**MY SQL**

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**SQL TUTORIAL BASICS**

**SQL (Structured Query Language)**

SQL (Structured Query Language) is used to perform operations on the records stored in the database, such as updating records, inserting records, deleting records, creating and modifying database tables, views, etc.

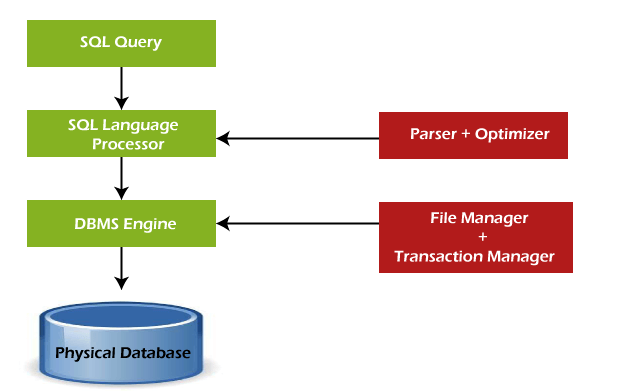
SQL is not a database system, but it is a query language.

Suppose you want to perform the queries of SQL language on the stored data in the database. You are required to install any database management system in your systems, for example, [Oracle](https://www.javatpoint.com/oracle-tutorial), [MySQL](https://www.javatpoint.com/mysql-tutorial), [MongoDB](https://www.javatpoint.com/mongodb-tutorial), [PostgreSQL](https://www.javatpoint.com/postgresql-tutorial), [SQL Server](https://www.javatpoint.com/sql-server-tutorial), [DB2](https://www.javatpoint.com/db2-tutorial), etc.

SQL is a short-form of the structured query language, and it is pronounced as S-Q-L or sometimes as See-Quell.

This database language is mainly designed for maintaining the data in relational database management systems. It is a special tool used by data professionals for handling structured data (data which is stored in the form of tables). It is also designed for stream processing in RDSMS.

You can easily create and manipulate the database, access and modify the table rows and columns, etc. This query language became the standard of ANSI in the year of 1986 and ISO in the year of 1987.



Some SQL Commands

The SQL commands help in creating and managing the database. The most common SQL commands which are highly used are mentioned below:

1. CREATE command
2. UPDATE command
3. DELETE command
4. SELECT command
5. DROP command
6. INSERT command

CREATE Command

This command helps in creating the new database, new table, table view, and other objects of the database.

UPDATE Command

This command helps in updating or changing the stored data in the database.

DELETE Command

This command helps in removing or erasing the saved records from the database tables. It erases single or multiple tuples from the tables of the database.

SELECT Command

This command helps in accessing the single or multiple rows from one or multiple tables of the database. We can also use this command with the WHERE clause.

DROP Command

This command helps in deleting the entire table, table view, and other objects from the database.

INSERT Command

This command helps in inserting the data or records into the database tables. We can easily insert the records in single as well as multiple rows of the table.

|  |  |
| --- | --- |
| **SQL** | **No-SQL** |
| 1. SQL is a relational database management system. | 1. While No-SQL is a non-relational or distributed database management system. |
| 2. The query language used in this database system is a structured query language. | 2. The query language used in the No-SQL database systems is a non-declarative query language. |
| 3. The schema of SQL databases is predefined, fixed, and static. | 3. The schema of No-SQL databases is a dynamic schema for unstructured data. |
| 4. These databases are vertically scalable. | 4. These databases are horizontally scalable. |
| 5. The database type of SQL is in the form of tables, i.e., in the form of rows and columns. | 5. The database type of No-SQL is in the form of documents, key-value, and graphs. |
| 6. It follows the ACID model. | 6. It follows the BASE model. |
| 7. Complex queries are easily managed in the SQL database. | 7. NoSQL databases cannot handle complex queries. |
| 8. This database is not the best choice for storing hierarchical data. | 8. While No-SQL database is a perfect option for storing hierarchical data. |
| 9. All SQL databases require object-relational mapping. | 9. Many No-SQL databases do not require object-relational mapping. |
| 10. Gauges, CircleCI, Hootsuite, etc., are the top enterprises that are using this query language. | 10. Airbnb, Uber, and Kickstarter are the top enterprises that are using this query language. |
| 11. SQLite, Ms-SQL, Oracle, PostgreSQL, and MySQL are examples of SQL database systems. | 11. Redis, MongoDB, Hbase, BigTable, CouchDB, and Cassandra are examples of NoSQL database systems |

The syntax of the structured query language is a unique set of rules and guidelines, which is not case-sensitive. Its Syntax is defined and maintained by the ISO and ANSI standards.

Following are some most important points about the SQL syntax which are to remember:

* You can write the keywords of SQL in both uppercase and lowercase, but writing the SQL keywords in uppercase improves the readability of the SQL query.
* SQL statements or syntax 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 syntax depends on relational algebra and tuple relational calculus.

# **SQL Data Types**

Data types are used to represent the nature of the data that can be stored in the database table. For example, in a particular column of a table, if we want to store a string type of data then we will have to declare a string data type of this column.

Data types mainly classified into three categories for every database.

* String Data types
* Numeric Data types
* Date and time Data type

MySQL Data Types

A list of data types used in MySQL database. This is based on MySQL 8.0.

**MySQL String Data Types**

|  |  |
| --- | --- |
| **CHAR(Size)** | It is used to specify a fixed length string that can contain numbers, letters, and special characters. Its size can be 0 to 255 characters. Default is 1. |
| **VARCHAR(Size)** | It is used to specify a variable length string that can contain numbers, letters, and special characters. Its size can be from 0 to 65535 characters. |
| **BINARY(Size)** | It is equal to CHAR() but stores binary byte strings. Its size parameter specifies the column length in the bytes. Default is 1. |
| **VARBINARY(Size)** | It is equal to VARCHAR() but stores binary byte strings. Its size parameter specifies the maximum column length in bytes. |
| **TEXT(Size)** | It holds a string that can contain a maximum length of 255 characters. |
| **TINYTEXT** | It holds a string with a maximum length of 255 characters. |
| **MEDIUMTEXT** | It holds a string with a maximum length of 16,777,215. |
| **LONGTEXT** | It holds a string with a maximum length of 4,294,967,295 characters. |
| **ENUM(val1, val2, val3,...)** | It is used when a string object having only one value, chosen from a list of possible values. It contains 65535 values in an ENUM list. If you insert a value that is not in the list, a blank value will be inserted. |
| **SET( val1,val2,val3,....)** | It is used to specify a string that can have 0 or more values, chosen from a list of possible values. You can list up to 64 values at one time in a SET list. |
| **BLOB(size)** | It is used for BLOBs (Binary Large Objects). It can hold up to 65,535 bytes. |

**MySQL Numeric Data Types**

|  |  |
| --- | --- |
| **BIT(Size)** | It is used for a bit-value type. The number of bits per value is specified in size. Its size can be 1 to 64. The default value is 1. |
| **INT(size)** | It is used for the integer value. Its signed range varies from -2147483648 to 2147483647 and unsigned range varies from 0 to 4294967295. The size parameter specifies the max display width that is 255. |
| **INTEGER(size)** | It is equal to INT(size). |
| **FLOAT(size, d)** | It is used to specify a floating point number. Its size parameter specifies the total number of digits. The number of digits after the decimal point is specified by **d** parameter. |
| **FLOAT(p)** | It is used to specify a floating point number. MySQL used p parameter to determine whether to use FLOAT or DOUBLE. If p is between 0 to24, the data type becomes FLOAT (). If p is from 25 to 53, the data type becomes DOUBLE(). |
| **DOUBLE(size, d)** | It is a normal size floating point number. Its size parameter specifies the total number of digits. The number of digits after the decimal is specified by d parameter. |
| **DECIMAL(size, d)** | It is used to specify a fixed point number. Its size parameter specifies the total number of digits. The number of digits after the decimal parameter is specified by **d** parameter. The maximum value for the size is 65, and the default value is 10. The maximum value for **d** is 30, and the default value is 0. |
| **DEC(size, d)** | It is equal to DECIMAL(size, d). |
| **BOOL** | It is used to specify Boolean values true and false. Zero is considered as false, and nonzero values are considered as true. |

**MySQL Date and Time Data Types**

|  |  |
| --- | --- |
| **DATE** | It is used to specify date format YYYY-MM-DD. Its supported range is from '1000-01-01' to '9999-12-31'. |
| **DATETIME(fsp)** | It is used to specify date and time combination. Its format is YYYY-MM-DD hh:mm:ss. Its supported range is from '1000-01-01 00:00:00' to 9999-12-31 23:59:59'. |
| **TIMESTAMP(fsp)** | It is used to specify the timestamp. Its value is stored as the number of seconds since the Unix epoch('1970-01-01 00:00:00' UTC). Its format is YYYY-MM-DD hh:mm:ss. Its supported range is from '1970-01-01 00:00:01' UTC to '2038-01-09 03:14:07' UTC. |
| **TIME(fsp)** | It is used to specify the time format. Its format is hh:mm:ss. Its supported range is from '-838:59:59' to '838:59:59' |
| **YEAR** | It is used to specify a year in four-digit format. Values allowed in four digit format from 1901 to 2155, and 0000. |

Types of Operator

SQL operators are categorized in the following categories:

1. SQL Arithmetic Operators
2. SQL Comparison Operators
3. SQL Logical Operators
4. SQL Set Operators
5. SQL Bit-wise Operators
6. SQL Unary Operators

**Let's discuss each operator with their types.**

SQL Arithmetic Operators

The **Arithmetic Operators** perform the mathematical operation on the numerical data of the SQL tables. These operators perform addition, subtraction, multiplication, and division operations on the numerical operands.

**Following are the various arithmetic operators performed on the SQL data:**

1. SQL Addition Operator (+)
2. SQL Subtraction Operator (-)
3. SQL Multiplication Operator (+)
4. SQL Division Operator (-)
5. SQL Modulus Operator (+)

SQL Comparison Operators

The **Comparison Operators** in SQL compare two different data of SQL table and check whether they are the same, greater, and lesser. The SQL comparison operators are used with the WHERE clause in the SQL queries

**Following are the various comparison operators which are performed on the data stored in the SQL database tables:**

1. SQL Equal Operator (=)
2. SQL Not Equal Operator (!=)
3. SQL Greater Than Operator (>)
4. SQL Greater Than Equals to Operator (>=)
5. SQL Less Than Operator (<)\
6. SQL Less Than Equals to Operator (<=)

SQL Logical Operators

The **Logical Operators** in SQL perform the Boolean operations, which give two results **True and False.** These operators provide **True** value if both operands match the logical condition.

**Following are the various logical operators which are performed on the data stored in the SQL database tables:**

1. SQL ALL operator
2. SQL AND operator
3. SQL OR operator
4. SQL BETWEEN operator
5. SQL IN operator
6. SQL NOT operator
7. SQL ANY operator
8. SQL LIKE operator

SQL Unary Operators

The **Unary Operators** in SQL perform the unary operations on the single data of the SQL table, i.e., these operators operate only on one operand.

These types of operators can be easily operated on the numeric data value of the SQL table.

**Following are the various unary operators which are performed on the numeric data stored in the SQL table:**

1. SQL Unary Positive Operator
2. SQL Unary Negative Operator
3. SQL Unary Bitwise NOT Operator

SQL Set Operators

The **Set Operators** in SQL combine a similar type of data from two or more SQL database tables. It mixes the result, which is extracted from two or more SQL queries, into a single result.

Set operators combine more than one select statement in a single query and return a specific result set.

**Following are the various set operators which are performed on the similar data stored in the two SQL database tables:**

1. SQL Union Operator
2. SQL Union ALL Operator
3. SQL Intersect Operator
4. SQL Minus Operator

# **SQL TABLE**

# **SQL Table**

Table is a collection of data, organized in terms of rows and columns. In DBMS term, table is known as relation and row as tuple.

#### **Note: A table has a specified number of columns, but can have any number of rows.**

Table is the simple form of data storage. A table is also considered as a convenient representation of relations.

Let's see an example of an employee table:

|  |  |  |
| --- | --- | --- |
| Employee | | |
| **EMP\_NAME** | **ADDRESS** | **SALARY** |
| Ankit | Lucknow | 15000 |
| Raman | Allahabad | 18000 |
| Mike | New York | 20000 |

SQL TABLE Variable

The **SQL Table variable** is used to create, modify, rename, copy and delete tables. Table variable was introduced by Microsoft.

It was introduced with SQL server 2000 to be an alternative of temporary tables.

It is a variable where we temporary store records and results. This is same like temp table but in the case of temp table we need to explicitly drop it.

Table variables are used to store a set of records. So declaration syntax generally looks like CREATE TABLE syntax.

**create** **table** "tablename"

("column1" "data type",

"column2" "data type",

"column3" "data type",

...

"columnN" "data type");

# **SQL CREATE TABLE**

SQL CREATE TABLE statement is used to create table in a database.

If you want to create a table, you should name the table and define its column and each column's data type.

Let's see the simple syntax to create the table.

**CREATE** **TABLE** Employee

(

EmployeeID **int**,

FirstName **varchar**(255),

LastName **varchar**(255),

Email **varchar**(255),

AddressLine **varchar**(255),

City **varchar**(255)

);

# **SQL DROP TABLE**

A SQL DROP TABLE statement is used to delete a table definition and all data from a table.

This is very important to know that once a table is deleted all the information available in the table is lost forever, so we must be very careful when using this command.

Let's see the syntax to drop the table from the database.

First we verify STUDENTS table and then we would delete it from the database.

SQL> **DESC** STUDENTS;

This shows that STUDENTS table is available in the database, so we can drop it as follows:

SQL>**DROP** **TABLE** STUDENTS;

Now, use the following command to check whether table exists or not.

SQL> **DESC** STUDENTS;

Query OK, 0 rows affected (0.01 sec)

* **In SQL, "DESC" stands for "describe." It is a command used to retrieve metadata about a table, such as the names and data types of its columns. The syntax for using DESC in SQL varies slightly depending on the specific database management system (DBMS) you're using, but the general form is:**

# **SQL DELETE TABLE**

The DELETE statement is used to delete rows from a table. If you want to remove a specific row from a table you should use WHERE condition.

1. **DELETE FROM table\_name [WHERE condition];**

But if you do not specify the WHERE condition it will remove all the rows from the table.

1. **DELETE FROM table\_name;**

Difference between DELETE and TRUNCATE statements

There is a slight difference b/w delete and truncate statement. The **DELETE statement** only deletes the rows from the table based on the condition defined by WHERE clause or delete all the rows from the table when condition is not specified.

But it does not free the space containing by the table.

The **TRUNCATE statement:** it is used to delete all the rows from the table **and free the containing space.**

Execute the following query to truncate the table:

1. **TRUNCATE** **TABLE** employee;

Difference b/w DROP and TRUNCATE statements

When you use the drop statement it deletes the table's row together with the table's definition so all the relationships of that table with other tables will no longer be valid.

**When you drop a table:**

* Table structure will be dropped
* Relationship will be dropped
* Integrity constraints will be dropped
* Access privileges will also be dropped

On the other hand, when we **TRUNCATE** a table, the table structure remains the same, so you will not face any of the above problems.

# **SQL RENAME TABLE**

In some situations, database administrators and users want to change the name of the table in the SQL database because they want to give a more relevant name to the table.

Any database user can easily change the name by using the RENAME TABLE and ALTER TABLE statement in Structured Query Language.

The RENAME TABLE and ALTER TABLE syntax help in changing the name of the table.

## Syntax of RENAME statement in SQL

1. RENAME old\_table \_name To new\_table\_name ;

* Suppose, you want to change the above table name into "Car\_2021\_Details". For this, you have to type the following RENAME statement in SQL:

**RENAME Cars To Car\_2021\_Details ;**

* After this statement, the table "Cars" will be changed into table name "Car\_2021\_Details".

## Syntax of ALTER TABLE statement in SQL

**ALTER TABLE old\_table\_name RENAME TO new\_table\_name;**

In the Syntax, we must specify the RENAME TO keyword after the old name of the table.

Suppose, you want to change the name of the above table into "Bikes\_Details" using ALTER TABLE statement. For this, you have to type the following query in SQL:

**ALTER TABLE Bikes RENAME TO Bikes\_Details ;**

After this statement, the table "Bikes" will be changed into the table name "Bikes\_Details".

# **SQL TRUNCATE TABLE**

A truncate SQL statement is used to remove all rows (complete data) from a table. It is similar to the DELETE statement with no WHERE clause.

#### **TRUNCATE TABLE Vs DELETE TABLE**

Truncate table is faster and uses lesser resources than DELETE TABLE command.

#### **TRUNCATE TABLE Vs DROP TABLE**

Drop table command can also be used to delete complete table but it deletes table structure too. TRUNCATE TABLE doesn't delete the structure of the table.

Let's see the syntax to truncate the table from the database.

**TRUNCATE** **TABLE** table\_name;

# **SQL COPY TABLE**

If you want to copy the data of one SQL table into another SQL table in the same SQL server, then it is possible by using the SELECT INTO statement in SQL.

The SELECT INTO statement in Structured Query Language copies the content from one existing table into the new table. SQL creates the new table by using the structure of the existing table.

## Syntax of SELECT INTO statement in SQL

1. **SELECT \* INTO New\_table\_name FROM old\_table\_name;**

# **SQL TEMP TABLE**

The concept of temporary table is introduced by SQL server. It helps developers in many ways:

**Temporary tables** can be created at run-time and can do all kinds of operations that a normal table can do. These temporary tables are created inside tempdb database.

There are two types of temp tables based on the behavior and scope.

1. Local Temp Variable
2. Global Temp Variable

## Local Temp Variable

Local temp tables are only available at current connection time. It is automatically deleted when user disconnects from instances. It is started with hash (#) sign.

**CREATE TABLE #local temp table (**

**User id int,**

**Username varchar (50),**

**User address varchar (150)**

**)**

## Global Temp Variable

Global temp tables name starts with double hash (##). Once this table is created, it is like a permanent table. It is always ready for all users and not deleted until the total connection is withdrawn.

**CREATE TABLE ##new global temp table (**

**User id int,**

**User name varchar (50),**

**User address varchar (150)**

**)**

# **SQL ALTER TABLE**

The ALTER TABLE statement in Structured Query Language allows you to add, modify, and delete columns of an existing table. This statement also allows database users to add and remove various SQL constraints on the existing tables.

Any user can also change the name of the table using this statement.

## ALTER TABLE ADD Column statement in SQL

In many situations, you may require to add the columns in the existing table. Instead of creating a whole table or database again you can easily add single and multiple columns using the ADD keyword.

## Syntax of ALTER TABLE ADD Column statement in SQL

1. **ALTER TABLE table\_name ADD column\_name column-definition;**

The above syntax only allows you to add a single column to the existing table. If you want to add more than one column to the table in a single SQL statement, then use the following syntax:

1. **ALTER TABLE table\_name**

**ADD (column\_Name1 column-definition,**

**column\_Name2 column-definition,**

**.....**

**column\_NameN column-definition);**

Suppose, you want to add the new column Car\_Model in the above table. For this, you have to type the following query in the SQL:

**ALTER TABLE Cars ADD Car\_Model Varchar(20);**

ALTER TABLE MODIFY Column statement in SQL

The MODIFY keyword is used for changing the column definition of the existing table.

Syntax of ALTER TABLE MODIFY Column statement in SQL

1. ALTER TABLE table\_name MODIFY column\_name column-definition;

This syntax only allows you to modify a single column of the existing table. If you want to modify more than one column of the table in a single SQL statement, then use the following syntax:

ALTER TABLE table\_name

MODIFY (column\_Name1 column-definition,

column\_Name2 column-definition,

.....

column\_NameN column-definition);

## ALTER TABLE DROP Column statement in SQL

In many situations, you may require to delete the columns from the existing table. Instead of deleting the whole table or database you can use DROP keyword for deleting the columns.

## Syntax of ALTER TABLE DROP Column statement in SQL

1. ALTER TABLE table\_name DROP Column column\_name ;

## ALTER TABLE RENAME Column statement in SQL

The RENAME keyword is used for changing the name of columns or fields of the existing table.

## Syntax of ALTER TABLE RENAME Column statement in SQL

1. ALTER TABLE table\_name RENAME COLUMN old\_name to new\_name;

# **SQL SELECT STATEMENT**

# **SQL SELECT Statement**

The SELECT statement is the most used command in Structured Query Language. It is used to access the records from one or more database tables and views. It also retrieves the selected data that follow the conditions we want.

By using this command, we can also access the record from the column of the table. The table which stores the record returned by the SELECT statement is called a result-set table.

### Syntax of SELECT Statement in SQL

1. **SELECT** Column\_Name\_1, Column\_Name\_2, ....., Column\_Name\_N **FROM** Table\_Name;

In this SELECT syntax, **Column\_Name\_1, Column\_Name\_2, ….., Column\_Name\_N** are the name of those columns in the table whose data we want to read.

If you want to access all rows from all fields of the table, use the following SQL SELECT syntax with \*

**EXAMPLE:**

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, "B1"),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, "B2");

SELECT \* FROM Student\_Records;

**OUTPUT:**

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|B1

205|Yatin|Lucknow|20|75|B1

206|Ishika|Ghaziabad|19|51|C1

207|Vivek|Goa|20|62|B2

[Execution complete with exit code 0]

SELECT First\_Name,Age FROM Student\_Records;

**OUTPUT:**

Akash|18

Bhavesh|19

Yash|20

Bhavana|19

Yatin|20

Ishika|19

Vivek|20

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records WHERE Age = 20;

**OUTPUT:**

203|Yash|Delhi|20|89|A2

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|B2

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records Group by Age;

**OUTPUT:**

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records Group by Grade having Percentage > 80;

**OUTPUT:**

202|Bhavesh|Kanpur|19|93|A1

201|Akash|Delhi|18|89|A2

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records order by Percentage desc;

**OUTPUT:**

202|Bhavesh|Kanpur|19|93|A1

201|Akash|Delhi|18|89|A2

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|B1

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|B2

206|Ishika|Ghaziabad|19|51|C1

[Execution complete with exit code 0]

# **SQL SELECT UNIQUE**

There is no difference between DISTINCT and UNIQUE.

**SELECT UNIQUE** is an old syntax which was used in oracle description but later ANSI standard defines DISTINCT as the official keyword.

After that oracle also added DISTINCT but did not withdraw the service of UNIQUE keyword for the sake of backward compatibility.

In simple words, we can say that SELECT UNIQUE statement is used to retrieve a unique or distinct element from the table.

Let's see the syntax of select unique statement.

**SELECT** **UNIQUE** column\_name

**FROM** table\_name;

# **SQL SELECT DISTINCT**

The **SQL DISTINCT command** is used with SELECT key word to retrieve only distinct or unique data.

In a table, there may be a chance to exist a duplicate value and sometimes we want to retrieve only unique values. In such scenarios, SQL SELECT DISTINCT statement is used.

#### **Note: SQL SELECT UNIQUE and SQL SELECT DISTINCT statements are same.**

Let's see the syntax of select distinct statement.

**SELECT** **DISTINCT** column\_name ,column\_name

**FROM**  table\_name;

# **How to use distinct in SQL?**

SQL **DISTINCT** clause is used to remove the duplicates columns from the result set.

The distinct keyword is used with select keyword in conjunction. It is helpful when we avoid duplicate values present in the specific **columns/tables**. The **unique values** are fetched when we use the distinct keyword.

* SELECT DISTINCT returns only distinct (**different**) values.
* DISTINCT eliminates duplicate records from the table.
* DISTINCT can be used with aggregates: **COUNT, AVG, MAX**, etc.
* DISTINCT operates on a single column.
* Multiple columns are not supported for DISTINCT.

### Syntax:

**SELECT** **DISTINCT** expressions

**FROM** tables

[**WHERE** conditions];

### Parameters:

**Expressions:** The columns or calculations that we want to retrieve are called expression.

**Tables:** The tables that we want to retrieve the records. There is only one table in the FROM clause.

**WHERE conditions:** The conditions may meet for the records which are selected and it is optional.

**Note:**

* When one expression is provided in the **DISTINCT** clause then the query will return the unique values of the expressions.
* The query will retrieve the unique combinations for the listed expressions if more than one expression is provided in the **DISTINCT** clause here.
* In SQL, the **DISTINCT** clause cannot ignore the NULL values. So when we use the DISTINCT clause in the SQL statement, our result set will include NULL as a distinct value.

SELECT distinct Address FROM Student\_Records ;

**OUTPUT:**

Delhi

Kanpur

Lucknow

Ghaziabad

Goa

[Execution complete with exit code 0]

# **SQL SELECT COUNT**

The **SQL COUNT()** is a function that returns the number of records of the table in the output.

This function is used with the SQL SELECT statement.

**Let's take a simple example:** If you have a record of the voters in the selected area and want to count the number of voters, then it is very difficult to do it manually, but you can do it easily by using SQL SELECT COUNT query.

## Syntax of Select Count Function in SQL

1. **SELECT COUNT(column\_name) FROM table\_name;**

In the syntax, we have to specify the column's name after the COUNT keyword and the name of the table on which the Count function is to be executed.

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT count(Grade) as total\_students FROM Student\_Records ;

**OUTPUT:**

5

[Execution complete with exit code 0]

## Select Count(\*) Function in SQL

The count(\*) function in SQL shows all the Null and Non-Null records present in the table.

### Syntax of Count (\*) Function in SQL

1. **SELECT** COUNT(\*) **FROM** table\_name;

SELECT count(\*) as total\_students FROM Student\_Records ;

**OUTPUT:**

7

[Execution complete with exit code 0]

SELECT count(First\_Name) as total\_students FROM Student\_Records where Age != 20 ;

OUTPUT:

4

[Execution complete with exit code 0]

SELECT count(distinct Address) as total\_students FROM Student\_Records where Percentage > 80 ;

2

[Execution complete with exit code 0]

SELECT distinct Address as total\_students FROM Student\_Records where Percentage > 80 ;

Delhi

Kanpur

[Execution complete with exit code 0]

# **SQL SELECT TOP**

The **SELECT TOP** statement in SQL shows the limited number of records or rows from the database table. The TOP clause in the statement specifies how many rows are returned.

It shows the top N number of rows from the tables in the output. This clause is used when there are thousands of records stored in the database tables.

**Let's take a simple example:** If a Student table has a large amount of data about students, the select TOP statement determines how much student data will be retrieved from the given table.

## Syntax of TOP Clause in SQL

SELECT TOP number | percent column\_Name1, column\_Name2, ....., column\_NameN  FROM table\_name

#### **Note: All the database systems do not support the TOP keyword for selecting the limited number of records. Oracle supports the ROWNUM keyword, and MySQL supports the LIMIT keyword.**

## Syntax of LIMIT Clause in MySQL

1. SELECT column\_Name1,column\_Name2, ....., column\_NameN FROM table\_name LIMIT value;

In the syntax, we have to specify the value after the LIMIT keyword. The value denotes the number of rows to be shown from the top in the output.

SELECT \* from Student\_Records limit 3  
**OUTPUT:**

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

[Execution complete with exit code 0]

# **SQL SELECT FIRST**

The SQL first() function is used to return the first value of the selected column.

Let's see the syntax of sql select first() function:

1. **SELECT** **FIRST**(column\_name) **FROM** table\_name;

Here a point is notable that first function is only supported by MS Access.

If you want to retrieve the first value of the "customer\_name" column from the "customers" table, you need to write following query.

1. **SELECT** **FIRST**(customer\_name) **AS** first\_customer **FROM** customers;

#### **Note: The SELECT FIRST statement is only supported by MS Access. This statement doesn't work with other databases like Oracle, MySQL etc.**

# **SQL SELECT LAST**

The **LAST()** function in Structured Query Language shows the last value from the specified column of the table.

#### **Note: This SQL function is only supported in Microsoft Access database. Oracle supports ORDER BY and ROWNUM keywords, and MySQL supports the LIMIT keyword for selecting the last record.**

### Syntax of LAST() Function

1. **SELECT** **LAST** (Field\_Name) **FROM** Table\_Name ;

SELECT First\_Name FROM Student\_Records ORDER BY Student\_Id DESC LIMIT 1;

OUTPUT:

Vivek

[Execution complete with exit code 0]

# **SQL SELECT RANDOM**

The SQL SELECT RANDOM() function returns the random row. It can be used in online exam to display the random questions.

There are a lot of ways to select a random record or row from a database table. Each database server needs different SQL syntax.

If you want to select a random row with **MY SQL**:

**SELECT** **column** **FROM** **table**

**ORDER** **BY** RAND ( )

LIMIT 1

# **SQL SELECT IN**

SQL IN is an operator used in a SQL query to help reduce the need to use multiple SQL "OR" conditions.

It is used in SELECT, INSERT, UPDATE or DELETE statement.

#### **Advantage of SQL SELECT IN**

It minimizes the use of SQL OR operator.

Let's see the syntax for SQL IN:

Expression IN (value 1, value 2 ... value n);

SELECT \*

FROM Student\_Records

WHERE Student\_Id IN (201, 203, 024, 207);

201|Akash|Delhi|18|89|A2

203|Yash|Delhi|20|89|A2

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

# **SQL SELECT DATE**

SQL SELECT DATE is used to retrieve a date from a database. If you want to find a particular date from a database, you can use this statement.

**For example:** let's see the query to get all the records after '2013-12-12'.

**SELECT** \* **FROM**

**table**-**name** **WHERE** your **date**-**column** >= '2013-12-12'

Let's see the another query to get all the records after '2013-12-12' and before '2013-12-13' date.

**SELECT**\* **FROM**

**table**-**name** **where** your **date**-**column** < '2013-12-13' and your **date**-**column** >= '2013-12-12'

If you want to compare the dates within the query, you should use BETWEEN operator to compare the dates.

**SELECT** \* **FROM**

table\_name **WHERE** yourdate BETWEEN '2012-12-12' and '2013-12-12

# **SQL SELECT SUM**

It is also known as SQL SUM() function. It is used in a SQL query to return summed value of an expression.

Let's see the Syntax for the select sum function:

**SELECT** SUM (expression)

**FROM** tables

**WHERE** conditions;

expression may be numeric field or formula.

#### **SQL SUM EXAMPLE with single field:**

If you want to know how the combined total salary of all employee whose salary is above 20000 per month.

**SELECT** SUM (salary) **AS** "Total Salary"

**FROM** employees

**WHERE** salary > 20000;

In this example, you will find the expression as "Total Salary" when the result set is returned.

#### **SQL SUM EXAMPLE with SQL DISTINCT:**

You can also use SQL DISTINCT clause with SQL SUM function.

**SELECT** SUM (**DISTINCT** salary) **AS** "Total Salary"

**FROM** employees

**WHERE** salary > 20000;

#### **SQL SUM EXAMPLE with SQL GROUP BY:**

Sometimes there is a need to use the SQL GROUP BY statement with the SQL SUM function.

For example, we could also use the SQL SUM function to return the name of department and the total sales related to department.

**SELECT** department, SUM (sales) **AS** "Total Sales"

**FROM** order\_details

**GROUP** **BY** department;

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT SUM (Percentage) AS "Total"

FROM Student\_Records

WHERE Percentage > 80;

271

[Execution complete with exit code 0]

SELECT SUM (distinct Percentage) AS "Total"

FROM Student\_Records

WHERE Percentage > 80;

182

[Execution complete with exit code 0]

SELECT SUM (Percentage),Address AS "Total"

FROM Student\_Records

group by Address;

256|Delhi

51|Ghaziabad

62|Goa

93|Kanpur

75|Lucknow

[Execution complete with exit code 0]

# **SQL SELECT NULL**

First of all we should know that what null value is? Null values are used to represent missing unknown data.

There can be two conditions:

1. Where SQL is NULL
2. Where SQL is NOT NULL

If in a table, a column is optional, it is very easy to insert data in column or update an existing record without adding a value in this column. This means that field has null value.

#### **Note: we should not compare null value with 0. They are not equivalent.**

SELECT Student\_Id,First\_Name,Address

FROM Student\_Records

where Grade is NULL

204|Bhavana|Delhi

207|Vivek|Goa

[Execution complete with exit code 0]

SELECT Student\_Id,First\_Name,Address

FROM Student\_Records

where Grade is NOT NULL

201|Akash|Delhi

202|Bhavesh|Kanpur

203|Yash|Delhi

205|Yatin|Lucknow

206|Ishika|Ghaziabad

[Execution complete with exit code 0]

# **SQL CLAUSE**

# **SQL WHERE**

A **WHERE clause** in SQL is a data manipulation language statement.

WHERE clauses are not mandatory clauses of SQL DML statements. But it can be used to limit the number of rows affected by a SQL DML statement or returned by a query.

Actually. it filters the records. It returns only those queries which fulfill the specific conditions.

WHERE clause is used in SELECT, UPDATE, DELETE statement etc.

Let's see the syntax for sql where:

**SELECT** column1, **column** 2, ... **column** n

**FROM**    table\_name

**WHERE** [conditions]

WHERE clause uses some conditional selection

|  |  |
| --- | --- |
| = | equal |
| > | greater than |
| < | less than |
| >= | greater than or equal |
| <= | less than or equal |
| < > | not equal to |

# **SQL AND**

* The SQL **AND** condition is used in SQL query to create two or more conditions to be met.
* It is used in SQL **SELECT, INSERT, UPDATE** and **DELETE**
* Let's see the syntax for SQL AND:
* SELECT columns FROM tables WHERE condition 1 AND condition 2;
* The SQL AND condition require that both conditions should be met.
* The SQL AND condition also can be used to join multiple tables in a SQL statement.
* To understand this concept practically, let us see some examples.

