

Functional Testing : (Front End (UI) + Backend Testing (Database Testing))

- Behavior coverage
- Input domain coverage
- Error handling coverage
- Service level coverage
- Calculation based Coverage
- **Backend Coverage(Database coverage/Database Testing)**

Backend coverage testing / database testing

- Validating all **front end operations** are stored in database
 - Front end operation or **data entered in the front end is stored in the database** or backend
 - As a tester, we check or validate, whenever data has been entered in the front end that data has been stored in the database or not (**validating front end with backend**)
 - We check or validate data can be **fetched or not**
 - So, we simply fire the **SQL queries** & we get response in the form of table (rows & column), where we check whether **data is stored or not**
- Or
- SQL query is used to **fetch data or to check stored data**

Web Based application:

Ex.1: Sign Up Form: (First Name, Last Name, Email, Mob, & Address): If we have to check on UI == to check if signup is success. We can check for success message.

Customers_Sign_up table:

- Validate Existence of the values in the database table
- Validate Correctness of the values in the database table
- Validate Completeness of the values in a database table

Database Systems:

Database: Storage Location: Collection of related data.

- **Structured Data-** IRCTC, Facebook, Flipkart, Amazon, MSEB Board, MPSC
- **Unstructured Data-** Random Data—Social Media Post- Data can not be stored in db in the form of Database.

Database Management Systems (DBMS):

- To perform any operations on the data we need the database management systems
- SQL Server, MySQL, Oracle, DB2, MongoDB

When we deal with structured data we use **RDBMS**.

SQL

1. **SQL** (*Structured Query Language*) is **used** to **perform operations** on the **records stored** in the **database** such as **updating** records, **deleting** records, **creating** and **modifying tables**, views, etc.
2. SQL is just a **query language**; it is **not a database**. To **perform** SQL queries, you **need** to **install** any **database**, for example, Oracle, MySQL, MongoDB, PostgreSQL, SQL Server, DB2, etc.

What is SQL?

1. SQL stands for **Structured Query Language**.
 2. It is **designed** for **managing data** in a relational database management system (**RDBMS**).
 3. It is pronounced as S-Q-L or sometime **See-Qwell**.
 4. SQL is a database language, it is **used** for database creation, deletion, fetching rows, and modifying rows, etc.
- All **DBMS** like MySQL, Oracle, MS Access, Sybase, Informix, PostgreSQL, and SQL Server use SQL as **standard** database language.

Why SQL is required?

SQL is required:

1. To **create** new databases, tables and views
2. To **insert** records in a database
3. To **update** records in a database
4. To **delete** records from a database
5. To **retrieve** data from a database

What SQL does?

- With SQL, we can query our database in several ways, using English-like statements.
- With SQL, a user can access data from a relational database management system.
- It allows the user to describe the data.
- It allows the user to define the data in the database and manipulate it when needed.
- It allows the user to create and drop database and table.
- It allows the user to create a view, stored procedure, function in a database.
- It allows the user to set permission on tables, procedures, and views.

SQL Syntax

SQL **follows** some **unique** set of **rules** and **guidelines** called **syntax**. Here, we are providing all the basic SQL syntax.

- **SQL** is **not** case sensitive. Generally SQL **keywords** are **written** in **uppercase**.
- SQL statements are **dependent** on text lines. We can place a single SQL statement on one or multiple text lines.
- You can perform most of the **action** in a database **with** SQL statements.

SQL statement

SQL statements are **started** with any of the SQL **commands/keywords** like SELECT, INSERT, UPDATE, DELETE, ALTER, DROP etc. and the **statement ends with a semicolon (;)**.

Example of SQL statement:

1. **SELECT** *"column_name"* **FROM** *"table_name"*;

Why semicolon is used after SQL statements:

Semicolon is **used** to **separate** SQL statements. It is a **standard way** to **separate** SQL statements in a **database system** in which more than one SQL statements are used in the same call.

SQL Commands

These are the some important SQL command:

