Database Testing

Pollab Ahmed

QA Engineer

Cantaloupe, Inc.

Content

- Database testing, it's types & process
- SQL And it's queries
- Interview questions

What is Database Testing?

- Database Testing is a type of software testing that checks the schema, tables, triggers, etc. of the Database under test. It also checks data integrity and consistency. It may involve creating complex queries to load/stress test the Database and check its responsiveness.

Why Database Testing is important?

- It ensures data values and information received and stored into database are valid or not.
- It helps to save data loss, saves aborted transaction data and no unauthorized access to the information.

Database Types

Based on the function and structure of a database, databases can generally be categorized into three main types:

- Relational Database: Relational databases organize data into tables that are related to each other through common fields. They use Structured Query Language (SQL) for querying and managing the data. Example: MySQL, PostgreSQL, Oracle, SQL Server, SQLite etc.
- NoSQL Database: NoSQL (Not Only SQL) databases are designed to handle various types of unstructured, semi-structured, or structured data. They offer more flexibility and scalability compared to relational databases and are suitable for handling large volumes of data. For example: MongoDB, Firebase, DynamoDB etc.
- NewSQL Database: NewSQL databases aim to combine the benefits of traditional SQL databases with the scalability and performance advantages of NoSQL databases. For example: CockroachDB, and NuoDB

Database Testing Techniques

Based on the function and structure of a database, DB testing can be categorized into three categories −

- Structural Testing
- Functional Testing
- Non-functional Testing

Structural Testing

- Structural database testing involves verifying those components of database, which are not exposed to end users. It deals with table and column testing, schema testing, stored procedures and views testing, checking triggers, etc.
- Schema/Mapping Testing
- Stored Procedures and View Testing
- Trigger Testing
- Tables and Column Testing
- Database Server Check

Functional Testing

- Functional testing is performed keeping in mind an end-user point of view; whether the required transactions and operations run by the end-users meet the business specifications.
- Black-box Testing
- White-box Testing

Non-functional Testing

- Nonfunctional testing involves performing load testing, stress testing, checking minimum system requirements to meet business specification, risk finding and performance optimization of database.
- Load Testing
- Stress Testing
- Security Testing

Database Testing – Processes

- The process to perform database testing is like testing of other applications.