SELECT Student\_Id,First\_Name,Address

FROM Student\_Records

where Grade is NOT NULL AND Student\_Id in (201,204,205);

201|Akash|Delhi

205|Yatin|Lucknow

[Execution complete with exit code 0]

UPDATE Student\_Records SET Address = "Delhi" WHERE Student\_Id = 206 AND First\_Name = "Ishika";

SELECT\* from Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

206|Ishika|Delhi|19|51|C1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

DELETE FROM Student\_Records WHERE Student\_Id = 206 AND First\_Name = "Ishika";

SELECT\* from Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

# **SQL OR**

The SQL **OR** condition is used in SQL query to create a SQL statement where records are returned when any one condition met. It can be used in a **SELECT** statement, **INSERT** statement, **UPDATE** statement or **DELETE** statement.

**Let's see the syntax for the OR condition:**

1. **SELECT** columns **FROM** tables **WHERE** condition 1 OR condition 2;

SELECT \* FROM Student\_Records WHERE Student\_Id = 206 OR First\_Name = "Yash";

203|Yash|Delhi|20|89|A2

206|Ishika|Ghaziabad|19|51|C1

[Execution complete with exit code 0]

DELETE FROM Student\_Records WHERE Student\_Id = 206 OR First\_Name = "Yash";

SELECT\* from Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

UPDATE Student\_Records SET Address = "Delhi" WHERE Student\_Id = 206 OR First\_Name = "Vivek";

SELECT\* from Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

206|Ishika|Delhi|19|51|C1

207|Vivek|Delhi|20|62|

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records WHERE Student\_Id = 206 or First\_Name = NULL;

206|Ishika|Ghaziabad|19|51|C1

[Execution complete with exit code 0]

# **SQL NOT**

The NOT operator displays a record if the condition(s) is NOT TRUE.

NOT Syntax

SELECT *column1*,*column2, ...*  
FROM *table\_name*  
WHERE NOT *condition*;

CREATE TABLE Student\_records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(302, "Bhavesh", "Kanpur", 19, 93, "A1"),

(303, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(307, "Vivek", "Goa", 20, 62, NULL);

SELECT \* FROM Student\_records

WHERE NOT Address = "Delhi";

302|Bhavesh|Kanpur|19|93|A1

205|Yatin|Lucknow|20|75|B1

206|Ishika|Ghaziabad|19|51|C1

307|Vivek|Goa|20|62|

[Execution complete with exit code 0]

# **SQL WITH CLAUSE**

The SQL WITH clause is used to provide a sub-query block which can be referenced in several places within the main SQL query. It was introduced by oracle in oracle 9i release2 database.

There is an example of employee table:

**Syntax for the SQL WITH clause -**

This syntax is for SQL WITH clause using a single sub-query alias.

**WITH** <alias\_name> **AS** (sql\_sub-query\_statement)

**SELECT** column\_list **FROM** <alias\_name> [**table** **name**]

[**WHERE** <join\_condition>]

When you use multiple sub-query aliases, the syntax will be as follows.

**WITH** <alias\_name\_A>  **AS** (sql\_sub-query\_statement)

<alias\_name\_B> **AS** (sql\_sub-query\_statement\_from\_alias\_name\_A

Or sql\_sub-query\_statement)

**SELECT** <column\_list>

**FROM** <alias\_name\_A >,< alias\_name\_B >, [tablenames]

[**WHERE** < join\_condition>]

# **SQL COUNT(),AVG() and SUM()**

The COUNT() function returns the number of rows that matches a specified criterion.

COUNT() Syntax

SELECT COUNT(*column\_name*)  
FROM *table\_name*  
WHERE *condition*;

The AVG() function returns the average value of a numeric column.

AVG() Syntax

SELECT AVG(*column\_name*)  
FROM *table\_name*  
WHERE *condition*;

The SUM() function returns the total sum of a numeric column.

SUM() Syntax

SELECT SUM(*column\_name*)  
FROM *table\_name*

SELECT 'sum' AS Message;

SELECT SUM(Age) FROM Student\_records;

SELECT 'count' AS Message;

SELECT COUNT(Age) FROM Student\_records;

SELECT 'average' AS Message;

SELECT AVG(Age) FROM Student\_records ;

sum

135

count

7

average

19.2857142857143

[Execution complete with exit code 0]

# **SQL LIKE**

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 percent sign and the underscore can also be used in combinations!

LIKE Syntax

SELECT *column1, column2, ...*  
FROM *table\_name*  
WHERE *columnN* LIKE *pattern*;

**Tip:** You can also combine any number of conditions using AND or OR operators.

Here are some examples showing different LIKE operators with '%' and '\_' wildcards:

SELECT \* FROM Student\_records

WHERE Address LIKE "%anpu%";

302|Bhavesh|Kanpur|19|93|A1

[Execution complete with exit code 0]

CREATE TABLE animals (

id INT NOT NULL AUTO\_INCREMENT,

name CHAR(30) NOT NULL,

PRIMARY KEY (id)

);

INSERT INTO animals (name) VALUES

('dog'),('cat'),('penguin'),

('lax'),('whale'),('ostrich');

UPDATE animals SET name = 'dolphin' WHERE name LIKE 'l%';

SELECT \* FROM animals;

id name

1 dog

2 cat

3 penguin

4 dolphin

5 whale

6 ostrich

[Execution complete with exit code 0]

DELETE FROM animals WHERE name LIKE 'l%';

SELECT \* FROM animals;

id name

1 dog

2 cat

3 penguin

5 whale

6 ostrich

[Execution complete with exit code 0]

|  |  |
| --- | --- |
| **LIKE Operator** | **Description** |
| WHERE CustomerName LIKE 'a%' | Finds any values that start with "a" |
| WHERE CustomerName LIKE '%a' | Finds any values that end with "a" |
| WHERE CustomerName LIKE '%or%' | Finds any values that have "or" in any position |
| WHERE CustomerName LIKE '\_r%' | Finds any values that have "r" in the second position |
| WHERE CustomerName LIKE 'a\_%' | Finds any values that start with "a" and are at least 2 characters in length |
| WHERE CustomerName LIKE 'a\_\_%' | Finds any values that start with "a" and are at least 3 characters in length |
| WHERE ContactName LIKE 'a%o' | Finds any values that start with "a" and ends with "o" |

# **SQL BETWEEN**

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.

BETWEEN Syntax

SELECT *column\_name(s)*  
FROM *table\_name*  
WHERE *column\_name*BETWEEN *value1* AND *value2;*

SELECT \* FROM Student\_records

WHERE Age BETWEEN 15 AND 19;

201|Akash|Delhi|18|89|A2

302|Bhavesh|Kanpur|19|93|A1

204|Bhavana|Delhi|19|78|

206|Ishika|Ghaziabad|19|51|C1

[Execution complete with exit code 0]

SELECT \* FROM Student\_records

WHERE Age NOT BETWEEN 15 AND 19;

303|Yash|Delhi|20|89|A2

205|Yatin|Lucknow|20|75|B1

307|Vivek|Goa|20|62|

[Execution complete with exit code 0]

UPDATE Student\_records SET Percentage = 98 WHERE Age BETWEEN 15 and 19;

Select \* from Student\_records;

Student\_Id First\_Name Address Age Percentage Grade

201 Akash Delhi 18 98 A2

204 Bhavana Delhi 19 98 NULL

205 Yatin Lucknow 20 75 B1

206 Ishika Ghaziabad 19 98 C1

302 Bhavesh Kanpur 19 98 A1

303 Yash Delhi 20 89 A2

307 Vivek Goa 20 62 NULL

[Execution complete with exit code 0]

DELETE FROM Student\_records WHERE Age BETWEEN 15 and 19;

Select \* from Student\_records;

Student\_Id First\_Name Address Age Percentage Grade

205 Yatin Lucknow 20 75 B1

303 Yash Delhi 20 89 A2

307 Vivek Goa 20 62 NULL

[Execution complete with exit code 0]

# **SQL SELECT AS**

* SQL '**AS'** is used to assign a new name temporarily to a table column or even a table.
* It makes an easy presentation of query results and allows the developer to label results more accurately without permanently renaming table columns or even the table itself.
* Let's see the syntax of select as:

1. **SELECT** Column\_Name1 **AS** New\_Column\_Name, Column\_Name2  **As** New\_Column\_Name **FROM** Table\_Name;

Here, the Column\_Name is the name of a column in the original table, and the New\_Column\_Name is the name assigned to a particular column only for that specific query. This means that New\_Column\_Name is a temporary name that will be assigned to a query.

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT Student\_Id AS 'id', First\_Name FROM Student\_Records;

201|Akash

202|Bhavesh

203|Yash

204|Bhavana

205|Yatin

206|Ishika

207|Vivek

[Execution complete with exit code 0]

#### **Note: SQL AS is the same as SQL ALIAS.**

SELECT Student\_Name AS Student, AVG (Student\_Percentage) AS Average\_Percentage FROM students;

201|Akash|19.2857142857143

[Execution complete with exit code 0]

SELECT Student\_Id AS Stu, CONCAT(First\_Name, ', ', Age) AS Student\_Info FROM Student\_Records;

// Error: near line 21: in prepare, no such function: CONCAT (1)

[Execution complete with exit code 1]

# **HAVING Clause in SQL**

The HAVING clause places the condition in the groups defined by the GROUP BY clause in the SELECT statement.

This SQL clause is implemented after the 'GROUP BY' clause in the 'SELECT' statement.

This clause is used in SQL because we cannot use the WHERE clause with the SQL aggregate functions. Both WHERE and HAVING clauses are used for filtering the records in SQL queries.

### Difference between HAVING and WHERE Clause

The difference between the WHERE and HAVING clauses in the database is the most important question asked during an IT interview.

|  |  |
| --- | --- |
| **HAVING** | **WHERE** |
| 1. The HAVING clause is used in database systems to fetch the data/values from the groups according to the given condition. | 1. The WHERE clause is used in database systems to fetch the data/values from the tables according to the given condition. |
| 2. The HAVING clause is always executed with the GROUP BY clause. | 2. The WHERE clause can be executed without the GROUP BY clause. |
| 3. The HAVING clause can include SQL aggregate functions in a query or statement. | 3. We cannot use the SQL aggregate function with WHERE clause in statements. |
| 4. We can only use SELECT statement with HAVING clause for filtering the records. | 4. Whereas, we can easily use WHERE clause with UPDATE, DELETE, and SELECT statements. |
| 5. The HAVING clause is used in SQL queries after the GROUP BY clause. | 5. The WHERE clause is always used before the GROUP BY clause in SQL queries. |
| 6. We can implements this SQL clause in column operations. | 6. We can implements this SQL clause in row operations. |
| 7. It is a post-filter. | 7. It is a pre-filter. |
| 8. It is used to filter groups. | 8. It is used to filter the single record of the table. |

The following table shows the comparisons between these two clauses, but the main difference is that the [WHERE clause](https://www.javatpoint.com/sql-where) uses condition for filtering records before any groupings are made, while HAVING clause uses condition for filtering values from a group.

### Syntax of HAVING clause in SQL

1. **SELECT** column\_Name1, column\_Name2, ....., column\_NameN aggregate\_function\_name(column\_Name)

**FROM** table\_name **GROUP** **BY** column\_Name1 **HAVING** condition;

### MIN Function with HAVING Clause:

If you want to show each department and the minimum salary in each department, you must write the following query:

1. **SELECT** **MIN**(Emp\_Salary), Emp\_Dept **FROM** Employee **GROUP** **BY** Emp\_Dept;

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT MIN(Percentage), First\_Name FROM Student\_Records GROUP BY Address;

78|Bhavana

51|Ishika

62|Vivek

93|Bhavesh

75|Yatin

[Execution complete with exit code 0]

SELECT max(Percentage), First\_Name FROM Student\_Records GROUP BY Address;

89|Akash

51|Ishika

62|Vivek

93|Bhavesh

75|Yatin

[Execution complete with exit code 0]

# **SQL EXCEPT**

Usually, we use a JOIN clause to get the combined result from more than one table. Sometimes, we need a result set that contains records from one table but not available in the other table. In that case, SQL provides an EXCEPT clause/operator.

The EXCEPT clause in [SQL](https://www.javatpoint.com/sql-tutorial) is widely used to filter records from more than one table. This statement first combines the two [SELECT statements](https://www.javatpoint.com/sql-select) and returns records from the first SELECT query, which aren't present in the second SELECT query's result. In other words, it retrieves all rows from the first SELECT query while deleting redundant rows from the second.

This statement behaves the same as the minus operator does in mathematics. This article will illustrate how to use the SQL EXCEPT clause with the help of basic examples.

### Rules for SQL EXCEPT

We should consider the following rules before using the EXCEPT statement in SQL:

* In all SELECT statements, the number of columns and orders in the tables must be the same.
* The corresponding column's data types should be either the same or compatible.
* The fields in the respective columns of two SELECT statements cannot be the same.

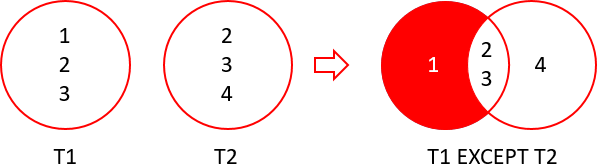
### SQL EXCEPT Syntax

The following syntax illustrates the use of EXCEPT clause:

1. **SELECT** column\_lists **from** table\_name1
2. **EXCEPT**
3. **SELECT** column\_lists **from** table\_name2;

#### **NOTE: It is to note that MySQL does not support EXCEPT clause. So here we are going to use the PostgreSQL database to explain SQL EXCEPT examples.**

The below image explains the working of EXCEPT operation in the two tables T1 and T2:



**Illustration:**

* Table T1 includes data 1, 2, and 3.
* Table T2 includes data 2, 3, and 4.

When we execute the EXCEPT query on these tables, we will get 1, which is unique data from the T1, and it will not found in the T2.

CREATE TABLE customer

(

id integer NOT NULL primary key,

name text NOT NULL,

age integer NOT NULL,

salary real NOT NULL

);

CREATE TABLE orders

(

order\_id integer NOT NULL,

date NOT NULL,

cust\_id integer NOT NULL,

amount real NOT NULL

);

INSERT INTO customer(id, name, age, salary)

VALUES (101, 'John', 24, 20000),

(102, 'Mike', 22, 25000),

(103, 'Emily', 24, 22000),

(104, 'James', 20, 30000),

(105, 'Sophia', 21, 35000);

INSERT INTO orders( order\_id, date, cust\_id, amount)

VALUES (1, '2009-10-08', 103, 1500),

(2, '2009-11-06', 103, 1000),

(3, '2009-12-05', 102, 2500),

(4, '2009-09-08', 101, 1800);

SELECT id, name, amount, date

FROM customer

LEFT JOIN orders

ON customer.id = orders.cust\_id

EXCEPT

SELECT id, name, amount, date

FROM customer

RIGHT JOIN orders

ON customer.id = orders.cust\_id;

id name amount date

104 James NULL NULL

105 Sophia NULL NULL

[Execution complete with exit code 0]

### EXCEPT statements in a single table

Generally, we use the EXCEPT statements in two tables, but we can also use them to filter records from a single table.

CREATE TABLE contacts (

id INT PRIMARY KEY AUTO\_INCREMENT,

first\_name VARCHAR(30) NOT NULL,

last\_name VARCHAR(25) NOT NULL,

email VARCHAR(210) NOT NULL,

age VARCHAR(22) NOT NULL

);

INSERT INTO contacts (first\_name,last\_name,email,age)

VALUES ('Kavin','Peterson','kavin.peterson@verizon.net','21'),

('Nick','Jonas','nick.jonas@me.com','18'),

('Peter','Heaven','peter.heaven@google.com','23'),

('Michal','Jackson','michal.jackson@aol.com','22'),

('Sean','Bean','sean.bean@yahoo.com','23'),

('Tom ','Baker','tom.baker@aol.com','20'),

('Ben','Barnes','ben.barnes@comcast.net','17'),

('Mischa ','Barton','mischa.barton@att.net','18'),

('Sean','Bean','sean.bean@yahoo.com','16'),

('Eliza','Bennett','eliza.bennett@yahoo.com','25'),

('Michal','Krane','michal.Krane@me.com','25'),

('Peter','Heaven','peter.heaven@google.com','20'),

('Brian','Blessed','brian.blessed@yahoo.com','20'),

('Kavin','Peterson','kavin.peterson@verizon.net','30');

SELECT id, first\_name,age FROM contacts

EXCEPT

SELECT id, first\_name, age FROM contacts WHERE age > 21;

id first\_name age

8 Mischa 18

9 Sean 16

7 Ben 17

2 Nick 18

13 Brian 20

1 Kavin 21

6 Tom 20

12 Peter 20

[Execution complete with exit code 0]

**SQL ORDER BY CLAUSE**

# **SQL ORDER BY Clause**

* Whenever we want to sort the records based on the columns stored in the tables of the SQL database, then we consider using the ORDER BY clause in SQL.
* The ORDER BY clause in SQL will help us to sort the records based on the specific column of a table. This means that all the values stored in the column on which we are applying ORDER BY clause will be sorted, and the corresponding column values will be displayed in the sequence in which we have obtained the values in the earlier step.
* Using the ORDER BY clause, we can sort the records in ascending or descending order as per our requirement. The records will be sorted in ascending order whenever the **ASC keyword** is used with ORDER by clause. **DESC keyword** will sort the records in descending order.
* **If no keyword is specified after the column based on which we have to sort the records, in that case, the sorting will be done by default in the ascending order.**

Before writing the queries for sorting the records, let us understand the syntax.

### Syntax to sort the records in ascending order:

1. **SELECT** ColumnName1,...,ColumnNameN **FROM** TableName  **ORDER** **BY** ColumnName **ASC**;

### Syntax to sort the records in descending order:

1. **SELECT** ColumnName1,...,ColumnNameN **FROM** TableName  **ORDER** **BY** ColumnNameDESC;

### Syntax to sort the records in ascending order without using ASC keyword:

1. **SELECT** ColumnName1,...,ColumnNameN **FROM** TableName  **ORDER** **BY** ColumnName;

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT \* FROM Student\_Records ORDER BY Age;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

204|Bhavana|Delhi|19|78|

206|Ishika|Ghaziabad|19|51|C1

203|Yash|Delhi|20|89|A2

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records ORDER BY First\_Name;

201|Akash|Delhi|18|89|A2

204|Bhavana|Delhi|19|78|

202|Bhavesh|Kanpur|19|93|A1

206|Ishika|Ghaziabad|19|51|C1

207|Vivek|Goa|20|62|

203|Yash|Delhi|20|89|A2

205|Yatin|Lucknow|20|75|B1

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records ORDER BY First\_Name desc;

205|Yatin|Lucknow|20|75|B1

203|Yash|Delhi|20|89|A2

207|Vivek|Goa|20|62|

206|Ishika|Ghaziabad|19|51|C1

202|Bhavesh|Kanpur|19|93|A1

204|Bhavana|Delhi|19|78|

201|Akash|Delhi|18|89|A2

[Execution complete with exit code 0]

# **SQL ORDER BY CLAUSE WITH ASCENDING ORDER**

* Whenever we want to sort the records based on the columns stored in the tables of the SQL database, then we consider using the ORDER BY clause in SQL.
* The **ORDER BY clause in SQL helps us sort the records based on a table's specific column.** This means that initially, all the values stored in the column on which we are applying the ORDER BY clause will be sorted. Then the corresponding column values will be displayed in the same sequence in which the values we have obtained in the earlier step.
* Using the ORDER BY clause, we can sort the records in ascending or descending order as per our requirement. The records will be sorted in ascending order whenever the **ASC keyword** is used with the ORDER by clause. Whereas, **DESC keyword** will sort the records in descending order. If no keyword is specified after the column based on which we have to sort the records, then in that case, the sorting will be done by default in the ascending order.

Before writing the queries for sorting the records, let us understand the syntax.

**Syntax to sort the records in ascending order:**

1. **SELECT** ColumnName1,…,ColumnNameN **FROM** TableName  **ORDER** **BY** ColumnName **ASC**;

# **SQL ORDER BY CLAUSE WITH DESCENDING ORDER**

* Whenever we want to sort the records based on the columns stored in the tables of the SQL database, then we consider using the ORDER BY clause in SQL.
* The ORDER BY clause in SQL helps us to sort the records based on the specific column of a table. This means that initially, all the values stored in the column on which we are applying the ORDER BY clause will be sorted. Then the corresponding column values will be displayed in the same sequence in which the values we have obtained in the earlier step.
* Using the ORDER BY clause, we can sort the records in ascending or descending order as per our requirement. The records will be sorted in ascending order whenever the ASC keyword is used with the ORDER by clause. **DESC keyword will sort the records in descending order**. If no keyword is specified after the column based on which we have to sort the records, then, in that case, the sorting will be done by default in the ascending order.

Before writing the queries for sorting the records, let us understand the syntax.

**Syntax to sort the records in descending order:**

1. **SELECT** ColumnName1,…,ColumnNameN **FROM** TableName  **ORDER** **BY** ColumnNameDESC;

# **SQL ORDER BY RANDOM**

If you want the resulting record to be **ordered randomly**, you should use the following codes according to several databases.

Here is a question: what is the need to fetch a random record or a row from a database?

Sometimes you may want to display random information like articles, links, pages, etc., to your user.

If you want to fetch random rows from any of the databases, you have to use some altered queries according to the databases.

* **Select a random row with Postgre SQL:**

1. **SELECT** **column** **FROM** **table** **ORDER** **BY** RANDOM () LIMIT 1;

SELECT \* FROM Student\_Records ORDER BY RANDOM ();

201|Akash|Delhi|18|89|A2

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|

202|Bhavesh|Kanpur|19|93|A1

206|Ishika|Ghaziabad|19|51|C1

[Execution complete with exit code 0]

SELECT \* FROM Student\_Records ORDER BY RANDOM () LIMIT 1;

Every time you run you will get random data

201|Akash|Delhi|18|89|A2

[Execution complete with exit code 0]

204|Bhavana|Delhi|19|78|

[Execution complete with exit code 0]

205|Yatin|Lucknow|20|75|B1

[Execution complete with exit code 0]

# **SQL ORDER BY LIMIT**

We can retrieve limited rows from the database. I can be used in pagination where are forced to show only limited records like 10, 50, 100 etc.

SELECT \* FROM Student\_Records ORDER BY RANDOM () LIMIT 3;

204|Bhavana|Delhi|19|78|

203|Yash|Delhi|20|89|A2

202|Bhavesh|Kanpur|19|93|A1

[Execution complete with exit code 0]

# **SQL SORTING ON MULTIPLE COLUMNS**

Let's take an example of customer table which has many columns, the following SQL statement selects all customers from the table named "customer", stored by the "country" and "Customer-Name" columns:

**SELECT** \* **FROM** customers

**ORDER** **BY** country, Customer-**Name**;

SELECT \* FROM Student\_Records ORDER BY Age,Grade

201|Akash|Delhi|18|89|A2

204|Bhavana|Delhi|19|78|

202|Bhavesh|Kanpur|19|93|A1

206|Ishika|Ghaziabad|19|51|C1

207|Vivek|Goa|20|62|

203|Yash|Delhi|20|89|A2

205|Yatin|Lucknow|20|75|B1

[Execution complete with exit code 0]

# **SQL ORDER BY DATE**

* ORDER BY is a clause in SQL which is used with SELECT query to fetch the records in ascending or descending order from a table.
* Just like we sort the integer and the string values stored in the column of the tables, similarly, we can sort the dates stored in the SQL table's column.
* All the records will be, by default, sorted in the ascending order. To sort the records in descending order, the DESC keyword is used.

CREATE TABLE student(

ID INT PRIMARY KEY,

Name VARCHAR(20),

Percentage INT,

Location VARCHAR(20),

DateOfBirth DATE);

INSERT INTO student(ID, Name, Percentage, Location, DateOfBirth)

VALUES (1, "Manthan Koli", 79, "Delhi", "2003-08-20"),

(2, "Dev Dixit", 75, "Pune", "1999-06-17"),

(3, "Aakash Deshmukh", 87, "Mumbai", "1997-09-12"),

(4, "Aaryan Jaiswal", 90, "Chennai", "2005-10-02"),

(5, "Rahul Khanna", 92, "Ambala", "1996-03-04");

SELECT \* FROM student Order by DateOfBirth;

ID Name Percentage Location DateOfBirth

5 Rahul Khanna 92 Ambala 1996-03-04

3 Aakash Deshmukh 87 Mumbai 1997-09-12

2 Dev Dixit 75 Pune 1999-06-17

1 Manthan Koli 79 Delhi 2003-08-20

4 Aaryan Jaiswal 90 Chennai 2005-10-02

[Execution complete with exit code 0]

SELECT \* FROM student Order by DateOfBirth desc;

ID Name Percentage Location DateOfBirth

4 Aaryan Jaiswal 90 Chennai 2005-10-02

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

5 Rahul Khanna 92 Ambala 1996-03-04

[Execution complete with exit code 0]

SELECT Name,DATE\_FORMAT(DateOfBirth,'%Y') FROM student ORDER BY DATE\_FORMAT(DateOfBirth,'%Y') ;

Name DATE\_FORMAT(DateOfBirth,'%Y')

Rahul Khanna 1996

Aakash Deshmukh 1997

Dev Dixit 1999

Manthan Koli 2003

Aaryan Jaiswal 2005

[Execution complete with exit code 0]

SELECT Name,DAY(DateOfBirth) as day FROM student ORDER BY DAY(DateOfBirth) ;

Name day

Aaryan Jaiswal 2

Rahul Khanna 4

Aakash Deshmukh 12

Dev Dixit 17

Manthan Koli 20

[Execution complete with exit code 0]

**SQL INSERT**

# **SQL INSERT STATEMENT**

SQL INSERT statement is a SQL query. It is used to insert a single or multiple records in a table.

There are two ways to insert data in a table:

1. By SQL insert into statement
   1. By specifying column names
   2. Without specifying column names
2. By SQL insert into select statement

## 1) Inserting data directly into a table

You can insert a row in the table by using SQL INSERT INTO command.

There are two ways to insert values in a table.

**In the first method there is no need to specify the column name where the data will be inserted, you need only their values.**

**INSERT** **INTO** table\_name

**VALUES** (value1, value2, value3....);

**The second method specifies both the column name and values which you want to insert.**

**INSERT** **INTO** table\_name (column1, column2, column3....)

**VALUES** (value1, value2, value3.....);

Let's take an example of table which has five records within it.

**INSERT** **INTO** STUDENTS (ROLL\_NO, **NAME**, AGE, CITY)

**VALUES** (1, ABHIRAM, 22, ALLAHABAD);

**INSERT** **INTO** STUDENTS (ROLL\_NO, **NAME**, AGE, CITY)

**VALUES** (2, ALKA, 20, GHAZIABAD);

**INSERT** **INTO** STUDENTS (ROLL\_NO, **NAME**, AGE, CITY)

**VALUES** (3, DISHA, 21, VARANASI);

**INSERT** **INTO** STUDENTS (ROLL\_NO, **NAME**, AGE, CITY)

**VALUES** (4, ESHA, 21, DELHI);

**INSERT** **INTO** STUDENTS (ROLL\_NO, **NAME**, AGE, CITY)

**VALUES** (5, MANMEET, 23, JALANDHAR);

It will show the following table as the final result.

|  |  |  |  |
| --- | --- | --- | --- |
| **ROLL\_NO** | **NAME** | **AGE** | **CITY** |
| 1 | ABHIRAM | 22 | ALLAHABAD |
| 2 | ALKA | 20 | GHAZIABAD |
| 3 | DISHA | 21 | VARANASI |
| 4 | ESHA | 21 | DELHI |
| 5 | MANMEET | 23 | JALANDHAR |

You can create a record in CUSTOMERS table by using this syntax also.

**INSERT** **INTO** CUSTOMERS

**VALUES** (6, PRATIK, 24, KANPUR);

## 2) Inserting data through SELECT Statement

**SQL INSERT INTO SELECT Syntax**

**INSERT** **INTO** table\_name

[(column1, column2, .... **column**)]

**SELECT** column1, column2, .... **Column** N

**FROM** table\_name [**WHERE** condition];

Note: when you add a new row, you should make sure that data type of the value and the column should be matched.

If any integrity constraints are defined for the table, you must follow them.

# **SQL INSERT Multiple Rows**

Many times developers ask that is it possible to insert multiple rows into a single table in a single statement. Currently, developers have to write multiple insert statements when they insert values in a table. It is not only boring but also time-consuming.

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT \* FROM Student\_Records ORDER BY Age,Grade

**SQL UPDATE**

# **SQL UPDATE**

The SQL commands (*UPDATE* and *DELETE*) are used to modify the data that is already in the database. The SQL DELETE command uses a WHERE clause.

**SQL UPDATE** statement is used to change the data of the records held by tables. Which rows is to be update, it is decided by a condition. To specify condition, we use WHERE clause.

The UPDATE statement can be written in following form:

**UPDATE** table\_name **SET** [column\_name1= value1,... column\_nameN = valueN] [**WHERE** condition]

**Or**

**UPDATE** table\_name

**SET** column\_name = expression

**WHERE** conditions

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

UPDATE Student\_Records

SET First\_Name = "lochu"

WHERE Student\_Id = 206;

SELECT \* FROM Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

206|lochu|Ghaziabad|19|51|C1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

## Updating Multiple Fields:

If you are going to update multiple fields, you should separate each field assignment with a comma.

SQL UPDATE statement for multiple fields:

MYSQL SYNTAX FOR UPDATING TABLE:

**UPDATE** table\_name

**SET** field1 = new-value1, field2 = new-value2,

[**WHERE** CLAUSE]

UPDATE Student\_Records

SET First\_Name = "lochu",Age = 22

WHERE Student\_Id = 206;

SELECT \* FROM Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

206|lochu|Ghaziabad|22|51|C1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

# **SQL UPDATE with JOIN**

**SQL UPDATE JOIN** means we will update one table using another table and join condition.

Let us take an example of a customer table. I have updated customer table that contains latest customer details from another source system. I want to update the customer table with latest data. In such case, I will perform join between target table and source table using join on customer ID.

Let's see the *syntax* of SQL UPDATE query with JOIN statement.

**UPDATE** customer\_table

**INNER** JOIN

Customer\_table

**ON** customer\_table.rel\_cust\_name = customer\_table.cust\_id

**SET** customer\_table.rel\_cust\_name = customer\_table.cust\_name

# **SQL UPDATE DATE**

How to update a date and time field in SQL?

If you want to update a date & time field in SQL, you should use the following query.

let's see the syntax of sql update date.

**UPDATE** **table**

**SET** Column\_Name = 'YYYY-MM-DD HH:MM:SS'

**WHERE** Id = value

**SQL DELETE**

# **SQL DELETE**

The **SQL DELETE statement** is used to delete rows from a table. Generally DELETE statement removes one or more records from a table.

#### **SQL DELETE Syntax**

Let's see the Syntax for the SQL DELETE statement:

1. **DELETE** **FROM** table\_name [**WHERE** condition];

The WHERE clause in the SQL DELETE statement is optional and it identifies the rows in the column that gets deleted.

WHERE clause is used to prevent the deletion of all the rows in the table, If you don't use the WHERE clause you might loss all the rows.

 Another example of delete statement is given below

1. **DELETE** **FROM** EMPLOYEE;

It will delete all the records of EMPLOYEE table.

CREATE TABLE Student\_Records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_Records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

DELETE From Student\_Records Where Student\_Id = 205;

SELECT \* FROM Student\_Records;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

206|Ishika|Ghaziabad|19|51|C1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

DELETE From Student\_Records;

SELECT \* FROM Student\_Records;

[Execution complete with exit code 0]

# **SQL DELETE TABLE**

The DELETE statement is used to delete rows from a table. If you want to remove a specific row from a table you should use WHERE condition.

1. **DELETE** **FROM** table\_name [**WHERE** condition];

But if you do not specify the WHERE condition it will remove all the rows from the table.

1. **DELETE** **FROM** table\_name;

There are some more terms similar to DELETE statement like as DROP statement and TRUNCATE statement but they are not exactly same there are some differences between them.

## Difference between DELETE and TRUNCATE statements

There is a slight difference b/w delete and truncate statement. The **DELETE statement** only deletes the rows from the table based on the condition defined by WHERE clause or delete all the rows from the table when condition is not specified.

But it does not free the space containing by the table.

The **TRUNCATE statement:** it is used to delete all the rows from the table **and free the containing space.**

1. **TRUNCATE** **TABLE** employee;

## Difference b/w DROP and TRUNCATE statements

When you use the drop statement it deletes the table's row together with the table's definition so all the relationships of that table with other tables will no longer be valid.

**When you drop a table:**

* Table structure will be dropped
* Relationship will be dropped
* Integrity constraints will be dropped
* Access privileges will also be dropped

On the other hand when we **TRUNCATE** a table, the table structure remains the same, so you will not face any of the above problems

# **SQL DELETE ROW**

Let us take an example of student.

If you want to delete a student with id 003 from the student\_name table, then the SQL DELETE query should be like this:

**DELETE** **FROM** student\_name

**WHERE** id = 003;

# **SQL DELETE ALL ROWS**

The statement SQL DELETE ALL ROWS is used to delete all rows from the table. If you want to delete all the rows from student table the query would be like,

1. **DELETE** **FROM** STUDENT\_NAME;

# **SQL DELETE DUPLICATE ROWS**

If you have got a situation that you have multiple duplicate records in a table, so at the time of fetching records from the table you should be more careful. You make sure that you are fetching unique records instead of fetching duplicate records.

To overcome with this problem we use DISTINCT keyword.

It is used along with SELECT statement to eliminate all duplicate records and fetching only unique records.

