COSC 305
DATABASE SYSTEM I

LECTURE 3

BY

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TODAY'S CLASS

- STORAGE STRUCTURE
  - Classification of Physical Storage Medium
  - Storage Devices
  - Storage Access and Buffer Management
  - Storage Hierarchy

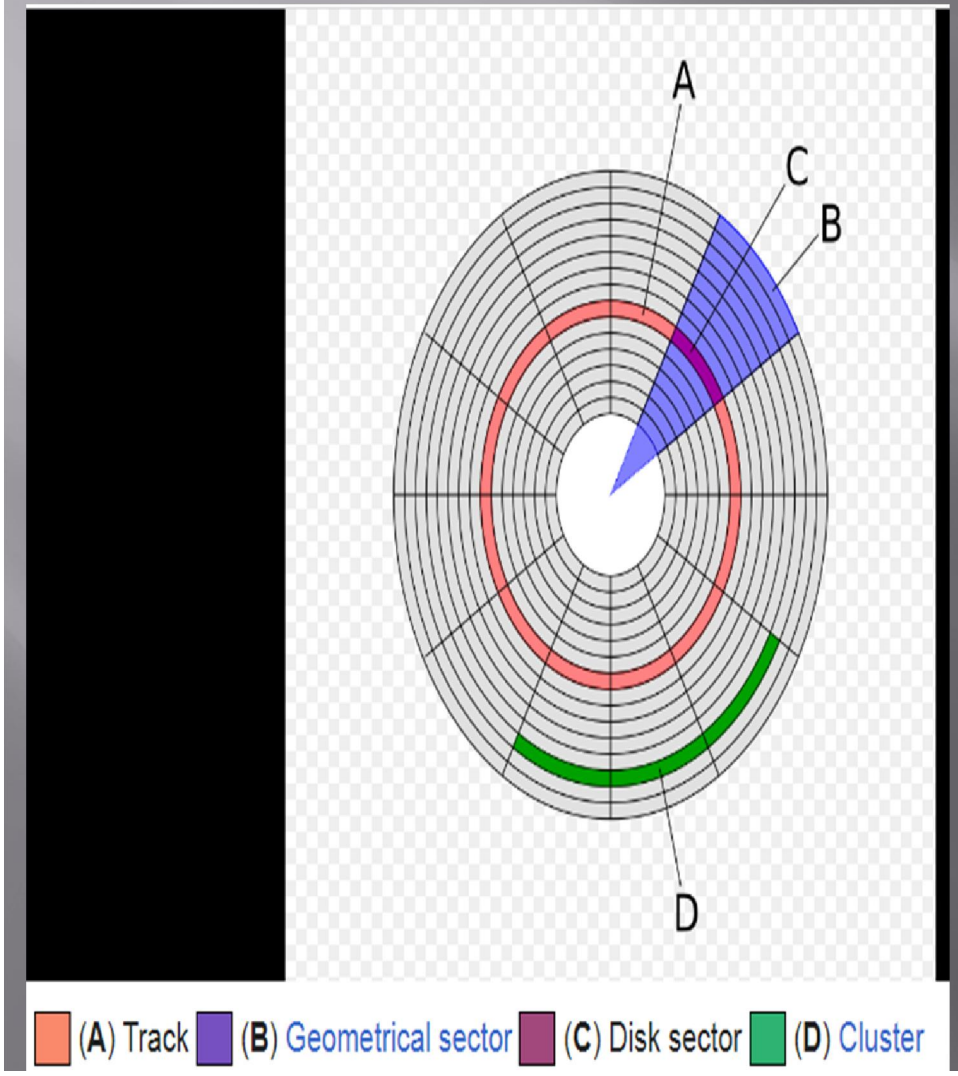
- File Organization Techniques
  - Sequential
  - Heap
  - Hash
  - Clustered
  - B+