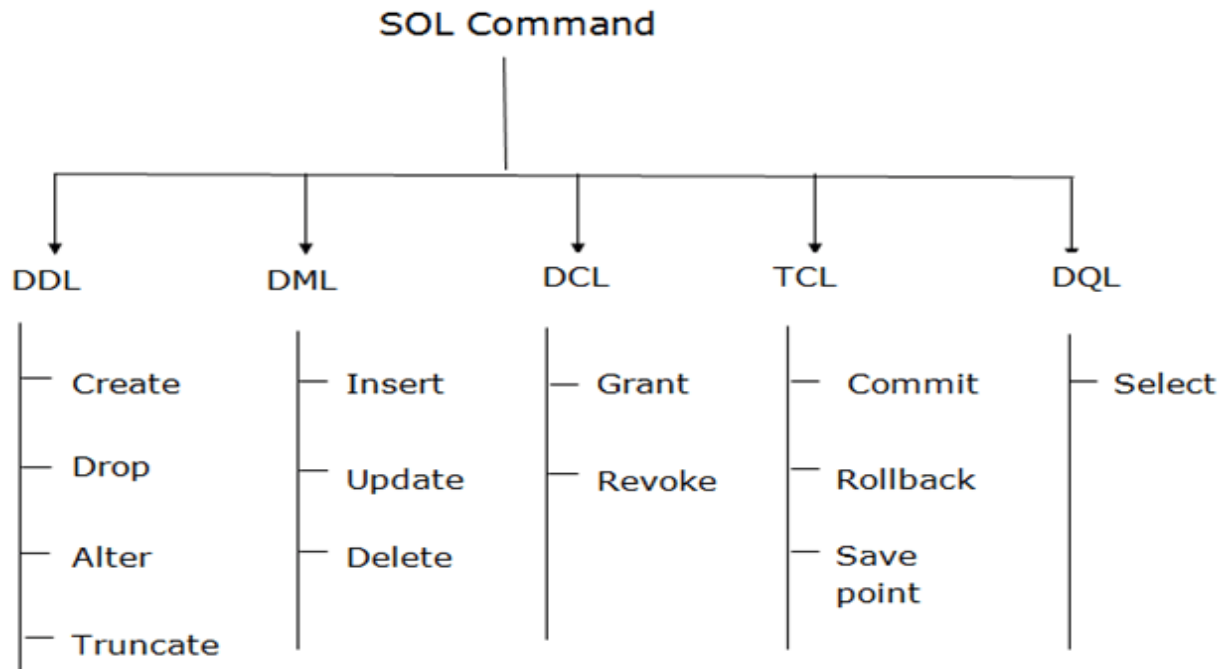
- **SELECT:** it extracts data from a database.
- **UPDATE:** it updates data in database.
- **DELETE:** it deletes data from database.
- **CREATE TABLE:** it creates a new table.
- **ALTER TABLE:** it is used to modify the table.
- **DROP TABLE:** it deletes a table.
- **CREATE DATABASE:** it creates a new database.
- **ALTER DATABASE:** It is used to modify a database.
- **INSERT INTO:** it inserts new data into a database.
- **CREATE INDEX:** it is used to create an index (search key).
- **DROP INDEX:** it deletes an index.

SQL Commands

- SQL commands are **instructions**. It is **used** to communicate **with** the database. It is also **used** to **perform** specific tasks, functions, and queries of **data**.
- SQL can **perform** various **tasks** like create a table, add data to tables, drop the table, modify the table, and set **permission for users**.

Types of SQL Commands

There are **five** types of SQL commands: **DDL, DML, DCL, TCL, and DQL**.



1. Data Definition Language (DDL)

- DDL **changes** the structure of the table **like** creating a table, deleting a table, altering a table, etc.
- All the **command** of DDL are **auto-committed** that **means** it permanently **save** all the **changes** in the database.

Here are some commands that come under DDL:

- CREATE
- ALTER
- DROP
- TRUNCATE

2. Data Manipulation Language

- DML commands are **used** to **modify** the database. It is responsible for all form of changes in the database.
- The command of DML is **not auto-committed** that means it **can't permanently save** all the changes in the database. They can be rollback.

Here are some commands that come under DML:

- INSERT
- UPDATE
- DELETE

3. Data Query Language

DQL is **used** to **fetch** the data from the database.

It uses only one command:

- SELECT

Database Tables

A database most often contains **one or more tables**. Each table is identified by a **name** (e.g. "Sign Up" or "Login Credentials" or "Orders" or "Employ Info"). Tables contain **records (rows)** with data.

Table Name- **Sign Up**

ID	FN	LN	MobNo	EmailId	City
1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	Anna	Hajare	3333	3@gmail.com	Pune
4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	Soniya	Gandhi	5555	5@gmail.com	Pune

The table above contains five records (one for each user) and 6 columns (ID, FN, LN, MobNo, EmailId, & City).

1. SQL SELECT Statement

The SELECT statement is used to select data from a database / table.

The following SQL statement selects or fetch all the records in the "SignUp" table:

The following SQL statement selects all the columns from the "SignUp" table:

SELECT Syntax

```
SELECT * FROM table_name;
```

Example

```
SELECT * FROM SignUp;
```

Output / Result

ID	FN	LN	MobNo	EmailId	City
1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	Anna	Hajare	3333	3@gmail.com	Pune
4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	Soniya	Gandhi	5555	5@gmail.com	Pune

The following SQL statement selects or fetch the particular column data / records in the "Sign Up" table:

The following SQL statement selects the "FN" and "LN" columns from the "SignUp" table:

Syntax

```
SELECT column1, column2,...  
FROM table_name;
```

Example

```
SELECT FN, LN  
FROM SignUp;
```

Output / Result

	FN	LN
1	Rahul	Gandhi
2	Arvind	Kejriwal
3	Anna	Hajare
4	Sharad	Pawar
5	Soniya	Gandhi

2. DISTINCT

The SELECT DISTINCT statement is **used** to **return** / **show only distinct (different) values or unique values** in the particular column.

Inside a table, a column often **contains many** duplicate values; and sometimes you only want to list the different (distinct) values.

The following SQL statement selects only the DISTINCT values from the "LN" column in the "SignUp" table:

Syntax

```
SELECT DISTINCT column1, column2,...  
FROM table_name;
```

Example

```
SELECT DISTINCT LN  
FROM SignUp;
```

Output / Result

	LN
1	Gandhi
2	Kejriwal
3	Hajare
4	Pawar

SELECT Example Without DISTINCT

The following SQL statement selects all (including the duplicates) values from the "LN" column in the "SignUp" table:

Syntax

```
SELECT Column1
FROM table_name;
```

Example

```
SELECT LN
FROM SignUp;
```

Output / Result

	LN
1	Gandhi
2	Kejriwal
3	Hajare
4	Pawar
5	Gandhi

The following SQL statement lists the number of different (distinct) LN:

Syntax

```
SELECT COUNT (DISTINCT column1, column2,...)
FROM table_name;
```

Example

```
SELECT COUNT (DISTINCT LN)
FROM SignUp;
```

Output / Result

Number of Records-4

3. TOP

It is used to specify the number of records to return.