**SYNTAX:**

The basic syntax to eliminate duplicate records from a table is:

**SELECT** **DISTINCT** column1, column2,....columnN

**FROM** **table** \_name

**WHERE** [conditions]

SELECT DISTINCT First\_Name,Address FROM Student\_Records

ORDER BY Student\_Id;

Akash|Delhi

Bhavesh|Kanpur

Yash|Delhi

Bhavana|Delhi

Yatin|Lucknow

Ishika|Ghaziabad

Vivek|Goa

Yash|hello

[Execution complete with exit code 0]

# **SQL DELETE DATABASE**

You can easily remove or delete indexes, tables and databases with the DROP statement.

**The DROP index statement is:**

Used to delete index in the table

**DROP INDEX syntax for MySQL:**

1. **ALTER** **TABLE** table\_name **DROP** **INDEX** index\_name

# **SQL DELETE VIEW**

Before knowing about what is SQL delete view, it is important to know -

**What is SQL view?**

A view is a result set of a stored query on the data.

The SQL view is a table which does not physically exist. It is only a virtual table.

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SQL VIEW can be created by a SQL query by joining one or more table.

**Syntax for SQL create view -**

**CREATE** **VIEW** view\_name **AS**

**SELECT** columns

**FROM** tables

**WHERE** conditions;

If you want to delete a SQL view, It is done by SQL DROP command you should use the following syntax:

**SQL DROP VIEW syntax:**

1. **DROP** **VIEW** view\_name

CREATE VIEW view\_name AS

SELECT Student\_Id,First\_Name

FROM Student\_Records

WHERE Address != "Delhi";

SELECT \* FROM view\_name;

202|Bhavesh

208|Yash

205|Yatin

206|Ishika

207|Vivek

[Execution complete with exit code 0]

CREATE VIEW view\_name AS

SELECT Student\_Id,First\_Name

FROM Student\_Records

WHERE Address != "Delhi";

DROP VIEW view\_name;

SELECT \* FROM view\_name;

Error: near line 29: in prepare, no such table: view\_name (1)

[Execution complete with exit code 1]

# **SQL DELETE JOIN**

This is very commonly asked question that how to delete or update rows using join clause

It is not a very easy process, sometimes, we need to update or delete records on the basis of complex WHERE clauses.

There are three tables which we use to operate on SQL syntax for DELETE JOIN.

These tables are table1, table2 and target table.

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**SQL Syntax for delete JOIN**

1. **DELETE** [target **table**]
2. **FROM**    [table1]
3. **INNER** JOIN [table2]
4. **ON** [table1.[joining **column**] = [table2].[joining **column**]
5. **WHERE**   [condition]

**Syntax for update**

1. **UPDATE** [target **table**]
2. **SET** [target **column**] = [new value]
3. **FROM**    [table1]
4. **INNER** JOIN [table2]
5. **ON** [table1.[joining **column**] = [table2].[joining **column**]
6. **WHERE**   [condition]

**SQL JOIN**

# **SQL JOIN**

As the name shows, JOIN means *to combine something*. In case of SQL, JOIN means **"to combine two or more tables"**.

The SQL JOIN clause takes records from two or more tables in a database and combines it together.

**ANSI standard SQL** defines five types of JOIN :

1. inner join,
2. left outer join,
3. right outer join,
4. full outer join, and
5. cross join.

In the process of joining, rows of both tables are combined in a single table.

#### **Why SQL JOIN is used?**

If you want to access more than one table through a select statement.

If you want to combine two or more table then SQL JOIN statement is used .it combines rows of that tables in one table and one can retrieve the information by a SELECT statement.

The joining of two or more tables is based on common field between them.

SQL INNER JOIN also known as simple join is the most common type of join.

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

CREATE TABLE table2

(

Id Int PRIMARY KEY,

Last\_Name VARCHAR (20),

Hobby VARCHAR (20),

Attendance Int NOT NULL,

Batch VARCHAR (10)

);

INSERT INTO table2 VALUES

(201,"kumar","drawing",45,"red"),

(202,"gowd","singling",55,"blue"),

(203,"shekar","dancing",65,"yellow"),

(204,"vilehya","painting",45,"green"),

(205,"krishna","travelling",85,"red"),

(206,"koushal","gardening",75,"yellow"),

(207,"shankar","drawing",55,"blue");

SELECT Student\_Id, First\_Name, Last\_Name, Hobby

FROM table1 t1, table2 t2

where t1.Student\_Id = t2.Id

201|Akash|kumar|drawing

202|Bhavesh|gowd|singling

203|Yash|shekar|dancing

204|Bhavana|vilehya|painting

205|Yatin|krishna|travelling

206|Ishika|koushal|gardening

207|Vivek|shankar|drawing

[Execution complete with exit code 0]

SELECT Student\_Id, First\_Name, Last\_Name, Hobby

FROM table1 t1, table2 t2

201|Akash|kumar|drawing

201|Akash|gowd|singling

201|Akash|shekar|dancing

201|Akash|vilehya|painting

201|Akash|krishna|travelling

201|Akash|koushal|gardening

201|Akash|shankar|drawing

202|Bhavesh|kumar|drawing

202|Bhavesh|gowd|singling

202|Bhavesh|shekar|dancing

202|Bhavesh|vilehya|painting

202|Bhavesh|krishna|travelling

202|Bhavesh|koushal|gardening

202|Bhavesh|shankar|drawing

203|Yash|kumar|drawing

203|Yash|gowd|singling

203|Yash|shekar|dancing

203|Yash|vilehya|painting

203|Yash|krishna|travelling

203|Yash|koushal|gardening

203|Yash|shankar|drawing

204|Bhavana|kumar|drawing

204|Bhavana|gowd|singling

204|Bhavana|shekar|dancing

204|Bhavana|vilehya|painting

204|Bhavana|krishna|travelling

204|Bhavana|koushal|gardening

204|Bhavana|shankar|drawing

205|Yatin|kumar|drawing

205|Yatin|gowd|singling

205|Yatin|shekar|dancing

205|Yatin|vilehya|painting

205|Yatin|krishna|travelling

205|Yatin|koushal|gardening

205|Yatin|shankar|drawing

206|Ishika|kumar|drawing

206|Ishika|gowd|singling

206|Ishika|shekar|dancing

206|Ishika|vilehya|painting

206|Ishika|krishna|travelling

206|Ishika|koushal|gardening

206|Ishika|shankar|drawing

207|Vivek|kumar|drawing

207|Vivek|gowd|singling

207|Vivek|shekar|dancing

207|Vivek|vilehya|painting

207|Vivek|krishna|travelling

207|Vivek|koushal|gardening

207|Vivek|shankar|drawing

[Execution complete with exit code 0]

# **SQL OUTER JOIN**

* In the SQL outer JOIN, **all the content from both the tables is integrated together.**
* Even though the records from both the tables are matched or not, the matching and non-matching records from both the tables will be considered an output of the outer join in SQL.
* There are three different types of outer join in SQL:
  1. **Left Outer Join**
  2. **Right Outer Join**
  3. **Full Outer Join**

1. Left Outer Join:

* If we use the left outer join to combine two different tables, then we will get all the records from the left table. But we will get only those records from the right table, which have the corresponding key in the left table.
* Syntax of writing a query to perform left outer join:

SELECT TableName1.columnName1, TableName2.columnName2 FROM TableName1 LEFT OUTER JOIN TableName2 ON TableName1.ColumnName = TableName2.ColumnName;

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(302, "Bhavesh", "Kanpur", 19, 93, "A1"),

(303, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(307, "Vivek", "Goa", 20, 62, NULL);

CREATE TABLE table2

(

Id Int PRIMARY KEY,

Last\_Name VARCHAR (20),

Hobby VARCHAR (20),

Attendance Int NOT NULL,

Batch VARCHAR (10)

);

INSERT INTO table2 VALUES

(201,"kumar","drawing",45,"red"),

(302,"gowd","singling",55,"blue"),

(203,"shekar","dancing",65,"yellow"),

(304,"vilehya","painting",45,"green"),

(205,"krishna","travelling",85,"red"),

(306,"koushal","gardening",75,"yellow"),

(207,"shankar","drawing",55,"blue");

SELECT t1.Student\_Id, t1.First\_Name, t2.Last\_Name, t2.Batch FROM table1 t1

LEFT OUTER JOIN table2 t2 ON t1.Student\_Id = t2.Id;

Student\_Id First\_Name Last\_Name Batch

201 Akash kumar red

204 Bhavana NULL NULL

205 Yatin krishna red

206 Ishika NULL NULL

302 Bhavesh gowd blue

303 Yash NULL NULL

307 Vivek NULL NULL

[Execution complete with exit code 0]

2. Right Outer Join:

* Right outer join is the reverse of left outer join. If we use the right outer join to combine two different tables, then we will get all the records from the right table. But we will get only those records from the left table, which have the corresponding key in the right table.
* Syntax of writing a query to perform right outer join:

1. **SELECT** TableName1.columnName1, TableName2.columnName2 **FROM** TableName1  RIGHT OUTER JOIN TableName2  **ON** TableName1.ColumnName = TableName2.ColumnName;

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

RIGHT OUTER JOIN table2 t2 ON t1.Student\_Id = t2.Id;

Id First\_Name Last\_Name Grade

201 Akash kumar A2

203 NULL shekar NULL

205 Yatin krishna B1

207 NULL shankar NULL

302 Bhavesh gowd A1

304 NULL vilehya NULL

306 NULL koushal NULL

[Execution complete with exit code 0]

3. Full Outer Join:

* If we use a full outer join to combine two different tables, ***then we will get all the records from both the table,***e., we will get all the records from the left table as well as the right table.
* **MySQL doesn't support FULL OUTER JOIN directly**. So to implement full outer join in MySQL, we will execute two queries in a single query. The first query will be of LEFT OUTER JOIN, and the second query will be of RIGHT OUTER JOIN. We will combine the first and second query with the UNION operator to see the results of FULL OUTER JOIN.
* Syntax of writing a query to perform full outer join:

1. **SELECT** TableName1.columnName1, TableName2.columnName2 **FROM** TableName1  LEFT OUTER JOIN TableName2  **ON** TableName1.ColumnName = TableName2.ColumnName **UNION** **SELECT** TableName1.columnName1, TableName2.columnName2 **FROM** TableName1  RIGHT OUTER JOIN TableName2  **ON** TableName1.ColumnName = TableName2.ColumnName;

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(302, "Bhavesh", "Kanpur", 19, 93, "A1"),

(303, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(307, "Vivek", "Goa", 20, 62, NULL);

CREATE TABLE table2

(

Id Int PRIMARY KEY,

Last\_Name VARCHAR (20),

Hobby VARCHAR (20),

Attendance Int NOT NULL,

Batch VARCHAR (10)

);

INSERT INTO table2 VALUES

(201,"kumar","drawing",45,"red"),

(302,"gowd","singling",55,"blue"),

(203,"shekar","dancing",65,"yellow"),

(304,"vilehya","painting",45,"green"),

(205,"krishna","travelling",85,"red"),

(306,"koushal","gardening",75,"yellow"),

(207,"shankar","drawing",55,"blue");

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

RIGHT OUTER JOIN table2 t2 ON t1.Student\_Id = t2.Id UNION

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

LEFT OUTER JOIN table2 t2 ON t1.Student\_Id = t2.Id

Id First\_Name Last\_Name Grade

201 Akash kumar A2

203 NULL shekar NULL

205 Yatin krishna B1

207 NULL shankar NULL

302 Bhavesh gowd A1

304 NULL vilehya NULL

306 NULL koushal NULL

NULL Bhavana NULL NULL

NULL Ishika NULL C1

NULL Yash NULL A2

NULL Vivek NULL NULL

[Execution complete with exit code 0]

Different Types of SQL JOINs

Here are the different types of the JOINs in SQL:

* (INNER) JOIN: Returns records that have matching values in both tables
* LEFT (OUTER) JOIN: Returns all records from the left table, and the matched records from the right table
* RIGHT (OUTER) JOIN: Returns all records from the right table, and the matched records from the left table
* FULL (OUTER) JOIN: Returns all records when there is a match in either left or right table

# **SQL Left Join**

* Join operation in SQL is used to **combine multiple tables together into a single table.**
* If we use **left join to combine two different tables, then we will get all the records from the left table**. But we will get only those records from the right table, which have the corresponding key in the left table. Rest other records in the right table for which the common column value doesn't match with the common column value of the left table; then, it is displayed as NULL.

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

LEFT JOIN table2 t2 ON t1.Student\_Id = t2.Id

Id First\_Name Last\_Name Grade

201 Akash kumar A2

NULL Bhavana NULL NULL

205 Yatin krishna B1

NULL Ishika NULL C1

302 Bhavesh gowd A1

NULL Yash NULL A2

NULL Vivek NULL NULL

[Execution complete with exit code 0]

# **SQL RIGHT JOIN**

* Join operation in SQL is used to combine multiple tables together into a single table.
* **If we use the right join to combine two different tables, then we will get all the records from the right table**. But we will get only those records from the left table, which have the corresponding key in the right table. Rest other records in the left table for which the common column value doesn't match with the common column value of the right table; displayed as NULL.
* Let us look at the syntax of writing a query to perform the right join operation in SQL.

**SELECT** TableName1.columnName1, TableName2.columnName2 **FROM** TableName1

RIGHT JOIN TableName2 **ON** TableName1.ColumnName = TableName2.ColumnName;

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

Right JOIN table2 t2 ON t1.Student\_Id = t2.Id

Id First\_Name Last\_Name Grade

201 Akash kumar A2

203 NULL shekar NULL

205 Yatin krishna B1

207 NULL shankar NULL

302 Bhavesh gowd A1

304 NULL vilehya NULL

306 NULL koushal NULL

[Execution complete with exit code 0]

# **SQL FULL JOIN**

The SQL full join is the result of combination of both left and right outer join and the join tables have all the records from both tables. It puts NULL on the place of matches not found.

SQL full outer join and SQL join are same. generally it is known as SQL FULL JOIN.

**Syntax for full outer join:**

**SELECT** \*

**FROM** table1

**FULL** OUTER JOIN table2

**ON** table1.column\_name = table2.column\_name;

# **SQL Cross Join**

* Join operation in SQL is used to combine multiple tables together into a single table.
* If we use the cross join to combine two different tables, then we will get the Cartesian product of the sets of rows from the joined table. When each row of the first table is combined with each row from the second table, it is known as Cartesian join or cross join.
* After performing the cross join operation, the total number of rows present in the final table will be equal to the product of the number of rows present in table 1 and the number of rows present in table 2.
* If there are two records in table 1 and three records in table 2, then after performing cross join operation, we will get six records in the final table.
* Let us look at the syntax of writing a query to perform the cross join operation in SQL.

1. **SELECT** TableName1.columnName1, TableName2.columnName2 **FROM** TableName1 CROSS JOIN TableName2 **ON** TableName1.ColumnName = TableName2.ColumnName;

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

CROSS JOIN table2 t2

Id First\_Name Last\_Name Grade

201 Vivek kumar NULL

201 Yash kumar A2

201 Bhavesh kumar A1

201 Ishika kumar C1

201 Yatin kumar B1

201 Bhavana kumar NULL

201 Akash kumar A2

203 Vivek shekar NULL

203 Yash shekar A2

203 Bhavesh shekar A1

203 Ishika shekar C1

203 Yatin shekar B1

203 Bhavana shekar NULL

203 Akash shekar A2

205 Vivek krishna NULL

205 Yash krishna A2

205 Bhavesh krishna A1

205 Ishika krishna C1

205 Yatin krishna B1

205 Bhavana krishna NULL

205 Akash krishna A2

207 Vivek shankar NULL

207 Yash shankar A2

207 Bhavesh shankar A1

207 Ishika shankar C1

207 Yatin shankar B1

207 Bhavana shankar NULL

207 Akash shankar A2

302 Vivek gowd NULL

302 Yash gowd A2

302 Bhavesh gowd A1

302 Ishika gowd C1

302 Yatin gowd B1

302 Bhavana gowd NULL

302 Akash gowd A2

304 Vivek vilehya NULL

304 Yash vilehya A2

304 Bhavesh vilehya A1

304 Ishika vilehya C1

304 Yatin vilehya B1

304 Bhavana vilehya NULL

304 Akash vilehya A2

306 Vivek koushal NULL

306 Yash koushal A2

306 Bhavesh koushal A1

306 Ishika koushal C1

306 Yatin koushal B1

306 Bhavana koushal NULL

306 Akash koushal A2

[Execution complete with exit code 0]

SELECT t2.Id, t1.First\_Name, t2.Last\_Name, t1.Grade FROM table1 t1

CROSS JOIN table2 t2 ON t1.Student\_Id = t2.Id

Id First\_Name Last\_Name Grade

201 Akash kumar A2

205 Yatin krishna B1

302 Bhavesh gowd A1

[Execution complete with exit code 0]

**SQL KEYS**

# **SQL PRIMARY KEY**

A column or columns is called **primary key (PK)** that *uniquely identifies each row in the table*.

If you want to create a primary key, you should define a PRIMARY KEY constraint when you create or modify a table.

When multiple columns are used as a primary key, it is known as **composite primary key**.

In designing the composite primary key, you should use as few columns as possible. It is good for storage and performance both, the more columns you use for primary key the more storage space you require.

Inn terms of performance, less data means the database can process faster.

#### **Points to remember for primary key:**

* Primary key enforces the entity integrity of the table.
* Primary key always has unique data.
* A primary key length cannot be exceeded than 900 bytes.
* A primary key cannot have null value.
* There can be no duplicate value for a primary key.
* A table can contain only one primary key constraint.

When we specify a primary key constraint for a table, database engine automatically creates a unique index for the primary key column.

#### **Main advantage of primary key:**

The main advantage of this uniqueness is that we get **fast access**.

In oracle, it is not allowed for a primary key to contain more than 32 columns.

**MySQL:**

**CREATE** **TABLE** students

(

S\_Id **int** NOT NULL,

LastName **varchar** (255) NOT NULL,

FirstName **varchar** (255),

Address **varchar** (255),

City **varchar** (255),

**PRIMARY** **KEY** (S\_Id)

)

SQL primary key for multiple columns:

**MySQL, SQL Server, Oracle, MS Access:**

**CREATE** **TABLE** students

(

S\_Id **int** NOT NULL,

LastName **varchar** (255) NOT NULL,

FirstName **varchar** (255),

Address **varchar** (255),

City **varchar** (255),

**CONSTRAINT** pk\_StudentID **PRIMARY** **KEY** (S\_Id, LastName)

)

**Note:**you should note that in the above example there is only one PRIMARY KEY (pk\_StudentID). However it is made up of two columns (S\_Id and LastName).

SQL primary key on ALTER TABLE

When table is already created and you want to create a PRIMARY KEY constraint on the "S\_Id" column you should use the following SQL:

**Primary key on one column:**

**ALTER** **TABLE** students

**ADD** **PRIMARY** **KEY** (S\_Id)

**Primary key on multiple column:**

**ALTER** **TABLE** students

**ADD** **CONSTRAINT** pk\_StudentID **PRIMARY** **KEY** (S\_Id,LastName)

How to DROP a PRIMARY KEY constraint?

If you want to DROP (remove) a primary key constraint, you should use following syntax:

**MySQL:**

**ALTER** **TABLE** students

**DROP** **PRIMARY** **KEY**

# **SQL FOREIGN KEY**

In the relational databases, a foreign key is a field or a column that is used to establish a link between two tables.

In simple words you can say that, a foreign key in one table used to point primary key in another table.

Here orders are given by students.

**First table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **S\_Id** | **LastName** | **FirstName** | **CITY** |
| 1 | MAURYA | AJEET | ALLAHABAD |
| 2 | JAISWAL | RATAN | GHAZIABAD |
| 3 | ARORA | SAUMYA | MODINAGAR |

**Second table:**

|  |  |  |
| --- | --- | --- |
| **O\_Id** | **OrderNo** | **S\_Id** |
| 1 | 99586465 | 2 |
| 2 | 78466588 | 2 |
| 3 | 22354846 | 3 |
| 4 | 57698656 | 1 |

Here you see that "S\_Id" column in the "Orders" table points to the "S\_Id" column in "Students" table.

* The "S\_Id" column in the "Students" table is the PRIMARY KEY in the "Students" table.
* The "S\_Id" column in the "Orders" table is a FOREIGN KEY in the "Orders" table

SQL FOREIGN KEY constraint ON CREATE TABLE:

(Defining a foreign key constraint on single column)

To create a foreign key on the "S\_Id" column when the "Orders" table is created:

**MySQL:**

**CREATE** **TABLE** orders

(

O\_Id **int** NOT NULL,

Order\_No  **int** NOT NULL,

S\_Id **int**,

PRIMARY **KEY** (O\_Id),

**FOREIGN** **KEY** (S\_Id) **REFERENCES** Persons (S\_Id)

)

SQL FOREIGN KEY constraint for ALTER TABLE:

If the Order table is already created and you want to create a FOREIGN KEY constraint on the "S\_Id" column, you should write the following syntax:

**Defining a foreign key constraint on single column:**

**MySQL / SQL Server / Oracle / MS Access:**

**ALTER** **TABLE** Orders

**ADD** **CONSTRAINT** fk\_PerOrders

**FOREIGN** **KEY**(S\_Id)

**REFERENCES** Students (S\_Id)

DROP SYNTAX for FOREIGN KEY COSTRAINT:

If you want to drop a FOREIGN KEY constraint, use the following syntax:

**MySQL:**

**ALTER** **TABLE** Orders

ROP **FOREIGN** **KEY** fk\_PerOrders

Difference between primary key and foreign key in SQL:

* These are some important differences between primary key and foreign key in SQL-
* Primary key cannot be null on the other hand foreign key can be null.
* Primary key is always unique while foreign key can be duplicated.
* Primary key uniquely identify a record in a table while foreign key is a field in a table that is primary key in another table.
* There is only one primary key in the table on the other hand we can have more than one foreign key in the table.
* By default primary key adds a clustered index on the other hand foreign key does not automatically create an index, clustered or non-clustered. You must manually create an index for foreign key.

# **SQL Composite Key**

A composite key is a combination of two or more columns in a table that can be used to uniquely identify each row in the table when the columns are combined uniqueness is guaranteed, but when it taken individually it does not guarantee uniqueness.

Sometimes more than one attributes are needed to uniquely identify an entity. A primary key that is made by the combination of more than one attribute is known as a composite key.

In other words we can say that:

Composite key is a key which is the combination of more than one field or column of a given table. It may be a candidate key or primary key.

MySQL:

**CREATE** **TABLE** SAMPLE\_TABLE

(COL1 **integer**,

COL2 **varchar**(30),

COL3 **varchar**(50),

**PRIMARY** **KEY** (COL1, COL2));

# **Unique Key in SQL**

* A unique key is a set of one or more than one fields/columns of a table that uniquely identify a record in a database table.
* You can say that it is little like primary key but it can accept only one null value and it cannot have duplicate values.
* The unique key and primary key both provide a guarantee for uniqueness for a column or a set of columns.
* There is an automatically defined unique key constraint within a primary key constraint.
* There may be many unique key constraints for one table, but only one PRIMARY KEY constraint for one table.

**MySQL:**

**CREATE** **TABLE** students

**CREATE** **TABLE** students

(

S\_Id **int** NOT NULL,

LastName **varchar** (255) NOT NULL,

FirstName **varchar** (255),

City **varchar** (255),

**UNIQUE** (S\_Id)

)

**(Defining a unique key constraint on multiple columns):**

**MySQL / SQL Server / Oracle / MS Access:**

**CREATE** **TABLE** students

(

S\_Id **int** NOT NULL,

LastName **varchar** (255) NOT NULL,

FirstName **varchar** (255),

City **varchar** (255),

**CONSTRAINT** uc\_studentId **UNIQUE** (S\_Id, LastName)

)

**SQL UNIQUE KEY constraint on ALTER TABLE:**

If you want to create a unique constraint on "S\_Id" column when the table is already created, you should use the following SQL syntax:

**(Defining a unique key constraint on single column):**

**MySQL / SQL Server / Oracle / MS Access:**

**ALTER** **TABLE** students

**ADD** **UNIQUE** (S\_Id)

**(Defining a unique key constraint on multiple columns):**

**MySQL / SQL Server / Oracle / MS Access:**

**ALTER** **TABLE** students

**ADD** **CONSTRAINT** uc\_StudentId **UNIQUE**  (S\_Id, LastName)

**DROP SYNTAX FOR A FOREIGN KEY constraint:**

If you want to drop a UNIQUE constraint, use the following SQL syntax:

**MySQL:**

**ALTER** **TABLE** students

**DROP** **INDEX** uc\_studentID

# **Alternate Key in SQL**

Alternate key is a secondary key it can be simple to understand by an example:

Let's take an example of student it can contain NAME, ROLL NO., ID and CLASS.

Here ROLL NO. is primary key and rest of all columns like NAME, ID and CLASS are alternate keys.

If a table has more than one candidate key, one of them will become the primary key and rest of all are called alternate keys.

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In simple words, you can say that any of the candidate key which is not part of primary key is called an alternate key. So when we talk about alternate key, the column may not be primary key but still it is a unique key in the column.

#### **An alternate key is just a candidate key that has not been selected as the primary key.**

# **SQL Injection**

The SQL Injection is a code penetration technique that might cause loss to our database. It is one of the most practiced web hacking techniques to place malicious code in SQL statements, via webpage input. SQL injection can be used to manipulate the application's web server by malicious users.

SQL injection generally occurs when we ask a user to input their username/userID. Instead of a name or ID, the user gives us an SQL statement that we will unknowingly run on our database. For Example - we create a SELECT statement by adding a variable "demoUserID" to select a string. The variable will be fetched from user input (getRequestString).

1. demoUserI = getrequestString("UserId");
2. demoSQL = "SELECT \* FROM users WHERE UserId =" +demoUserId;

## Types of SQL injection attacks

SQL injections can do more harm other than passing the login algorithms. Some of the SQL injection attacks include:

* Updating, deleting, and inserting the data: An attack can modify the cookies to poison a web application's database query.
* It is executing commands on the server that can download and install malicious programs such as Trojans.
* We are exporting valuable data such as credit card details, email, and passwords to the attacker's remote server.
* Getting user login details: It is the simplest form of SQL injection. Web application typically accepts user input through a form, and the front end passes the user input to the back end database for processing.

## Example of SQL Injection

We have an application based on employee records. Any employee can view only their own records by entering a unique and private employee ID. We have a field like an Employee ID. And the employee enters the following in the input field:

236893238 or 1=1

It will translate to:

1. **SELECT** \* **from** EMPLOYEE **where** EMPLOYEE\_ID == 236893238 or 1=1

The SQL code above is valid and will return EMPLOYEE\_ID row from the EMPLOYEE table. The 1=1 will return all records for which this holds true. All the employee data is compromised; now, the malicious user can also similarly delete the employee records.

Example:

1. **SELECT** \* **from** Employee **where** (Username == "" or 1=1) AND (**Password**="" or 1=1).

Now the malicious user can use the '=' operator sensibly to retrieve private and secure user information. So instead of the query mentioned above, the following query, when exhausted, retrieve protected data, not intended to be shown to users.

1. **SELECT** \* **from** EMPLOYEE **where** (Employee\_name =" " or 1=1) AND (**Password**=" " or 1=1)

**SQL STRING FUNCTIONS**

# **SQL String Functions**

In this article, you will learn about the various string functions of Structured Query Language in detail with examples.

## What are String Functions in SQL?

SQL String functions are the predefined functions that allow the database users for string manipulation. These functions only accept, process, and give results of the string data type.

Following are the most important string functions in Structured Query Language:

1. ASCII()
2. CHAR\_LENGTH()
3. CHARACTER\_LENGTH()
4. CONCAT()
5. CONCAT\_WS()
6. FIND\_IN\_SET()
7. FORMAT()
8. INSERT()
9. INSTR()
10. LCASE()
11. LEFT()
12. LOCATE()
13. LOWER()
14. LPAD()
15. LTRIM()
16. MID()
17. POSITION()
18. REPEAT()
19. REPLACE()
20. REVERSE()
21. RIGHT()
22. RPAD()
23. RTRIM()
24. SPACE()
25. STRCMP()
26. SUBSTR()
27. SUBSTRING()
28. SUBSTRING\_INDEX()
29. UCASE()
30. UPPER()

## ASCII String Function

This function in SQL returns the ASCII value of the character in the output. It gives the ASCII value of the left-most character of the string.

CREATE TABLE Student\_records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(302, "Bhavesh", "Kanpur", 19, 93, "A1"),

(303, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(307, "Vivek", "Goa", 20, 62, NULL);

SELECT First\_Name,ASCII(First\_Name) FROM Student\_records;

First\_Name ASCII(First\_Name)

Akash 65

Bhavana 66

Yatin 89

Ishika 73

Bhavesh 66

Yash 89

Vivek 86

[Execution complete with exit code 0]

# **BIT\_LENGTH Function in SQL**

The BIT\_LENGTH string function of Structured Query Language returns the length of the string in bits.

### Syntax of BIT\_LENGTH String Function

**Syntax1:** This syntax uses the BIT\_LENGTH function with the column name of the SQL table:

1. **SELECT** BIT\_LENGTH(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the name of that column on which we want to perform the BIT\_LENGTH string function for finding the length of the string in bits.

**Syntax2:** This syntax uses the BIT\_LENGTH function with the string:

1. **SELECT** BIT\_LENGTH(Original\_String);

SELECT BIT\_LENGTH('JAVATPOINT') AS BIT\_LENGTH\_word;

BIT\_LENGTH\_word

80

[Execution complete with exit code 0]

## CHAR\_LENGTH String Function

This string function returns the length of the specified word. It shows the number of characters from the word.

SELECT First\_Name,CHAR\_LENGTH(First\_Name) FROM Student\_records;

First\_Name CHAR\_LENGTH(First\_Name)

Akash 5

Bhavana 7

Yatin 5

Ishika 6

Bhavesh 7

Yash 4

Vivek 5

[Execution complete with exit code 0]

## CHARACTER\_LENGTH String Function

This string function returns the length of the given string. It shows the number of all characters and spaces from the sentence

SELECT CHARACTER\_LENGTH("hello my name is lochani") ;

CHARACTER\_LENGTH("hello my name is lochani")

24

[Execution complete with exit code 0]

## CONCAT String Function

This string function concatenates two strings or words and forms a new string in the result.

### Syntax of CONCAT String Function:

1. **SELECT** CONCAT(Column\_Name1, Column\_Name2, ..... column\_NameN) **AS** Alias\_Name **FROM** Table\_Name;
2. **SELECT** CONCAT(String\_1, String\_2, String\_3, ...., String\_N);

SELECT CONCAT(First\_Name,"-",Grade) FROM Student\_records;

CONCAT(First\_Name,"-",Grade)

Akash-A2

NULL

Yatin-B1

Ishika-C1

Bhavesh-A1

Yash-A2

NULL

[Execution complete with exit code 0]

## CONCAT\_WS String Function

This string function concatenates multiple strings or words with the help of concatenating symbol. This function uses another parameter that denotes the concatenate symbol.

### Syntax of CONCAT\_WS String Function:

**Syntax1:** This syntax uses CONCAT\_WS() with table columns:

1. **SELECT** CONCAT\_WS( Concatenate\_symbol, Column\_Name1, Column\_Name2, ..... column\_NameN) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses CONCAT\_WS() with multiple strings:

1. **SELECT** CONCAT\_WS(Concatenate\_symbol, String\_1, String\_2, String\_3, ...., String\_N);

SELECT CONCAT\_WS("::",First\_Name,Age) FROM Student\_records;

CONCAT\_WS("::",First\_Name,Age)

Akash::18

Bhavana::19

Yatin::20

Ishika::19

Bhavesh::19

Yash::20

Vivek::20

[Execution complete with exit code 0]

## FIND\_IN\_SET String Function

This string function allows you to find the position of the searched\_string in the set of strings.

### Syntax of FIND\_IN\_SET String Function:

1. **SELECT** FIND\_IN\_SET(Concatenate\_symbol, String\_1, String\_2, String\_3, ...., String\_N);

SELECT FIND\_IN\_SET('Goa', 'Mumbai, Goa, Banglore, Delhi, Kolkata, Chennai');

FIND\_IN\_SET('Goa', 'Mumbai, Goa, Banglore, Delhi, Kolkata, Chennai')

2

**FORMAT String Function**

This String function allows you to display the given string in the specified format.

### Syntax of FORMAT String Function:

**Syntax1:** This syntax uses FORMAT() with table column:

1. **SELECT** FORMAT(Column\_Name1, Format\_String) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses FORMAT() with the string:

1. **SELECT** FORMAT(String\_1, Format\_String);

SELECT FORMAT(123456.789, '#,##0.00 "dollars"') AS FormattedValue;

FormattedValue

----------------

123,456.79 dollars

## INSERT String Function

This string function allows the database users to insert the sub-string in the original string at the given index position.

### Syntax of INSERT String Function:

**Syntax1:** This syntax uses INSERT() with the column of the SQL:

1. **SELECT** **INSERT**(Column\_Name, Position, Number, String) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses INSERT() with the string:

1. **SELECT** **INSERT**(String\_1, Position, Number, String\_2);

SELECT Address, INSERT(Address, 3, 4, 'Agra') AS Insert\_Agra FROM Student\_records;

Address Insert\_Agra

Delhi DeAgra

Delhi DeAgra

Lucknow LuAgraw

Ghaziabad GhAgrabad

Kanpur KaAgra

Delhi DeAgra

Goa GoAgra

[Execution complete with exit code 0]

## INSTR String Function

This string function returns the index value of the first occurrence of the given character in the string.