CLASSIFICATION OF STORAGE

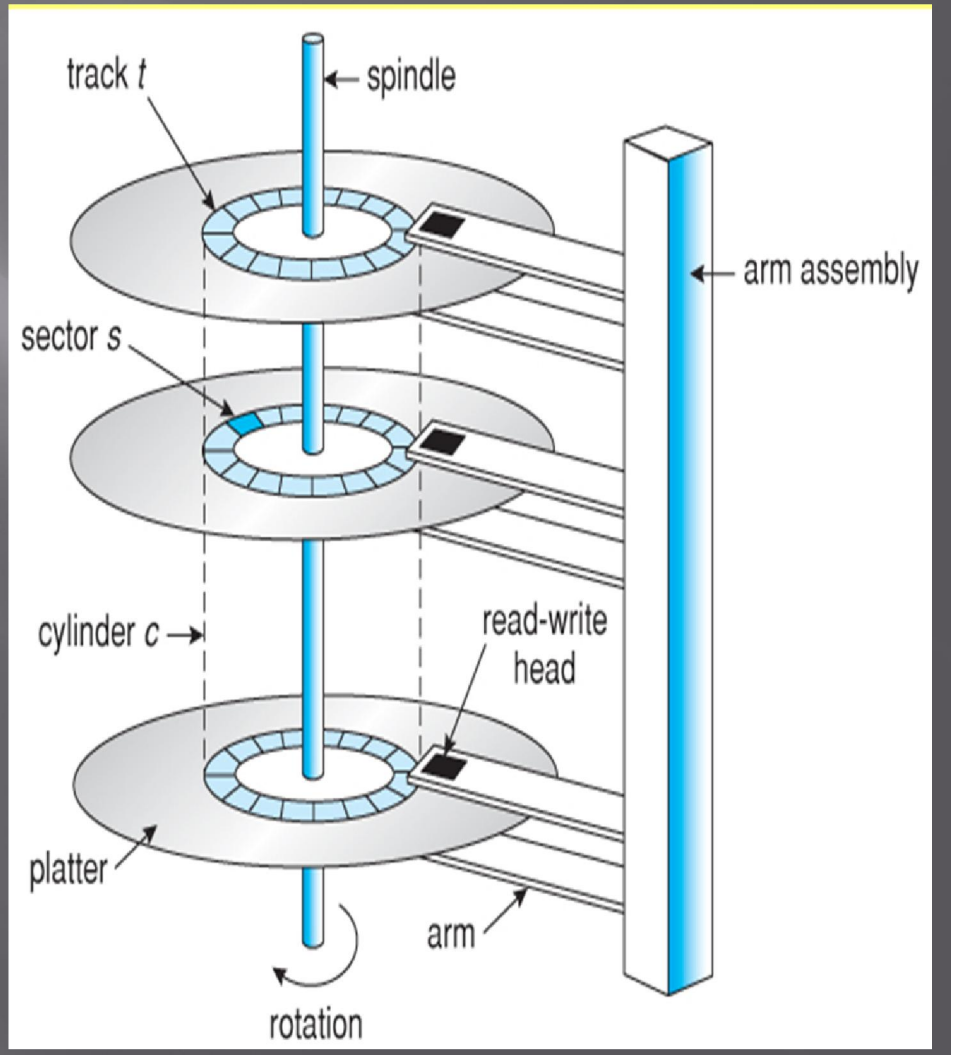
- Classification is based on the following criteria
  - Speed & Cost per unit data
    - Registers
    - Cache
    - Main Memory (RAM)
    - Magnetic Disk
    - Optical Disk
    - Magnetic Tapes
  - Reliability
    - Volatile
    - Non Volatile