It is a SQL statement it used to show / display the top records in a particular column.

It is a SQL statement use to select top values in a particular table

The following SQL statement selects the first three records from the "Signup" table (for SQL Server/MS Access):

Syntax

```
SELECT TOP value / number * FROM table_name;
```

Example

```
SELECT TOP 3 * FROM SignUp;
```

Output

	ID	FN	LN	MobNo	EmailId	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune

The following SQL statement selects the first 50% of the records from the "Sign Up" table (for SQL Server/MS Access):

Syntax

```
SELECT TOP 50 PERCENT * FROM table_name;
```

Example

```
SELECT TOP 50 PERCENT * FROM SignUp;
```

Output

	ID	FN	LN	MobNo	EmailId	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune

4. ORDER BY

The ORDER BY keyword is used to sort the result-set in ascending or descending order.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in descending order, use the DESC keyword.

It is a SQL statement it used to display the records by ascending & descending order from selected column.

The following SQL statement selects all SignUp from the "SignUp" table, sorted by the "FN" column:

Syntax

```
SELECT * FROM table_name  
ORDER BY column1;
```

Example

```
SELECT * FROM SignUp  
ORDER BY FN;
```

Output

	ID	FN	LN	MobNo	EmailId	City
1	3	Anna	Hajare	3333	3@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	1	Rahul	Gandhi	1111	1@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune

ORDER BY DESC Example

The following SQL statement selects all SignUp from the "SignUp" table, sorted DESCENDING by the "FN" column:

Syntax

```
SELECT * FROM table_name
ORDER BY column1 DESC;
```

Example

```
SELECT * FROM SignUP
ORDER BY FN DESC;
```

Output

	ID	FN	LN	MobNo	EmailId	City
2	5	Soniya	Gandhi	5555	5@gmail.com	Pune
1	4	Sharad	Pawar	4444	4@gmail.com	Baramati
3	1	Rahul	Gandhi	1111	1@gmail.com	Pune
4	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
5	3	Anna	Hajare	3333	3@gmail.com	Pune

5. Where Clause

The WHERE clause is used to filter records.

It is used to extract only those records that fulfill a specified condition.

Note: The WHERE clause is not only used in SELECT statements, it is also used in UPDATE, DELETE, etc.!

The following SQL statement selects all the SignUp from the City "Pune", in the "SignUp" table:

Syntax

```
SELECT * FROM table_name  
WHERE Condition or Column Name=Value;
```

Example

```
SELECT * FROM SignUp  
WHERE City='Pune';
```

Output

	ID	FN	LN	MobNo	EmailId	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	3	Anna	Hajare	3333	3@gmail.com	Pune
3	5	Soniya	Gandhi	5555	5@gmail.com	Pune

Syntax

```
SELECT * FROM table_name  
WHERE Condition;
```

Example

```
SELECT * FROM SignUp  
WHERE ID=1;
```

Output

	ID	FN	LN	MobNo	EmailId	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune

Syntax

```
SELECT Column1, Column2  
FROM table_name  
WHERE Condition;
```

Example

```
SELECT EmailId  
FROM SignUp  
WHERE City= 'Pune';
```

Output

	Email Id
1	1@gmail.com
2	3@gmail.com
3	5@gmail.com

Types of Where Clause

1. OR
2. AND

The WHERE clause can be combined with AND & OR operators.

The AND and OR operators are used to filter records based on more than one condition:

- The AND operator displays a record if all the conditions separated by AND are TRUE.
- The OR operator displays a record if any of the conditions separated by OR is TRUE.

1. OR 1 1=1 1 0=1 0 1=1 0 0=0

It is a SQL statement use to select records when both condition are true or one condition is true.

It is a SQL statement use to select records either one condition must be true then output will be true.

The following SQL statement selects all fields from "SignUp" where FN is "Rahul" OR LN is "Gandhi":

Syntax

```
SELECT * FROM table_name  
WHERE Condition1 OR Condition 2;
```

Example

```
SELECT * FROM SignUp  
WHERE FN= 'Rahul' OR LN= 'Gandhi';    1 1 = 1   0 1=1
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	5	Soniya	Gandhi	5555	5@gmail.com	Pune

Syntax

```
SELECT Column1, Column2
FROM table_name
WHERE Condition1 OR Condition 2;
```

Example

```
SELECT Email Id
FROM SignUp
WHERE FN='Rahul' OR LN='Gandhi';
```

Output

	Email Id
1	1@gmail.com
2	5@gmail.com

2. AND

It is a SQL statement in that select record when both the condition must be true then output will be true.

The following SQL statement selects all fields from "SignUp" where FN is "Rahul" AND LN is "Gandhi":

Syntax

```
SELECT * FROM table_name
WHERE condition1 AND condition2
```

Example

```
SELECT * FROM SignUp
WHERE FN='Rahul' AND LN='Gandhi';
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune

Syntax

```
SELECT Column1, Column2
FROM table_name
WHERE Condition1 AND Condition 2;
```

Example

```
SELECT Mob. No
FROM SignUp
WHERE FN='Rahul' AND LN='Gandhi';
```

Output

	Mob. No
1	1111

6. LIKE Operator

The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

There are two wildcards often used in conjunction with the LIKE operator:

- The percent sign (%) represents zero, one, or multiple characters
- The underscore sign (_) represents one, single character