### Syntax of INSTR String Function:

**Syntax1:** This syntax uses INSTR() with the column of the SQL:

1. **SELECT** INSTR(Column\_Name, **character**) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses INSTR() with the string:

1. **SELECT** INSTR(String, **character**);

SELECT First\_Name, INSTR(First\_Name, 'a') AS FN FROM Student\_records;

First\_Name FN

Akash 1

Bhavana 3

Yatin 2

Ishika 6

Bhavesh 3

Yash 2

Vivek 0

[Execution complete with exit code 0]

## LCASE String Function

This string function allows users to convert the specified string into lower case letters.

### Syntax of LCASE String Function:

**Syntax1:** This syntax uses LCASE() with the column of the SQL table:

1. **SELECT** LCASE(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses LCASE() with the string:

1. **SELECT** LCASE(String);

SELECT First\_Name, LCASE(First\_Name) AS LOW FROM Student\_records;

First\_Name LOW

Akash akash

Bhavana bhavana

Yatin yatin

Ishika ishika

Bhavesh bhavesh

Yash yash

Vivek vivek

[Execution complete with exit code 0]

## LEFT String Function

This string function shows the leftmost characters from the given string. It reads the characters to the given index position.

### Syntax of LEFT String Function:

**Syntax1:** This syntax uses LEFT() with the column of the SQL table:

1. **SELECT** LEFT(Column\_Name, Index\_position) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses LEFT() with the string:

1. **SELECT** LEFT(String, Index\_position);

SELECT First\_Name, LEFT(First\_Name,3) AS Left\_char FROM Student\_records;

First\_Name Left\_char

Akash Aka

Bhavana Bha

Yatin Yat

Ishika Ish

Bhavesh Bha

Yash Yas

Vivek Viv

[Execution complete with exit code 0]

# **LENGTH Function in SQL**

The LENGTH string function of Structured Query Language returns the number of characters of the given string or word.

### Syntax of LENGTH String Function

**Syntax1:** This syntax uses the LENGTH function with the column name of the SQL table:

1. **SELECT** LENGTH(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the name of that column on which we want to perform the LENGTH string function for finding the number of characters of each value.

**Syntax2:** This syntax uses the LENGTH function with the string:

1. **SELECT** LENGTH(Original\_String);

## SELECT LENGTH( ' JAVATPOINT') AS LENGTH\_word;

LENGTH\_word

11

[Execution complete with exit code 0]

## LOCATE String Function

This string function shows the index value of the first occurrence of the word in the given string.

### Syntax of LOCATE String Function:

**Syntax1:** This syntax uses LOCATE() with the column of the SQL table:

1. **SELECT** LOCATE( Search\_string, Column\_Name, Search\_position) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses LOCATE() with the string:

1. **SELECT** LOCATE(Search\_string, String Search\_position);

SELECT First\_Name, LOCATE('a', First\_Name, 2) AS LOCATE\_r FROM Student\_records;

First\_Name LOCATE\_r

Akash 3

Bhavana 3

Yatin 2

Ishika 6

Bhavesh 3

Yash 2

Vivek 0

[Execution complete with exit code 0]

## LOWER String Function

This string function allows users to convert the specified string into lower case letters. This function is also the same as the LCASE() string function.

### Syntax of LOWER String Function:

**Syntax1:** This syntax uses LOWER() with the column of the SQL table:

1. **SELECT** LOWER(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses LOWER() with the string:

1. **SELECT** LOWER(String);

## LPAD String Function

This string function adds the given symbol to the left of the given string.

### Syntax of LPAD String Function:

**Syntax1:** This syntax uses LPAD() with the column of the SQL table:

1. **SELECT** LPAD(Column\_Name, **size**, symbol) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses LPAD() with the string:

1. **SELECT** LPAD(String, **size**, symbol);

SELECT First\_Name, LPAD(First\_Name,10,'\*') AS star FROM Student\_records;

First\_Name star

Akash \*\*\*\*\*Akash

Bhavana \*\*\*Bhavana

Yatin \*\*\*\*\*Yatin

Ishika \*\*\*\*Ishika

Bhavesh \*\*\*Bhavesh

Yash \*\*\*\*\*\*Yash

Vivek \*\*\*\*\*Vivek

[Execution complete with exit code 0]

## LTRIM String Function

This string function cuts the given character or string from the left of the given original string. It also removes the space from the left of the specified string.

### Syntax of LTRIM String Function:

**Syntax1:** This syntax uses LTRIM() with the column of the SQL table:

1. **SELECT** LTRIM(Column\_Name, string) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses LTRIM() with the string:

1. **SELECT** LTRIM(Original\_String, trimmed\_string );

SELECT LTRIM( 'NEW DELHI IS THE CAPITAL OF INDIA', 'NEW DELHI');

S THE CAPITAL OF INDIA

[Execution complete with exit code 0]

SELECT LTRIM( '####98221545', '#');

98221545

[Execution complete with exit code 0]

## MID String Function

This string function extracts the sub-string from the given position of the original string.

### Syntax of MID String Function:

**Syntax1:** This syntax uses MID() with the column of the SQL table:

1. **SELECT** MID(Column\_Name, Starting\_Position, Length) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses MID() with the string:

1. **SELECT** MID(Original\_String, Starting\_Position, Length);

SELECT First\_Name, MID(First\_Name, 3, 8 ) AS MID\_name FROM Student\_records;

First\_Name MID\_name

Akash ash

Bhavana avana

Yatin tin

Ishika hika

Bhavesh avesh

Yash sh

Vivek vek

[Execution complete with exit code 0]

NOW()

* NOW () function returns the current system' date and time.

**Syntax to find the current date and time:**

1. **SELECT** NOW ();

**OR**

**Syntax to find the current date and time from a table's column:**

1. **SELECT** NOW () **FROM** TableName;

## SELECT NOW () AS CurrentDatenTime;

## 2021-09-13 10:38:24

## POSITION String Function

This string function finds the position of the first occurrence of the given string in the main string.

### Syntax of POSITION String Function:

**Syntax1:** This syntax uses POSITION() with the column of the SQL table:

1. **SELECT** POSITION(String IN Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses POSITION() with the string:

1. **SELECT** POSITION(String IN Original\_String);

SELECT First\_Name, POSITION('a' IN First\_Name) AS pos FROM Student\_records;

First\_Name pos

Akash 1

Bhavana 3

Yatin 2

Ishika 6

Bhavesh 3

Yash 2

Vivek 0

[Execution complete with exit code 0]

## REPEAT String Function

This string function writes the given string or character till the given number of times.

### Syntax of REPEAT String Function:

**Syntax1:** This syntax uses REPEAT() with the column of the SQL table:

1. **SELECT** REPEAT(Column\_Name, Repetation\_Number) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses REPEAT() with the string:

1. **SELECT** REPEAT( String, Repetation\_Number);

SELECT First\_Name, REPEAT(Age,3) AS rep FROM Student\_records;

First\_Name rep

Akash 181818

Bhavana 191919

Yatin 202020

Ishika 191919

Bhavesh 191919

Yash 202020

Vivek 202020

[Execution complete with exit code 0]

## REPLACE String Function

This string function cuts the given string by removing the given sub-string.

### Syntax of REPLACE String Function:

**Syntax1:** This syntax uses REPLACE() with the column of the SQL table:

1. **SELECT** REPLACE(Column\_Name, sub\_string) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses REPLACE() with the string:

1. **SELECT** REPLACE( Original\_String, sub\_string);

SELECT Address, REPLACE( Address, 'a' ) AS REPLACE\_a\_Address FROM Student\_records;

## REVERSE String Function

This string function of Structured query Language reverses all the characters of the string.

### Syntax of REVERSE String Function:

**Syntax1:** This syntax uses REVERSE() with the column of the SQL table:

1. **SELECT** REVERSE(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses REVERSE() with the string:

1. **SELECT** REVERSE(String);

SELECT Address, REVERSE( Address) AS rev FROM Student\_records;

Address rev

Delhi ihleD

Delhi ihleD

Lucknow wonkcuL

Ghaziabad dabaizahG

Kanpur rupnaK

Delhi ihleD

Goa aoG

[Execution complete with exit code 0]

## RIGHT String Function

This string function shows the right-most characters from the given string. It reads the characters from the right side to the given index position.

### Syntax of RIGHT String Function:

**Syntax1:** This syntax uses RIGHT() with the column of the SQL table:

1. **SELECT** RIGHT(Column\_Name, Index\_position) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses RIGHT() with the string:

1. **SELECT** RIGHT(String, Index\_position);

SELECT First\_Name, RIGHT(First\_Name,3) AS reigt FROM Student\_records;

First\_Name reigt

Akash ash

Bhavana ana

Yatin tin

Ishika ika

Bhavesh esh

Yash ash

Vivek vek

[Execution complete with exit code 0]

## ROUND()

The ROUND () function is used to round a numeric column to the number of decimals specified.

**Syntax to round the numeric values:**

1. **SELECT** ROUND (NumericValue, Decimals);

where,

Decimal represents the number of decimals to be fetched.

**OR**

**Syntax to round the numeric values from the table's column:**

1. **SELECT** ROUND (ColumnName, Decimals) **FROM** TableName;

## SELECT ROUND (18000.44444, 0) AS RoundedValue;

RoundedValue

18000

[Execution complete with exit code 0]

## 

## RPAD String Function

This string function adds the given symbol to the right of the given string.

### Syntax of RPAD String Function:

**Syntax1:** This syntax uses RPAD() with the column of the SQL table:

1. **SELECT** RPAD(Column\_Name, **size**, symbol) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses RPAD() with the string:

1. **SELECT** RPAD(String, **size**, symbol);

SELECT First\_Name, RPAD(First\_Name,10,'\*') AS rpd FROM Student\_records;

First\_Name rpd

Akash Akash\*\*\*\*\*

Bhavana Bhavana\*\*\*

Yatin Yatin\*\*\*\*\*

Ishika Ishika\*\*\*\*

Bhavesh Bhavesh\*\*\*

Yash Yash\*\*\*\*\*\*

Vivek Vivek\*\*\*\*\*

[Execution complete with exit code 0]

## RTRIM String Function

This string function cuts the given character or string from the right of the given original string. It also removes the space from the right of the specified string.

### Syntax of RTRIM String Function:

**Syntax1:** This syntax uses RTRIM() with the column of the SQL table:

1. **SELECT** RTRIM(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses RTRIM() with the string:

1. **SELECT** RTRIM(Original\_String);

SELECT RTRIM( 'NEW DELHI IS THE CAPITAL OF INDIA', 'CAPITAL OF INDIA');

NEW DELHI IS THE

[Execution complete with exit code 0]

## SPACE String Function

This string function adds the specified number of spaces.

### Syntax of SPACE String Function:

1. **SELECT** SPACE(Number);

### Example of SPACE String function:

The following SELECT query adds the 11 spaces:

1. **SELECT** SPACE(11);

## SUBSTR String Function

This string function extracts the sub-string from the given position of the original string.

### Syntax of SUBSTR String Function:

**Syntax1:** This syntax uses SUBSTR() with the column of the SQL table:

1. **SELECT** SUBSTR(Column\_Name, Starting\_Position, Length) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses SUBSTR() with the string:

1. **SELECT** SUBSTR(Original\_String, Starting\_Position, Length);

SELECT Address, SUBSTR(Address, 3, 8 ) AS Address FROM Student\_records;

Address Address

Delhi lhi

Delhi lhi

Lucknow cknow

Ghaziabad aziabad

Kanpur npur

Delhi lhi

Goa a

[Execution complete with exit code 0]

## STRCMP String Function

This string function compares the two specified strings with each other. This function returns 0 if both strings in SQL are similar, returns -1 if the first string is smaller than the second string, and returns 1 if the first string is bigger than the second string.

### Syntax of STRCMP String Function:

**Syntax1:** This syntax uses STRCMP() with the columns of the SQL table:

1. **SELECT** STRCMP(Column\_Name1, Column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses STRCMP() with the two strings:

1. **SELECT** STRCMP(String1, String2);

SELECT First\_Name,Address, STRCMP(First\_Name,Address) AS cmp FROM Student\_records;

First\_Name Address cmp

Akash Delhi -1

Bhavana Delhi -1

Yatin Lucknow 1

Ishika Ghaziabad 1

Bhavesh Kanpur -1

Yash Delhi 1

Vivek Goa 1

[Execution complete with exit code 0]

## SUBSTRING String Function

This string function shows the character of the given index value in the original string.

### Syntax of SUBSTRING String Function:

**Syntax1:** This syntax uses SUBSTRING() with the column of the SQL table:

1. **SELECT** SUBSTRING(Column\_Name, Index\_Position, Starting\_Position) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses SUBSTRING() with the string:

1. **SELECT** SUBSTRING(Original\_String, Index\_Position, Starting\_

SELECT First\_Name,Address, SUBSTRING(First\_Name,3,1) AS cmp FROM Student\_records;

First\_Name Address cmp

Akash Delhi a

Bhavana Delhi a

Yatin Lucknow t

Ishika Ghaziabad h

Bhavesh Kanpur a

Yash Delhi s

Vivek Goa v

[Execution complete with exit code 0]

## UCASE String Function

This string function allows users to convert the specified string into upper case letters or capital letters.

## Syntax of UCASE String Function:

**Syntax1:** This syntax uses UCASE() with the column of the SQL table:

1. **SELECT** UCASE(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses UCASE() with the string:

1. **SELECT** UCASE(String);

SELECT First\_Name,UCASE(First\_Name) AS uc FROM Student\_records;

First\_Name uc

Akash AKASH

Bhavana BHAVANA

Yatin YATIN

Ishika ISHIKA

Bhavesh BHAVESH

Yash YASH

Vivek VIVEK

[Execution complete with exit code 0]

## UPPER String Function

This string function allows users to convert the specified string into the UPPER case letters. This function is also the same as the UCASE() string function.

### Syntax of UPPER String Function:

**Syntax1:** This syntax uses UPPER() with the column of the SQL table:

1. **SELECT** UPPER(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

**Syntax2:** This syntax uses UPPER() with the string:

1. **SELECT** UPPER(String);

**SQL MISCELLENOUS**

# **SQL CAST Function**

The SQL CAST function is mainly used to convert the expression from one data type to another data type. If the SQL Server CAST function is unable to convert a declaration to the desired data type, this function returns an error. We use the CAST function to convert numeric data into character or string data.

### Syntax:

CAST (expression **AS** [data type])

Here, the [data type] is a type of valid data types in RDBMS.

The syntax is:

CAST (EXPRESSION **AS** Data\_ Type[(Length)]

\_ \_ CAST in the SQL example

**SELECT** CAST (123 **AS** **VARCHAR** (20)) [result\_name]

**FROM** [Source]

SELECT First\_Name,CAST(Percentage AS integer) FROM Student\_records;

First\_Name CAST(Percentage AS integer)

Akash 89

Bhavana 79

Yatin 75

Ishika 51

Bhavesh 93

Yash 89

Vivek 62

[Execution complete with exit code 0]

# **SQL Comments**

SQL Comments are used to explain the sections of the SQL statements, and used to prevent the statements of SQL. In many programming languages, comments matter a lot.

A Microsoft Access database does not support the comments. So, **Mozilla Firefox** and **Microsoft Edge** use the Microsoft Access database in the examples.

There are three types of comments, which are given below:

1. **Single line comments.**
2. **Multi-line comments**
3. **Inline comments**

## Single Line Comment

Comments starting and ending with a single line are said as individual line comments. The line which starts with '–' is a single line comment, and that particular line is not executed.

The text between **--** and end of the line is ignored and cannot be executed.

**Syntax:**

-- single-line comment

-- another comment

SELECT \* FROM Customers;

The following example uses a single-line comment:

### Example 1

--Select all:

**SELECT** \* **FROM** Employees;

Multi-line Comments

Comments that start in one line and end in different front are said as multi-line comments. The text between **/\*** and **\*/** is ignored in the code part.

The line starting with '/\*' is considered as a starting point of comment and terminated when '\*/' lies at the end.

**Syntax**:

/\* multi-line comment

another comment \*/

**SELECT** \* **FROM** Customers;

Example 1

/\***Select** all the columns

**of** all the records

in the Customers **table**:\*/

**SELECT** \* **FROM** Employees;

Inline comments:

Inline comments are an extension of multi-line comments, and comments can be stated between the statements and are enclosed in between '/\*' and '\*/.'

**Syntax**:

SELECT \* FROM /\*Employees; \*/

Examples:

Multi line comment ->

/\* **SELECT** \* **FROM** Teachers;

**SELECT** \* **FROM** Teacher\_DETAILS;

**SELECT** \* **FROM** Orders; \*/

**SELECT** \* **FROM** Course;

SQL Comment Indicators

SQL Comment Indicator is indicated according to the given examples

It includes the double hyphen ( — ), braces ( { } ), and C-style ( /\* . . . \*/ ) comment delimiters. It also includes the comments after the statement.

**SELECT** \* **FROM** customer; -- Selects all rows and columns

**SELECT** \* **FROM** employee; {Selects all **rows** and columns}

**SELECT** \* **FROM** employee; /\*Selects all columns and **rows**\*/copy **to** the clipboard

# **Joining Three or More Tables in SQL**

***Joining multiple tables*** in SQL is some tricky task. It can be more difficult if you need to ***join*** more than two tables in single SQL query, we will analyze how to retrieve data from multiple tables using **INNER JOINs**. In this section, we have used two approaches to **join three or more tables in SQL.**

### Example:

**We are creating three tables, as follows:**

student

marks

details

There are two approaches to join three or more tables in [SQL](https://www.javatpoint.com/sql-tutorial):

### 1. Using JOINS in SQL:

The same logic is applied here which is used to join **two tables** i.e., the **minimum** number of join statements to join **n** tables are **(n-1)**.

create table student(

s\_id int primary key,

s\_name varchar(17));

insert into student values(1, 'Jack');

insert into student values(2, 'Rithvik');

insert into student values(3, 'Jaspreet');

insert into student values(4, 'Praveen');

insert into student values(5, 'Bisa');

insert into student values(6, 'Suraj');

create table marks(

school\_id int primary key,

s\_id int,

score int,

status varchar(20));

insert into marks values(1004, 1, 23, 'fail');

insert into marks values(1008, 6, 95, 'pass');

insert into marks values(1012, 2, 97, 'pass');

insert into marks values(1016, 7, 67, 'pass');

insert into marks values(1020, 3, 100, 'pass');

insert into marks values(1025, 8, 73, 'pass');

insert into marks values(1030, 4, 88, 'pass');

insert into marks values(1035, 9, 13, 'fail');

insert into marks values(1040, 5, 16, 'fail');

insert into marks values(1050, 10, 53, 'pass');

create table details(

address\_city varchar(20),

email\_ID varchar(20),

school\_id int,

accomplishments varchar(50));

insert into details values('Bangalore', 'jsingh@jtp.com', 1020, 'ACM ICPC selected');

insert into details values('Hyderabad', 'praveen@jtp.com', 1030, 'Geek of the month');

insert into details values('Delhi', 'rithvik@jtp.com', 1012, 'IOI finalist');

insert into details values('Chennai', 'om@jtp.com', 1111, 'Geek of the year');

insert into details values('Banglore',' suraj@jtp.com', 1008, 'IMO finalist');

insert into details values('Mumbai', 'sasukeh@jtp.com', 2211, 'Made a robot');

insert into details values('Ahmedabad', 'itachi@jtp.com', 1172, 'Code Jam finalist');

insert into details values('Jaipur', 'kumar@jtp.com', 1972, 'KVPY finalist');

select s\_name, score, status, address\_city, email\_id,

accomplishments from student s inner join mark m on

s.s\_id = m.s\_id inner join details d on

d.school\_id = m.school\_id;

s\_name score status address\_city email\_id accomplishments

Jaspreet 100 pass Bangalore jsingh@jtp.com ACM ICPC selected

Praveen 88 pass Hyderabad praveen@jtp.com Geek of the month

Rithvik 97 pass Delhi rithvik@jtp.com IOI finalist

Suraj 95 pass Banglore suraj@jtp.com IMO finalist

[Execution complete with exit code 0]

### 2. Using the Parent-child Relationship:

In the parent-child relationship, we use [**where** clause](https://www.javatpoint.com/sql-where) to join two or more tables. Create column **X** as a primary key in one table and a foreign key in another table

Look at the tables which are created:  
**s\_id** is the **primary key** in the student table and **foreign key** in the marks table. **(student (parent) - marks(child))**.  
**school\_id** is the **primary key** in the marks table and **foreign key** in the student table. **(marks(parent) - details(child))**.

select s\_name, score, status, address\_city,

email\_id, accomplishments from student s,

marks m, details d where s.s\_id = m.s\_id and

m.school\_id = d.school\_id;

s\_name score status address\_city email\_id accomplishments

Jaspreet 100 pass Bangalore jsingh@jtp.com ACM ICPC selected

Praveen 88 pass Hyderabad praveen@jtp.com Geek of the month

Rithvik 97 pass Delhi rithvik@jtp.com IOI finalist

Suraj 95 pass Banglore suraj@jtp.com IMO finalist

[Execution complete with exit code 0]

# **How to create functions in SQL?**

**SQL** has many **built-in functions** for performing the calculation of data. **SQL** provides **built-in** functions to perform the **operations**. Some useful functions of SQL are performing the **mathematical calculations, string concatenation** and **sub-string** etc.

SQL functions are **divided** into two parts:

1. Aggregate Functions
2. Scalar Functions

## SQL Aggregate Functions

SQL **Aggregate** functions return a single value which is calculated from the values.

* **AVG():** It returns the average value of the column.
* **COUNT():** It returns the number of rows in the table.
* **FIRST():** It returns the first value of the column.
* **LAST():** It returns the last value
* **MAX():** It returns the largest value of the column.
* **MIN():** It returns the smallest value of the column.
* **SUM():** It returns the sum of rows of the table.

## SQL Scalar functions

SQL Scalar functions returns the single value according to the input value.

### Scalar functions:

* **UCASE():** It converts the database field to uppercase.
* **LCASE():** It converts a field to lowercase.
* **MID():** It extracts characters from the text field.
* **LEN():** It returns the length of a text field.
* **ROUND():** It rounds a numeric field to the number of decimals.
* **NOW():** It returns the current date and time.
* **FORMAT():** It formats how a field is to be displayed.

# **How to Delete Duplicate Rows in SQL?**

## A) Delete duplicate rows with the DELETE JOIN statement

CREATE TABLE contacts (

id INT PRIMARY KEY AUTO\_INCREMENT,

first\_name VARCHAR(30) NOT NULL,

last\_name VARCHAR(25) NOT NULL,

email VARCHAR(210) NOT NULL,

age VARCHAR(22) NOT NULL

);

INSERT INTO contacts (first\_name,last\_name,email,age)

VALUES ('Kavin','Peterson','kavin.peterson@verizon.net','21'),

('Nick','Jonas','nick.jonas@me.com','18'),

('Peter','Heaven','peter.heaven@google.com','23'),

('Michal','Jackson','michal.jackson@aol.com','22'),

('Sean','Bean','sean.bean@yahoo.com','23'),

('Tom ','Baker','tom.baker@aol.com','20'),

('Ben','Barnes','ben.barnes@comcast.net','17'),

('Mischa ','Barton','mischa.barton@att.net','18'),

('Sean','Bean','sean.bean@yahoo.com','16'),

('Eliza','Bennett','eliza.bennett@yahoo.com','25'),

('Michal','Krane','michal.Krane@me.com','25'),

('Peter','Heaven','peter.heaven@google.com','20'),

('Brian','Blessed','brian.blessed@yahoo.com','20'),

('Kavin','Peterson','kavin.peterson@verizon.net','30');

SELECT email,count(email) FROM contacts

group by email

email count(email)

kavin.peterson@verizon.net 2

nick.jonas@me.com 1

peter.heaven@google.com 2

michal.jackson@aol.com 1

sean.bean@yahoo.com 2

tom.baker@aol.com 1

ben.barnes@comcast.net 1

mischa.barton@att.net 1

eliza.bennett@yahoo.com 1

michal.Krane@me.com 1

brian.blessed@yahoo.com 1

[Execution complete with exit code 0]

SELECT email,count(email) FROM contacts

group by email

having count(email) > 1;

email count(email)

kavin.peterson@verizon.net 2

peter.heaven@google.com 2

sean.bean@yahoo.com 2

[Execution complete with exit code 0]

DELETE t1 FROM contacts t1

INNER JOIN contacts t2

WHERE

t1.id > t2.id AND

t1.email = t2.email;

select \* from contacts;

id first\_name last\_name email age

1 Kavin Peterson kavin.peterson@verizon.net 21

2 Nick Jonas nick.jonas@me.com 18

3 Peter Heaven peter.heaven@google.com 23

4 Michal Jackson michal.jackson@aol.com 22

5 Sean Bean sean.bean@yahoo.com 23

6 Tom Baker tom.baker@aol.com 20

7 Ben Barnes ben.barnes@comcast.net 17

8 Mischa Barton mischa.barton@att.net 18

10 Eliza Bennett eliza.bennett@yahoo.com 25

11 Michal Krane michal.Krane@me.com 25

13 Brian Blessed brian.blessed@yahoo.com 20

[Execution complete with exit code 0]

# **Nth Highest age**

CREATE TABLE contacts (

id INT PRIMARY KEY AUTO\_INCREMENT,

first\_name VARCHAR(30) NOT NULL,

last\_name VARCHAR(25) NOT NULL,

email VARCHAR(210) NOT NULL,

age VARCHAR(22) NOT NULL

);

INSERT INTO contacts (first\_name,last\_name,email,age)

VALUES ('Kavin','Peterson','kavin.peterson@verizon.net','21'),

('Nick','Jonas','nick.jonas@me.com','18'),

('Peter','Heaven','peter.heaven@google.com','23'),

('Michal','Jackson','michal.jackson@aol.com','22'),

('Sean','Bean','sean.bean@yahoo.com','23'),

('Tom ','Baker','tom.baker@aol.com','20'),

('Ben','Barnes','ben.barnes@comcast.net','17'),

('Mischa ','Barton','mischa.barton@att.net','18'),

('Sean','Bean','sean.bean@yahoo.com','16'),

('Eliza','Bennett','eliza.bennett@yahoo.com','25'),

('Michal','Krane','michal.Krane@me.com','25'),

('Peter','Heaven','peter.heaven@google.com','20'),

('Brian','Blessed','brian.blessed@yahoo.com','20'),

('Kavin','Peterson','kavin.peterson@verizon.net','30');

select first\_name,age from contacts order by age desc;

SELECT min(age)

FROM (

SELECT DISTINCT age

FROM contacts

ORDER BY age DESC

LIMIT 2

) AS subquery;

first\_name age

Kavin 30

Eliza 25

Michal 25

Peter 23

Sean 23

Michal 22

Kavin 21

Tom 20

Peter 20

Brian 20

Nick 18

Mischa 18

Ben 17

Sean 16

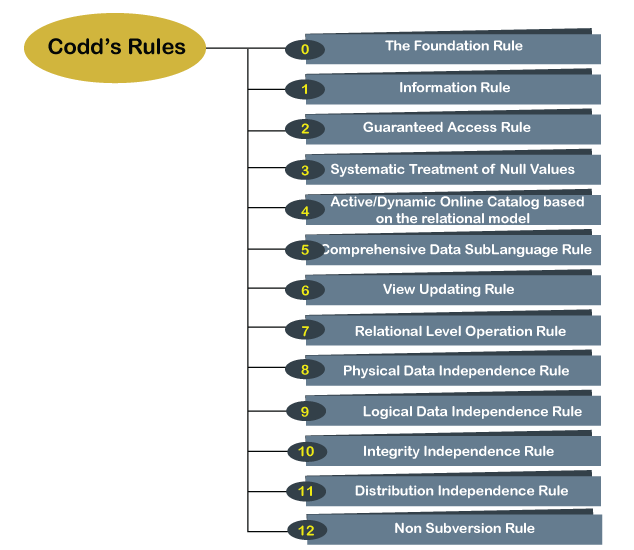
min(age)

25

[Execution complete with exit code 0]

# **12 Codd's Rules**

Every database has tables, and constraints cannot be referred to as a rational database system. And if any database has only relational data model, it cannot be a [**Relational Database System (RDBMS)**](https://www.javatpoint.com/what-is-rdbms). So, some rules define a database to be the correct RDBMS. These rules were developed by **Dr. Edgar F. Codd (E.F. Codd)** in **1985**, who has vast research knowledge on the Relational Model of database Systems. Codd presents his 13 rules for a database to test the concept of [DBMS](https://www.javatpoint.com/dbms-tutorial) against his relational model, and if a database follows the rule, it is called a **true relational database (RDBMS)**. These 13 rules are popular in RDBMS, known as **Codd's 12 rules**.



### Rule 0: The Foundation Rule

The database must be in relational form. So that the system can handle the database through its relational capabilities.

### Rule 1: Information Rule

A database contains various information, and this information must be stored in each cell of a table in the form of rows and columns.

### Rule 2: Guaranteed Access Rule

Every single or precise data (atomic value) may be accessed logically from a relational database using the combination of primary key value, table name, and column name.

### Rule 3: Systematic Treatment of Null Values

This rule defines the systematic treatment of Null values in database records. The null value has various meanings in the database, like missing the data, no value in a cell, inappropriate information, unknown data and the primary key should not be null.

### Rule 4: Active/Dynamic Online Catalog based on the relational model

It represents the entire logical structure of the descriptive database that must be stored online and is known as a database dictionary. It authorizes users to access the database and implement a similar query language to access the database.

### Rule 5: Comprehensive Data SubLanguage Rule

The relational database supports various languages, and if we want to access the database, the language must be the explicit, linear or well-defined syntax, character strings and supports the comprehensive: data definition, view definition, data manipulation, integrity constraints, and limit transaction management operations. If the database allows access to the data without any language, it is considered a violation of the database.

### Rule 6: View Updating Rule

All views table can be theoretically updated and must be practically updated by the database systems.

### Rule 7: Relational Level Operation (High-Level Insert, Update and delete) Rule

A database system should follow high-level relational operations such as insert, update, and delete in each level or a single row. It also supports union, intersection and minus operation in the database system.

### Rule 8: Physical Data Independence Rule

All stored data in a database or an application must be physically independent to access the database. Each data should not depend on other data or an application. If data is updated or the physical structure of the database is changed, it will not show any effect on external applications that are accessing the data from the database.

### Rule 9: Logical Data Independence Rule

It is like physical data independence. It means, if any changes occurred to the logical level (table structures), it should not affect the user's view (application). For example, suppose a table either split into two tables, or two table joins to create a single table, these changes should not be impacted on the user view application.

### Rule 10: Integrity Independence Rule

A database must maintain integrity independence when inserting data into table's cells using the SQL query language. All entered values should not be changed or rely on any external factor or application to maintain integrity. It is also helpful in making the database-independent for each front-end application.

### Rule 11: Distribution Independence Rule

The distribution independence rule represents a database that must work properly, even if it is stored in different locations and used by different end-users. Suppose a user accesses the database through an application; in that case, they should not be aware that another user uses particular data, and the data they always get is only located on one site. The end users can access the database, and these access data should be independent for every user to perform the SQL queries.

### Rule 12: Non Subversion Rule

The non-submersion rule defines RDBMS as a [SQL](https://www.javatpoint.com/sql-tutorial) language to store and manipulate the data in the database. If a system has a low-level or separate language other than SQL to access the database system, it should not subvert or bypass integrity to transform data

# **SQL Auto Increment**

Databases are used to store the humongous amount of data logically. You might have come across various instances wherein you face difficulty mentioning a unique number for every record present in the table. This scenario is practically impossible because the manual entry is restricted. Thus, there's no scope for **incrementing the values**. In this kind of situation, you drop in other methods and choose auto increment in SQL. The auto-increment in SQL entering a unique number increases the count to every new record present in the table automatically. To get familiar with auto-increment in [SQL](https://www.javatpoint.com/sql-tutorial), let's look at some justifications to understand better.

## What is an auto-increment in SQL?

As the name suggests, auto-increment is defined as a field that is mainly used to generate a unique number for each record being added to a table at any instance. In general terms, it is used for a primary key column because a [primary key in SQL](https://www.javatpoint.com/sql-primary-key) is supposed to be unique and not null. Thus, auto-increment makes it easy for the developers to automatically generate a unique number for all the records.

The data that you store in the database will not always have unique properties, so that some records are picked and manipulated uniquely. To ensure such unique identification of each record, you create an attribute for unique identification that can specify each row. Thus, after creating such a unique identity, you need to set it with auto increment so that values once incremented can be conveniently stored in the database.

Auto increment in SQL adds up an advantage by easily identifying each record. It is important to keep in mind that you need to set the column as auto-increment in the Create statement. Else, some problems may arise. Thus, to maintain integrity, you need to assign a primary key to the auto-increment, ensuring that the data's identity is maintained in the database.

Now, since you are quite familiar with auto-increment in SQL, let's proceed with discussing this field in different Database Management Systems.

## Auto Increment features in SQL.

Some of the features of auto-increment are enlisted below:

1. It helps you to create Primary Key which might not have any unique identification attribute in data.
2. The value in auto-increment can be explicitly initialized and modified at any point in time.
3. Unique identification of records can be easily created.
4. With Auto Increment, flexibility to process the gap between each record can be handled easily.
5. Writing queries in SQL for auto-increment is syntactically easy.

