MySQL - RDBMS

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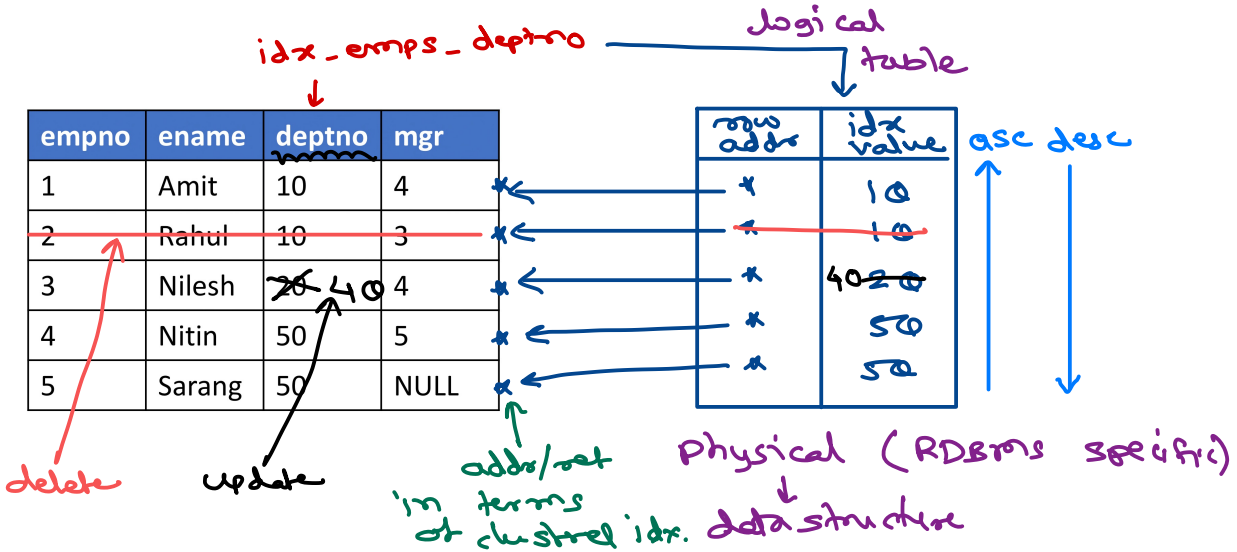
Index

- Index enable faster searching in tables by indexed columns.
  - CREATE INDEX idx_name ON table(column);
- One table can have multiple indexes on different columns/order.
- Typically indexes are stored as some data structure (like BTREE or HASH) on disk.
- Indexes are updated during DML operations. So DML operation are slower on indexed tables.



Index

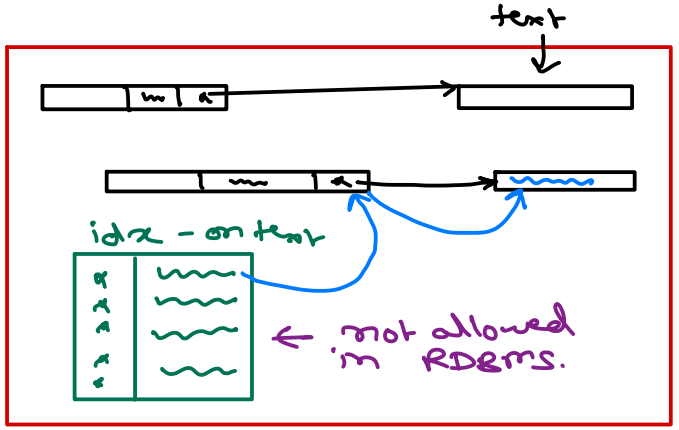
- Index can be ASC or DESC.
  - It cause storage of key values in respective order (MySQL 8.x onwards).
  - ASC/DESC index is used by optimizer on ORDER BY queries.
- There are four types of indexes:
  - Simple index
    - CREATE INDEX idx_name ON table(column [ASC|DESC]);
  - Unique index
    - CREATE UNIQUE INDEX idx_name ON table(column [ASC|DESC]);
    - Doesn't allow duplicate values.
  - Composite index
    - CREATE INDEX idx_name ON table(column1 [ASC|DESC], column2 [ASC|DESC]);
    - Composite index can also be unique. Do not allow duplicate combination of columns.
  - Clustered index
    - PRIMARY index automatically created on Primary key for row lookup.
    - If primary key is not available, hidden index is created on synthetic column.
    - It is maintained in tabular form and its reference is used in other indexes.

