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UNIT – 4
Device Management

★ **Disk Scheduling :-**

The major responsibility of the operating system is to use the hardware in an efficient manner. For the disk drivers meeting this responsibility having a fast access time and disk bandwidth. We can improve both access time and bandwidth by scheduling the servicing of the disk input – output request in a good manner.

1. **First Come First Serve (FCFS) scheduling:**

FCFS is the simplest algorithm defined for disk scheduling. Program for this algorithm is easy to implement but it does not provide the fastest service for this consider following example –

Ques– Consider an order disk queue with request involving tracks 98, 183, 37, 122, 14, 124, 65 and 67. If the read / write head initially at track 53. What is the total distance that the disk move to satisfy all the pending request for FCFS.

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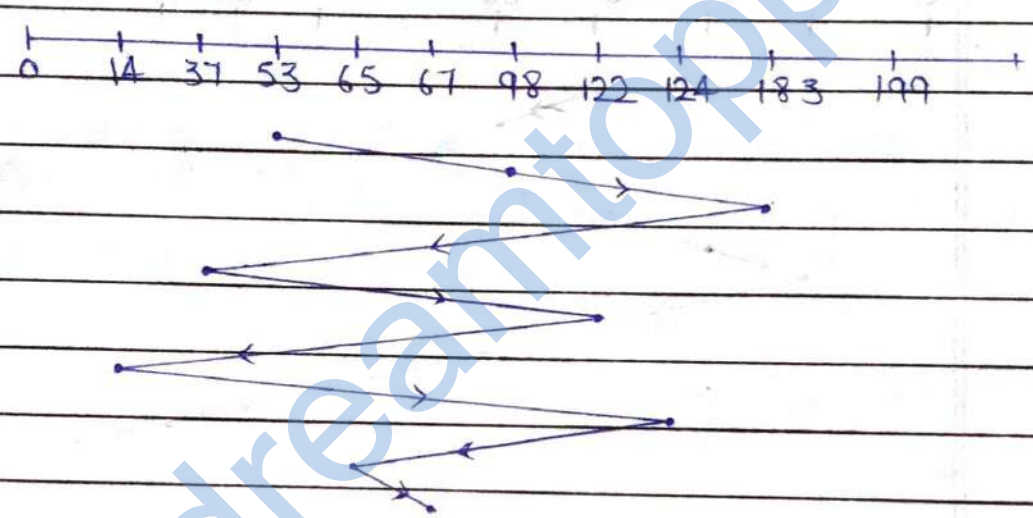
Sol:- Since the head is initially at track 53. We see that disk move from 53 to 98, then to 183, 37, 122, 14, 124, 65, 67.

Total head movement = 640 tracks

$|98-53| + |183-98| + |37-183| + |122-37| + |14-122| + |124-14| + |65-124| + |67-65|$

$= 45 + 85 + 146 + 85 + 108 + 110 + 59 + 2$

$= 640$ tracks



Queue :- 98, 183, 37, 122, 14, 124, 65, 67

Initial position of head - 53

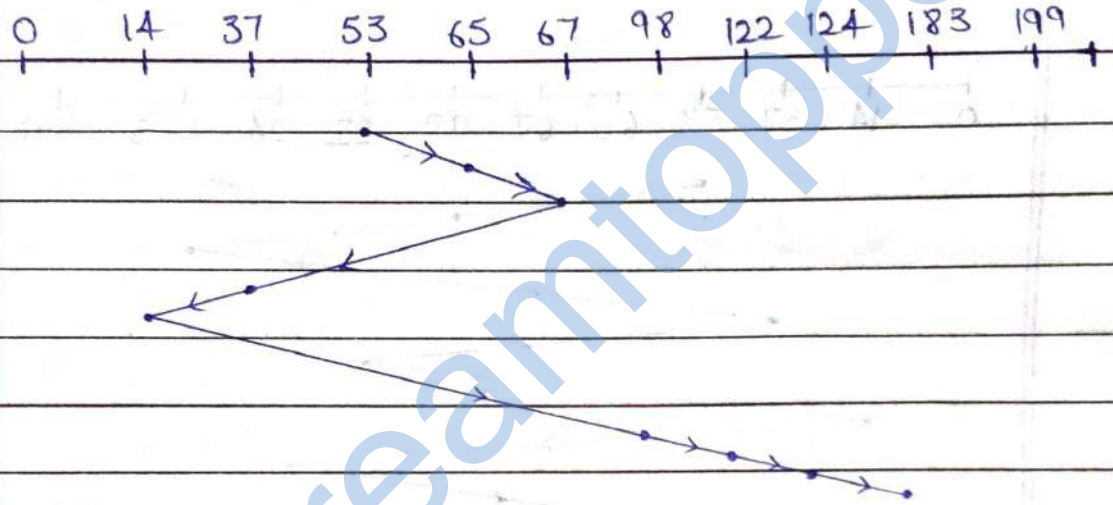
fig :- FCFS Scheduling

2- **Shortest-Seek-Time-First (SSTF) Scheduling:**

It is reasonable to service all the request close to the current head position before moving the head far away to service other request.