CREATE TABLE animals (

id INT NOT NULL AUTO\_INCREMENT,

name CHAR(30) NOT NULL,

PRIMARY KEY (id)

);

INSERT INTO animals (name) VALUES

('dog'),('cat'),('penguin'),

('lax'),('whale'),('ostrich');

SELECT \* FROM animals;

id name

1 dog

2 cat

3 penguin

4 lax

5 whale

6 ostrich

[Execution complete with exit code 0]

# **Commit and Rollback in SQL**

* Commit and rollback are the **transaction control commands** in SQL.
* All the commands that are executed consecutively, treated as a single unit of work and termed as a **transaction.**
* If you want to save all the commands which are executed in a transaction, then just after completing the transaction, you have to execute the **commit** command. This command will save all the commands which are executed on a table. All these changes made to the table will be saved to the disk permanently.
* Whenever the commit command is executed in SQL, all the updations which we have carried on the table will be uploaded to the server, and hence our work will be saved.
* The **rollback** command is used to get back to the previous permanent status of the table, which is saved by the commit command.
* Suppose, we have started editing a table and later thought that the changes that we have recently carried out on a table are not required. Then, in that case, we can roll back our transaction, which simply means to get back to the previous permanent status of the table, which is saved by the commit command.

#### **Note: One thing to note about the rollback command is that if you have already committed your recent changes, you cannot rollback your transaction. In that case, you can only roll to the last permanent change.**

CREATE TABLE student(

ID INT PRIMARY KEY,

Name VARCHAR(20),

Percentage INT,

Location VARCHAR(20),

DateOfBirth DATE);

START TRANSACTION;

INSERT INTO student(ID, Name, Percentage, Location, DateOfBirth)

VALUES (1, "Manthan Koli", 79, "Delhi", "2003-08-20"),

(2, "Dev Dixit", 75, "Pune", "1999-06-17"),

(3, "Aakash Deshmukh", 87, "Mumbai", "1997-09-12"),

(4, "Aaryan Jaiswal", 90, "Chennai", "2005-10-02"),

(5, "Rahul Khanna", 92, "Ambala", "1996-03-04");

SELECT \* FROM student;

COMMIT;

SET autocommit = 0;

DELETE FROM student WHERE ID = 5;

SELECT \*FROM student;

ROLLBACK;

SELECT \* FROM student;

UPDATE student SET Percentage = 80 WHERE ID = 1;

SELECT \* FROM student;

ROLLBACK;

SELECT \* FROM student;

ID Name Percentage Location DateOfBirth

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

5 Rahul Khanna 92 Ambala 1996-03-04

ID Name Percentage Location DateOfBirth

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

ID Name Percentage Location DateOfBirth

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

5 Rahul Khanna 92 Ambala 1996-03-04

ID Name Percentage Location DateOfBirth

1 Manthan Koli 80 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

5 Rahul Khanna 92 Ambala 1996-03-04

ID Name Percentage Location DateOfBirth

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

5 Rahul Khanna 92 Ambala 1996-03-04

[Execution complete with exit code 0]

# **SQL get month from the date**

* To remember important dates, we can store them in the database tables of SQL.
* There may arise a situation in which instead of retrieving an entire date from the column of an SQL table, you only want the month of the date to be fetched from the table's columns.
* There are different dates functions available in SQL, using which we can fetch different parts of date from the columns as per our requirements.
* The **MONTH ()** function in SQL is used to get the month from an entire date stored in the table's column.
* Along with retrieving the date in the default format in which it is stored, there is a DATE\_FORMAT () function in SQL using which the date values can be retrieved in a more readable format.

CREATE TABLE student(

ID INT PRIMARY KEY,

Name VARCHAR(20),

Percentage INT,

Location VARCHAR(20),

DateOfBirth DATE);

INSERT INTO student(ID, Name, Percentage, Location, DateOfBirth)

VALUES (1, "Manthan Koli", 79, "Delhi", "2003-08-20"),

(2, "Dev Dixit", 75, "Pune", "1999-06-17"),

(3, "Aakash Deshmukh", 87, "Mumbai", "1997-09-12"),

(4, "Aaryan Jaiswal", 90, "Chennai", "2005-10-02"),

(5, "Rahul Khanna", 92, "Ambala", "1996-03-04");

SELECT Name,MONTH(DateOfBirth) FROM student;

Name MONTH(DateOfBirth)

Manthan Koli 8

Dev Dixit 6

Aakash Deshmukh 9

Aaryan Jaiswal 10

Rahul Khanna 3

[Execution complete with exit code 0]

SELECT Name,DATE\_FORMAT(DateOfBirth,'%M') as month FROM student;

Name month

Manthan Koli August

Dev Dixit June

Aakash Deshmukh September

Aaryan Jaiswal October

Rahul Khanna March

[Execution complete with exit code 0]

# **Savepoint in SQL**

* Savepoint is a command in SQL that is used with the rollback command.
* It is a command in Transaction Control Language that is used to mark the transaction in a table.
* Consider you are making a very long table, and you want to roll back only to a certain position in a table then; this can be achieved using the savepoint.
* If you made a transaction in a table, you could mark the transaction as a certain name, and later on, if you want to roll back to that point, you can do it easily by using the transaction's name.
* Savepoint is helpful when we want to roll back only a small part of a table and not the whole table. In simple words, we can say savepoint is a bookmark in SQL.

CREATE TABLE student(

ID INT PRIMARY KEY,

Name VARCHAR(20),

Percentage INT,

Location VARCHAR(20),

DateOfBirth DATE);

INSERT INTO student(ID, Name, Percentage, Location, DateOfBirth)

VALUES (1, "Manthan Koli", 79, "Delhi", "2003-08-20"),

(2, "Dev Dixit", 75, "Pune", "1999-06-17"),

(3, "Aakash Deshmukh", 87, "Mumbai", "1997-09-12"),

(4, "Aaryan Jaiswal", 90, "Chennai", "2005-10-02"),

(5, "Rahul Khanna", 92, "Ambala", "1996-03-04");

START TRANSACTION;

INSERT INTO student VALUES (10, "Saurabh Singh", 54, "Kashmir", "1989-01-06");

SAVEPOINT ini;

DELETE FROM student WHERE ID = 5;

SAVEPOINT del;

UPDATE student SET Percentage = 80 WHERE ID = 1;

SAVEPOINT upd;

ROLLBACK TO upd;

SELECT \* FROM student;

ROLLBACK TO del;

SELECT \* FROM student;

ROLLBACK TO ini;

SELECT \* FROM student;

ID Name Percentage Location DateOfBirth

1 Manthan Koli 80 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

10 Saurabh Singh 54 Kashmir 1989-01-06

ID Name Percentage Location DateOfBirth

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

10 Saurabh Singh 54 Kashmir 1989-01-06

ID Name Percentage Location DateOfBirth

1 Manthan Koli 79 Delhi 2003-08-20

2 Dev Dixit 75 Pune 1999-06-17

3 Aakash Deshmukh 87 Mumbai 1997-09-12

4 Aaryan Jaiswal 90 Chennai 2005-10-02

5 Rahul Khanna 92 Ambala 1996-03-04

10 Saurabh Singh 54 Kashmir 1989-01-06

[Execution complete with exit code 0]

# **TIME Datatype in SQL**

* There are many scenarios in SQL when you need to store the time in the SQL tables of your database.
* To store the time in your SQL tables, your first step should be to create a column in your table which is capable of storing the time.
* If you want the time to be stored in the column of your table, you need to create a column with the TIME data type.
* The TIME data type by default stores the time in "HH:MM:SS" format.
* Using the SELECT statement in SQL, you can retrieve the time from the column of the SQL tables.
* Along with retrieving the time in the default format in which it is stored, there is a TIME\_FORMAT () function in SQL using which the time can be retrieved in a more readable format.
* You can retrieve the time in the default format in which it is stored in the table, i.e., "HH:MM:SS," or you also have the option of retrieving the specific parts of the time such as hour, minute, and seconds by choosing an appropriate parameter according to our requirement and passing it to the TIME\_FORMAT() function. The time can also be retrieved in a 12 hour and a 24-hour format.
* We can also print the time followed by AM/ PM.

CREATE TABLE student(

ID INT PRIMARY KEY,

Name VARCHAR(20),

Percentage INT,

Location VARCHAR(20),

Item\_OrderDate DATE,

Item\_OrderTime TIME);

INSERT INTO student(ID, Name, Percentage, Location, Item\_OrderDate,Item\_OrderTime)

VALUES (1, "Manthan Koli", 79, "Delhi", "2003-08-20", "19:10:00"),

(2, "Dev Dixit", 75, "Pune", "1999-06-17", "13:10:00"),

(3, "Aakash Deshmukh", 87, "Mumbai", "1997-09-12", "09:16:00"),

(4, "Aaryan Jaiswal", 90, "Chennai", "2005-10-02", "16:10:00"),

(5, "Rahul Khanna", 92, "Ambala", "1996-03-04", "18:40:00");

SELECT Name,TIME\_FORMAT (Item\_OrderTime, "%r") AS Formatted\_Time FROM student

Name Formatted\_Time

Manthan Koli 07:10:00 PM

Dev Dixit 01:10:00 PM

Aakash Deshmukh 09:16:00 AM

Aaryan Jaiswal 04:10:00 PM

Rahul Khanna 06:40:00 PM

[Execution complete with exit code 0]

SELECT Name,TIME\_FORMAT (Item\_OrderTime, "%T %p") AS Formatted\_Time FROM student ;

Name Formatted\_Time

Manthan Koli 19:10:00 PM

Dev Dixit 13:10:00 PM

Aakash Deshmukh 09:16:00 AM

Aaryan Jaiswal 16:10:00 PM

Rahul Khanna 18:40:00 PM

[Execution complete with exit code 0]

;

SELECT Name,TIME\_FORMAT (Item\_OrderTime, "%H") AS Formatted\_Time FROM student ;

Name Formatted\_Time

Manthan Koli 19

Dev Dixit 13

Aakash Deshmukh 09

Aaryan Jaiswal 16

Rahul Khanna 18

[Execution complete with exit code 0]

SELECT Name, TIME\_FORMAT (Item\_OrderTime, "%i") AS Formatted\_Time FROM student ;

Name Formatted\_Time

Manthan Koli 10

Dev Dixit 10

Aakash Deshmukh 16

Aaryan Jaiswal 10

Rahul Khanna 40

[Execution complete with exit code 0]

SELECT Name, TIME\_FORMAT (Item\_OrderTime, "%S") AS Item\_OrderSeconds FROM student ;

Name Item\_OrderSeconds

Manthan Koli 00

Dev Dixit 00

Aakash Deshmukh 00

Aaryan Jaiswal 00

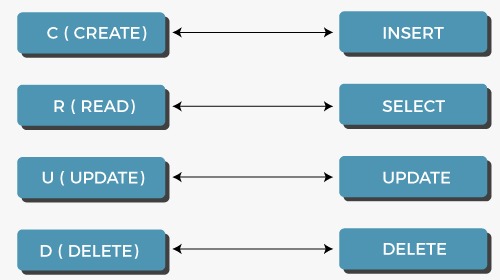
Rahul Khanna 00

[Execution complete with exit code 0]

# **CRUD Operations in SQL**

As we know, CRUD operations act as the foundation of any computer programming language or technology. So before taking a deeper dive into any programming language or technology, one must be proficient in working on its CRUD operations. This same rule applies to databases as well.

Let us start with the understanding of CRUD operations in SQL with the help of examples. We will be writing all the queries in the supporting examples using the MySQL database.



## 1. Create:

In CRUD operations, 'C' is an acronym for **create,** which means to add or insert data into the SQL table. So, firstly we will create a table using CREATE command and then we will use the INSERT INTO command to insert rows in the created table.

**Syntax for table creation:**

1. **CREATE** **TABLE** Table\_Name (ColumnName1 Datatype, ColumnName2 Datatype,..., ColumnNameN Datatype);

where,

* Table\_Name is the name that we want to assign to the table.
* Column\_Name is the attributes under which we want to store data of the table.
* Datatype is assigned to each column. Datatype decides the type of data that will be stored in the respective column.

**Syntax for insertion of data in table:**

1. **INSERT** **INTO** Table\_Name (ColumnName1,...., ColumnNameN) **VALUES** (Value 1,....,Value N),....., (Value 1,.

## 2. Read:

In CRUD operations, 'R' is an acronym for **read,** which means **retrieving or fetching the data from the SQL table.** So, we will use the SELECT command to fetch the inserted records from the SQL table. We can retrieve all the records from a table using an asterisk (\*) in a SELECT query. There is also an option of retrieving only those records which satisfy a particular condition by using the WHERE clause in a SELECT query.

**Syntax to fetch all the records:**

1. **SELECT** \***FROM** TableName;

**Syntax to fetch records according to the condition:**

1. **SELECT** \***FROM** TableName **WHERE** CONDITION;

## 3. Update:

In CRUD operations, 'U' is an acronym for the **update,** which **means making updates to the records present in the SQL tables.** So, we will use the UPDATE command to make changes in the data present in tables.

**Syntax:**

1. **UPDATE** Table\_Name **SET** ColumnName = Value **WHERE** CONDITION;

## 4. Delete:

In CRUD operations, 'D' is an acronym for **delete,** which means **removing or deleting the records from the SQL tables.** We can delete all the rows from the SQL tables using the DELETE query. There is also an option to remove only the specific records that satisfy a particular condition by using the WHERE clause in a DELETE query.

**Syntax to delete all the records:**

1. **DELETE** **FROM** TableName;

**Syntax to delete records according to the condition:**

1. **DELETE** **FROM** TableName **WHERE** CONDITION;

# **SQL INDEX**

The Index in SQL is a special table used to speed up the searching of the data in the database tables. It also retrieves a vast amount of data from the tables frequently. The INDEX requires its own space in the hard disk.

The index concept in SQL is same as the index concept in the novel or a book.

It is the best SQL technique for improving the performance of queries. The drawback of using indexes is that they slow down the execution time of UPDATE and INSERT statements. But they have one advantage also as they speed up the execution time of SELECT and WHERE statements.

In SQL, an Index is created on the fields of the tables. We can easily build one or more indexes on a table. The creation and deletion of the Index do not affect the data of the database.

In this article, you will learn how to create, alter, and remove an index in the SQL database.

### Why SQL Index?

The following reasons tell why Index is necessary in SQL:

* SQL Indexes can search the information of the large database quickly.
* This concept is a quick process for those columns, including different values.
* This data structure sorts the data values of columns (fields) either in ascending or descending order. And then, it assigns the entry for each value.
* Each Index table contains only two columns. The first column is row\_id, and the other is indexed-column.
* When indexes are used with smaller tables, the performance of the index may not be recognized.

## Create an INDEX

In SQL, we can easily create the Index using the following CREATE Statement:

1. **CREATE** **INDEX** Index\_Name **ON** Table\_Name ( Column\_Name);

Here, **Index\_Name** is the name of that index that we want to create, and **Table\_Name** is the name of the table on which the index is to be created. The **Column\_Name** represents the name of the column on which index is to be applied.

If we want to create an index on the combination of two or more columns, then the following syntax can be used in SQL:

1. **CREATE** **INDEX** Index\_Name **ON** Table\_Name ( column\_name1, column\_name2, ...., column\_nameN);

## Create UNIQUE INDEX

Unique Index is the same as the Primary key in SQL. The unique index does not allow selecting those columns which contain duplicate values.

This index is the best way to maintain the data integrity of the SQL tables.

**Syntax for creating the Unique Index is as follows:**

1. **CREATE** **UNIQUE** **INDEX** Index\_Name **ON** Table\_Name ( Column\_Name);

**Example for creating a Unique Index in SQL:**

Let's take the above Employee table. The following SQL query creates the unique index i**ndex\_salary** on the **Emp\_Salary** column of the **Employee** table.

1. **CREATE** **UNIQUE** **INDEX** index\_salary **ON** Employee (Emp\_Salary);

## Rename an INDEX

We can easily rename the index of the table in the relational database using the ALTER command.

**Syntax:**

**ALTER** **INDEX** old\_Index\_Name RENAME **TO** new\_Index\_Name;

**Example for Renaming the Index in SQL:**

The following SQL query renames the index **'index\_Salary'** to **'index\_Employee\_Salary'** of the above Employee table:

1. **ALTER** **INDEX** index\_Salary RENAME **TO** index\_Employee\_Salary;

## Remove an INDEX

An Index of the table can be easily removed from the SQL database using the DROP command. If you want to delete an index from the data dictionary, you must be the owner of the database or have the privileges for removing it.

**Syntaxes for Removing an Index in relational databases are as follows:**

**In Oracle database:**

1. **DROP** **INDEX** Index\_Name;

**In MySQL database:**

1. **ALTER** **TABLE** Table\_Name **DROP** **INDEX** Index\_Name;

**In Ms-Access database:**

1. **DROP** **INDEX** Index\_Name **ON** Table\_Name;

**In SQL Server Database:**

1. **DROP** **INDEX** Table\_Name.Index\_Name;

**Example for removing an Index in SQL:**

Suppose we want to remove the above **'index\_Salary'** from the SQL database. For this, we have to use the following SQL query:

1. **DROP** **INDEX** index\_salary;

## Alter an INDEX

An index of the table can be easily modified in the relational database using the ALTER command.

**The basic syntax for modifying the Index in SQL is as follows:**

1. **ALTER** **INDEX** Index\_Name **ON** Table\_Name REBUILD;

## When should INDEXES not be used in SQL?

The Indexes should not be used in SQL in the following cases or situations:

* SQL Indexes can be avoided when the size of the table is small.
* When the table needs to be updated frequently.
* Indexed should not be used on those cases when the column of a table contains a large number of NULL values.

CREATE TABLE Student\_records

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO Student\_records VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(302, "Bhavesh", "Kanpur", 19, 93, "A1"),

(303, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(307, "Vivek", "Goa", 20, 62, NULL);

CREATE INDEX Grade\_sys ON Student\_records(First\_Name, Grade);

SELECT \*

FROM Student\_records

WHERE First\_Name = 'John' AND Grade = 'A';

ERROR 1142 (42000) at line 21: INDEX command denied to user 'mycompiler'@'localhost' for table 'Student\_records'

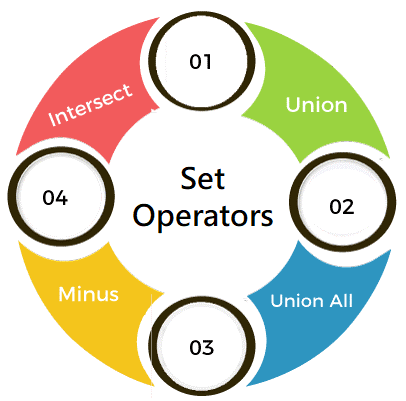
[Execution complete with exit code 1]

# **SET Operators in SQL**

SET operators are special type of operators which are used to combine the result of two queries.

Operators covered under SET operators are:

1. **UNION**
2. **UNION ALL**
3. **INTERSECT**
4. **MINUS**



There are certain rules which must be followed to perform operations using SET operators in SQL. Rules are as follows:

1. **The number and order of columns must be the same.**
2. **Data types must be compatible**

1. UNION:

* UNION will be used to combine the result of two select statements.
* Duplicate rows will be eliminated from the results obtained after performing the UNION operation.

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

CREATE TABLE table2

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table2 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(102, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(104, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(106, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT \*FROM table1 UNION SELECT \*FROM table2;

Student\_Id First\_Name Address Age Percentage Grade

201 Akash Delhi 18 89 A2

202 Bhavesh Kanpur 19 93 A1

203 Yash Delhi 20 89 A2

204 Bhavana Delhi 19 78 NULL

205 Yatin Lucknow 20 75 B1

206 Ishika Ghaziabad 19 51 C1

207 Vivek Goa 20 62 NULL

102 Bhavesh Kanpur 19 93 A1

104 Bhavana Delhi 19 78 NULL

106 Ishika Ghaziabad 19 51 C1

[Execution complete with exit code 0]

2. UNION ALL

* This operator combines all the records from both the queries.
* Duplicate rows will be not be eliminated from the results obtained after performing the UNION ALL operation.

SELECT \*FROM table1 UNION ALL SELECT \*FROM table2;

Student\_Id First\_Name Address Age Percentage Grade

201 Akash Delhi 18 89 A2

202 Bhavesh Kanpur 19 93 A1

203 Yash Delhi 20 89 A2

204 Bhavana Delhi 19 78 NULL

205 Yatin Lucknow 20 75 B1

206 Ishika Ghaziabad 19 51 C1

207 Vivek Goa 20 62 NULL

102 Bhavesh Kanpur 19 93 A1

104 Bhavana Delhi 19 78 NULL

106 Ishika Ghaziabad 19 51 C1

201 Akash Delhi 18 89 A2

203 Yash Delhi 20 89 A2

205 Yatin Lucknow 20 75 B1

207 Vivek Goa 20 62 NULL

[Execution complete with exit code 0]

3. INTERSECT:

* It is used to combine two SELECT statements, but it only returns the records which are common from both SELECT statements.

SELECT \*FROM table1 INTERSECT SELECT \*FROM table2;

Student\_Id First\_Name Address Age Percentage Grade

205 Yatin Lucknow 20 75 B1

207 Vivek Goa 20 62 NULL

203 Yash Delhi 20 89 A2

201 Akash Delhi 18 89 A2

[Execution complete with exit code 0]

4.MINUS:

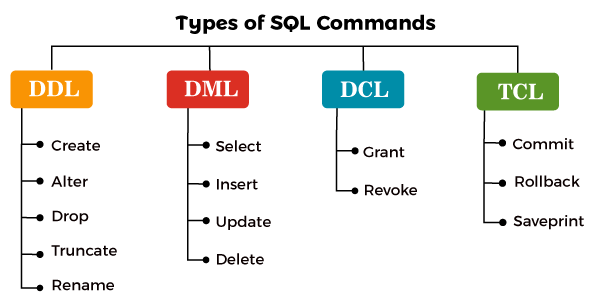
* It displays the rows which are present in the first query but absent in the second query with no duplicates.

SELECT \* FROM table1 MINUS SELECT \* FROM table2;

# **Types of SQL Commands**

SQL is a structured query language, which is used to deal with structured data. Structured data is data that is generally stored in the form of relations or tables.

Whenever we store the data in tables or relations, we need SQL commands. Moreover, these commands are also required to retrieve the data which is stored in tables.



Let us take a deeper dive into the classification of SQL commands with the help of practical examples. We will use the MySQL database for writing all the queries.

## (A) DDL

* DDL stands for **data definition language**. DDL Commands deal with the schema, i.e., the table in which our data is stored.
* All the structural changes such as creation, deletion and alteration on the table can be carried with the DDL commands in SQL.
* Commands covered under DDL are:
  1. **CREATE**
  2. **ALTER**
  3. **DROP**
  4. **TRUNCATE**
  5. **RENAME**

Let us see each of the commands in the DDL category with more details.

### 1. CREATE:

In SQL, whenever we wish to create a new database or a table in a database, we use **CREATE** command.

**Syntax to create a new database:**

1. **CREATE** **DATABASE** DatabaseName;

**Syntax to create a table:**

1. **CREATE** **TABLE** TableName (ColumnName1 datatype, ColumnName2 datatype,….., ColumnName3 datat

### 2. ALTER

In SQL, whenever we wish to alter the table structure, we will use the ALTER command. Using alter command, we can make structural changes to the table, such ***as adding a new column, removing or deleting an existing column from the table, changing the datatype of an existing column and renaming an existing column***.

Let's look at the syntax before writing the queries using ALTER command.

**Syntax of ALTER command to add a new column:**

1. **ALTER** **TABLE** table\_name **ADD** column\_name datatype(**size**);

**Syntax of ALTER command to delete an existing column:**

1. **ALTER** **TABLE** table\_name **DROP** **COLUMN** column\_name;

**Syntax of ALTER command to rename the existing table's column:**

1. **ALTER** **TABLE** table\_name RENAME **COLUMN** old\_column\_name **TO** new\_column\_name;

**Syntax of ALTER command to change the datatype of an existing column:**

1. **ALTER** **TABLE** table\_name **MODIFY** column\_name datatype(**size**);

### 3. DROP

DROP command is **used to remove or delete the table's records and the table's structure from the database.**

**Syntax:**

1. **DROP** **TABLE** table\_name;

. TRUNCATE

A TRUNCATE command is used to delete the table's records, *but the table's structure will remain unaffected in the database.*

ADVERTISEMENT

**Syntax:**

1. **TRUNCATE** **TABLE** table\_name;

### RENAME

Rename COMMAND is used to give a new name to an existing table.

**Syntax to rename a table:**

1. RENAME **TABLE** old\_table\_name **TO** new\_table\_name;

(B) DML

* DML stands for *Data Manipulation Language*. Using DML commands in SQL, we can make changes in the data present in tables.
* Whenever we wish to manipulate the data or fetch the data present in SQL tables, we can use DML commands in SQL.
* DML commands in SQL will change the data, such as **inserting new records, deleting or updating existing records from the SQL tables**. We can also retrieve all the data from SQL tables according to our requirements.
* Commands covered under DDL are:
  1. **INSERT**
  2. **SELECT**
  3. **UPDATE**
  4. **DELETE**

Let us see each of the commands in the DML category with more details.

1. INSERT

INSERT command is ***used to insert records in a table***. We can insert a single as well as multiple records for a single table at the same time.

**Syntax:**

1. **INSERT** **INTO** table\_name **VALUES** (Column1\_Value, Column2\_Value, …., ColumnN\_Value);

### SELECT

A **SELECT command is used to retrieve the records from the table**. According to our requirements, we can retrieve all the records or some specific records from the table. Whenever we want to retrieve some specific records from the table, then we have to specify the WHERE clause in a SELECT query. WHERE clause will contain a condition, any record that matches the condition will be considered as a part of the output.

**Syntax to retrieve all the records:**

1. **SELECT** \***FROM** table\_name;

**Syntax to retrieve some specific records:**

1. **SELECT** \***FROM** table\_name **WHERE** condition;

### UPDATE

UPDATE command works for the values present in the table. Whenever we wish to update a value for any record present in a table, we will use the UPDATE command in SQL.

**Syntax:**

1. **UPDATE** table\_name **SET** column\_name = value **WHERE** condition;

### DELETE

DELETE command is used to remove records from a table.

**Syntax:**

1. **DELETE** **FROM** table\_name;

© DCL

* DCL stands for **Data Control Language.**
* Whenever we want to control the access to the data present in SQL tables, we will use DCL commands in SQL. Only the authorized users can access the data stored in the tables.
* Every user will have some pre-defined privileges; accordingly, the data can be accessed by that particular user. Using the DCL commands in SQL, we can give privileges to the user on the SQL database and tables, or we can also revoke the given privileges from the user.
* Commands covered under DCL are:

**1. GRANT**

Access privileges can be assigned to a user for the databases and tables using the GRANT command.

**2. REVOKE**

All the access privileges which are already assigned to the user can be revoked by using the REVOKE command.

(D) TCL:

* TCL stands for **Transaction Control Language**. TCL commands are generally used in transactions.
* Using TCL commands in SQL, we can save our transactions to the database and roll them back to a specific point in our transaction. We can also save a particular portion of our transaction using the SAVEPOINT command.
* Commands covered under TCL are:

**1. COMMIT:**

To save all the operations executed in a particular transaction, we need to execute a commit command just after the transaction completion.

**2. ROLLBACK**

Using the rollback command in SQL, you can roll to the last saved state of a transaction.

**3. SAVEPOINT**

Using the SAVEPOINT command, you can assign a name to a specific part of the transaction.

# **SQL Subquery**

The Subquery or Inner query is an SQL query placed inside another SQL query. It is embedded in the HAVING or WHERE clause of the SQL statements.

**Following are the important rules which must be followed by the SQL Subquery:**

1. The SQL subqueries can be used with the following statements along with the SQL expression operators:

* SELECT statement,
* UPDATE statement,
* INSERT statement, and
* DELETE statement.

2. The subqueries in SQL are always enclosed in the parenthesis and placed on the right side of the SQL operators.

3. We cannot use the ORDER BY clause in the subquery. But, we can use the GROUP BY clause, which performs the same function as the ORDER BY clause.

4. If the subquery returns more than one record, we have to use the multiple value operators before the Subquery.

5. We can use the BETWEEN operator within the subquery but not with the subquery.

## Subquery with SELECT statement

In SQL, inner queries or nested queries are used most frequently with the SELECT statement. The syntax of Subquery with the SELECT statement is described in the following block:

SELECT Column\_Name1, Column\_Name2, ...., Column\_NameN

FROM Table\_Name WHERE Column\_Name Comparison\_Operator

( SELECT Column\_Name1, Column\_Name2, ...., Column\_NameN

FROM Table\_Name WHERE condition;

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT AVG(Percentage) FROM table1;

SELECT \* FROM table1 WHERE Percentage > ( SELECT AVG(Percentage) FROM table1);

76.7142857142857

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

[Execution complete with exit code 0]

UPDATE table1 SET Age = Age + 5 WHERE Student\_Id IN ( SELECT Student\_Id FROM table1 WHERE Address = "Delhi" );

SELECT \* FROM table1;

201|Akash|Delhi|23|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|25|89|A2

204|Bhavana|Delhi|24|78|

205|Yatin|Lucknow|20|75|B1

206|Ishika|Ghaziabad|19|51|C1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

DELETE FROM table1 WHERE Student\_Id IN ( SELECT Student\_Id FROM table1 WHERE Grade = 'C1' ) ;

SELECT \* From table1;

201|Akash|Delhi|18|89|A2

202|Bhavesh|Kanpur|19|93|A1

203|Yash|Delhi|20|89|A2

204|Bhavana|Delhi|19|78|

205|Yatin|Lucknow|20|75|B1

207|Vivek|Goa|20|62|

[Execution complete with exit code 0]

# **SQL View**

SQL provides the concept of VIEW, which hides the complexity of the data and restricts unnecessary access to the database. It permits the users to access only a particular column rather than the whole data of the table.

The **View** in the Structured Query Language is considered as the virtual table, which depends on the result-set of the predefined SQL statement.

Like the SQL tables, Views also store data in rows and columns, but the rows do not have any physical existence in the database.

Any database administrator and user can easily create the View by selecting the columns from one or more database tables. They can also delete and update the views according to their needs.

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A view can store either all the records of the table or a particular record from the table using the WHERE clause.

## Create a SQL View

You can easily create a View in Structured Query Language by using the CREATE VIEW statement. You can create the View from a single table or multiple tables.

**Syntax to Create View from Single Table**

**CREATE** **VIEW** View\_Name **AS**

**SELECT** Column\_Name1, Column\_Name2, ....., Column\_NameN

**FROM** Table\_Name

**WHERE** condition;

In the syntax, View\_Name is the name of View you want to create in SQL. The SELECT command specifies the rows and columns of the table, and the WHERE clause is optional, which is used to select the particular record from the table.

**Syntax to Create View from Multiple Tables**

You can create a View from multiple tables by including the tables in the SELECT statement.

REATE **VIEW** View\_Name **AS**

**SELECT** Table\_Name1.Column\_Name1, Table\_Name1.Column\_Name2, Table\_Name2.Column\_Name2, ....., Table\_NameN.Column\_NameN

**FROM** Table\_Name1, Table\_Name2, ....., Table\_NameN

**WHERE** condition;

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

CREATE VIEW Student\_View AS

SELECT Student\_Id, First\_Name, Grade

FROM table1

WHERE Percentage > 80;

Select \* FROM Student\_View;

201|Akash|A2

202|Bhavesh|A1

203|Yash|A2

[Execution complete with exit code 0]

## Example to Create a View from Multiple tables

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 89, "A2"),

(204, "Bhavana", "Delhi", 19, 78, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 51, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

CREATE TABLE table2

(

Id Int PRIMARY KEY,

Last\_Name VARCHAR (20),

Hobby VARCHAR (20),

Attendance Int NOT NULL,

Batch VARCHAR (10)

);

INSERT INTO table2 VALUES

(201,"kumar","drawing",45,"red"),

(202,"gowd","singling",55,"blue"),

(203,"shekar","dancing",65,"yellow"),

(204,"vilehya","painting",45,"green"),

(205,"krishna","travelling",85,"red"),

(206,"koushal","gardening",75,"yellow"),

(207,"shankar","drawing",55,"blue");

CREATE VIEW Student\_Teacher\_View AS

SELECT table1.Student\_Id, table1.First\_Name, table2.Last\_Name, table2.Hobby

FROM table1,table2

WHERE table1.Student\_Id=table2.Id;

Select \* from Student\_Teacher\_View;

201|Akash|kumar|drawing

202|Bhavesh|gowd|singling

203|Yash|shekar|dancing

204|Bhavana|vilehya|painting

205|Yatin|krishna|travelling

206|Ishika|koushal|gardening

207|Vivek|shankar|drawing

[Execution complete with exit code 0]

# **Constraints in SQL**

Constraints in SQL means we are applying certain conditions or restrictions on the database. This further means that before inserting data into the database, we are checking for some conditions. If the condition we have applied to the database holds true for the data which is to be inserted, then only the data will be inserted into the database tables.

### Constraints in SQL can be categorized into two types:

1. **Column Level Constraint:**  
   Column Level Constraint is used to apply a constraint on a single column.
2. **Table Level Constraint:**  
   Table Level Constraint is used to apply a constraint on multiple columns.

### Some of the real-life examples of constraints are as follows:

1. Every person has a unique email id. This is because while creating an email account for any user, the email providing services such as Gmail, Yahoo or any other email providing service will always check for the availability of the email id that the user wants for himself. If some other user already takes the email id that the user wants, then that id cannot be assigned to another user. This simply means that no two users can have the same email ids on the same email providing service. So, here the email id is the constraint on the database of email providing services.
2. Whenever we set a password for any system, there are certain constraints that are to be followed. These constraints may include the following:
   * There must be one uppercase character in the password.
   * Password must be of at least eight characters in length.
   * Password must contain at least one special symbol.