STORAGE STRUCTURE

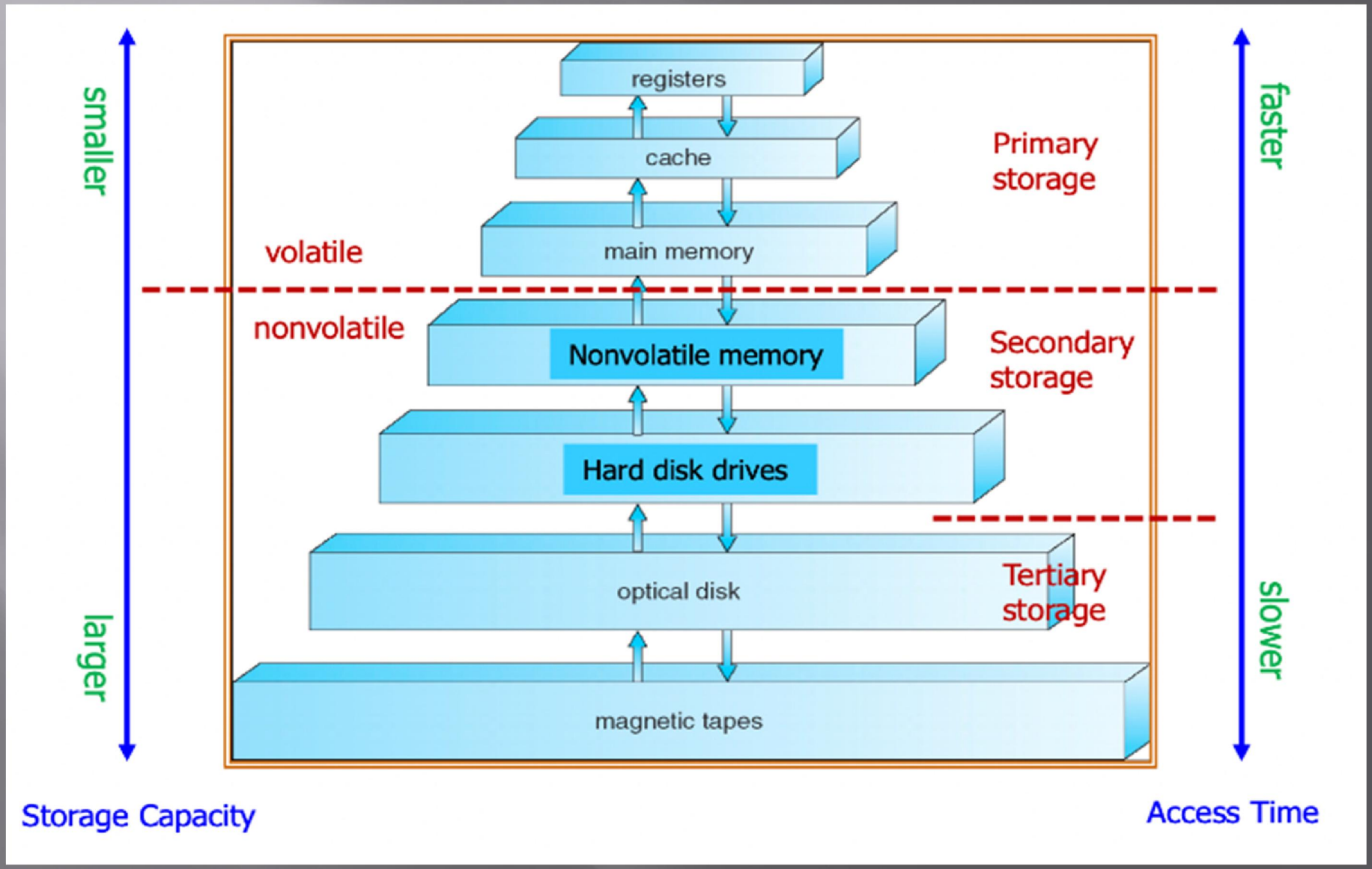
DISK STRUCTURE



MAGNETIC DISK



STORAGE HIERARCHY



DISK MECHANISMS

- Access Time
  - Time it takes from when a read or write request is issued to when the data transfer begins.
- Data Transfer Rate
  - The rate at which data can be retrieved from or stored to the disk.
- Mean Time to Faliure(MTTF)
  - the average time the disk is expected to run continuously without any failure.

STORAGE ACCESS AND BUFFER MANAGEMENT

- Block
  - A contiguous sequence of sectors from a single track
  - Data is transferred between main memory and disk using blocks
- File Organization
  - Optimize block access time by organizing the blocks to correspond to how data will be accessed .
  - Non-volatile buffers speed up disk writes by immediately writing blocks to a non-volatile RAM buffer
  - controller then writes to disk whenever the disk has no other requests.