The following SQL statement selects all SignUp with a FN starting with "A":

➤ For Starting with Specific alphabets

Syntax

```
SELECT * FROM table_name  
WHERE column LIKE pattern;
```

Example

```
SELECT * FROM SignUp  
WHERE FN LIKE "A%";
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
2	3	Anna	Hajare	3333	3@gmail.com	Pune

Syntax

```
SELECT column1,column2,...  
FROM table_name  
WHERE column LIKE pattern;
```

Example

```
SELECT LN  
FROM SignUp  
WHERE FN LIKE "A%";
```

Output

	LN
1	Kejriwal
2	Hajare

➤ For Ending with Specific alphabets

The following SQL statement selects all SignUp with a FN ending with "d":

Syntax

```
SELECT * FROM table_name  
WHERE column LIKE pattern;
```

Example

```
SELECT * FROM SignUp  
WHERE FN LIKE "%d";
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
2	4	Sharad	Pawar	4444	4@gmail.com	Baramati

Syntax

```
SELECT column1,column2,...  
FROM table_name  
WHERE column LIKE pattern;
```

Example

```
SELECT LN  
FROM SignUp  
WHERE FN LIKE "%d";
```

Output

	LN
1	Kejriwal
2	Pawar

Select all records where the value of the FN column does NOT start with the letter "A".

Syntax

```
SELECT * FROM table_name  
WHERE column NOT LIKE Pattern;
```

Example

```
SELECT * FROM SignUp
WHERE FN NOT LIKE "A%";
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	4	Sharad	Pawar	4444	4@gmail.com	Baramati
3	5	Soniya	Gandhi	5555	5@gmail.com	Pune

Select all records where the value of the column starts with the letter "A".

Syntax

```
SELECT * FROM table_name
WHERE column LIKE "A%";
```

Select all records where the value of the column *ends* with the letter "a".

Syntax

```
SELECT * FROM table_name
WHERE column LIKE "%a";
```

Select all records where the value of the column starts with letter "A" and ends with the letter "b".

Syntax

```
SELECT * FROM table_name
WHERE column LIKE "A%b";
```

Select all records where the value of the column contains the letter "a".

Syntax

```
SELECT * FROM table_name
WHERE column LIKE "%a%";
```

Select all records where the value of the column does NOT start with the letter "A".

Syntax

```
SELECT * FROM table_name
WHERE column NOT LIKE "A%";
```

For Starting with alphabets ABC

The following SQL statement selects all Sign Up with a FN starting with "A", "B", or "C":

Syntax

```
SELECT * FROM table_name
WHERE column LIKE "[ABC]%";
```

For Ending with alphabets ABC

The following SQL statement selects all Sign Up with a FN ending with "A", "B", or "C":

Syntax

```
SELECT * FROM table_name
WHERE column LIKE "%[ABC]";
```


LIKE Operator	Description
WHERE Column LIKE 'a%'	Finds any values that start with "a"
WHERE Column LIKE '%a'	Finds any values that end with "a"
WHERE Column LIKE '%or%'	Finds any values that have "or" in any position
WHERE Column LIKE '_r%'	Finds any values that have "r" in the second position
WHERE Column LIKE 'a_%'	Finds any values that start with "a" and are at least 2 characters in length
WHERE Column LIKE 'a__%'	Finds any values that start with "a" and are at least 3 characters in length
WHERE Column LIKE 'a%o'	Finds any values that start with "a" and ends with "o"

7. WILDCARD

A wildcard character is used to substitute one or more characters in a string.

Wildcard characters are used with the LIKE operator. The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

The following SQL statement selects all SignUp with a FN starting with any character, followed by "ahul":

Syntax

```
SELECT * FROM table_name
WHERE Column LIKE Specified pattern;
```

Example

```
SELECT * FROM SignUp
WHERE FN LIKE '_ahul';
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune

8. IN Operator

The **IN** operator allows you to specify multiple values in a **WHERE** clause.

It is used to fetch one or more data from the table.

It is use to select those records which specify in query.

The following SQL statement selects all SignUp that are Present in "Rahul", "Soniya":

Syntax

```
SELECT * FROM table_name
WHERE Column IN ('Value1', 'Value2', 'Value3'...)
```

Example

```
SELECT * FROM SignUp
WHERE FN IN ('Rahul', 'Soniya');
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	5	Soniya	Gandhi	5555	5@gmail.com	Pune

The following SQL statement selects all Sign Up that are NOT present in "Rahul", "Soniya":

Syntax

```
SELECT * FROM table_name
WHERE Column NOT IN ('Value1', 'Value2', 'Value3'...);
```

Example

```
SELECT * FROM SignUp
WHERE FN NOT IN ('Rahul', 'Soniya');
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
2	3	Anna	Hajare	3333	3@gmail.com	Pune
3	4	Sharad	Pawar	4444	4@gmail.com	Baramati

9. BETWEEN Operator

The **BETWEEN** operator selects values within a given range. The values can be numbers, text, or dates.

The **BETWEEN** operator is inclusive: begin and end values are included.

It is a SQL statement use to select value between ranges which specified.