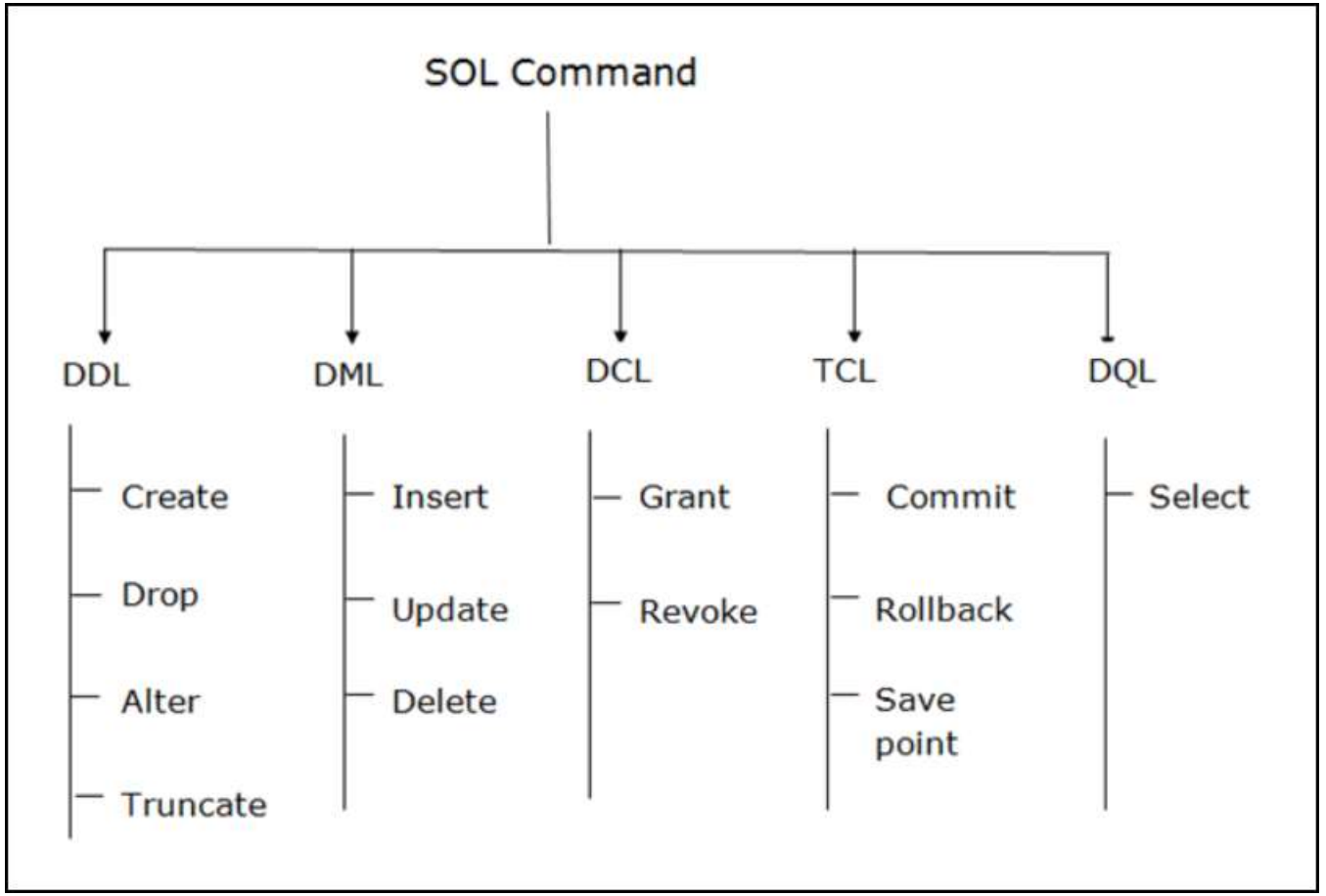
DB testing can be described with the key processes given below,

- Set up the environment
- Run a test
- Check the test result
- Validate according to the expected results
- Report the findings to the respective stakeholders
- Various SQL statements are used to develop the Test cases. The most common SQL statement, which is used to perform DB testing, is the Select statement. Apart from this, various DDL, DML, DCL statements can also be used.
- Example − Create, Insert, Select, Update, etc.

What is SQL?

- Structured Query Language(SQL) as we all know is the database language using which we can perform certain operations on the existing database and, we can use this language to create a database. SQL uses certain commands like Create, Drop, Insert, etc. to carry out the required tasks.

Categories of SQL Commands



Key in SQL

- A key represents a value in SQL which helps in identifying records uniquely. Through key, we can identify duplicate information and establish relationship between multiple tables.
- Primary key
- Foreign Key
- Composite key
- Candidate key

