1. Indexing
   1. An index is a data structure associated with a table or view that speeds up the retrieval of rows from the table based on the values in one or more columns.
   2. B tree and B+ tree data structure
   3. Indexes are used to find values within a specific column more quickly
   4. SQL normally searches sequentially through a column
   5. The longer the column, the more expensive the operation is
   6. Update takes more time, SELECT takes less time
   7. In case multiple column index, it flow a sequence example: lastName, firstName -> lastName , lastName +. firstName, not work with firstName only.
2. *Usage of Indexes in SQL*
   1. **Faster Data Retrieval:**
      1. The primary purpose of indexes is to accelerate data retrieval operations, especially SELECT queries. By providing a shortcut to the desired rows, indexes significantly reduce the time it takes to locate and retrieve data.
   2. **Optimizing Joins:**
      1. When joining tables, indexes on the columns involved in the join conditions can dramatically enhance performance. They allow SQL to quickly identify matching rows, minimizing the need for full-table scans.
   3. **Sorting and Grouping:**
      1. Indexes are beneficial when sorting or grouping data. They can speed up the execution of ORDER BY and GROUP BY clauses, as SQL can utilize the index to efficiently retrieve and organize the required data.
   4. **Constraint Enforcement:**
      1. Unique indexes play a vital role in enforcing data integrity by preventing the insertion of duplicate values in the indexed columns. Primary keys are implemented using unique indexes, ensuring each row has a unique identifier.
   5. **Covering Queries:**
      1. Covering indexes are valuable for queries that can be satisfied entirely by scanning the index. This reduces the need to access the actual data rows, resulting in faster query execution.
3. Show Index

SHOW INDEXES FROM table\_name;

1. Create Index

CREATE INDEX index\_name  
ON table\_name (column1, column2, ...);

1. Create Unique Index

CREATE UNIQUE INDEX index\_name  
ON table\_name (column1, column2, ...);

1. Delete Index

ALTER TABLE table\_name

DROP INDEX index\_name;