### Constraints available in SQL are:

1. NOT NULL
2. UNIQUE
3. PRIMARY KEY
4. FOREIGN KEY
5. CHECK
6. DEFAULT
7. CREATE INDEX

Now let us try to understand the different constraints available in SQL in more detail with the help of examples. We will use MySQL database for writing all the queries.

### 1. NOT NULL

* NULL means empty, i.e., the value is not available.
* Whenever a table's column is declared as NOT NULL, then the value for that column cannot be empty for any of the table's records.
* There must exist a value in the column to which the NOT NULL constraint is applied.

#### **NOTE: NULL does not mean zero. NULL means empty column, not even zero.**

**Syntax to apply the NOT NULL constraint during table creation:**

1. **CREATE** **TABLE** TableName (ColumnName1 datatype NOT NULL, ColumnName2 datatype,…., ColumnNameN datatype);

2. UNIQUE

* Duplicate values are not allowed in the columns to which the UNIQUE constraint is applied.
* The column with the unique constraint will always contain a unique value.
* This constraint can be applied to one or more than one column of a table, which means more than one unique constraint can exist on a single table.
* Using the UNIQUE constraint, you can also modify the already created tables.

**Syntax to apply the UNIQUE constraint on a single column:**

1. **CREATE** **TABLE** TableName (ColumnName1 datatype **UNIQUE**, ColumnName2 datatype,…., ColumnNameN datatype);

3. PRIMARY KEY

* PRIMARY KEY Constraint is a combination of NOT NULL and Unique constraints.
* NOT NULL constraint and a UNIQUE constraint together forms a PRIMARY constraint.
* The column to which we have applied the primary constraint will always contain a unique value and will not allow null values.

**Syntax of primary key constraint during table creation:**

1. **CREATE** **TABLE** TableName (ColumnName1 datatype **PRIMARY** **KEY**, ColumnName2 datatype,…., ColumnNameN datatype);

4. FOREIGN KEY

* A foreign key is used for referential integrity.
* When we have two tables, and one table takes reference from another table, i.e., the same column is present in both the tables and that column acts as a primary key in one table. That particular column will act as a foreign key in another table.

**Syntax to apply a foreign key constraint during table creation:**

1. **CREATE** **TABLE** tablename(ColumnName1 Datatype(**SIZE**) **PRIMARY** **KEY**, ColumnNameN Datatype(**SIZE**), **FOREIGN** **KEY**( ColumnName ) **REFERENCES** PARENT\_TABLE\_NAME(Primary\_Key\_ColumnName));

5.CHECK

* Whenever a check constraint is applied to the table's column, and the user wants to insert the value in it, then the value will first be checked for certain conditions before inserting the value into that column.
* **For example:** if we have an age column in a table, then the user will insert any value of his choice. The user will also enter even a negative value or any other invalid value. But, if the user has applied check constraint on the age column with the condition age greater than 18. Then in such cases, even if a user tries to insert an invalid value such as zero or any other value less than 18, then the age column will not accept that value and will not allow the user to insert it due to the application of check constraint on the age column.

**Syntax to apply check constraint on a single column:**

1. **CREATE** **TABLE** TableName (ColumnName1 datatype **CHECK** (ColumnName1 Condition), ColumnName2 datatype,…., ColumnNameN datatype);

### 6.DEFAULT

Whenever a default constraint is applied to the table's column, and the user has not specified the value to be inserted in it, then the default value which was specified while applying the default constraint will be inserted into that particular column.

**Syntax to apply default constraint during table creation:**

1. **CREATE** **TABLE** TableName (ColumnName1 datatype **DEFAULT** Value, ColumnName2 datatype,…., ColumnNameN datatype);

### 7.CREATE INDEX

CREATE INDEX constraint is used to create an index on the table. Indexes are not visible to the user, but they help the user to speed up the searching speed or retrieval of data from the database.

**Syntax to create an index on single column:**

1. **CREATE** **INDEX** IndexName **ON** TableName (ColumnName 1);

# **Pattern Matching in SQL**

* LIKE clause is used to perform the pattern matching task in SQL.
* A WHERE clause is generally preceded by a LIKE clause in an SQL query.
* LIKE clause searches for a match between the patterns in a query with the pattern in the values present in an SQL table. If the match is successful, then that particular value will be retrieved from the SQL table.
* LIKE clause can work with strings and numbers.

The LIKE clause uses the following symbols known as wildcard operators in SQL to perform this pattern-matching task in SQL.

1. To represent zero, one or more than one character, % (percentage) is used.
2. To represent a single character \_ (underscore) is used.

### (A) Using LIKE clause with % (percentage)

**Example 1:** Write a query to display employee details in which name starts with 'Pr'.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** **Name** LIKE 'Pr%';

We have used the SELECT query with the WHERE clause applied on the Name column followed by the LIKE clause. We have specified the expression value as 'Pr' in the LIKE clause, followed by the wildcard operator percent (%). So, according to the query, all the records that have names starting with the string 'Pr' followed by any other character will be considered a part of the output.

**Example 2:**Write a query to display employee details in which 'ya' is a substring in a name.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** **Name** LIKE '%ya%';

We have used the SELECT query with the WHERE clause applied on the Name column followed by the LIKE clause. In the LIKE clause, we have specified the expression value as 'ya' preceded and followed by the wildcard operator percent(%). So, according to the query, all the records which have names containing 'ya' as the substring, followed and preceded by any other character, will be considered as a part of the output.

**Example 3:** Write a query to display employee details in which city name ends with 'i'.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** City LIKE '%i';

We have used the SELECT query with the WHERE clause applied on the City column followed by the LIKE clause. In the LIKE clause, we have specified the expression value as 'i' preceded by the wildcard operator percent (%). So according to the query, all the records with city names ending with 'i' preceded by any other character will be considered a part of the output.

### (B) Using LIKE clause with \_ (underscore)

**Example 1:**

Write a query to display employee details in which city name starts with 'Na', ends with 'ik', and contains any single character between 'Na' and 'ik'.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** City LIKE 'Na\_ik';

We have used the SELECT query with the WHERE clause applied on the City column followed by the LIKE clause. In the LIKE clause, we have specified the expression value as 'Na' followed by the wildcard operator underscore (\_) with the string 'ik'. So, according to the query, all the records that have city names starting with 'Na' followed by any single character and ending with 'ik' will be considered as a part of the output.

### (C) Using LIKE clause with % and \_ operator in a single query

**Example 1:** Write a query to display employee details in which employee name contains 'a' at fifth position.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** **Name** LIKE '\_\_\_\_a%';

We have used the SELECT query with the WHERE clause applied on the Name column followed by the LIKE clause. In the LIKE clause, we have specified the expression value as the wildcard operator underscore (\_) five times, followed by 'a' with another wildcard operator percentage (%). So according to the query, all the records which has names starting with any five alphabets followed by an alphabet 'a' and ending with any other alphabet will be considered as a part of the output.

**Example 2:**

Write a query to display employee details in which salary contains a substring '00' starting from the 5th position.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** Salary LIKE '\_\_00%';

We have used the SELECT query with the WHERE clause applied on the Salary column followed by the LIKE clause. In the LIKE clause, we have specified the expression value as the wildcard operator underscore (\_) twice, followed by double zero ending with another wildcard operator percentage (%). So, according to the query, all the records that have salary starting with any two digits followed by a double zero and ending with any number will be considered as a part of the output.

### D) Using LIKE clause with NOT operator

**Example 1:**

Write a query to display employee details in which employee name is not like 'Priya'.

**Query:**

1. mysql> **SELECT** \* **FROM** employee\_details **WHERE** **Name** NOT LIKE 'Priya%';

We have used the SELECT query with the WHERE clause applied on the Name column followed by the LIKE clause preceded by NOT. In the LIKE clause, we have specified the expression value as 'Priya' followed by the wildcard operator percentage (%). So, according to the query, all the records that have names not starting with 'Priya' followed by any alphabet will be considered as a part of the output.

# **SQL Date Functions**

In this tutorial, we will learn about some of the important date functions which are in-built in SQL.

### Date functions in SQL:

1. NOW()
2. CURDATE()
3. CURTIME()
4. DATE()
5. EXTRACT()
6. DATE\_ADD()
7. DATE\_SUB()
8. DATEDIFF()
9. DATE\_FORMAT()

### NOW():

NOW () function in SQL will give the current system's date and time.

**Syntax:**

1. **SELECT** NOW ();

SELECT NOW() as now\_time;

now\_time

2024-03-28 05:29:05

[Execution complete with exit code 0]

### CURDATE()

CURDATE () function in SQL will give the current system's date.

**Syntax:**

1. **SELECT** CURDATE ();

SELECT CURDATE() as date;

date

2024-03-28

[Execution complete with exit code 0]

### CURTIME()

CURTIME () function in SQL will give the current system time.

**Syntax:**

1. **SELECT** CURTIME ();

SELECT CURTIME() as time;

time

05:36:00

[Execution complete with exit code 0]

 DATE()

Using the DATE () function in SQL, you can specifically extract the date from the DATETIME datatype column.

**Syntax:**

1. **SELECT** **DATE** (DateTimeValue);

SELECT DATE ("2021-10-24 18:28:44") AS SHOW\_DATE;

SHOW\_DATE

2021-10-24

[Execution complete with exit code 0]

### EXTRACT()

Using the EXTRACT() function in SQL, we can extract a specific part of date and time according to our requirements: day, month, year, day, hour, minute, etc.

**Syntax:**

1. **SELECT** EXTRACT (PART **FROM** **DATE** / **TIME**);

SELECT EXTRACT(YEAR FROM "2021-10-24") AS SHOW\_YEAR;

SHOW\_YEAR

2021

[Execution complete with exit code 0]

SELECT EXTRACT(MONTH FROM "2021-10-24") AS SHOW\_MONTH;

SHOW\_MONTH

10

[Execution complete with exit code 0]

SELECT EXTRACT(DAY FROM "2021-10-24") AS SHOW\_DAY;

SHOW\_DAY

24

[Execution complete with exit code 0]

SELECT EXTRACT(HOUR FROM "19:10:43") AS SHOW\_HOUR;

SHOW\_HOUR

19

[Execution complete with exit code 0]

SELECT EXTRACT(MINUTE FROM "19:10:43") AS SHOW\_MINUTE;

SHOW\_MINUTE

10

[Execution complete with exit code 0]

SELECT EXTRACT(SECOND FROM "19:10:43") AS SHOW\_SECOND;

SHOW\_SECOND

43

[Execution complete with exit code 0]

### DATE\_ADD()

Using the DATE\_ADD () function in SQL, we can add a specific time interval to the given date.

**Syntax:**

1. **SELECT** DATE\_ADD (**DATE**, INTERVAL VALUE Unit\_to\_be\_added);

SELECT DATE\_ADD("2021-10-24", INTERVAL 15 DAY) AS NEW\_DATE;

NEW\_DATE

2021-11-08

[Execution complete with exit code 0]

SELECT DATE\_ADD("2021-10-24", INTERVAL 5 MONTH) AS NEW\_DATE;

NEW\_DATE

2022-03-24

[Execution complete with exit code 0]

### DATE\_SUB()

Using the DATE\_SUB () function in SQL, we can remove a specific time interval from the given date.

**Syntax:**

1. **SELECT** DATE\_SUB (**DATE**, INTERVAL VALUE Unit\_to\_be\_subtracted);

SELECT DATE\_SUB("2021-10-24", INTERVAL 25 YEAR) AS NEW\_DATE;

NEW\_DATE

1996-10-24

[Execution complete with exit code 0]

### DATEDIFF()

Using the DATEDIFF() function in SQL will give us the number of days that fall between the two given dates.

**Syntax:**

1. **SELECT** DATEDIFF(Date1, Date2);

SELECT DATEDIFF("2021-10-24", "2021-10-09") AS NEW\_DATE;

NEW\_DATE

15

[Execution complete with exit code 0]

### DATE\_FORMAT()

Using the DATE\_FORMAT () function in SQL, we can display the date or time-related information in a well-formatted manner.

**Syntax of using a DATE\_FORMAT function on a table's column:**

1. **SELECT** DATE\_FORMAT (ColumnName, Expression) **FROM** **Table** **Name**;

SELECT DATE\_FORMAT("2021-10-24", "%W %D %M %Y") AS Formatted\_Date;

Formatted\_Date

Sunday 24th October 2021

[Execution complete with exit code 0]

# **SQL CASE**

The **CASE** is a statement that operates if-then-else type of logical queries. This statement returns the value when the specified condition evaluates to True. When no condition evaluates to True, it returns the value of the ELSE part.

When there is no ELSE part and no condition evaluates to True, it returns a NULL value.

In Structured Query Language, CASE statement is used in SELECT, INSERT, and DELETE statements with the following three clauses:

1. WHERE Clause
2. ORDER BY Clause
3. GROUP BY Clause

This statement in SQL is always followed by at least one pair of WHEN and THEN statements and always finished with the END keyword.

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The CASE statement is of two types in relational databases:

1. Simple CASE statement
2. Searched CASE statement

### Syntax of CASE statement in SQL

CASE <expression>

**WHEN** condition\_1 **THEN** statement\_1

**WHEN** condition\_2 **THEN** statement\_2 …….

**WHEN** condition\_N **THEN** statement\_N

**ELSE** result

**END**;

Here, the CASE statement evaluates each condition one by one.

If the expression matches the condition of the first WHEN clause, it skips all the further WHEN and THEN conditions and returns the statement\_1 in the result.

If the expression does not match the first WHEN condition, it compares with the seconds WHEN condition. This process of matching will continue until the expression is matched with any WHEN condition.

If no condition is matched with the expression, the control automatically goes to the ELSE part and returns its result. In the CASE syntax, the ELSE part is optional.

In Syntax, CASE and END are the most important keywords which show the beginning and closing of the CASE statement

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL,

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 59, "A2"),

(204, "Bhavana", "Delhi", 19, 38, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 41, "C1"),

(207, "Vivek", "Goa", 20, 62, NULL);

SELECT Student\_Id, First\_Name, Percentage,

CASE

WHEN Percentage >= 90 THEN 'Outstanding'

WHEN Percentage >= 80 AND Percentage < 90 THEN 'Excellent'

WHEN Percentage >= 70 AND Percentage < 80 THEN 'Good'

WHEN Percentage >= 60 AND Percentage < 70 THEN 'Average'

WHEN Percentage >= 50 AND Percentage < 60 THEN 'Bad'

WHEN Percentage < 50 THEN 'Failed'

END AS Stu\_Remarks

FROM table1;

Student\_Id First\_Name Percentage Stu\_Remarks

201 Akash 89 Excellent

202 Bhavesh 93 Outstanding

203 Yash 59 Bad

204 Bhavana 38 Failed

205 Yatin 75 Good

206 Ishika 41 Failed

207 Vivek 62 Average

[Execution complete with exit code 0]

# **How to use CHECK in SQL**

In this article, you will learn how to use the CHECK keyword to the column in SQL queries.

### What is CHECK in SQL?

CHECK is a SQL constraint that allows database users to enter only those values which fulfill the specified condition. If any column is defined as a CHECK constraint, then that column holds only TRUE values.

**The following syntax adds the CHECK constraint to the column at the time of table creation:**

1. **CREATE** **TABLE** Table\_Name
2. (
3. Column\_Name\_1 DataType (character\_size **of** the column\_1) **CHECK** (Boolean\_Expression),
4. Column\_Name\_2 DataType (character\_size **of** the column\_2) **CHECK** (Boolean\_Expression),
5. Column\_Name\_3 DataType (character\_size **of** the column\_3) **CHECK** (Boolean\_Expression),
6. ........,
7. Column\_Name\_N DataType (character\_size **of** the column\_N) **CHECK** (Boolean\_Expression)
8. )  ;

We can easily use the CHECK constraint to one or more columns in one SQL table.

**The following syntax adds the CHECK constraint to the column when the table already exists:**

1. **ALTER** **TABLE** Table\_Name **ALTER** **COLUMN** Column\_Name datatype **CHECK**;

If you want to use the CHECK constraint at the time of table creation, you have to follow the steps given below:

1. Create the new database
2. Create a new table with the CHECK constraint
3. Insert the values
4. View the records of Table

CREATE TABLE table1

(

Student\_Id Int PRIMARY KEY,

First\_Name VARCHAR (20),

Address VARCHAR (20),

Age Int NOT NULL CHECK (Age >=18),

Percentage Int NOT NULL,

Grade VARCHAR (10)

);

INSERT INTO table1 VALUES

(201, "Akash", "Delhi", 18, 89, "A2"),

(202, "Bhavesh", "Kanpur", 19, 93, "A1"),

(203, "Yash", "Delhi", 20, 59, "A2"),

(204, "Bhavana", "Delhi", 19, 38, NULL),

(205, "Yatin", "Lucknow", 20, 75, "B1"),

(206, "Ishika", "Ghaziabad", 19, 41, "C1"),

(207, "Vivek", "Goa", 10, 62, NULL);

SELECT Student\_Id, First\_Name, Percentage

FROM table1;

ERROR 3819 (HY000) at line 12: Check constraint 'table1\_chk\_1' is violated.

[Execution complete with exit code 1]

Add CHECK constraint to Existing table

Any database user can easily add a CHECK constraint to the existing table by using the ADD keyword in the SQL ALTER query.

**Syntax to specify CHECK constraint to the Existing table:**

1. **ALTER** **TABLE** Table\_Name **ADD** **CONSTRAINT** Constraint\_Name **CHECK**(Boolean\_Expression);

ALTER TABLE table1 ADD CONSTRAINT chk\_age CHECK(Age >= 18);

SELECT Student\_Id, First\_Name, Percentage

FROM table1;

ERROR 3819 (HY000) at line 21: Check constraint 'chk\_age' is violated.

[Execution complete with exit code 1]

ALTER TABLE table1 DROP CONSTRAINT chk\_age;

# **DEFAULT in SQL**

In this SQL article, you will learn how to use DEFAULT on the columns of the table in Structured Query Language.

### What is a DEFAULT constraint?

The DEFAULT is a constraint in SQL which allows users to fill a column with the default or fixed value.

If no value is specified to the column at the time of insertion, then the default value will be added automatically to that column.

**The following syntax adds the DEFAULT constraint to the column at the time of table creation:**

**CREATE** **TABLE** Table\_Name

(

Column\_Name\_1 DataType (character\_size **of** the column\_1) **DEFAULT** Value,

Column\_Name\_2 DataType (character\_size **of** the column\_2) **DEFAULT** Value,

Column\_Name\_3 DataType (character\_size **of** the column\_3) **DEFAULT** Value,

........,

Column\_Name\_N DataType (character\_size **of** the column\_N) **DEFAULT** Value,

)  ;

In the SQL DEFAULT syntax, we have to define the value with the DEFAULT constraint. The database users can easily specify the DEFAULT constraint to one or more columns in one SQL table.

**The following syntax adds the DEFAULT constraint to the column when the table already exists:**

1. **ALTER** **TABLE** Table\_Name **ALTER** **COLUMN** Column\_Name datatype **DEFAULT**;

If you want to use the DEFAULT constraint at the time of table creation, you have to follow the steps given below:

1. Create the new database
2. Create a new table and add DEFAULT
3. Insert the records
4. View the table's data

CREATE TABLE Doctor\_Info

(

Doctor\_ID INT NOT NULL PRIMARY KEY,

Doctor\_Name VARCHAR(100),

Doctor\_Specialist VARCHAR(80) DEFAULT 'Heart',

Doctor\_Gender Varchar(20) DEFAULT 'Male',

Doctor\_Country Varchar(80) DEFAULT 'Russia'

) ;

INSERT INTO Doctor\_Info VALUES

(1035, 'Jones',DEFAULT,DEFAULT,'U. K.'),

(1015, 'Moris',DEFAULT,DEFAULT,DEFAULT),

(1003, 'Harry','Fever',DEFAULT,'U. K.'),

(1044,'Bella',DEFAULT,'Female', 'U. K.'),

(1025, 'Moria',DEFAULT,DEFAULT,DEFAULT);

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Specialist Doctor\_Gender Doctor\_Country

1003 Harry Fever Male U. K.

1015 Moris Heart Male Russia

1025 Moria Heart Male Russia

1035 Jones Heart Male U. K.

1044 Bella Heart Female U. K.

[Execution complete with exit code 0]

# **DELETIONS OF COLUMNS AND ROWS**

# **How to Delete Column from Table in SQL**

This article describes how to delete one or more columns from the table in Structured Query Language.

The ALTER command in SQL deletes the single and multiple columns from the SQL table. It allows the database users to modify the structure of the created table in the database.

**The syntax for deleting a Single Column from the table is given below:**

1. **ALTER** **TABLE** Table\_Name **DROP** Column\_Name;

**The syntax for deleting Multiple Columns from the table is given below:**

1. **ALTER** **TABLE** Table\_Name **DROP** Column\_Name1, Column\_Name2, ......, Column\_NameN;

We have to use the DROP keyword in the ALTER command for deleting one or more columns from the table.

If you want to delete the column from the table, you have to follow the following steps one by one in the given order:

1. Create a Database in your system.
2. Create a Table in the database and Insert the data into the table.
3. Show the table before column deletion.
4. Delete a single column from the table.
5. Show the table after deletion.

CREATE TABLE Doctor\_Info

(

Doctor\_ID INT NOT NULL PRIMARY KEY,

Doctor\_Name VARCHAR(100),

Doctor\_Specialist VARCHAR(80) DEFAULT 'Heart',

Doctor\_Gender Varchar(20) DEFAULT 'Male',

Doctor\_Country Varchar(80) DEFAULT 'Russia'

) ;

INSERT INTO Doctor\_Info VALUES

(1035, 'Jones',DEFAULT,DEFAULT,'U. K.'),

(1015, 'Moris',DEFAULT,DEFAULT,DEFAULT),

(1003, 'Harry','Fever',DEFAULT,'U. K.'),

(1044,'Bella',DEFAULT,'Female', 'U. K.'),

(1025, 'Moria',DEFAULT,DEFAULT,DEFAULT);

ALTER TABLE Doctor\_Info DROP Doctor\_Gender;

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Specialist Doctor\_Country

1003 Harry Fever U. K.

1015 Moris Heart Russia

1025 Moria Heart Russia

1035 Jones Heart U. K.

1044 Bella Heart U. K.

[Execution complete with exit code 0]

ALTER TABLE Doctor\_Info

DROP Doctor\_Gender,

DROP Doctor\_Specialist;

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Country

1003 Harry U. K.

1015 Moris Russia

1025 Moria Russia

1035 Jones U. K.

1044 Bella U. K.

[Execution complete with exit code 0]

# **How to Delete one row in SQL**

Here, you will learn how to delete one row or record from a table in Structured Query Language.

We can easily delete one record using the SQL DELETE statement. This statement also removes all the existing rows from the database tables. It also helps in removing the data from the SQL views.

Once a row has been deleted from the table, that row cannot be recovered.

**The SQL syntax for deleting a specific row is given below:**

1. **DELETE** **FROM** Table\_Name **WHERE** condition;

In this syntax, the WHERE clause specifies that record which you want to remove from the table. If you run the DELETE command without WHERE clause, the query will remove all the rows from the SQL table.

If you want to remove the records permanently from the table, you have to follow the following steps one by one in the given order:

1. Create a Database.
2. Create a Table and Insert the data into the table.
3. Show the table before deletion.
4. Delete one record from the table.
5. Show the table after deletion.

DELETE FROM Doctor\_Info WHERE Doctor\_ID = 1015;

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Specialist Doctor\_Gender Doctor\_Country

1003 Harry Fever Male U. K.

1025 Moria Heart Male Russia

1035 Jones Heart Male U. K.

1044 Bella Heart Female U. K.

[Execution complete with exit code 0]

## Delete Multiple Records from the table

DELETE FROM Doctor\_Info WHERE Doctor\_ID <= 1015;

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Specialist Doctor\_Gender Doctor\_Country

1025 Moria Heart Male Russia

1035 Jones Heart Male U. K.

1044 Bella Heart Female U. K.

[Execution complete with exit code 0]

# **ADDITION OF ROWS AND COLUMNS**

# **How to Add Column in the Table in SQL**

In this section, we shall learn how to add a column in the table in Structured Query Language.

The ALTER command in SQL allows the database users to add one or more columns in the SQL table. It allows the database users to modify the structure of the existing table in the database.

**The syntax for adding a Single Column from the table is given below:**

1. **ALTER** TABLETable\_Name **ADD** Column\_Name datatype;

**The syntax for deleting Multiple Columns from the table is given below:**

1. **ALTER** TABLETable\_Name **ADD** Column\_Name1 Column1\_datatype, Column\_Name2 Column2\_datatype, ......, Column\_NameN Columnn\_datatype;

We have to use the ADD keyword in the ALTER command for adding one or more columns in the table.

If you want to add a column in the table, you have to follow the following steps one by one in a given order:

1. Create a Database.
2. Create a Table in the database.
3. View the Table structure before column addition.
4. Add a single column to the table.
5. View the Table structure after column addition.

ALTER TABLE Doctor\_Info ADD Average INT NOT NULL DEFAULT 0;

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Specialist Doctor\_Gender Doctor\_Country Average

1003 Harry Fever Male U. K. 0

1015 Moris Heart Male Russia 0

1025 Moria Heart Male Russia 0

1035 Jones Heart Male U. K. 0

1044 Bella Heart Female U. K. 0

[Execution complete with exit code 0]

ALTER TABLE Doctor\_Info ADD Engine\_Number Varchar(50),

ADD Car\_Number Varchar(45) ;

SELECT \* FROM Doctor\_Info;

Doctor\_ID Doctor\_Name Doctor\_Specialist Doctor\_Gender Doctor\_Country Engine\_Number Car\_Number

1003 Harry Fever Male U. K. NULL NULL

1015 Moris Heart Male Russia NULL NULL

1025 Moria Heart Male Russia NULL NULL

1035 Jones Heart Male U. K. NULL NULL

1044 Bella Heart Female U. K. NULL NULL

[Execution complete with exit code 0]

# **How to Add Row in the Table in SQL**

INSERT INTO Doctor\_Info VALUES

(1035, 'Jones',DEFAULT,DEFAULT,'U. K.'),

(1015, 'Moris',DEFAULT,DEFAULT,DEFAULT),

(1003, 'Harry','Fever',DEFAULT,'U. K.'),

(1044,'Bella',DEFAULT,'Female', 'U. K.'),

(1025, 'Moria',DEFAULT,DEFAULT,DEFAULT);

# **How to Add Foreign Key in SQL**

In this article, we will learn how to add a Foreign Key to the column in the table of our SQL database.

The **FOREIGN KEY** in SQL is used to join the record of two tables in the database. The column defined as the FOREIGN KEY in one table must be the PRIMARY KEY in another table in the same database.

We can easily add foreign key to the column in the following two ways:

1. Add foreign key using Create table statement
2. Add foreign key using Alter Table statement

If you want to add a FOREIGN KEY to the column into the SQL table, you have to follow the below steps in the given sequence:

1. Create the database in the system.
2. Create two tables in the same database.
3. View Table structure before foreign key addition.
4. Add a foreign key to the table.
5. View the table structure.

CREATE TABLE Cars\_Price\_Details

(

Model INT NOT NULL PRIMARY KEY,

Cars\_Price INT NOT NULL

);

CREATE TABLE Cars\_Details

(

Car\_Number INT AUTO\_INCREMENT PRIMARY KEY,

Model INT, -- Define Model column without the FOREIGN KEY constraint here

Cars\_Name VARCHAR(20),

Color VARCHAR(20) UNIQUE,

Price INT NOT NULL,

FOREIGN KEY (Model) REFERENCES Cars\_Price\_Details(Model) -- Define FOREIGN KEY constraint separately

);

DESC Cars\_Details;

Field Type Null Key Default Extra

Car\_Number int NO PRI NULL auto\_increment

Model int YES MUL NULL

Cars\_Name varchar(20) YES NULL

Color varchar(20) YES UNI NULL

Price int NO NULL

[Execution complete with exit code 0]

## Add Foreign key to the Existing Table

**If you want to add the foreign key to the existing table, you have to use the following ALTER syntax in SQL:**

1. **ALTER** **TABLE** Table\_Name1 **ADD** **CONSTRAINT** ForeignKey\_Name **FOREIGN** **KEY** (Column\_Name) **REFERENCES** Table\_Name2 (Column\_Name);

**The following query adds a FOREIGN KEY on the Model column when the Cars\_Details table already exists in the database system:**

1. **ALTER** **TABLE** Cars\_Details **ADD** **CONSTRAINT** FK\_Cars\_Details **FOREIGN** **KEY** (Model) **REFERENCES** Cars\_Price\_Details (Car\_Model);

## 

## Delete foreign key from the table

If you want to delete the foreign key from the column of the table, you have to use the following **ALTER** syntax in SQL:

1. **ALTER** **TABLE** Table\_Name **DROP** **FOREIGN** **KEY** Foreign\_Key\_Name;

**The following query deletes the created FOREIGN KEY from the Model column of the Cars\_Details table:**

1. **ALTER** **TABLE** Cars **DROP** **FOREIGN** **KEY** FK\_Cars\_Details;

# **How to Add a Primary Key in SQL**

In this article, we will learn how to add Primary Key to the column in the table of our SQL database.

The **PRIMARY KEY** is used to retrieve each record of the SQL table. The field defined as the PRIMARY KEY must contain different and NOT NULL values. You can easily add a primary key to the column in the following two ways:

1. Add Primary key using Create table statement
2. Add primary key using Alter Table statement

If you want to add primary key to a column in the table, you have to follow the below steps in the given sequence:

1. Create a database in the system.
2. Create the table in the SQL database.
3. View the table structure.
4. Add the primary key to column in the table.
5. View the table structure.

CREATE TABLE Cars\_Details

(

Car\_Number INT AUTO\_INCREMENT PRIMARY KEY,

Model INT,

Cars\_Name VARCHAR(20),

Color VARCHAR(20) UNIQUE,

Price INT NOT NULL

);

DESC Cars\_Details;

Field Type Null Key Default Extra

Car\_Number int NO PRI NULL auto\_increment

Model int YES NULL

Cars\_Name varchar(20) YES NULL

Color varchar(20) YES UNI NULL

Price int NO NULL

[Execution complete with exit code 0]

## Delete Primary key from the table

If you want to delete the Primary key from the column of the table, then you have to use the following **ALTER** syntax in SQL:

1. **ALTER** **TABLE** Table\_Name **DROP** **PRIMARY** **KEY**;

**The following query deletes the PRIMARY KEY from the Model column of the Cars table:**

1. **ALTER** **TABLE** Cars **DROP** **PRIMARY** **KEY**;

## Add Primary key to the Existing Table

**If you want to add a primary key in the existing table, you have to use the following ALTER syntax in SQL:**

1. **ALTER** **TABLE** Table\_Name **ADD** **CONSTRAINT** Constraint\_Name **PRIMARY** **KEY** (Column\_Name);

**The following query adds a PRIMARY KEY constraint on the Color column when the Cars table already exists in the database system:**

1. **ALTER** **TABLE** Cars **ADD** **CONSTRAINT** clr\_prmrykey **PRIMARY** **KEY** ( Color);

# **SQL Stored Procedure**

A stored procedure in Structured Query Language is a group of logical statements stored in the database for performing a particular task.

It is a subprogram consisting of a name, a list of parameters, and Transact-SQL statements.

Any user can store the stored procedure as a named object in the SQL database and can call it by using triggers, other procedures, and other programming applications such as Java, PHP, R, C#, Python, etc.

SQL database creates an execution plan and stores it in the cache memory when the stored procedure is called for the first time. The plan is reused by SQL Server, which executes the stored procedure quickly with reliable performance.

Types of Stored Procedure

Following are the two types of Stored Procedures in SQL:

* User-defined Stored Procedures
* System Stored Procedures

User-defined Stored Procedures

User-defined Stored Procedures are created by the database developers and administrators and stored in the current database.

This type of stored procedure provides one or more SQL statements for retrieving, updating, and deleting values from database tables.

User-Defined stored procedure is further categorized into the following two types:

1. T-SQL Stored Procedure
2. CLR Stored Procedure

**T-SQL Stored Procedure**

The Transact-SQL procedure accepts the parameters and returns them. This stored procedure manages INSERT, UPDATE, and DELETE statements with or without parameters and gives the row data in the output.

**CLR Stored Procedure**

CLR stored procedure is that stored procedure which is created by the combination of CLR (Common Language Runtime) and another stored procedure written in a CLR-based language like C# and VB.NET.

CLR procedures are the objects of .Net Framework, which execute in the memory of the SQL database server.

System Stored Procedures

SQL database server creates and executes the system stored procedures for administrative activities. SQL database server does not allow developers to interfere with system stored procedures.

**Syntax of Stored Procedure in SQL**

The following syntax is used to create the simple stored procedure in Structured Query Language:

**CREATE** **PROCEDURE** Procedure\_Name

**AS**

/\*    SQL Statements \*/

GO;

The following syntax is used to execute the stored procedure in Structured Query Language:

1. **EXEC** Procedure\_Name ;

CREATE TABLE Student\_Stored\_Procedure

(

Student\_ID INT NOT NULL,

Student\_Name varchar(100),

Student\_Course varchar(50),

Student\_Age INT,

Student\_Marks INT

);

INSERT INTO Student\_Stored\_Procedure VALUES

(101, 'Anuj', 'B.tech', 20, 88),

(102, 'Raman', 'MCA', 24, 98),

(104, 'Shyam', 'BBA', 19, 92),

(107, 'Vikash', 'B.tech', 20, 78),

(111, 'Monu', 'MBA', 21, 65),

(114, 'Jones', 'B.tech', 18, 93),

(121, 'Parul', 'BCA', 20, 97),

(123, 'Divya', 'B.tech', 21, 89),

(128, 'Hemant', 'MBA', 23, 90),

(130, 'Nidhi', 'BBA', 20, 88),

(132, 'Priya', 'MBA', 22, 99),

(138, 'Mohit', 'MCA', 21, 92);

CREATE PROCEDURE Show\_All\_Students

AS

BEGIN

SELECT \* FROM Student\_Stored\_Procedure;

END;

GO;

EXEC Show\_All\_Students;

# **Trigger in SQL**

In this article, you will learn about the trigger and its implementation with examples.