Primary key

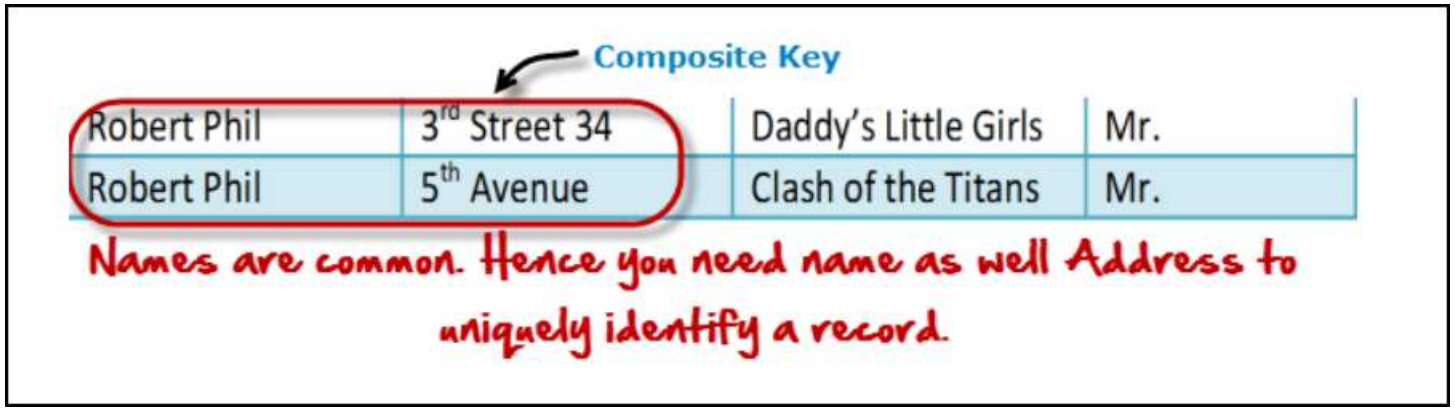
- A primary key is a single column value used to identify a database record uniquely.
- A primary key cannot be NULL
- A primary key value must be unique
- The primary key values should rarely be changed
- The primary key must be given a value when a new record is inserted.

Foreign Key

- Foreign Key references the primary key of another Table! It helps in connecting another Tables.
- A foreign key can have a different name from its primary key
- It ensures rows in one table have corresponding rows in another
- Unlike the Primary key, they do not have to be unique. Most often they aren't
- Foreign keys can be null even though primary keys can not

Composite key

- A composite key is a primary key composed of multiple columns used to identify a record uniquely.
- In our database, we have two people with the same name Robert Phil, but they live in different places.



Candidate key

- In a table, the columns which can be defined as a primary key, are individually a candidate key.

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Natan	mno@yahoo.com

SQL QUERY

Like

- a% - at the beginning
- %a – at the end
- a__% - must have 2 letters after a at the beginning
- %__a – must have 2 letters before the end

Regular Expression

- ^ - beginning of a string
- $ - end of a string
- | - logical or
- . – to skip a letter
- [ampd] - single specific character after or before
- [a-z] - single any character after or before

- LIKE does very simple wildcard matches, and REGEX is capable of very complicated wildcard matches

Order by

- USE sql_store;
- SELECT * FROM customers ORDER BY state;
- SELECT * FROM customers ORDER BY state, first_name;
- SELECT * FROM customers ORDER BY state ASC;
- SELECT * FROM customers ORDER BY state DESC;
- SELECT * FROM customers ORDER BY state DESC/ASC, first_name DESC/ASC;

- Order by clause will execute after where clause

Group by

- The GROUP BY statement groups rows that have the same values into summary rows, like "find the number of customers in each country".
- The GROUP BY statement is often used with aggregate functions (COUNT(), MAX(), MIN(), SUM(), AVG()) to group the result-set by one or more columns.

Aggregate Functions

- COUNT(), MAX(), MIN(), SUM(), AVG()
- The HAVING clause was added to SQL because the WHERE keyword cannot be used with aggregate functions.