Syntax

```
SELECT * FROM table_name  
WHERE Column_name BETWEEN Value 1 AND Value 2;
```

Example

```
SELECT * FROM SignUp  
WHERE ID BETWEEN 2 AND 4;
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
2	3	Anna	Hajare	3333	3@gmail.com	Pune
3	4	Sharad	Pawar	4444	4@gmail.com	Baramati

Example

```
SELECT * FROM SignUp
WHERE Email Id BETWEEN '1@gmail.com' AND '3@gmail.com';
```

Output

ID	FN	LN	Mob. No	Email Id	City
1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	Anna	Hajare	3333	3@gmail.com	Pune

Example

```
SELECT * FROM Sign Up
WHERE FN BETWEEN Arvind AND Soniya;
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
2	3	Anna	Hajare	3333	3@gmail.com	Pune
3	4	Sharad	Pawar	4444	4@gmail.com	Baramati
4	5	Soniya	Gandhi	5555	5@gmail.com	Pune

NOT BETWEEN Example

To display the products outside the range of the previous example, use **NOT BETWEEN**:

It is a SQL statement use to select value between range which specified.

Syntax

```
SELECT * FROM table_name  
WHERE Column_name NOT BETWEEN Value 1 AND Value 2;
```

Example

```
SELECT * FROM SignUp  
WHERE ID NOT BETWEEN 2 AND 4;
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	5	Soniya	Gandhi	5555	5@gmail.com	Pune

10. INSERT IN TO

The INSERT INTO statement is used to insert new records in a table.

INSERT INTO Syntax

It is possible to write the INSERT INTO statement in two ways:

1. Specify both the column names and the values to be inserted:

```
INSERT INTO table_name (column1, column2, column3,...)  
VALUES (value1, value2, value3, ...);
```

2. If you are adding values for all the columns of the table, you do not need to specify the column names in the SQL query. However, make sure the order of the values is in the same order as the columns in the table. Here, the INSERT INTO syntax would be as follows:

```
INSERT INTO table_name  
VALUES (value1, value2, value3, ...);
```

The following SQL statement inserts a new record in the "SignUp" table:

Syntax

```
INSERT INTO table_name  
VALUES (value1, value2, value3, ...);
```

Example

```
INSERT INTO SignUp  
VALUES (6, "Jayant", "Patil", 6666, 6@gmail.com, "Sangli");
```


Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune
6	6	Jayant	Patil	6666	6@gmail.com	Sangli

It is also possible to only insert data in specific columns.

The following SQL statement will insert a new record, but only insert data in the "FN", "LN", and "MobNo" columns (Sr.No will be updated automatically):

Syntax

```
INSERT INTO table_name (column1, column2, column3,...)
VALUES (value1, value2, value3, ...);
```

Example

```
INSERT INTO SignUp(FN, LN, Mob.No)
VALUES ("Amit", "Deshmukh", 7777);
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati

5	5	Soniya	Gandhi	5555	5@gmail.com	Pune
6	6	Jayant	Patil	6666	6@gmail.com	Sangli
7		Amit	Deshmukh	7777		

Did you notice that we did not insert any number into the Sr.No field?

The Sr.No column is in auto-increment field and will be generated automatically when a new record is inserted in to the table.

11. UPDATE

The UPDATE statement is **used to modify the existing records in a table.**

The following SQL statement updates the FN with a new Mob.No, Email Id & City.

Syntax

```
UPDATE table_name
SET column1 = value1, column2 = value2, ...
WHERE condition;
```

Example

```
UPDATE SignUp
SET Mob.No = 0000, Email Id = 0@gmail.com, City = Delhi
WHERE FN = Rahul;
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	0000	0@gmail.com	Delhi
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai

3	3	Anna	Hajare	3333	3@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune

Update Warning!

Be careful when updating records. If you omit the WHERE clause, ALL records will be updated!

Example

UPDATE *SignUp*

SET *Mob.No* = 0000, *Email Id* = 0@gmail.com, *City* = Delhi

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	0000	0@gmail.com	Delhi
2	2	Arvind	Kejriwal	0000	0@gmail.com	Delhi
3	3	Anna	Hajare	0000	0@gmail.com	Delhi
4	4	Sharad	Pawar	0000	0@gmail.com	Delhi
5	5	Soniya	Gandhi	0000	0@gmail.com	Delhi

Note: Be careful when updating records in a table! Notice the WHERE clause in the UPDATE statement. The WHERE clause specifies which record(s) that should be updated. If you omit the WHERE clause, all records in the table will be updated!

12. DELETE

The DELETE statement is used to delete existing records in a table.

It is a SQL Statement used to delete the particular row in to the table.

The following SQL statement deletes the Mob.No "2222" from the "SignUp" table:

Syntax

```
DELETE FROM table_name WHERE condition;
```

Example

```
DELETE FROM SignUp WHERE Mob.No = 2222;
```

Output

ID	FN	LN	Mob. No	Email Id	City
1	Rahul	Gandhi	1111	1@gmail.com	Delhi
3	Anna	Hajare	3333	3@gmail.com	Pune
4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	Soniya	Gandhi	5555	5@gmail.com	Pune

Note: Be careful when deleting records in a table! Notice the WHERE clause in the DELETE statement. The WHERE clause specifies which record(s) should be deleted. If you omit the WHERE clause, all records in the table will be deleted!

Delete All Records

It is possible to delete all rows in a table without deleting the table. This means that the table structure, attributes, and indexes will be intact:

Syntax

```
DELETE FROM table_name;
```

The following SQL statement deletes all rows in the "SignUp" table, without deleting the table:

Example

```
DELETE FROM SignUp;
```

Output

Delete all the records only

ID	FN	LN	Mob. No	Email Id	City
----	----	----	---------	----------	------

13. SELECT IN TO

The **SELECT INTO** statement **copies data from one table into a new table.**

Syntax

