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Storage Management

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1. Structure of I/O System :
Ex-1

I/O Devices :-
Input Device:- It is an electromechanical device which generates the data for system to read
Output Device :- It is electromechanical device that accepts data from a computer .
Input-only Devices :- Mouse, Keyboard, CD-ROM
Output-only Devices :- Printer , graphical display screen
Input/output Devices :- tape, writable CD , network

Device Controller :- A device controller is the hardware unit which is attached with the input/output bus of the computer and provides the hardware interface between the computer and the input/output devices. On one side it knows how to communicate with the input/output devices and on the other hand it knows how to communicate with the computer system through input/output bus .

DMA: DMA stands for Direct Memory Access , it used when the large volume of data is require to move than it is the efficient technique. The DMA function can be performed by a separate module on the system bus or it can be incorporated into the I/O module.
Buffering :-
It is convenient to perform the input transfers in advance of request being made and to perform output transfer sometimes later after the request has been made . This technique is known as buffering .

Two type of Input/Output devices :-
i. **Block-oriented devices :-** The I/O devices which store information in block, that are usually of fixed size and transfers are made one block at a time .Generally, the data is referenced by their block number. Disk and tapes are examples of block-oriented devices.
ii. **Stream oriented devices** :- These devices transfer data in and out as a stream of bytes. They have NO block structure .Printers , terminals ,mouse, communication ports and other pointing devices that are not secondary storage are stream-oriented.

Single Buffering :-
It is the simple type of buffering which is supported by the operating system. When a user process issues an input/output request, the OS assigns a buffer in the system that is a portion of main memory to the operation.
EX-2

For the stream oriented input/output device, the single buffering scheme can be used as a line-at-a-time function or a byte-at-a-time fashion .

Double Buffering :- An improvement over a single buffering can be made by assigning two system buffer to the input/output operations. A process new transfer data to (or from) one

buffer while the operating system empties (or fill) the other. This is known as double buffering or buffer swapping .
Ex- 3

For **blocking-oriented device** , we can roughly estimate the transfer time as maximum value of [C,T] where C is the computation time that arises between input request and T is the time required to input one block.
For **stream-oriented input** we again find the two alternative modes of operation. For line-at-a-time operation the user process need not to be suspended for input or output unless the process runs ahead of the double buffer. For byte-at-a-time operation; double buffer, offers no particular advantage over single buffer of two length.

Disk Performance Parameters :-
a. **Seek Time :** Time required to move the read/write head to an addressed track.
b. **Latency Time** :- Time required to bring the starting position of the addressed sector under read/write head.
c. **Access Time :-** sum of seek time and latency time ; the time it takes to get into position to read or write
d. **Data Transfer Time :-** The data transfer time to or from disk , depends on the rotation speed of the disk in the following fashion :
T = b/rN
Where ,
T= data transfer time
b= no. of bytes to be transferred
N = no. of bytes on a track
r = rotation speed in revolution per second.
Therefore , the total average access time can be expressed as :
$T_a = T_s + 1/2r + b/rN$
Where, T_a **= total average access time**
T_s **= estimated seek time**

The estimate seek time or average seek time is defined as :
$T_s = m*n + s$
Where ,
n = number of tracks traversed
m = a constant that depends on disk drive
s = start up time

Disk Scheduling Algorithm :-
1. **First Come First Serve : -** It is the simplest algorithm defined for disk scheduling .
2. Shortest seek time first :- It is responsible to serve all the requests close head position , before moving the head for away in service other requests
3. **SCAN Scheduling :-** It is some time called elevator algorithm as disk arm behaves like an elevator in the building . i.e. first serve the requests going up and then reversing to service requests the other way .
4. **Circular Scan(C-Scan) :-** It is the variant of SCAN moves the head from one end of the disk to the other, serving the requests along the way. When it reaches one end it immediately return back towards other end without serving any request on reverse trip.
5. Look and C-Look : The version of SCAN and C-SCAN scheduling because they look for the request before continuing to more in a given direction.

Previous Year Question :-
Disk head is at 53 ,
98,183,37,122,14,124,65,67

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