A **Trigger** in Structured Query Language is a set of procedural statements which are executed automatically when there is any response to certain events on the particular table in the database. Triggers are used to protect the data integrity in the database.

In SQL, this concept is the same as the trigger in real life. For example, when we pull the gun trigger, the bullet is fired.

**To understand the concept of trigger in SQL, let's take the below hypothetical situation:**

Suppose Rishabh is the human resource manager in a multinational company. When the record of a new employee is entered into the database, he has to send the 'Congrats' message to each new employee. If there are four or five employees, Rishabh can do it manually, but if the number of new Employees is more than the thousand, then in such condition, he has to use the trigger in the database.

Thus, now Rishabh has to create the trigger in the table, which will automatically send a 'Congrats' message to the new employees once their record is inserted into the database.

The trigger is always executed with the specific table in the database. If we remove the table, all the triggers associated with that table are also deleted automatically.

**In Structured Query Language, triggers are called only either before or after the below events:**

1. **INSERT Event:** This event is called when the new row is entered in the table.
2. **UPDATE Event:** This event is called when the existing record is changed or modified in the table.
3. **DELETE Event:** This event is called when the existing record is removed from the table.

## Types of Triggers in SQL

Following are the six types of triggers in SQL:

1. **AFTER INSERT Trigger**  
   This trigger is invoked after the insertion of data in the table.
2. **AFTER UPDATE Trigger**  
   This trigger is invoked in SQL after the modification of the data in the table.
3. **AFTER DELETE Trigger**  
   This trigger is invoked after deleting the data from the table.
4. **BEFORE INSERT Trigger**  
   This trigger is invoked before the inserting the record in the table.
5. **BEFORE UPDATE Trigger**  
   This trigger is invoked before the updating the record in the table.
6. **BEFORE DELETE Trigger**  
   This trigger is invoked before deleting the record from the table.

## Syntax of Trigger in SQL

**CREATE** **TRIGGER** Trigger\_Name

[ BEFORE | **AFTER** ]  [ **Insert** | **Update** | **Delete**]

**ON** [Table\_Name]

[ **FOR** EACH ROW | **FOR** EACH **COLUMN** ]

**AS**

**Set** **of** SQL Statement

In the trigger syntax, firstly, we have to define the name of the trigger after the CREATE TRIGGER keyword. After that, we have to define the BEFORE or AFTER keyword with anyone event.

Then, we define the name of that table on which trigger is to occur.

After the table name, we have to define the row-level or statement-level trigger.

And, at last, we have to write the SQL statements which perform actions on the occurring of event

CREATE TABLE Student\_Trigger

(

Student\_RollNo INT NOT NULL PRIMARY KEY,

Student\_FirstName Varchar (100),

Student\_EnglishMarks INT,

Student\_PhysicsMarks INT,

Student\_ChemistryMarks INT,

Student\_MathsMarks INT,

Student\_TotalMarks INT,

Student\_Percentage INT );

CREATE TRIGGER Student\_Table\_Marks

BEFORE INSERT

ON

Student\_Trigger

FOR EACH ROW

SET new.Student\_TotalMarks = new.Student\_EnglishMarks + new.Student\_PhysicsMarks + new.Student\_ChemistryMarks + new.Student\_MathsMarks,

new.Student\_Percentage = ( new.Student\_TotalMarks / 400) \* 100;

INSERT INTO Student\_Trigger (Student\_RollNo, Student\_FirstName, Student\_EnglishMarks, Student\_PhysicsMarks, Student\_ChemistryMarks, Student\_MathsMarks, Student\_TotalMarks, Student\_Percentage) VALUES

( 201, Sorya, 88, 75, 69, 92, 0, 0);

SELECT \* FROM Student\_Trigger;

**SQL ANY Keyword**

What is Any in SQL?

The ANY is an operator in SQL. This operator compares the given value to each subquery value and returns those values that satisfy the condition.

ANY operator is mainly used in the HAVING or WHERE clause with the INSERT, UPDATE, DELETE and UPDATE SQL statements.

It always evaluates to TRUE if at least one subquery value matches according to the given condition. 10s

**The syntax for using ANY operator in Structured Query Language:**

1. **SELECT** Column\_Name\_1, Column\_Name\_2, Column\_Name\_3, ......, Column\_Name\_N **FROM** Table\_Name **WHERE** Column\_Name Comparison\_Operator ANY (**SELECT** Column\_Name **FROM** Table\_Name **WHERE** [condition]);

In the syntax, the ANY operator is followed by the SQL comparison operator, which helps compare the column value with the subquery.

Following are the SQL comparison operators used with the ANY operator in queries:

**1. Equal operator (=)**

The equal comparison operator with ANY operator evaluates to TRUE when the column's value is equal to any value of the subquery.

**Syntax:**

1. Column\_Name = ANY (subquery);

**2. Not Equal operator (!=)**

This comparison operator with ANY operator evaluates to TRUE when the column's value is not equal to any value of the subquery.

**Syntax:**

1. Column\_Name != ANY (subquery);

**3. Greater Than operator (>)**

This comparison operator with ANY operator evaluates to TRUE when the column's value is greater than the smallest value of the subquery.

**Syntax:**

1. Column\_Name > ANY (subquery);

**4. Less Than operator (<)**

This comparison operator with ANY operator evaluates to TRUE when the column's value is less than the largest value of the subquery.

**Syntax:**

1. Column\_Name < ANY (subquery);

**5. Greater Than Equal To operator (>=)**

This comparison operator with ANY operator evaluates to TRUE when the column's value is greater than or equals the smallest value of the subquery.

**Syntax:**

1. Column\_Name >= ANY (subquery);

**6. Less Than Equals To operator (<=)**

This comparison operator with ANY operator evaluates to TRUE when the column's value is less than and equals to the largest value of the subquery.

**Syntax:**

1. Column\_Name <= ANY (subquery);

If you want to use the SQL ANY operator in the tables for performing operations, you have to follow the given steps in the same manner:

1. Create a database in the system.
2. Create two new tables.
3. Insert the data in both tables
4. View the Inserted data of both tables
5. Use the ANY operator to view the data in different ways.

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

CREATE TABLE Department\_Info

(

Dept\_Id INT NOT NULL,

Dept\_Name Varchar(100),

Head\_Id INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 20000),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 38000),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 45000),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 42000),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 28000),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 35000);

INSERT INTO Department\_Info (Dept\_ID, Dept\_Name, Head\_Id) VALUES (4001, 'Arun', 1005);

INSERT INTO Department\_Info (Dept\_ID, Dept\_Name, Head\_Id) VALUES (4002, 'Zayant', 1009);

INSERT INTO Department\_Info (Dept\_ID, Dept\_Name, Head\_Id) VALUES (4003, 'Manish', 1007);

SELECT \* FROM Teacher\_Info WHERE Teacher\_Id = ANY (SELECT Head\_Id from Department\_Info);

Teacher\_ID Teacher\_First\_Name Teacher\_Last\_Name Teacher\_Dept\_Id Teacher\_Address Teacher\_City Teacher\_Salary

1005 Shivani Singhania 4001 501 street Kolkata 42000

1007 Shyam Besas 4003 202 street Lucknow 35000

[Execution complete with exit code 0]

SELECT AVG ( Teacher\_Salary ) from Teacher\_Info GROUP BY Teacher\_Dept\_Id ;

SELECT \* FROM Teacher\_Info WHERE Teacher\_Salary < ANY (SELECT AVG ( Teacher\_Salary ) from Teacher\_Info GROUP BY Teacher\_Dept\_Id );

AVG ( Teacher\_Salary )

35666.6667

33000.0000

35000.0000

Teacher\_ID Teacher\_First\_Name Teacher\_Last\_Name Teacher\_Dept\_Id Teacher\_Address Teacher\_City Teacher\_Salary

1001 Arush Sharma 4001 22 street New Delhi 20000

1006 Avinash Sharma 4002 12 street Delhi 28000

1007 Shyam Besas 4003 202 street Lucknow 35000

[Execution complete with exit code 0]

**SQL ANY Keyword**

What is Any in SQL?

The ALL is an operator in SQL. This operator compares the single record to every record of the list returned by the sub-query. This operator is always used with the SQL comparison operator, which is followed by the inner query.

**The syntax for using ALL operator in Structured Query Language:**

1. **SELECT** Column\_Name\_1, Column\_Name\_2, Column\_Name\_3, ……, Column\_Name\_N **FROM** Table\_Name **WHERE** Column\_Name Comparison\_Operator ALL (**SELECT** Column\_Name **FROM** Table\_Name **WHERE** [condition]);

In the ALL syntax, the ALL operator is followed by the SQL comparison operator, which helps compare the column value with the sub-query.

We can use the following comparison operators with the ALL operator in the statements of SQL:

**1. Equal operator (=)**

This comparison operator with ALL operator evaluates to TRUE when the value of specified column is equal to any value in the returned list.

**Syntax:**

1. Column\_Name = ALL (subquery);

**2. Not Equal operator (!=)**

This comparison operator with the ALL operator evaluates to TRUE when the value of the specified column is not equal to any value of the returned list.

**Syntax:**

1. Column\_Name != ALL (subquery);

**3. Greater Than operator (>)**

This comparison operator with the ALL operator evaluates to TRUE when the value of the specified column is greater than the biggest value of the returned list.

**Syntax:**

1. Column\_Name > ALL (subquery);

**4. Less Than operator (<)**

This comparison operator with the ALL operator evaluates to TRUE when the value of the specified column is less than the smallest value of the returned list.

**Syntax:**

1. Column\_Name < ALL (subquery);

**5. Greater Than Equal To operator (>=)**

This comparison operator with the ALL operator evaluates to TRUE when the value of the specified column is greater than or equals the biggest value of the returned list.

**Syntax:**

1. Column\_Name >= ALL (subquery);

**6. Less Than Equals To operator (<=)**

This comparison operator with the ALL operator evaluates to TRUE when the value of the specified column is less than or equals the smallest value of the returned list.

**Syntax:**

1. Column\_Name <= ALL (subquery);

If you want to perform the 'ALL' operator in the tables of SQL, then you have to follow the below points one by one in the given manner:

1. Create a database in the system.
2. Create two new tables.
3. Insert the data in both tables
4. View the Inserted data of both tables
5. Use the ALL operator to view the data in different ways.

CREATE TABLE Department\_Info

(

Dept\_Id INT NOT NULL,

Dept\_Name Varchar(100),

Head\_Id INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 20000),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 38000),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 45000),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 42000),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 28000),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 30000);

INSERT INTO Department\_Info (Dept\_ID, Dept\_Name, Head\_Id) VALUES (4001, 'Arun', 1005);

INSERT INTO Department\_Info (Dept\_ID, Dept\_Name, Head\_Id) VALUES (4002, 'Zayant', 1009);

INSERT INTO Department\_Info (Dept\_ID, Dept\_Name, Head\_Id) VALUES (4003, 'Manish', 1007);

SELECT AVG ( Teacher\_Salary ) from Teacher\_Info GROUP BY Teacher\_Dept\_Id;

SELECT \* FROM Teacher\_Info WHERE Teacher\_Salary < ALL (SELECT AVG ( Teacher\_Salary ) from Teacher\_Info GROUP BY Teacher\_Dept\_Id );

AVG ( Teacher\_Salary )

35666.6667

33000.0000

30000.0000

Teacher\_ID Teacher\_First\_Name Teacher\_Last\_Name Teacher\_Dept\_Id Teacher\_Address Teacher\_City Teacher\_Salary

1001 Arush Sharma 4001 22 street New Delhi 20000

1006 Avinash Sharma 4002 12 street Delhi 28000

[Execution complete with exit code 0]

# **MAKE\_SET Function in SQL**

The MAKE\_SET string function in Structured Query Language returns the value of the given bit from the set of multiple values.

### Syntax of MAKE\_SET String Function

In SQL, we can use the MAKE\_SET function with the columns of the table, strings, and characters.

**Syntax 1:**

1. **SELECT** MAKE\_SET(bits, Column\_Name1, column\_Name2, Column\_Name3,……. Column\_NameN) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the MAKE\_SET function with the existing table of SQL. Here, we have to define the name and columns of that table on which we want to perform MAKE\_SET function.

**Syntax 2:**

1. **SELECT** MAKE\_SET(bits, "String1", "String2", "String3", …… "StringN") **AS** Alias\_Name;

In this syntax, we used the MAKE\_SET function with list of strings.

**Syntax 3:**

1. **SELECT** MAKE\_SET(bits, "Character\_1", "character\_2", "Character\_3", ……., "Character\_N") **AS** Alias\_Name;

In this syntax, we used the MAKE\_SET function with list of characters.

### Examples of MAKE\_SET String function

**Example 1:** The following query uses the MAKE\_SET function with the list of strings:

1. **SELECT** MAKE\_SET( 1, ''H'', ''I'', ''A'', ''P'', ''Q'', ''S'', ''R'', ''T'', ''V'', ''M'' ) **AS** Value\_at1st\_bit;

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 20000),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 38000),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 45000),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 42000),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 28000),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 30000);

SELECT Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_Address,MAKE\_SET(2, Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_Address) AS Value\_at\_2bit FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Last\_Name Teacher\_Address Value\_at\_2bit

Arush Sharma 22 street Sharma

Bulbul Roy 120 street Roy

Saurabh Sharma 221 street Sharma

Shivani Singhania 501 street Singhania

Avinash Sharma 12 street Sharma

Shyam Besas 202 street Besas

[Execution complete with exit code 0]

# **FIELD Function in SQL**

The FIELD string function in Structured Query Language returns the position of the given string from the list of strings. If the given string is not found in the list of string, then FIELD function returns 0 in result.

### Syntax of FIELD String Function

In SQL, we can use the FIELD function with the columns of the table, strings, and characters.

**Syntax 1:**

1. **SELECT** FIELD(Searched\_value, Column\_Name1, column\_Name2, Column\_Name3,……. Column\_NameN) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the FIELD function with existing table of SQL. Here, we have to define the name and columns of that table on which we want to perform FIELD function.

**Syntax 2:**

1. **SELECT** FIELD("Searched\_String", "String1", "String2", "String3", …… "StringN") **AS** Alias\_Name;

In this syntax, we used the FIELD function with list of strings.

**Syntax 3:**

1. **SELECT** FIELD("Searched\_character", "Character\_1", "character\_2", "Character\_3", ……., "Character\_N") **AS** Alias\_Name;

In this syntax, we used the FIELD function with list of characters.

### Examples of FIELD String function

**Example 1:** The following query uses the FIELD function with the list of strings:

1. **SELECT** FIELD( ''S'', ''H'', ''I'', ''A'', ''P'', ''Q'', ''S'', ''R'', ''T'', ''V'', ''M'' ) **AS** Position\_of\_S;

SELECT Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_Address,FIELD('Sharma', Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_Address) AS Value\_at\_2bit FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Last\_Name Teacher\_Address Value\_at\_2bit

Arush Sharma 22 street 2

Bulbul Roy 120 street 0

Saurabh Sharma 221 street 2

Shivani Singhania 501 street 0

Avinash Sharma 12 street 2

Shyam Besas 202 street 0

[Execution complete with exit code 0]

# **CHAR Function in SQL**

The CHAR string function shows the ASCII value of the integer passed in the function. This function takes only one argument. If we pass the integer value which exceeds the given range then it shows NULL value.

### Syntax of CHAR String Function

In SQL, we can use the CHAR function with the columns of the table, strings, and characters.

**Syntax 1:**

1. **SELECT** **CHAR**(Integer\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the CHAR function with existing table of SQL. Here, we have to define the name and integer column of that table on which we want to perform CHAR function.

**Syntax 2:**

1. **SELECT** **CHAR**(Integer\_Value) **AS** Alias\_Name;

In this syntax, we used the CHAR function with the integer value.

### Examples of CHAR String function

**Example 1:** The following SELECT query shows the ASCII value of 20:

1. **SELECT** **CHAR**(20)**AS** ASCII\_of\_20;

SELECT Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_ID,CHAR(Teacher\_ID) AS char\_value FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Last\_Name Teacher\_ID char\_value

Arush Sharma 21

Bulbul Roy 62 >

Saurabh Sharma 64 @

Shivani Singhania 75 K

Avinash Sharma 76 L

Shyam Besas 77 M

[Execution complete with exit code 0]

# **ELT Function in SQL**

The ELT string function in Structured Query Language returns the string from the list of string according to the given index number. This function returns NULL, if no string is found at the given index position.

### Syntax of ELT String Function

In SQL, we can use the ELT function with the columns of the table, strings, and characters.

**Syntax 1:**

1. **SELECT** ELT(Index\_Value, Column\_Name1, column\_Name2, Column\_Name3,……. Column\_NameN) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the ELT function with existing table of SQL. Here, we have to define the name and columns of that table on which we want to perform ELT function.

**Syntax 2:**

1. **SELECT** ELT(Index\_Value, "String1", "String2", "String3", …… "StringN") **AS** Alias\_Name;

In this syntax, we used the ELT function with list of strings.

**Syntax 3:**

1. **SELECT** ELT(Index\_Value, "Character\_1", "character\_2", "Character\_3", ……., "Character\_N") **AS** Alias\_Name;

In this syntax, we used the ELT function with list of characters.

### Examples of ELT String function

**Example 1:** The following query uses the ELT function with the list of strings:

1. **SELECT** ELT( 5, ''H'', ''I'', ''A'', ''P'', ''Q'', ''S'', ''R'', ''T'', ''V'', ''M'' ) **AS** String\_at\_1stPosition;

SELECT Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_ID,ELT(1, Teacher\_First\_Name, Teacher\_Last\_Name,Teacher\_Address) AS Value\_at\_2bit FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Last\_Name Teacher\_ID Value\_at\_2bit

Arush Sharma 1001 Arush

Bulbul Roy 1002 Bulbul

Saurabh Sharma 1004 Saurabh

Shivani Singhania 1005 Shivani

Avinash Sharma 1006 Avinash

Shyam Besas 1007 Shyam

[Execution complete with exit code 0]

# **COUNT Function in SQL**

The COUNT is an aggregate function in SQL which returns the total number of rows from the table.

### Syntax of COUNT Function

In the Structured Query Language, we use the COUNT function with the columns of the table as shown in the following block:

1. **SELECT** COUNT(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the COUNT function.

SELECT COUNT(Teacher\_Dept\_Id) AS countuuu FROM Teacher\_Info;

countuuu

6

[Execution complete with exit code 0]

# **SQL ISNULL**

This tutorial will teach us to implement the IS NULL condition and IsNull function in SQL and SQL servers.

## IS NULL Condition in SQL

The user can use the IS NULL condition to verify whether a data value is NULL. If the value is NULL, the condition will return TRUE, or it will return False. The user can implement the IS NULL condition in SQL's SELECT, INSERT, DELETE, or UPDATE clauses.

### Syntax of IS NULL Condition

The syntax to implement the IS NULL condition is as follows:

Expr IS NULL

### Parameters Or Arguments in IS NULL Condition

**Expr:** It specifies the value or statement checked for the NULL value.

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT ,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT ,

Teacher\_marks INT,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary FLOAT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id,Teacher\_marks, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001,0, '22 street', 'New Delhi', NULL),

(NULL, 'Bulbul', 'Roy', 4002,45, '120 street', 'New Delhi', 3800.560),

(1004, 'Saurabh', 'Sharma', NULL,-78, '221 street', 'Mumbai', 4500.760),

(NULL, 'Shivani', 'Singhania', 4001,-56, '501 street', 'Kolkata', 4200.650),

(NULL, 'Avinash', 'Sharma', NULL,0, '12 street', 'Delhi', 3800.560),

(1007, 'Shyam', 'Besas', NULL,54, '202 street', 'Lucknow', 3000.340);

select Teacher\_ID,Teacher\_First\_Name from Teacher\_Info where Teacher\_Dept\_Id IS NULL;

Teacher\_ID Teacher\_First\_Name

1004 Saurabh

NULL Avinash

1007 Shyam

[Execution complete with exit code 0]

**SQL MATH FUNCTIONS**

# **POWER Function in SQL**

The POWER is a mathematical function in SQL which returns the value of a number raised to the power of another number. In the power function, we have to pass the two number as the argument in which one number acts as exponent and other acts as the base.

### Syntax of POWER String Function

1. **SELECT** POWER(Number1, Number2) **AS** Alias\_Name;

In this POWER function, following are the two arguments:

1. **Number1:** It acts as the base in the power function
2. **Number2:** And, it acts as the exponent.

In Structured Query Language, we can also use the POWER function with the integer columns of the table as shown in the following block:

1. **SELECT** POWER(column\_Name1, column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 20000),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 38000),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 45000),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 42000),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 28000),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 30000);

SELECT Teacher\_Dept\_Id,Teacher\_First\_Name,POWER(Teacher\_ID,3) AS expo FROM Teacher\_Info;

Teacher\_Dept\_Id Teacher\_First\_Name expo

4001 Arush 1003003001

4002 Bulbul 1006012008

4001 Saurabh 1012048064

4001 Shivani 1015075125

4002 Avinash 1018108216

4003 Shyam 1021147343

[Execution complete with exit code 0]

# **ROUND Function in SQL**

The SQL ROUND function rounds the specified number till the particular decimal places.

### Syntax of ROUND String Function

1. **SELECT** ROUND(Number, Decimal\_places, Operation) **AS** Alias\_Name;

In this ROUND function, following are the three arguments:

1. **Number:** It is that decimal number which is to be rounded. Decia
2. **Decimal\_places:** It can be positive or negative integer which shows the number of decimal places to be round.
3. **Operation:** It is optional.

In Structured Query Language, we can also use the ROUND function with the integer columns of the table as shown in the following block:

1. **SELECT** ROUND(Column\_Name, Decimal\_places, Operation) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the ROUND function with existing table of SQL. Here, we have to define the name and columns of that table on which we want to perform the ROUND function.

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 2000.9080),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 3800.560),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 4500.760),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 4200.650),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 2800.780),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 3000.340);

SELECT Teacher\_Dept\_Id,Teacher\_First\_Name,ROUND(Teacher\_Salary) AS salary FROM Teacher\_Info;

Teacher\_Dept\_Id Teacher\_First\_Name salary

4001 Arush 2001

4002 Bulbul 3801

4001 Saurabh 4501

4001 Shivani 4201

4002 Avinash 2801

4003 Shyam 3000

[Execution complete with exit code 0]

# **SUM Function in SQL**

The SUM is an aggregate function in SQL which returns the sum of integer column of the table.

### Syntax of SUM Function

In the Structured Query Language, we use the SUM function with the columns of the table as shown in the following block:

1. **SELECT** SUM(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the SUM function.

## SUM Function with WHERE clause

We can also use the WHERE clause with the SUM function which adds the values of filtered rows.

The syntax for using the SUM function with the WHERE clause is as follows:

1. **SELECT** SUM(column\_Name) **AS** Alias\_Name **FROM** Table\_Name **WHERE** Condition;

## SUM Function with DISTINCT clause

We can also use the DISTINCT clause with the SUM function which adds the distinct values of the column from the table.

The syntax for using the SUM function with the DISTINCT clause is as follows:

1. **SELECT** SUM(**DISTINCT** (column\_Name)) **AS** Alias\_Name **FROM** Table\_Name **WHERE** Condition;

## SUM Function with GROUP BY clause

We can also use the GROUP BY clause with the SUM function which adds the values which exist in the same group.

The syntax for using the SUM function with the GROUP BY clause is as follows:

1. **SELECT** Column\_Name1, SUM(column\_Name)) **AS** Alias\_Name **FROM** Table\_Name **GROUP** **BY Column;**

SELECT SUM(Teacher\_Salary) AS salary FROM Teacher\_Info;

salary

20305

[Execution complete with exit code 0]

SELECT SUM(Teacher\_Salary) AS salary FROM Teacher\_Info WHERE Teacher\_Last\_Name ='Sharma';

salary

9303

[Execution complete with exit code 0]

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 2000.9080),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 3800.560),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 4500.760),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 4200.650),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 3800.560),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 3000.340);

SELECT SUM(DISTINCT(Teacher\_Salary)) AS salary FROM Teacher\_Info ;

salary

17504

[Execution complete with exit code 0]

SELECT Teacher\_Last\_Name,SUM(Teacher\_Salary) AS salary FROM Teacher\_Info GROUP BY Teacher\_Last\_Name ;

Teacher\_Last\_Name salary

Sharma 10303

Roy 3801

Singhania 4201

Besas 3000

[Execution complete with exit code 0]

# **AVG Function in SQL**

The AVG is an aggregate function in SQL which returns the average of values of the integer column of the table.

### Syntax of AVG Function

In the Structured Query Language, we use the AVG function with the columns of the table as shown in the following block:

1. **SELECT** AVG(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the AVG function.

## AVG Function with WHERE clause

We can also use the WHERE clause with the AVG function which adds the values of filtered rows.

The syntax for using the AVG function with the WHERE clause is as follows:

1. **SELECT** AVG(column\_Name) **AS** Alias\_Name **FROM** Table\_Name **WHERE** Condition;

## AVG Function with DISTINCT clause

We can also use the DISTINCT clause with the AVG function which adds the distinct values of the column from the table.

The syntax for using the AVG function with the DISTINCT clause is as follows:

1. **SELECT** AVG(**DISTINCT** (column\_Name)) **AS** Alias\_Name **FROM** Table\_Name **WHERE** Condition;

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001, '22 street', 'New Delhi', 2000.9080),

(1002, 'Bulbul', 'Roy', 4002, '120 street', 'New Delhi', 3800.560),

(1004, 'Saurabh', 'Sharma', 4001, '221 street', 'Mumbai', 4500.760),

(1005, 'Shivani', 'Singhania', 4001, '501 street', 'Kolkata', 4200.650),

(1006, 'Avinash', 'Sharma', 4002, '12 street', 'Delhi', 3800.560),

(1007, 'Shyam', 'Besas', 4003, '202 street', 'Lucknow', 3000.340);

SELECT Teacher\_Last\_Name,AVG(Teacher\_Salary) AS salary FROM Teacher\_Info GROUP BY Teacher\_Last\_Name ;

Teacher\_Last\_Name salary

Sharma 3434.3333

Roy 3801.0000

Singhania 4201.0000

Besas 3000.0000

[Execution complete with exit code 0]

SELECT Teacher\_Last\_Name,AVG(Teacher\_Salary) AS salary FROM Teacher\_Info WHERE Teacher\_Last\_Name='Sharma' ;

Teacher\_Last\_Name salary

Sharma 3434.3333

[Execution complete with exit code 0]

SELECT AVG(DISTINCT(Teacher\_Salary)) AS salary FROM Teacher\_Info ;

salary

3500.8000

[Execution complete with exit code 0]

SELECT AVG(Teacher\_Salary) AS salary FROM Teacher\_Info ;

salary

3550.8333

[Execution complete with exit code 0]

# **BIN Function in SQL**

The BIN is a SQL function which converts the given decimal number to its binary equivalent. This function return NULL, if the NULL is passed in the function.

### Syntax of BIN Function

1. **SELECT** BIN(Decimal\_Number) **AS** Alias\_Name;

In the BIN syntax, we have to pass that decimal number whose binary equivalent we want to find.

In the Structured Query Language, we can also use the BIN function with the column of the table as shown in the following block:

1. **SELECT** BIN(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_ID,Teacher\_First\_Name,BIN(Teacher\_ID) AS b FROM Teacher\_Info ;

Teacher\_ID Teacher\_First\_Name b

1001 Arush 1111101001

1002 Bulbul 1111101010

1004 Saurabh 1111101100

1005 Shivani 1111101101

1006 Avinash 1111101110

1007 Shyam 1111101111

[Execution complete with exit code 0]

# **MAX Function in SQL**

The MAX is an aggregate function in SQL which returns the maximum or largest value from the specified column of the table.

### Syntax of MAX Function

In the Structured Query Language, we use the MAX function with the columns of the table as shown in the following block:

1. **SELECT** **MAX**(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the MAX function.

## MAX Function with WHERE clause

We can also use the WHERE clause with the MAX function which returns the largest value from the filtere rows.

The syntax for using the MAX function with the WHERE clause is as follows:

1. **SELECT** **MAX**(column\_Name) **AS** Alias\_Name **FROM** Table\_Name **WHERE** Condition;

## MAX Function with GROUP BY clause

We can also use the GROUP BY clause with the MAX function which returns the maximum value from the same group.

The syntax for using the MAX function with the GROUP BY clause is as follows:

1. **SELECT** Column\_Name1, **MAX**(column\_Name)) **AS** Alias\_Name **FROM** Table\_Name **GROUP** **BY Column;**

SELECT MAX(Teacher\_ID) AS m FROM Teacher\_Info ;

m

1007

[Execution complete with exit code 0]

SELECT Teacher\_Last\_Name,MAX(Teacher\_ID) AS m FROM Teacher\_Info GROUP BY Teacher\_Last\_Name;

Teacher\_Last\_Name m

Sharma 1006

Roy 1002

Singhania 1005

Besas 1007

[Execution complete with exit code 0]

SELECT Teacher\_Last\_Name,MAX(Teacher\_ID) AS m FROM Teacher\_Info WHERE Teacher\_Last\_Name='Sharma';

Teacher\_Last\_Name m

Sharma 1006

[Execution complete with exit code 0]

# **MIN Function in SQL**

The MIN is an aggregate function in SQL which returns the minimum or smallest value from the specified column of the table.

### Syntax of MIN Function

In the Structured Query Language, we use the MIN function with the columns of the table as shown in the following block:

1. **SELECT** **MIN**(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

## MIN Function with WHERE clause

We can also use the WHERE clause with the MIN function which returns the smallest value from the filtere rows.

The syntax for using the MIN function with the WHERE clause is as follows:

1. **SELECT** **MIN**(column\_Name) **AS** Alias\_Name **FROM** Table\_Name **WHERE** Condition;

## MIN Function with GROUP BY clause

We can also use the GROUP BY clause with the MIN function which returns the minimum value from the same group.

The syntax for using the MIN function with the GROUP BY clause is as follows:

1. **SELECT** Column\_Name1, **MIN**(column\_Name)) **AS** Alias\_Name **FROM** Table\_Name **GROUP** **BY** column;

SELECT Teacher\_Last\_Name,MIN(Teacher\_ID) AS m FROM Teacher\_Info WHERE Teacher\_Last\_Name='Sharma';

Teacher\_Last\_Name m

Sharma 1001

[Execution complete with exit code 0]

SELECT Teacher\_Last\_Name,MIN(Teacher\_ID) AS m FROM Teacher\_Info GROUP BY Teacher\_Last\_Name;

Teacher\_Last\_Name m

Sharma 1001

Roy 1002

Singhania 1005

Besas 1007

[Execution complete with exit code 0]

SELECT MIN(Teacher\_ID) AS m FROM Teacher\_Info;

m

1001

[Execution complete with exit code 0]

# **MOD Function in SQL**

The MOD is a string function in SQL which returns the remainder from the division of first number by second number.

### Syntax of MOD Function

1. **SELECT** MOD(Number1, Number2) **AS** Alias\_Name;

In the MOD syntax, Number1 is the dividend and Number2 is the divisor.

In the Structured Query Language, we can also use the MOD function with the columns of the table as shown in the following block:

1. **SELECT** MOD(Column\_Name1, Column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,MOD(Teacher\_Dept\_Id,Teacher\_ID) AS modd FROM Teacher\_Info;

Teacher\_First\_Name modd

Arush 998

Bulbul 996

Saurabh 989

Shivani 986

Avinash 984

Shyam 982

[Execution complete with exit code 0]

# **OCT Function in SQL**

The OCT is a SQL string function which converts the given decimal number to its octal equivalent.

### Syntax of OCT Function

1. **SELECT** OCT(Decimal\_Number) **AS** Alias\_Name;

In the OCT syntax, we have to pass that decimal number whose octal equivalent we want to find.

In the Structured Query Language, we can also use the OCT function with the column of the table as shown in the following block:

1. **SELECT** OCT(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the OCT function.

SELECT Teacher\_First\_Name,OCT(Teacher\_ID) AS num FROM Teacher\_Info;

Teacher\_First\_Name num

Arush 1751

Bulbul 1752

Saurabh 1754

Shivani 1755

Avinash 1756

Shyam 1757

[Execution complete with exit code 0]

# **SIGN Function in SQL**

The SIGN string function in Structured Query Language returns the specified number with the positive or negative sign. If the number is greater than zero, the function returns 1 otherwise -1. If the number specified as zero, the function returns zero in result.