hidden column added by RDBMS

Index

- Indexes should be created on shorter (INT, CHAR, …) columns to save disk space.
- Few RDBMS do not allow indexes on external columns i.e. TEXT, BLOB.
- MySQL support indexing on TEXT/BLOB up to n characters.
  - CREATE TABLE test (blob_col BLOB, …, INDEX(blob_col(10)));
- To list all indexes on table:
  - SHOW INDEXES ~~ON~~ FROM table;
- To drop an index:
  - DROP INDEX idx_name ON table;

index on first 10 bytes. i.e. only first 10 bytes used for searching with indexes.

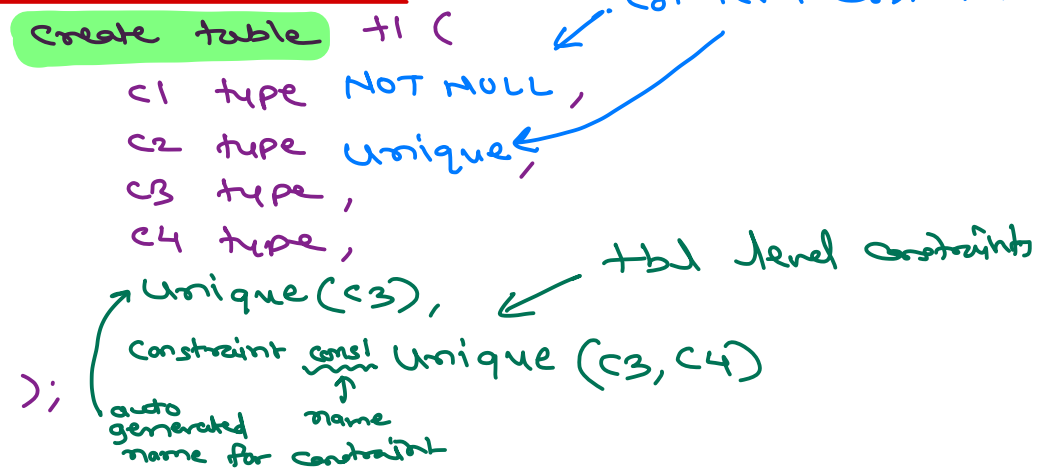


- When table is dropped, all indexes are automatically dropped.
- Indexes should not be created on the columns not used frequent search, ordering or grouping operations.
- Columns in join operation should be indexed for better performance.

emp(deptno) → ON e.deptno = d.deptno dept(deptno)

Constraints

- Constraints are restrictions imposed on columns.
- There are five constraints
  - NOT NULL → col level
  - UNIQUE → col or tbl level
  - PRIMARY KEY → col or tbl level
  - FOREIGN KEY → col or tbl level
  - CHECK → col or tbl level



- Few constraints can be applied at either column level or table level. Few constraints can be applied on both.
- Optionally constraint names can be mentioned while creating the constraint. If not given, it is auto-generated.
- Each DML operation check the constraints before manipulating the values. If any constraint is violated, error is raised.

Constraints

- NOT NULL
  - NULL values are not allowed.
  - Can be applied at column level only.
  - CREATE TABLE table(c1 TYPE NOT NULL, …);
- UNIQUE
  - Duplicate values are not allowed.
  - NULL values are allowed.
  - Not applicable for TEXT and BLOB.
  - UNIQUE can be applied on one or more columns.
  - Internally creates unique index on the column (fast searching).
  - Can be applied at column level or table level.
    - CREATE TABLE table(c1 TYPE UNIQUE, …);
    - CREATE TABLE table(c1 TYPE, …, UNIQUE(c1));
    - CREATE TABLE table(c1 TYPE, …, CONSTRAINT constraint_name UNIQUE(c1));

```
create table students (
    std INT not null,
    roll INT not null,
    name CHAR(20),
    unique (std, roll)
);
```

internally create unique composite index.

Thank you!

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