```
SELECT * INTO newtable FROM oldtable;
```

Example

```
SELECT * INTO Register FROM SignUp;
```

Output

Table Name- **Register**

ID	FN	LN	Mob. No	Email Id	City
1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	Anna	Hajare	3333	3@gmail.com	Pune
4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	Soniya	Gandhi	5555	5@gmail.com	Pune

14. ALIAS

It is a SQL statement it is used for to change the temporary column name & table name without changing in database.

SQL aliases are used to give a table, or a column in a table, a temporary name.

Aliases are often used to make column names more readable.

An alias only exists for the duration of that query.

An alias is created with the **AS** keyword.

Alias Column Syntax

```
SELECT column_name AS alias_name  
FROM table_name;
```

Alias Table Syntax

```
SELECT column_name(s)  
FROM table_name AS alias_name;
```

Alias for Columns Examples

The following SQL statement creates two aliases, one for the FN column and one for the LN column:

Example

```
SELECT FN AS FirstName, LN AS LastName  
FROM SignUp;
```

Output

Table Name- SignUp

	ID	FirstName	LastName	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune

Alias for Columns & Table Examples

Example

```
SELECT FN AS FirstName, LN AS LastName  
FROM SignUp AS Register;
```

Output

Table Name- Register

	ID	FirstName	LastName	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune

Aliases can be useful when:

- There are more than one table involved in a query

- Functions are used in the query
- Column names are big or not very readable
- Two or more columns are combined together

15. UNION

The **UNION** operator is used to combine the result-set of two or more **SELECT** statements.

- Every **SELECT** statement within **UNION** must have the same number of columns
- The columns must also have similar data types
- The columns in every **SELECT** statement must also be in the same order

UNION Syntax

```
SELECT column_name(s) FROM table1
UNION
SELECT column_name(s) FROM table2;
```

Example

Table Name- **Sign up**

ID	FN	LN	Mob. No	Email Id	City	Seats
1	Rahul	Gandhi	1111	1@gmail.com	Pune	45
2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai	49
3	Anna	Hajare	3333	3@gmail.com	Pune	45
4	Sharad	Pawar	4444	4@gmail.com	Baramati	55
5	Soniya	Gandhi	5555	5@gmail.com	Pune	49

Table Name- **Register**

ID	FN	LN	Mob. No	Email Id	City	Seats
1	Rahul	Gandhi	1111	1@gmail.com	Pune	45
2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai	49
3	Anna	Hajare	3333	3@gmail.com	Pune	45
4	Sharad	Pawar	4444	4@gmail.com	Baramati	55
5	Soniya	Gandhi	5555	5@gmail.com	Pune	49
6	Sanjay	Raut	66666	6@gmail.com	Mumbai	53
7	Uddhav	Thakre	7777	7@gmail.com	Mumbai	54
8	Rohit	Pawar	8888	8@gmail.com	Baramati	56
9	Dhiraj	Deshmukh	0000	9@gmail.com	Latur	57

Example

```

SELECT LN FROM SignUp
UNION
SELECT LN FROM Register;

```

Output

	LN
1	Deshmukh
2	Gandhi
3	Hajare
4	Kejriwal
5	Pawar
6	Raut
7	Thakre

Example

```
SELECT Seats FROM SignUp  
UNION  
SELECT Seats FROM Register;
```

Output

	Seats
1	45
2	49
3	53
4	54
5	55
6	56
7	57

UNION ALL

The **UNION** operator selects only distinct values by default. To allow duplicate values, use **UNION ALL**:

Syntax

```
SELECT column_name(s) FROM table1  
UNION ALL  
SELECT column_name(s) FROM table2;
```

Example

```
SELECT LN FROM SignUp  
UNION ALL  
SELECT LN FROM Register;
```

Output

	LN
1	Gandhi
2	Kejriwal
3	Hajare
4	Pawar
5	Gandhi
6	Gandhi
7	Kejriwal
8	Hajare
9	Pawar
10	Gandhi
11	Raut
12	Thakre
13	Pawar
14	Deshmukh

16. CREATE TABLE

The **CREATE TABLE** statement is used to create a new table in a database.

Syntax

```
CREATE TABLE table_name

(
    column1 datatype,
    column2 datatype,
    column3 datatype,
    ....
);
```

The column parameters specify the names of the columns of the table.

The data type parameter specifies the type of data the column can hold (e.g. varchar, integer, date, etc.).

Example

The following example creates a table called "SignUp" that contains six columns: ID, FN, LN, Mob.No, Email Id and City:

```
CREATE TABLE SignUp

(
    ID int,
    FN varchar(255),
    LN varchar(255),
    Mob.No int,
    Email Id varchar(255),
    City varchar(255)
);
```

The ID, Mob.No, column is of type int and will hold an integer.

The FN, LN, Email Id and City columns are of type varchar and will hold characters, and the maximum length for these fields is 255 characters.

The empty "Sign Up" table will now look like this:

Output

Table name- SignUp

ID	FN	LN	Mob. No	Email Id	City
----	----	----	---------	----------	------

17. DROP

The **DROP TABLE** statement is used to drop an existing table in a database.

It is used to delete both the structure & records stored in the table

Syntax

```
DROP TABLE table_name;
```

Example

```
DROP TABLE SignUp;
```

Output

Delete both the structure & records stored in the table

Note: Be careful before dropping a table. Deleting a table will result in loss of complete information stored in the table!

18. TRUNCATE

The **TRUNCATE TABLE** statement is used to delete the data inside a table, but not the table itself.

It is used to **delete all the rows from the table** means to **records stored in the table** & the **structure remain same**. Not delete the structure of the table.

Syntax