STORAGE ACCESS AND BUFFER MANAGEMENT

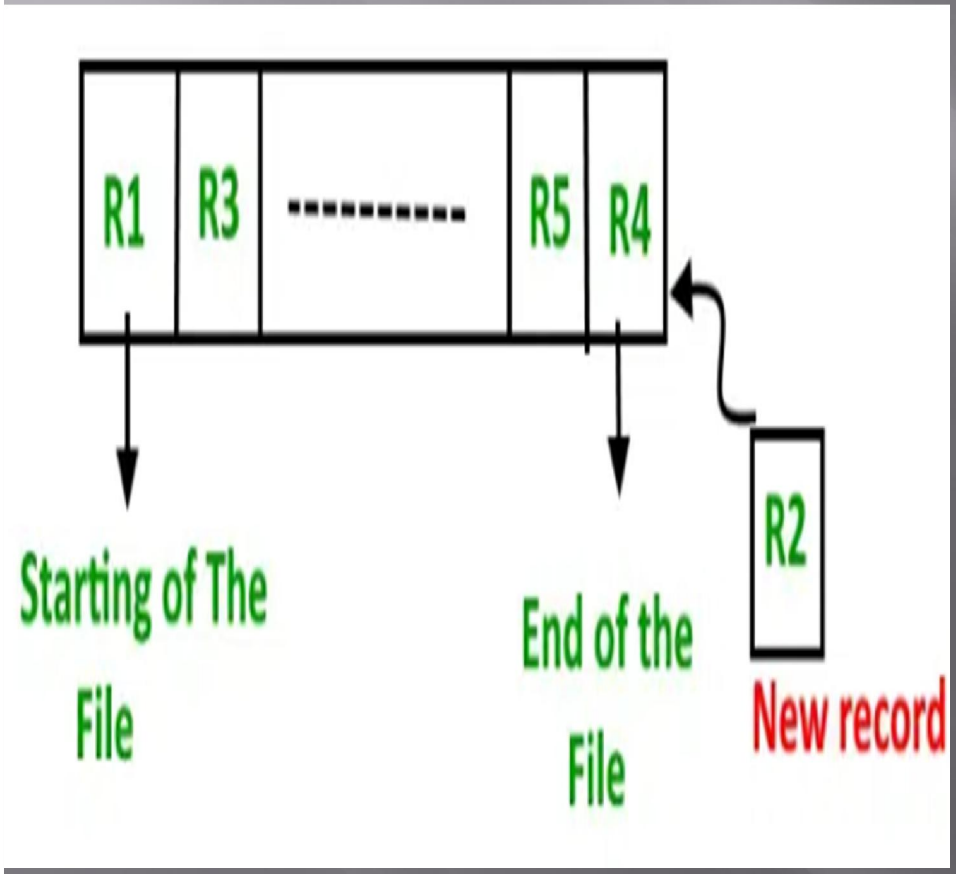
- Storage Access
  - A database file is partitioned into fixed-length storage units called *blocks* (or *pages*).
  - Database system seeks to minimize the number of block transfers between disk and main memory.
  - Transfer can be reduced by keeping as many blocks as possible in main memory.
- Buffer Pool
  - Portion of main memory available to store copies of disk blocks

