



SNS COLLEGE OF TECHNOLOGY, COIMBATORE-35

(AN AUTONOMOUS INSTITUTION)



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

19CST202-DATABASE MANAGEMENT SYSTEM

UNIT-V

PHYSICAL STORAGE AND MONGODB

Topic: Indexes

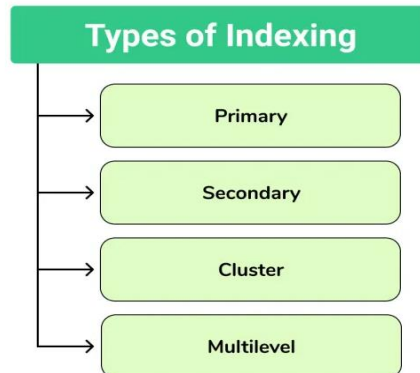
Indexes:

- An index takes a search key as input.
- Efficiently returns a collection of matching records.
- An Index is a small table having only two columns.
- The first column comprises a copy of the primary or candidate key of a table.
- The second column contains a set of pointers for holding the address of the disk block where that specific key-value is stored.

There are mainly 4 types of indexing methods

- Primary Indexing
- Secondary Indexing
- Cluster Indexing
- Multilevel Indexing

Types of Indexing

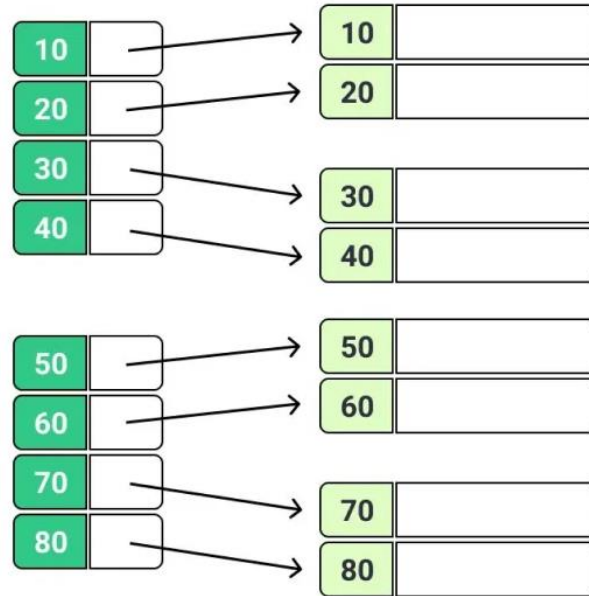


Primary Indexing

- Primary Index is an ordered file which has fixed length size with two fields.
- The first field is the same as a primary key and second field is pointed to that specific data block.
- In the primary index, there is always one to one relationship between the entries in the index table.
- Primary Indexing is further divided into two types.
 - Dense Index
 - Sparse Index

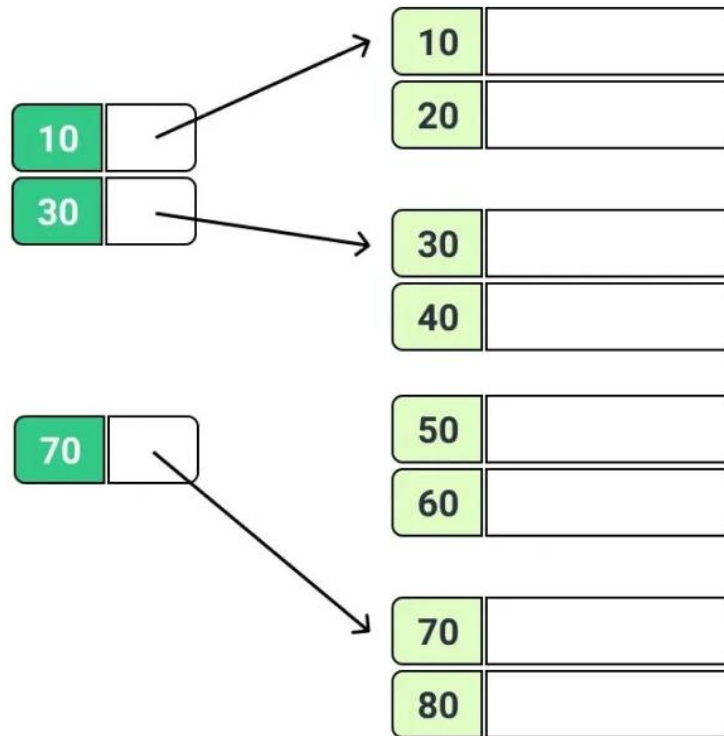
Dense Index

- In a dense index, a record is created for every search key valued in the database.
- Dense indexing helps you to search faster but needs more space to store index records.
- In dense indexing, records contain search key value and points to the real record on the disk