```
TRUNCATE TABLE table_name;
```

Example

```
TRUNCATE TABLE SignUp;
```

Output

ID	FN	LN	Mob. No	Email Id	City

No.	DELETE	TRUNCATE
1)	DELETE is a DML command.	TRUNCATE is a DDL command.
2)	We can use WHERE clause in DELETE command.	We cannot use WHERE clause with TRUNCATE
3)	DELETE statement is used to delete a row from a table	TRUNCATE statement is used to remove all the rows from a table.
4)	DELETE is slower than TRUNCATE statement.	TRUNCATE statement is faster than DELETE statement.
5)	You can rollback data after using DELETE statement.	It is not possible to rollback after using TRUNCATE statement.

19. ALTER

The **ALTER TABLE** statement is used to add, delete, or modify columns in an existing table.

The **ALTER TABLE** statement is also used to add and drop various constraints on an existing table.

ALTER TABLE - ADD Column

To add a column in a table, use the following syntax:

The following SQL adds an "Address" column to the "SignUp" table:

Syntax

```
ALTER TABLE table_name
```

```
ADD column_name datatype;
```

Example

```
ALTER TABLE Signup
```

```
ADD Address varchar(255);
```

Output

	ID	FN	LN	Mob. No	Email Id	City	Address
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune	
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai	
3	3	Anna	Hajare	3333	3@gmail.com	Pune	
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati	
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune	

ALTER TABLE - DROP COLUMN

To delete a column in a table, use the following syntax (notice that some database systems don't allow deleting a column):

The following SQL deletes the "Address" column from the "SignUp" table:

Syntax

```
ALTER TABLE table_name
DROP COLUMN column_name;
```

Example

```
ALTER TABLE SignUp
DROP COLUMN Address;
```

Output

	ID	FN	LN	Mob. No	Email Id	City
1	1	Rahul	Gandhi	1111	1@gmail.com	Pune
2	2	Arvind	Kejriwal	2222	2@gmail.com	Mumbai
3	3	Anna	Hajare	3333	3@gmail.com	Pune
4	4	Sharad	Pawar	4444	4@gmail.com	Baramati
5	5	Soniya	Gandhi	5555	5@gmail.com	Pune

ALTER TABLE - ALTER/MODIFY COLUMN

To change the data type of a column in a table, use the following syntax:

SQL Server / MS Access:

```
ALTER TABLE table_name  
ALTER COLUMN column_name datatype;
```

My SQL / Oracle (prior version 10G):

```
ALTER TABLE table_name  
MODIFY COLUMN column_name datatype;
```

Oracle 10G & Later:

```
ALTER TABLE table_name  
MODIFY column_name datatype;
```

Example

```
ALTER TABLE table_name  
MODIFY Date of Birth year/int;
```

Notice that the "Date of Birth" column is now of data type year and is going to hold a year in a two- or four-digit format.

Output

"Date of Birth" column is now of data type year and is going to hold a year in a two- or four-digit format.

20. CONSTRAINTS

SQL constraints are used to specify rules for the data in a table.

Constraints are used to limit the type of data that can go into a table.

This ensures the accuracy and reliability of the data in the table. If there is any violation between the constraint and the data action, the action is aborted.

Constraints can be column level or table level. Column level constraints apply to a column, and table level constraints apply to the whole table.

Syntax

```
CREATE TABLE T.N.
```

```
(
```

```
    C.N.1 datatype constraint,
```

```
    C.N 2 datatype constraint,
```

```
    C.N.3 datatype constraint, ....
```

```
);
```

Example

```
CREATE TABLE VCTC
```

```
(
```

```
    Sr No          int          Primary Key,
```

```
    Fname          varchar(255)  Not Null,
```

```
    Lname          varchar(255)  Not Null,
```

```
    Mockresult     int          Check (Mockresult < 10),
```

```
    Location        varchar(255)  Default "Punevctc"
```

```
    Mobilenos       int          Unique
```

```
);
```

The following constraints are commonly used in SQL:

1. NOTNULL

Ensures that a column cannot have a NULL value

The **NOT NULL** constraint enforces a column to **NOT accept NULL values.**

SQL NOT NULL on CREATE TABLE

Syntax

```
CREATE TABLE table_name

(
    column1 datatype constraints,
    column2 datatype constraints,
    column3 datatype constraints,
    ....
);
```

The following SQL ensures that the "ID", "FN", "LN", "Mob. No", "Email Id" and "City" columns will NOT accept NULL values when the "SignUp" table is created:

Example

```
CREATE TABLE SignUp

(
    ID int NOT NULL,
    FN varchar(255) NOT NULL,
    LN varchar(255) NOT NULL,
    Mob.No int NOT NULL,
    Email Id varchar(255) NOT NULL,
    City varchar(255) NOT NULL
);
```

2. UNIQUE KEY

Ensures that all values in a column are different

Unique Constraint allow only one NULL value.

Each table can have **more than one / multiple Unique Constraint / value.**

Syntax

```
CREATE TABLE table_name

(
    column1 datatype constraints,
    column2 datatype constraints,
    column3 datatype constraints,
    Column4 datatype constraints,
    ....
);
```

The following SQL creates a **UNIQUE** constraint on the "ID" & "Mob. No" column when the "SignUp" table is created:

Example