In our example the closest request to

the initial head position (53) is at track 65. Once we at 65 then next closest track is 67. Continuing in this manner as shown in figure below we finally reach at track 183. This algorithm result in total head movement of 236 track less than obtain in FCFS.



Queue = 98, 183, 37, 122, 14, 124, 65, 67
Initial position of head = 53

fig :- SSTF Scheduling

3- Scan - Scheduling :-

In this algorithm the disk arm starts at one end and move towards the other end servicing request as it reaches each track until it gets to other end of the disk. At the other end the direction of the head is reverse

and servicing continuous.
We can explain the scan algorithm as -
Before applying scan to schedule request on tracks 98, 183, 37, 122, 14, 124, 65 and 67.
The position of head is at 53.
The scan algorithm sometime called the elevator algorithm as the disk arm behave like an elevator in the building, first servicing all the request going up and then reversing to service request the other way.

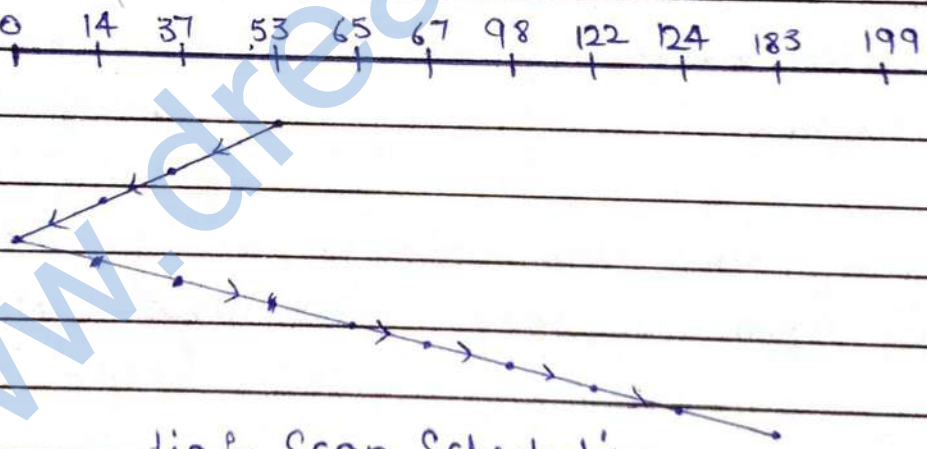


fig:- Scan Scheduling

4- **Circular Scan (C-Scan) Scheduling :-**
Circular scan scheduling is a variant of scan scheduling that provide more uniform waiting time like scan scheduling, circular scan move the head from one end of the disk to the other servicing

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request along the way:
Head Position = Large value

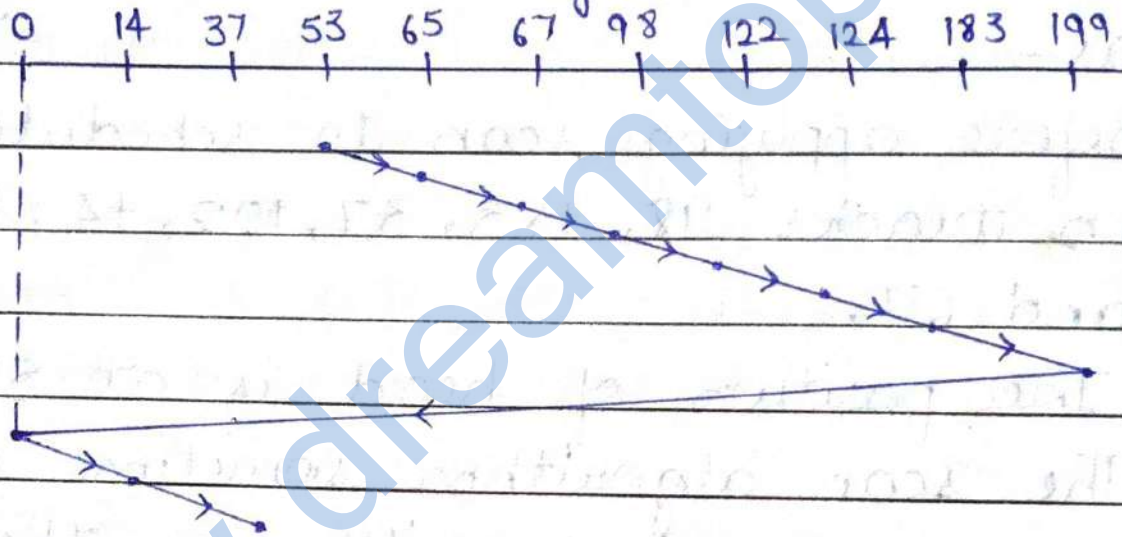

fig:- C-Scan Scheduling

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* **File-System Management :-** A file is a collection of related information, commonly files represent program and data. Data files may be numeric, alphabetic or alpha-numeric. In generated a file is a sequence of bits, bytes, lines or records.