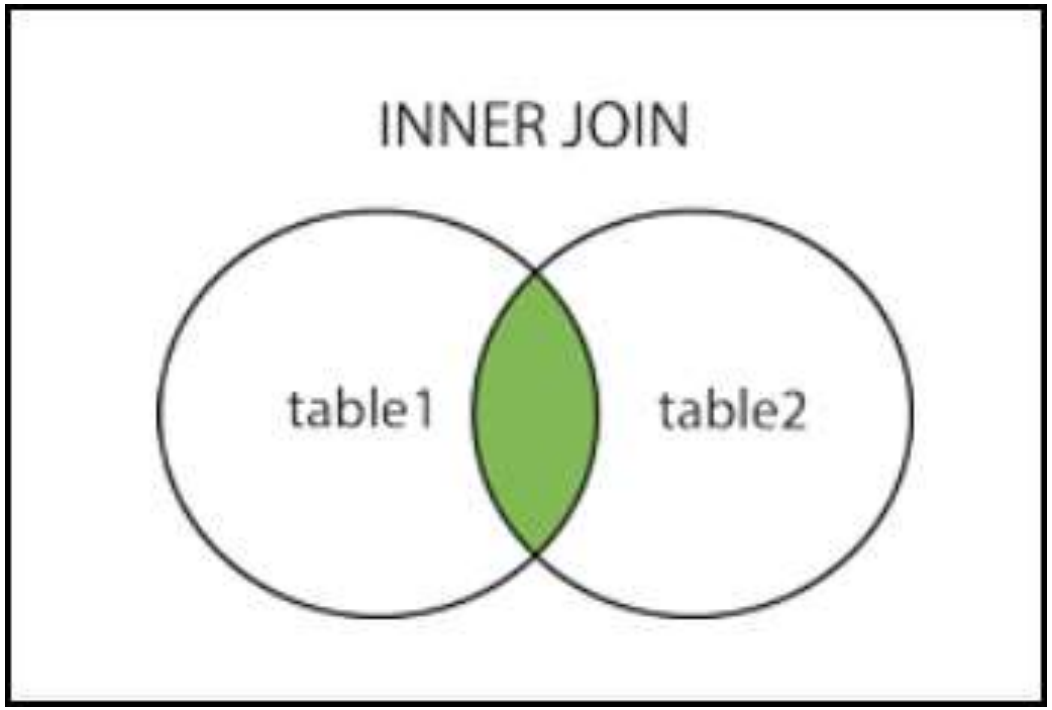
Case

```
SELECT  product_name, product_price,

CASE

        WHEN product_price<=20 THEN 'Product price is in peoples
capability.'

        WHEN product_price>=30 THEN 'Product price is a bit high.'

        ELSE 'Product price is out of the peoples capability.'

END AS price_measurement FROM products;
```