STORAGE ACCESS AND BUFFER MANAGEMENT

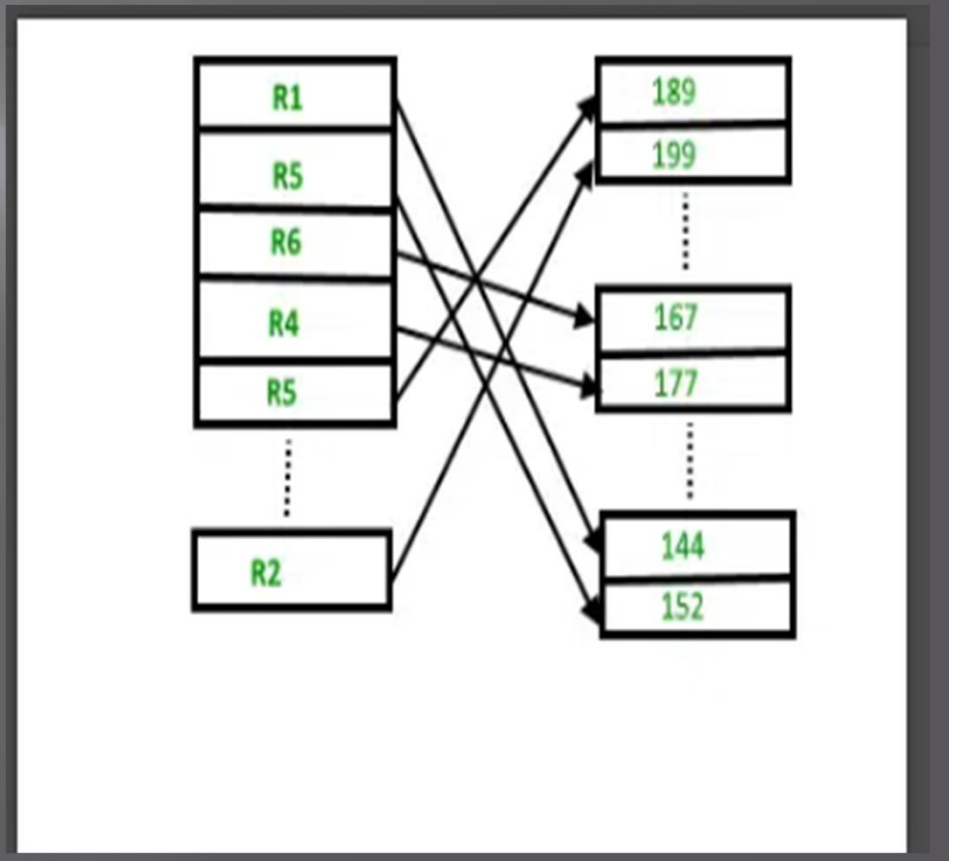
- Buffer Manager
  - System component responsible for allocating and managing buffer space in main memory