A file is name and is referred by its name. It has certain other properties such as its type, the time of its creation.

Attributes of a file –

1. Name
2. Identifier
3. Type
4. Location
5. Size
6. Protection
7. Time, date and user identification

1. **Name –** The symbolic file name is the only information that is kept in human readable form.

2. **Identifier –** This is a unique tag that is represented by the number which identify the file within the file system.

3. **Type –** This is the information about the file which is required for the system having different type of files.

4- Location – This information is a pointer to a device and to the location of the file on that device.

5- Size – The current size of file (in bytes, word or block) and possibly the maximum allow size are included in this attribute.

6- Protection – Access control information determine who can perform various operations on file.

7- Time, date and user identification – This information may be kept for creation, last modification and last uses. These data can be useful for the protection and security.

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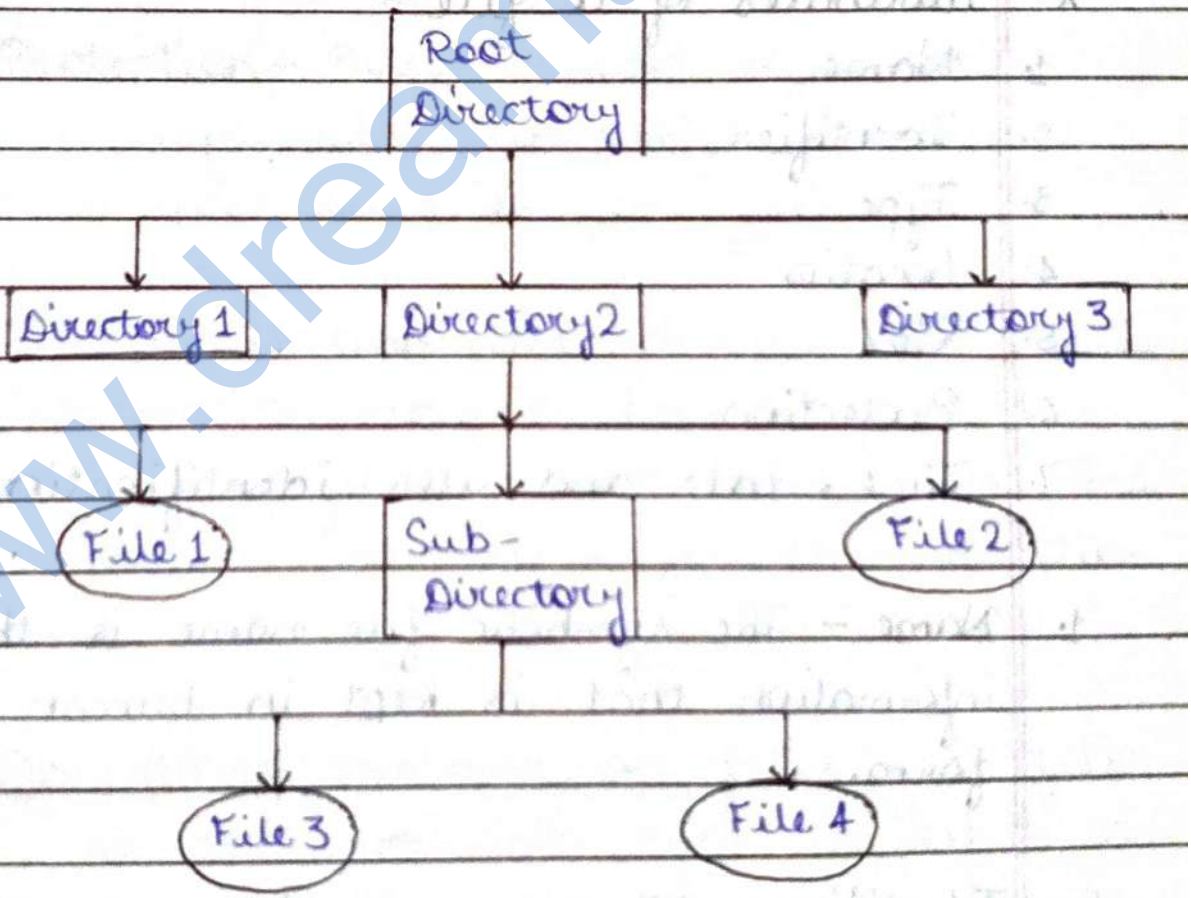
* Structure of file system management:
File management is one of the basic and important features of operating system. Operating system is used to manage files of computer system. All the files with different extension are managed by operating system.