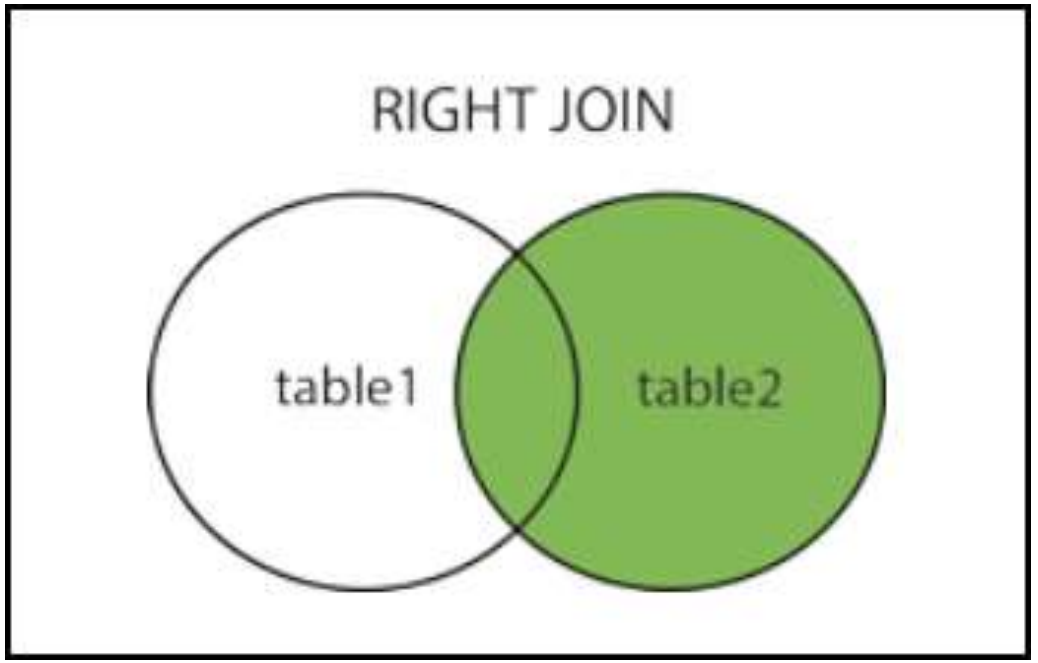
Join

- Inner join
- Left join
- Right join

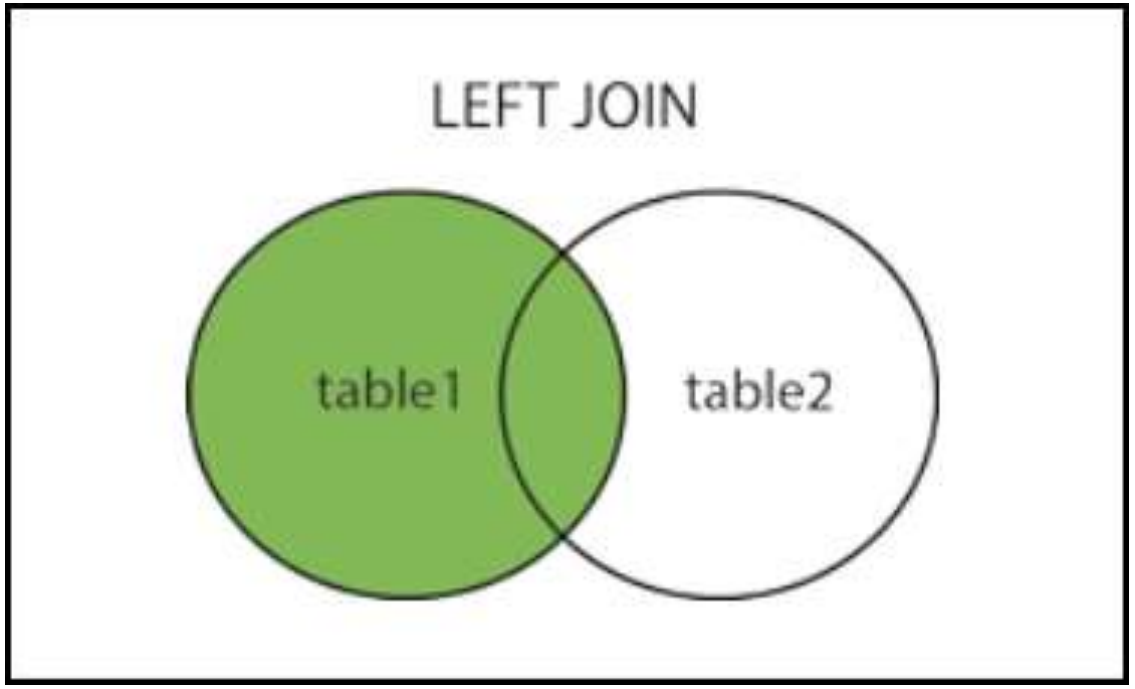
Inner Join/Join



Right Join



Left Join



Normalization

- Normalization is a way of organizing the data in the database. It divides a table into multiple tables to reduce data redundancy and dependency.
- It helps developers to integrate entity relationship model thus CRUD operation can be done easily.
- Normalization need to be done at the early stage of database construction. Otherwise, the whole database will be reconstructed at the later stage.

Interview Questions

- What is Cascade in SQL?
- Differentiate between delete, truncate and drop.
- Difference between DBMS and RDBMS.
- What do you understand by data redundancy and data inconsistency?
- What are the various types of relationship in database?
- What is stored procedure?
- Do you know the aggregate functions of database?
- Explain, Inner, Left, Right join.
- Find the 2nd highest product price.

Any Questions?