FILE ORGANIZATION TECHNIQUES

SEQUENTIAL

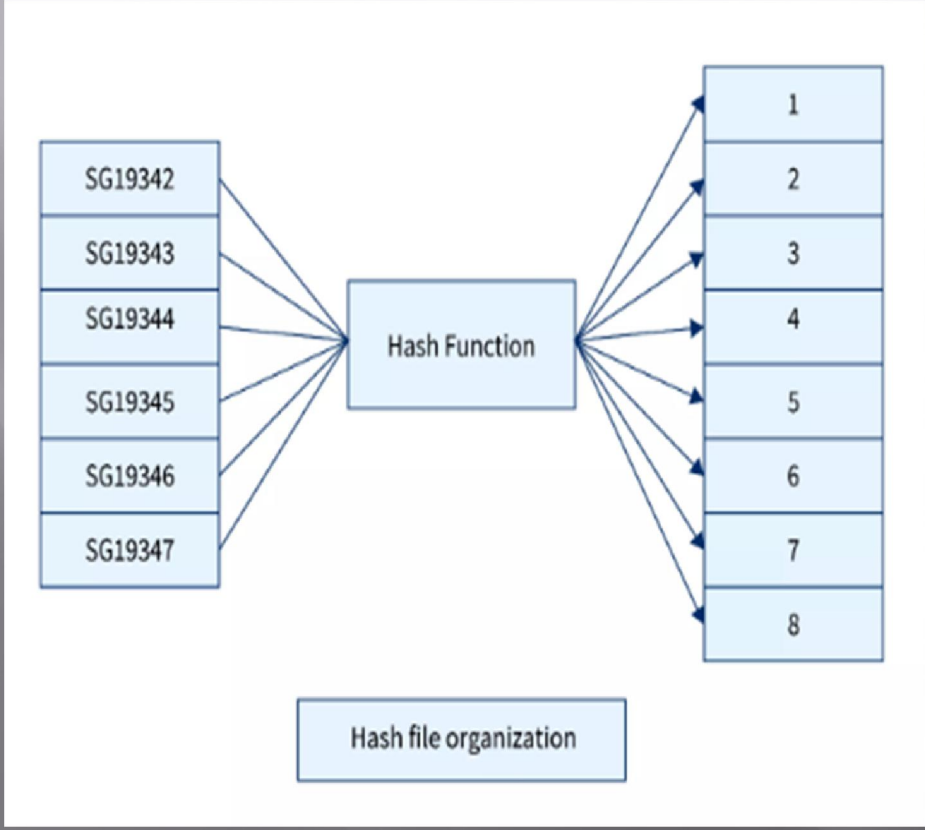


HEAP

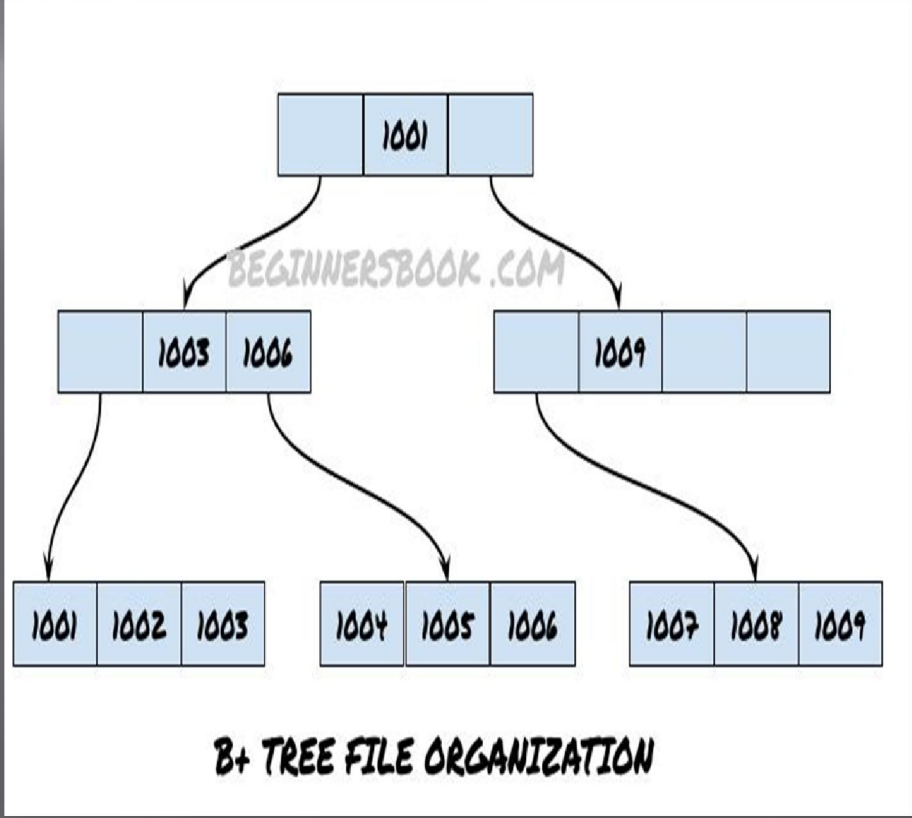


FILE ORGANIZATION TECHNIQUES

HASH



B+



FILE ORGANIZATION TECHNIQUES

EMPLOYEE TABLE

EMP_ID	EMP_NAME	EMP_ADD	EMP_DEP
1001	STEVE	ADDR1	D01
1002	JOHN	ADDR2	D02
1003	AJITH	ADDR2	D02
1004	RAM	ADDR4	D03
1005	CHAITANYA	ADDR1	D01

DEPARTMENT TABLE

EMP_DEP	DEPT_NAME
D01	SALES
D02	MARKETING
D03	HR

CLUSTER KEY

CLUSTER

EMP_DEP	DEPT_NAME	EMP_ID	EMP_NAME	EMP_ADD
D01	SALES	1001	STEVE	ADDR1
D01	SALES	1005	CHAITANYA	ADDR1
D02	MARKETING	1002	JOHN	ADDR2
D02	MARKETING	1003	AJITH	ADDR2
D03	HR	1004	RAM	ADDR4