The below figure shows the general hierarchy of the storage in an operating system:



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* **Operations perform on files** :- A file is an abstract data type, to define a file property we need to define various operations that can be perform on files. The OS provide various system calls to create, write, read, delete files.

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* **Single-level directory** – It is the simplest directory structure, All files are contain in the same directory which is easy to support and understand.

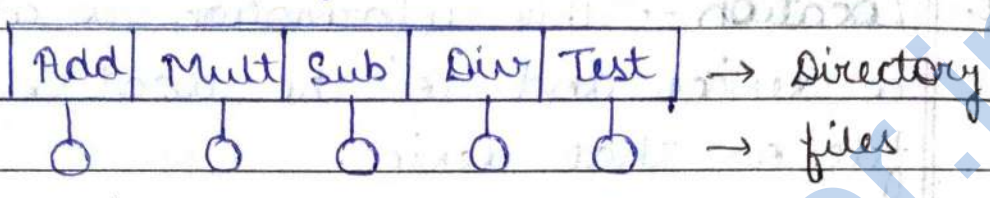

fig :- Single-level directory

A single level directory has certain limitations when the number of files increases or when the system has more than one user.
If two users call their data file then the unique name rule is violated.

* **Two-level directory** – The disadvantage of single-level directory is a confusion of file names between different users. The solution for this problem is to create directory for each-other.

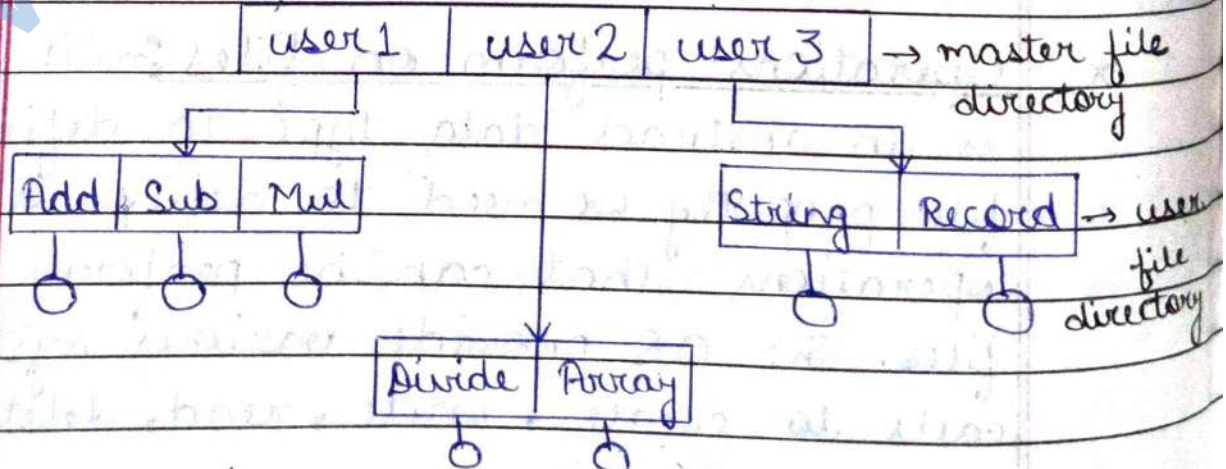

fig :- Two-level directory

In two-level directory structure each user has his own user file directory. Each user has similar structure but least only the files of a single user. When user login the system master file directory is search.

* **Access control verification :-**

Access control is a security technique that regulates who or what can view or use resources in a computing environment. It is a fundamental concept in security that minimizes risk to the business or organisation.

Access control system perform identification, authentication and authorization of users and entities by evaluating required login credentials that can include passwords, PINs, biometric scans.

These security control work by identifying an individual or entity, verifying that the person or application is who or what it claims to be, and authorizing the access level and set of actions associated with the username or IP address.

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- **Physical file system** – Physical files contain the actual data that is stored on the system and a description of how data is to be presented to or received from a program. They contain only one record format, and one or more members.
A physical file can have a keyed sequence access path. This means that data is presented to a program in a sequence based on one or more key fields in the file.

- **Logical file system** – Logical files do not contain data. They contain a description of records found in one or more physical files. A logical file is a view or representation of one or more physical files. Logical files that contain more than one format are referred to as multi-format logical files.