```
CREATE TABLE SignUp

(
    ID int NOT NULL/UNIQUE,
    FN varchar(255) NOT NULL,
    LN varchar(255) NOT NULL,
    Mob.No int NOT NULL/ UNIQUE,
    Email Id varchar(255) NOT NULL/UNIQUE,
    City varchar(255) NOT NULL
);
```

3. PRIMARY KEY

The PRIMARY KEY constraint uniquely identifies each record (rows) in a table.

A combination of a NOT NULL and UNIQUE. Uniquely identifies each row in a table

Primary keys must contain UNIQUE values, and cannot contain NULL values.

A table can have only ONE primary key; and in the table, this primary key can consist of single or multiple columns (fields).

Syntax

```
CREATE TABLE table_name

(
    column1 datatype constraints,
    column2 datatype constraints,
    column3 datatype constraints,
    column4 datatype constraints,
    PRIMARY KEY (column)
    ....
);
```

The following SQL creates a PRIMARY KEY on the "ID" column when the "SignUp" table is created:

Example

```
CREATE TABLE SignUp

(
    ID int NOT NULL UNIQUE,
    FN varchar(255) NOT NULL,
```

```
LN varchar(255) NOT NULL,  
Mob.No int NOT NULL/ UNIQUE,  
Email Id varchar(255) NOT NULL,  
City varchar(255) NOT NULL,  
PRIMARY KEY (ID)  
);
```

4. FOREIGN KEY

A foreign key is SQL constraints use to link two tables together

Foreign key can accept multiple null value.

We can have more than one foreign key in a table.

A **FOREIGN KEY** is a field (or collection of fields) in one table, that refers to the **PRIMARY KEY** in another table.

The table with the foreign key is called the child table, and the table with the primary key is called the referenced or parent table.

Syntax

```
CREATE TABLE table_name  
  
(  
    column1 datatype constraints,  
    column2 datatype constraints,  
    column3 datatype constraints,  
    column4 datatype constraints,  
    FOREIGN KEY (column)  
    ....  
);
```

Example

CREATE TABLE UIDAI

(

AADHAR NO int(25),

FIRSTNAME varchar(256) **NOT NULL**,

LASTNAME varchar(256),

MOBILE int(20) **UNIQUE**,

EMAIL ID varchar(256) **UNIQUE**,

PAN CARD varchar(25) **UNIQUE**,

CITY varchar(25),

PRIMARY KEY (*AADHAR NO*)

)

CREATE TABLE ICICI

(

FIRSTNAME varchar(256),

LASTNAME varchar(256),

BALANCE int (20),

ACCOUNT NO int (20),

AADHAR NO int (20),

FOREIGN KEY (*AADHAR NO*) **REFERENCE** UIDAI (*AADHAR NO*)

)

```
CREATE TABLE IDBI
```

```
(
```

```
AADHAR NO. int (20),
```

```
BALANCE int (20),
```

```
FOREIGN KEY (AADHAR NO) REFERENCE UIDAI (AADHAR NO)
```

```
)
```

Notice that the "AADHAR NO" column in the "ICICI", "AADHAR NO" column in the "IDBI" table points to the "AADHAR NO" column in the "UIDAI" table.

The "AADHAR NO" column in the "UIDAI" table is the **PRIMARY KEY** in the "UIDAI" table.

The "AADHAR NO" column in the "ICICI" table is a **FOREIGN KEY** in the "ICICI" table.

The "AADHAR NO" column in the "IDBI" table is a **FOREIGN KEY** in the "IDBI" table.

5. DEFAULT

Sets a default value for a column if no value is specified

SQL DEFAULT on CREATE TABLE

The following SQL sets a **DEFAULT** value for the "City" column when the "Persons" table is created:

Syntax

```
CREATE TABLE table_name

(
    column1 datatype constraints,
    column2 datatype constraints,
    column3 datatype constraints,
    column4 datatype constraints,
    ....
);
```

Example

```
CREATE TABLE Persons

(
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int NOT NULL,
    City varchar(255) DEFAULT 'Latur'
);
```

Output

Table Name- Persons

ID	LastName	FirstName	Age	City
1			20	Latur
2			22	Latur
3			23	Latur

6. CHECK

Ensures that the values in a column satisfies a specific condition

The **CHECK** constraint is used to limit the value range that can be placed in a column.

If you define a **CHECK** constraint on a column it will allow only certain values for this column.

If you define a **CHECK** constraint on a table it can limit the values in certain columns based on values in other columns in the row.

SQL CHECK on CREATE TABLE

Syntax

```
CREATE TABLE table_name

(
    column1 datatype constraints,
    column2 datatype constraints,
    column3 datatype constraints,
    column4 datatype constraints,
    CHECK (column) <, >, = Value
    ....
);
```

Example

```
CREATE TABLE Persons

(
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int NOT NULL,
    CHECK (Age>21)
);
```

Output

Table Name- Persons

PersonID	LastName	FirstName	Age
1			22
2			23

Difference between Primary key, Foreign key & Unique Key

Primary Key	Foreign Key	Unique Key
The PRIMARY KEY constraint uniquely identifies each record in a table. Primary keys must contain UNIQUE values	A FOREIGN KEY is a key used to link two tables together. A FOREIGN KEY is a field (or collection of fields) in one table that refers to the PRIMARY KEY in another table.	The UNIQUE constraint ensures that all values in a column are different.
Primary key cannot have a NULL value.	Foreign key can accept multiple null value.	Unique Constraint may have a NULL value.
Each table can have only one primary key.	We can have more than one foreign key in a table.	Each table can have more than one Unique Constraint.