Sparse Index

- The sparse index is an index record that appears for only some of the values in the file.
- Sparse Index helps you to resolve the issues of dense indexing.
- In sparse indexing technique, a range of index columns stores the same data block address, and when data needs to be retrieved, this block address will be fetched.
- Sparse indexing method stores index records for only some search key values.
- It needs less space, less maintenance overhead for insertion, and deletions but it is slower compared to the dense index for locating records.

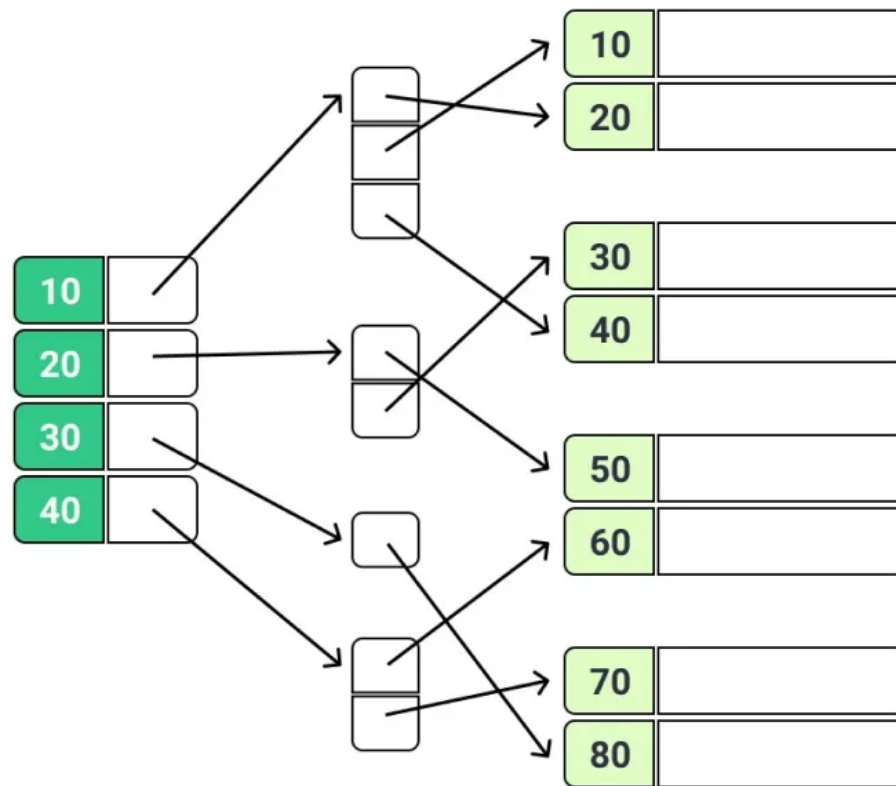


Secondary Indexing

- The secondary index can be generated by a field which has a unique value for each record.
- It is also known as a non-clustering index.
- This two-level database indexing technique is used to reduce the mapping size of the first level.
- For the first level, a large range of numbers is selected, because of this mapping size always remains small.

Example

- In a bank account database, data is stored sequentially by Account_No, we may want to find all accounts in of a specific branch of some bank.
- In this case, we can have a secondary index for every search key.
- Index record is a record pointing to a bucket that contains pointers to all the records with their specific search key value.



Cluster Indexing:

- In a clustered index, records themselves are stored in the index and not pointers.
- Sometimes the index is created on non-primary key columns which might not be unique for each record. In such a situation, you can group two or more columns to get the unique values and create an index which is called clustered Index.
- This also helps you to identify the record faster.

Example

- Consider a company recruited many employees in various departments. In this case, clustering index should be created for all employees who belong to the same dept.
- In a single cluster it is considered that an index points to the cluster as a whole.

Multilevel Indexing

- Multilevel Indexing is created when a primary index does not fit in memory.
- In this type of indexing method, you can reduce the number of disk accesses to short any record and kept on a disk as a sequential file and create a sparse base on that file.