### Syntax of SIGN String Function

**Syntax1:** This syntax uses the SIGN function with the column name of the SQL table:

1. **SELECT** SIGN(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the name of that column on which we have to use SIGN function

**Syntax2:** We can also use the SIGN function with any number:

1. **SELECT** SIGN(Number) **AS** Alias\_Name;

### Examples of SIGN String function

**Example 1:** The following SELECT query uses the SIGN function 0

1. **SELECT** SIGN(0)**AS** SIGN\_zero;

**Output:**

|  |
| --- |
| **SIGN\_zero** |
| 0 |

**Example 2:** The following SELECT query shows the SIGN of the number

1. **SELECT** SIGN(+10) **AS** SIGN\_positive;

**Output:**

|  |
| --- |
| **SIGN\_positive** |
| 1 |

**Example 3:** following SELECT query shows the SIGN of the negative number:

1. **SELECT** SIGN(-0.5) **AS** SIGN\_negative;

**Output:**

|  |
| --- |
| **SIGN\_negative** |
| -1 |

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT NOT NULL PRIMARY KEY,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT NOT NULL,

Teacher\_marks INT,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary INT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id,Teacher\_marks, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001,0, '22 street', 'New Delhi', 2000.9080),

(1002, 'Bulbul', 'Roy', 4002,45, '120 street', 'New Delhi', 3800.560),

(1004, 'Saurabh', 'Sharma', 4001,-78, '221 street', 'Mumbai', 4500.760),

(1005, 'Shivani', 'Singhania', 4001,-56, '501 street', 'Kolkata', 4200.650),

(1006, 'Avinash', 'Sharma', 4002,0, '12 street', 'Delhi', 3800.560),

(1007, 'Shyam', 'Besas', 4003,54, '202 street', 'Lucknow', 3000.340);

SELECT Teacher\_First\_Name,Teacher\_marks,SIGN(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 0

Bulbul 45 1

Saurabh -78 -1

Shivani -56 -1

Avinash 0 0

Shyam 54 1

[Execution complete with exit code 0]

# **SQRT Function in SQL**

The SQRT is a SQL function of mathematics which gives the square root of the given number. Suppose, the number is 25, then this function returns 5.

### Syntax of SQRT Function

1. **SELECT** SQRT(Number) **AS** Alias\_Name;

In the SQRT syntax, we have to pass that number whose square root we want to find.

In the Structured Query Language, we can also use the SQRT function with the fields of the table as shown in the following block:

1. **SELECT** SQRT(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_ID,SQRT(Teacher\_ID) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID num

Arush 1001 31.63858403911275

Bulbul 1002 31.654383582688826

Saurabh 1004 31.68595903550972

Shivani 1005 31.701734968294716

Avinash 1006 31.71750305430741

Shyam 1007 31.73326330524486

[Execution complete with exit code 0]

# **SQUARE Function in SQL**

The SQUARE is a mathematical function in Structured Query Language which returns the square of any specified number. This function shows the result in floating value. We can specify both positive or negative number in the SQUARE function, but it always returns positive value.

### Syntax of SQUARE String Function

**Syntax1:** This syntax uses the SQUARE function with the column name of the SQL table:

1. **SELECT** SQUARE(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the name of that column on which we want to perform the SQUARE string function. We can also use multiple square functions in single query.

**Syntax2:** This syntax uses the SQUARE function with the number:

1. **SELECT** SQUARE(Number);

### Examples of SQUARE String function

**Example 1:** The following SELECT query shows the square of 4:

1. **SELECT** SQUARE(4) **AS** SQUARE\_of\_4;

SELECT Teacher\_First\_Name,Teacher\_marks,SQUARE(Teacher\_marks) AS num FROM Teacher\_Info;

ERROR 1370 (42000) at line 23: execute command denied to user 'mycompiler'@'localhost' for routine 'mycompiler.SQUARE'

[Execution complete with exit code 1]

# **ABS Function in SQL**

The ABS is a mathematical function in the Structured Query Language which returns the absolute value of the particular number.

In simple words, this function finds the distance of a given number on the number line from zero.

This function accepts single numeric or any non-numeric data and returns the data type same as the argument type.

### Syntax of ABS String Function

**Syntax1:** This syntax uses the ABS function with the column name of the SQL table:

ADVERTISEMENT

1. **SELECT** ABS(Numeric\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this SELECT syntax, we have to specify the name of that numeric column on which we want to use ABS function.

**Syntax2:** We can also use the ABS function with the particular number as like the below syntax:

1. **SELECT** ABS(**Numeric** value) **AS** Alias\_Name;

SELECT Teacher\_First\_Name,Teacher\_marks,ABS(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 0

Bulbul 45 45

Saurabh -78 78

Shivani -56 56

Avinash 0 0

Shyam 54 54

[Execution complete with exit code 0]

# **COS Function in SQL**

The COS is a SQL function of mathematics which returns the cosine value of the specified number.

### Syntax of COS Function

1. **SELECT** COS(Number) **AS** Alias\_Name;

In the COS syntax, we have to pass that decimal number whose cosine value we want to return.

In the Structured Query Language, we can also use the COS function with the field of the table as shown in the following block:

1. **SELECT** COS(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the COS function.

SELECT Teacher\_First\_Name,Teacher\_marks,COS(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 1

Bulbul 45 0.5253219888177297

Saurabh -78 -0.8578030932449878

Shivani -56 0.8532201077225842

Avinash 0 1

Shyam 54 -0.8293098328631502

[Execution complete with exit code 0]

# **COT Function in SQL**

The COT is mathematics function which returns the cotangent value of the given number in the Structured Query Language.

### Syntax of COT Function

1. **SELECT** COT(Number) **AS** Alias\_Name;

In the COT syntax, we have to pass that numeric number in the function whose cot value we want to calculate.

In the Structured Query Language, we can also use the COT function in the SELECT query with the table fields:

1. **SELECT** COT(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this SELECT query, we have to define the name and field of that table on which we want to perform the COT function.

SELECT Teacher\_First\_Name,Teacher\_ID,COT(Teacher\_ID) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID num

Arush 1001 -0.42602656008158657

Bulbul 1002 -5.894255362759312

Saurabh 1004 -0.26725027818316094

Shivani 1005 -3.1255792428803546

Avinash 1006 1.2107620470937386

Shyam 1007 -0.12012740899160543

[Execution complete with exit code 0]

# **SIN Function in SQL**

The SIN is a SQL function of mathematics which returns the sine value of the specified number.

### Syntax of SIN Function

1. **SELECT** SIN(Number) **AS** Alias\_Name;

In the SIN syntax, we have to pass that decimal number whose sine value we want to return.

In the Structured Query Language, we can also use the SIN function with the field of the table as shown in the following block:

1. **SELECT** SIN(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the SIN function

SELECT Teacher\_First\_Name,Teacher\_ID,SIN(Teacher\_ID) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID num

Arush 1001 0.9199905975863218

Bulbul 1002 0.1672665419737925

Saurabh 1004 -0.9660944251371497

Shivani 1005 -0.30472449023565196

Avinash 1006 0.6368077356795173

Shyam 1007 0.992861866200276

[Execution complete with exit code 0]

# **ACOS Function in SQL**

The ACOS() is a mathematics function which returns the arc cosine value of the given number in the Structured Query Language. We have to specify the number between -1 to 1, otherwise this function returns NULL value in output.

### Syntax of ACOS Function

1. **SELECT** ACOS(Number) **AS** Alias\_Name;

In this SELECT syntax, we have to pass that numeric number in the function whose arc cosine value we want to find.

In the Structured Query Language, we can also use the ACOS function in SELECT query with the table field:

1. **SELECT** ACOS(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_marks,ACOS(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 1.5707963267948966

Bulbul 45 NULL

Saurabh -78 NULL

Shivani -56 NULL

Avinash 0 1.5707963267948966

Shyam 54 NULL

[Execution complete with exit code 0]

# **ASIN Function in SQL**

The ASIN is a SQL mathematics function which returns the arc sin of the specified number. This function returns NULL value, if the specified number is not between -1 to 1.

### Syntax of ASIN Function

1. **SELECT** ASIN(Number) **AS** Alias\_Name;

In the ASIN syntax, we have to pass that number whose arc sin value we want to calculate.

In the Structured Query Language, we can also use the ASIN function with the column of the table as shown in the following block:

1. **SELECT** ASIN(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_marks,ASIN(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 0

Bulbul 45 NULL

Saurabh -78 NULL

Shivani -56 NULL

Avinash 0 0

Shyam 54 NULL

[Execution complete with exit code 0]

# **ATAN Function in SQL**

The ATAN is a SQL function of mathematics which returns the arc tangent value of the specified number.

### Syntax of ATAN Function

1. **SELECT** ATAN(Number) **AS** Alias\_Name;

In the ATAN syntax, we have to pass that decimal number whose arc tangent value we want to find.

In the Structured Query Language, we can also use the ATAN function with the column of the table as shown in the following block:

1. **SELECT** ATAN(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_marks,ATAN(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 0

Bulbul 45 1.5485777614681775

Saurabh -78 -1.557976516321996

Shivani -56 -1.5529410816553442

Avinash 0 0

Shyam 54 1.5522799247268875

[Execution complete with exit code 0]

# **TAN Function in SQL**

The TAN() is a mathematics function which returns the tangent value of the given number in the Structured Query Language.

### Syntax of TAN Function

1. **SELECT** TAN(Number) **AS** Alias\_Name;

In this SELECT syntax, we have to pass that numeric number in the function whose tan value we want to find.

In the Structured Query Language, we can also use the TAN function in SELECT query with the table field:

1. **SELECT** TAN(Numeric\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_marks,TAN(Teacher\_marks) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks num

Arush 0 0

Bulbul 45 1.6197751905438615

Saurabh -78 0.5991799983411151

Shivani -56 0.6112736881917098

Avinash 0 0

Shyam 54 0.6738001006480598

[Execution complete with exit code 0]

# **CEIL Function in SQL**

The CEIL function in Structured Query Language returns the smallest integer value which is greater than or equal to the given number.

### Syntax of CEIL Function

**Syntax1:** This syntax uses the CEIL function with the column name of the SQL table:

1. **SELECT** CEIL(Integer\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this first syntax, we have to specify the name of that integer column on which we want to execute the CEIL numeric function.

**Syntax2:** This syntax uses the CEIL function with the integer or decimal value:

1. **SELECT** CEIL(Decimal\_Number);

SELECT Teacher\_First\_Name,Teacher\_Salary,CEIL(Teacher\_Salary) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Salary num

Arush 2000.91 2001

Bulbul 3800.56 3801

Saurabh 4500.76 4501

Shivani 4200.65 4201

Avinash 3800.56 3801

Shyam 3000.34 3001

[Execution complete with exit code 0]

# **FLOOR Function in SQL**

The FLOOR numeric function in Structured Query Language returns the largest integer value which is smaller than or equal to the given number.

### Syntax of FLOOR Function

**Syntax1:** This syntax uses the FLOOR function with the column name of the SQL table:

1. **SELECT** FLOOR(Integer\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this first syntax, we have to specify the name of that integer column on which we want to execute the FLOOR numeric function.

**Syntax2:** This syntax uses the FLOOR function with the integer or decimal value:

1. **SELECT** FLOOR(Decimal\_Number);

SELECT Teacher\_First\_Name,Teacher\_Salary,FLOOR(Teacher\_Salary) AS num FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Salary num

Arush 2000.91 2000

Bulbul 3800.56 3800

Saurabh 4500.76 4500

Shivani 4200.65 4200

Avinash 3800.56 3800

Shyam 3000.34 3000

[Execution complete with exit code 0]

# **LIMIT Function in SQL**

The LIMIT function in Structured Query Language returns the records from the table according to the specified limit value.

All the SQL version does not support the LIMIT function. It is important to note that the value of LIMIT must be a non-negative integer.

### Syntax of LIMIT Function

In SQL, we can use the LIMIT function with the columns of the string as well as integers.

1. **SELECT** Column\_Name1, Column\_Name2, Column\_Name3, ……., Column\_NameN **FROM** Table\_Name LIMIT Value;

In this syntax, we have to the specify the LIMIT keyword with its value after the name of the table.

SELECT Teacher\_First\_Name,Teacher\_Salary FROM Teacher\_Info LIMIT 3;

Teacher\_First\_Name Teacher\_Salary

Arush 2000.91

Bulbul 3800.56

Saurabh 4500.76

[Execution complete with exit code 0]

SELECT Teacher\_First\_Name,Teacher\_Salary,Teacher\_marks FROM Teacher\_Info ORDER BY Teacher\_marks DESC LIMIT 3;

Teacher\_First\_Name Teacher\_Salary Teacher\_marks

Shyam 3000.34 54

Bulbul 3800.56 45

Arush 2000.91 0

[Execution complete with exit code 0]

SELECT Teacher\_First\_Name,Teacher\_Salary,Teacher\_marks FROM Teacher\_Info ORDER BY Teacher\_marks LIMIT 3;

Teacher\_First\_Name Teacher\_Salary Teacher\_marks

Saurabh 4500.76 -78

Shivani 4200.65 -56

Arush 2000.91 0

[Execution complete with exit code 0]

# **CEILING Function in SQL**

The CEILING function in Structured Query Language returns the smallest integer value which is greater than or equal to the given number.

### Syntax of CEILING Function

**Syntax1:** This syntax uses the CEILING function with the column name of the SQL table:

1. **SELECT** CEILING(Integer\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to specify the name of that integer column on which we want to execute the CEILING numeric function.

**Syntax2:** This syntax uses the CEILING function with the integer or decimal value:

1. **SELECT** CEILING(Decimal\_Number);

SELECT Teacher\_First\_Name,Teacher\_Salary,CEILING(Teacher\_Salary) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Salary CEILING(Teacher\_Salary)

Arush 2000.91 2001

Bulbul 3800.56 3801

Saurabh 4500.76 4501

Shivani 4200.65 4201

Avinash 3800.56 3801

Shyam 3000.34 3001

[Execution complete with exit code 0]

# **DEGREES Function in SQL**

The DEGREES is a mathematical function in the Structured Query Language which converts the specified value of radians into degree.

This function accepts the angle of radian as argument and returns the equivalent angle in degree. The return type of function is same as the argument type.

### Syntax of DEGREES Function

**Syntax1:** This syntax uses the DEGREES function with the column name of the SQL table:

1. **SELECT** DEGREES(Numeric\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this SELECT syntax, we have to specify the name of that numeric column on which we want to use DEGREES function.

SELECT Teacher\_First\_Name,Teacher\_Salary,DEGREES(Teacher\_Salary) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Salary DEGREES(Teacher\_Salary)

Arush 2000.91 114643.58124394032

Bulbul 3800.56 217756.05114341475

Saurabh 4500.76 257874.53917260206

Shivani 4200.65 240679.5106163383

Avinash 3800.56 217756.05114341475

Shyam 3000.34 171906.8241400433

[Execution complete with exit code 0]

# **EXP Function in SQL**

The EXP is a SQL function of mathematics which returns e raised to the power of given number.

### Syntax of EXP Function

1. **SELECT** EXP(Number) **AS** Alias\_Name;

In the EXP syntax, we have to pass that decimal number whose e raised value we want to return.

In the Structured Query Language, we can also use the EXP function with the field of the table as shown in the following block:

1. **SELECT** EXP(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the EXP function.

SELECT Teacher\_First\_Name,Teacher\_marks,EXP(Teacher\_marks) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks EXP(Teacher\_marks)

Arush 0 1

Bulbul 45 3.4934271057485095e19

Saurabh -78 1.3336148155022614e-34

Shivani -56 4.780892883885469e-25

Avinash 0 1

Shyam 54 2.830753303274694e23

[Execution complete with exit code 0]

# **RADIANS Function in SQL**

The RADIANS numeric function of Structured Query Language returns the radians value of the specified degree.

### Syntax of RADIANS Function

**Syntax1:** This syntax uses the RADIANS function with the column name of the SQL table:

1. **SELECT** RADIANS(Numeric\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this first syntax, we have to specify the name of that column on which we want to execute the RADIANS function for converting the degree value into radians.

**Syntax2:** This syntax uses the RADIANS function with the number:

1. **SELECT** RADIANS(Number);

SELECT Teacher\_First\_Name,Teacher\_marks,RADIANS(Teacher\_marks) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks RADIANS(Teacher\_marks)

Arush 0 0

Bulbul 45 0.7853981633974483

Saurabh -78 -1.361356816555577

Shivani -56 -0.9773843811168246

Avinash 0 0

Shyam 54 0.9424777960769379

[Execution complete with exit code 0]

# **RAND Function in SQL**

The RAND() is a mathematical function in Structured Query Language which returns the random number between 0 and 1. 0 and 1 may also be returned by the function in the output.

### Syntax of RAND Function

1. **SELECT** RAND(Number) **AS** Alias\_Name;

In this SELECT syntax, we have to pass that numeric number in the function whose rand value we want to find.

In the Structured Query Language, we can also use the RAND function in SELECT query with the table field:

1. **SELECT** RAND(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this SELECT query, we have to define the name and field of that table on which we want to perform the RAND function.

SELECT Teacher\_First\_Name,Teacher\_ID,RAND(Teacher\_ID) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID RAND(Teacher\_ID)

Arush 1001 0.5885127331954546

Bulbul 1002 0.8386958426224961

Saurabh 1004 0.33906206147657897

Shivani 1005 0.5892451709036205

Avinash 1006 0.839428280330662

Shyam 1007 0.08961138975770343

[Execution complete with exit code 0]

# **ATN2 Function in SQL**

The ATN2 is a mathematics function which returns the arc tangent of two specified numbers.

### Syntax of ATN2 Function

1. **SELECT** ATN2(Number1, Number2) **AS** Alias\_Name;

In the ATN2 syntax, we have to pass two numeric numbers in the function from which we can find the value of arc tangent.

In the Structured Query Language, we can also use the ATN2 function in the SELECT query with the table fields:

1. **SELECT** ATN2(Column\_Name1, Column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

In this SELECT query, we have to define the name and fields of that table on which we want to perform the ATN2 function.

SELECT Teacher\_First\_Name,Teacher\_ID,ATN2(Teacher\_ID,Teacher\_Dept\_Id) FROM Teacher\_Info;

ERROR 1370 (42000) at line 23: execute command denied to user 'mycompiler'@'localhost' for routine 'mycompiler.ATN2'

[Execution complete with exit code 1]

# **LOG Function in SQL**

The LOG is a string function in SQL which returns the logarithm of the given number. Or, we can say that, it shows the logarithms of the number to the given base.

### Syntax of LOG Function

1. **SELECT** LOG(Number1, Number2) **AS** Alias\_Name;

In the LOG syntax, Number1 must be greater than 0 and it is the number whose log we want to find. Number2 is the base.

In the Structured Query Language, we can also use the LOG function with the columns of the table as shown in the following block:

1. **SELECT** LOG(Column\_Name1, Column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and columns of that table on which we want to perform the LOG function.

SELECT Teacher\_First\_Name,Teacher\_marks,LOG(Teacher\_marks) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks LOG(Teacher\_marks)

Arush 0 NULL

Bulbul 45 3.8066624897703196

Saurabh -78 NULL

Shivani -56 NULL

Avinash 0 NULL

Shyam 54 3.9889840465642745

[Execution complete with exit code 0]

# **LOG2 Function in SQL**

The LOG2 is a numeric function in SQL which returns the natural logarithm of the number to the base 2.

### Syntax of LOG2 Function

1. **SELECT** LOG2(Number) **AS** Alias\_Name;

In the LOG2 syntax, we have to pass that decimal number whose log base 2 value we want to find.

In the Structured Query Language, we can also use the LOG2 function with the column of the table as shown in the following block:

1. **SELECT** LOG2(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and column of that table on which we want to perform the LOG2 function

SELECT Teacher\_First\_Name,Teacher\_ID,LOG2(Teacher\_ID) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID LOG2(Teacher\_ID)

Arush 1001 9.967226258835993

Bulbul 1002 9.968666793195208

Saurabh 1004 9.971543553950772

Shivani 1005 9.972979786066292

Avinash 1006 9.974414589805527

Shyam 1007 9.975847968006784

[Execution complete with exit code 0]

# **LOG10 Function in SQL**

The LOG10() is a mathematics function which returns the logarithm of the specified number to base 10.

### Syntax of LOG10 Function

1. **SELECT** LOG10(Number) **AS** Alias\_Name;

In this SELECT syntax, we have to pass that numeric number in the function whose log 10 value we want to find.

In the Structured Query Language, we can also use the LOG10 function in SELECT query with the table field:

1. **SELECT** LOG10(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_ID,LOG10(Teacher\_ID) FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID LOG10(Teacher\_ID)

Arush 1001 3.000434077479319

Bulbul 1002 3.000867721531227

Saurabh 1004 3.0017337128090005

Shivani 1005 3.002166061756508

Avinash 1006 3.0025979807199086

Shyam 1007 3.003029470553618

[Execution complete with exit code 0]

# **GREATEST Function in SQL**

The GREATEST is a SQL numeric function which shows the greatest value from the specified inputs in Structured Query Language.

### Syntax of GREATEST Function

1. **SELECT** GREATEST(Number1, Number2, Number3, Number4, ......, NumberN) **AS** Alias\_Name;

In the GREATEST syntax, we have to pass those numbers from which we want to find greatest value.

In the Structured Query Language, we can also use the GREATEST function with the column of the table as shown in the following block:

1. **SELECT** GREATEST(Integer\_column\_Name1, Integer\_column\_Name1, Integer\_column\_Name1, Integer\_column\_Name1, ......., Integer\_column\_NameN,) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and columns of that table on which we want to perform the GREATEST function.

SELECT Teacher\_First\_Name,Teacher\_ID,Teacher\_Dept\_Id,GREATEST(Teacher\_Dept\_Id,Teacher\_ID) AS greater\_value FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID Teacher\_Dept\_Id greater\_value

Arush 1001 4001 4001

Bulbul 1002 4002 4002

Saurabh 1004 4001 4001

Shivani 1005 4001 4001

Avinash 1006 4002 4002

Shyam 1007 4003 4003

[Execution complete with exit code 0]

# **POW Function in SQL**

The POW is a mathematical function in SQL which returns the value of a number raised to the power of another number. This function is similar to the POWER function. In the POW function, we have to pass the two number as the argument in which one number acts as exponent and other acts as the base.

### Syntax of POW String Function

1. **SELECT** POW(Number1, Number2) **AS** Alias\_Name;

In this POW function, following are the two arguments:

**1. Number1:** It acts as the base in the power function

**2. Number2:** And, it acts as the exponent.

In Structured Query Language, we can also use the POW function with the integer columns of the table as shown in the following block:

1. **SELECT** POW(column\_Name1, column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the POW function with existing table of SQL. Here, we have to define the name and columns of that table on which we want to perform the POW function.

SELECT Teacher\_First\_Name,Teacher\_marks,POW(Teacher\_marks,5) AS greater\_value FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks greater\_value

Arush 0 0

Bulbul 45 184528125

Saurabh -78 -2887174368

Shivani -56 -550731776

Avinash 0 0

Shyam 54 459165024

[Execution complete with exit code 0]

# **DIV Function in SQL**

The DIV is a string function in SQL which returns the quotient by dividing the first number from second number.

### Syntax of DIV Function

1. **SELECT** DIV(Number1, Number2) **AS** Alias\_Name;

In the DIV syntax, Number1 is the dividend and Number2 is the divisor.

In the Structured Query Language, we can also use the DIV function with the columns of the table as shown in the following block:

1. **SELECT** DIV(Column\_Name1, Column\_Name2) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and columns of that table on which we want to perform the DIV function.

SELECT Teacher\_First\_Name,Teacher\_marks,POW(Teacher\_Dept\_Id,Teacher\_marks) AS greater\_value FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_marks greater\_value

Arush 0 1

Bulbul 45 1.2661022877005214e162

Saurabh -78 1.0736259312179085e-281

Shivani -56 1.8991581115525343e-202

Avinash 0 1

Shyam 54 3.3792620077547213e194

[Execution complete with exit code 0]

# **LEAST Function in SQL**

The LEAST is a SQL numeric function which shows the least value from the specified inputs in Structured Query Language.

### Syntax of LEAST Function

1. **SELECT** LEAST(Number1, Number2, Number3, Number4, ……, NumberN) **AS** Alias\_Name;

In the LEAST syntax, we have to pass those numbers from which we want to find least value.

In the Structured Query Language, we can also use the LEAST function with the column of the table as shown in the following block:

1. **SELECT** LEAST(Integer\_column\_Name1, Integer\_column\_Name1, Integer\_column\_Name1, Integer\_column\_Name1, ……., Integer\_column\_NameN,) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and columns of that table on which we want to perform the LEAST function.

SELECT Teacher\_First\_Name,Teacher\_ID,Teacher\_marks,LEAST(Teacher\_Dept\_Id,Teacher\_marks) AS least\_value FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID Teacher\_marks least\_value

Arush 1001 0 0

Bulbul 1002 45 45

Saurabh 1004 -78 -78

Shivani 1005 -56 -56

Avinash 1006 0 0

Shyam 1007 54 54

[Execution complete with exit code 0]

# **LN Function in SQL**

The LN is a numeric function in SQL which returns the natural logarithm of the specified integer number.

### Syntax of LN Function

1. **SELECT** LN(Number) **AS** Alias\_Name;

In the LN syntax, we have to pass that decimal number whose log base 2 value we want to find.

In the Structured Query Language, we can also use the LN function with the column of the table as shown in the following block:

1. **SELECT** LN(column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

SELECT Teacher\_First\_Name,Teacher\_ID,Teacher\_marks,LN(Teacher\_marks) AS value1 FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_ID Teacher\_marks value1

Arush 1001 0 NULL

Bulbul 1002 45 3.8066624897703196

Saurabh 1004 -78 NULL

Shivani 1005 -56 NULL

Avinash 1006 0 NULL

Shyam 1007 54 3.9889840465642745

[Execution complete with exit code 0]

# **UNICODE Function in SQL**

The UNICODE function of Structured Query Language shows the unicode (integer) value of the first character of the string. We can also use the UNICODE function with the string fields of the SQL table.

### Syntax of UNICODE String Function

**Syntax1:** This syntax uses the UNICODE function with the column names of the SQL table:

1. **SELECT** UNICODE (Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the column's name on which we want to use the UNICODE string function.

**Syntax2:** This syntax uses the UNICODE function with the set of characters (string):

1. **SELECT** UNICODE (String);

**Syntax2:** This syntax uses the UNICODE function with the individual character:

1. **SELECT** UNICODE (**character**);

SELECT Teacher\_First\_Name, UNICODE(Teacher\_Last\_Name) AS value1 FROM Teacher\_Info;

ERROR 1064 (42000) at line 23: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '(Teacher\_Last\_Name) AS value1 FROM Teacher\_Info' at line 1

[Execution complete with exit code 1]

# **REPLICATE Function in SQL**

The REPLICATE is a string function in SQL. It shows the inputted string in the output to the given number of times.

### Syntax of REPLICATE String Function

**Syntax1:** This syntax describes how to use the REPLICATE with the fields of the structured table.

1. **SELECT** REPLICATE(Column\_Name, Repetation\_value) **AS** Alias\_Name **FROM** Table\_Name;

If we want to perform Replicate function, then we have to specify the name of that column from the table whose values we want to repeat.

**Syntax2:** This syntax descibes how to use the REPLICATE function with the string or sentence:

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1. **SELECT** REPLICATE(Original\_String, Repetation\_value) **AS** Alias\_Name;

**Syntax3:** This syntax descibes how to use the REPLICATE function with the individual character:

1. **SELECT** REPLICATE(**Character**, Repetation\_value) **AS** Alias\_Name;

SELECT Teacher\_First\_Name,Teacher\_marks, REPLICATE(Teacher\_marks) AS value1 FROM Teacher\_Info;

ERROR 1370 (42000) at line 23: execute command denied to user 'mycompiler'@'localhost' for routine 'mycompiler.REPLICATE'

[Execution complete with exit code 1]

# **TRUNCATE Function in SQL**

The TRUNCATE is a numeric function in SQL which truncates the number according to the particular decimal points.

### Syntax of TRUNCATE Function

1. **SELECT** **TRUNCATE**(X, D) **AS** Alias\_Name;

In the TRUNCATE syntax, X is the integer number and D is the decimal points.

In the SQL, you can also use the TRUNCATE function with the integer field of the table as shown in the following block:

1. **SELECT** **TRUNCATE**(Integer\_Column\_Name, Decimal\_point ) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we have to define the name and columns of that table on which we want to perform the TRUNCATE function.

SELECT Teacher\_First\_Name,Teacher\_Salary, TRUNCATE(Teacher\_Salary,1) AS value1 FROM Teacher\_Info;

Teacher\_First\_Name Teacher\_Salary value1

Arush 2000.91 2000.9

Bulbul 3800.56 3800.5

Saurabh 4500.76 4500.7

Shivani 4200.65 4200.6

Avinash 3800.56 3800.5

Shyam 3000.34 3000.3

[Execution complete with exit code 0]

# **DATALENGTH Function in SQL**

The DATALENGTH string function of Structured Query Language returns the number of bytes used to indicate the expression.

### Syntax of DATALENGTH String Function

**Syntax1:** This syntax uses the DATALENGTH function with the column name of the SQL table:

1. **SELECT** DATALENGTH(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the name of that column on which we want to perform the DATALENGTH string function for finding the number of bytes used to represent the string or expression.

**Syntax2:** This syntax uses the DATALENGTH function with the string:

1. **SELECT** DATALENGTH(Original\_String);

SELECT Teacher\_First\_Name,DATALENGTH(Teacher\_First\_Name) AS value1 FROM Teacher\_Info;

ERROR 1370 (42000) at line 23: execute command denied to user 'mycompiler'@'localhost' for routine 'mycompiler.DATALENGTH'

[Execution complete with exit code 1]

# **NCHAR Function in SQL**

The NCHAR string function shows the unicode value of the integer passed in the function. This function takes only one parameter or argument. If we pass the integer value which exceeds the given range then it shows NULL value.

### Syntax of NCHAR String Function

In SQL, we can use the NCHAR function with the columns of the table, strings, and characters.

**Syntax1:**

1. **SELECT** **NCHAR**(Integer\_Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this syntax, we used the NCHAR function with existing table of SQL. Here, we have to define the name and integer column of that table on which we want to perform NCHAR function.

# **OCTET\_LENGTH Function in SQL**

The OCTET\_LENGTH string function of Structured Query Language returns the number of characters of the given string or word.

### Syntax of OCTET\_LENGTH String Function

**Syntax1:** This syntax uses the OCTET\_LENGTH function with the column name of the SQL table:

1. **SELECT** OCTET\_LENGTH(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In this first syntax, we have to specify the name of that column on which we want to execute the OCTET\_LENGTH string function for finding the number of characters of each value.

**Syntax2:** This syntax uses the OCTET\_LENGTH function with the string:

1. **SELECT** OCTET\_LENGTH(Original\_String);

**Syntax2:**

1. **SELECT** **NCHAR**(Integer\_Value) **AS** Alias\_Name;

In this syntax, we used the NCHAR function with the integer value.

SELECT Teacher\_First\_Name, OCTET\_LENGTH(Teacher\_First\_Name) AS value1 FROM Teacher\_Info;

Teacher\_First\_Name value1

Arush 5

Bulbul 6

Saurabh 7

Shivani 7

Avinash 7

Shyam 5

[Execution complete with exit code 0]

# **PATINDEX Function in SQL**

The PATINDEX string function in Structured Query Language returns the position of the specified pattern in the original string. If Sub-string is omitted in the original string, the PATINDEX function returns 0. The first position of the original string is indicated as 1.

### Syntax of PATINDEX String Function

**Syntax1:** This syntax uses the PATINDEX function with the column name of the SQL table:

1. **SELECT** PATINDEX(Pattern, Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the name of that column on which we want to find the position of string.

**Syntax2:** This syntax uses the PATINDEX function with the string:

1. **SELECT** PATINDEX(Pattern, Original\_String) **AS** Alias\_Name;

SELECT Teacher\_First\_Name, PATINDEX('a',Teacher\_First\_Name) AS value1 FROM Teacher\_Info;

ERROR 1370 (42000) at line 23: execute command denied to user 'mycompiler'@'localhost' for routine 'mycompiler.PATINDEX'

[Execution complete with exit code 1]

# **PI Function in SQL**

The PI() is a mathematics function which returns the pi value. In this section you will also learn how to use round function with the PI function.

In Structured Query Language, this function does not take any argument.

### Syntax of PI Function

1. **SELECT** PI() **AS** Alias\_Name;

In this SELECT syntax, we have to pass that numeric number in the function whose tan value we want to find.

### Examples of PI function

**Example 1:** This example returns the pi value of the specified number:

1. **SELECT** PI() + 8 **AS** pi\_plus8;

SELECT PI()+8 AS pi ;

pi

11.141593

[Execution complete with exit code 0]

# **ORD Function in SQL**

The ORD function of Structured Query Language shows the code of left-most character of the specified string or word. SQL also allows you to perform the ORD function on the String fields of the table.

### Syntax of ORD String Function

**Syntax1:** This syntax uses the ORD function with the column names of the SQL table:

1. **SELECT** ORD(Column\_Name) **AS** Alias\_Name **FROM** Table\_Name;

In the syntax, we have to specify the column's name on which we want to use the ORD string function.

**Syntax2:** This syntax uses the ORD function with the set of characters (string):

1. **SELECT** ORD(String);

**Syntax2:** This syntax uses the ORD function with the individual character:

1. **SELECT** ORD(**character**);

SELECT Teacher\_First\_Name,ORD(Teacher\_First\_Name) AS value1 FROM Teacher\_Info;

Teacher\_First\_Name value1

Arush 65

Bulbul 66

Saurabh 83

Shivani 83

Avinash 65

Shyam 83

[Execution complete with exit code 0]

**SQL GENERAL FUNCTIONS**

# **SQL General Functions: NVL, NVL2, DECODE, COALESCE, LNNVL and NANVL**

## Introduction

Today, we are going to learn about SQL general Functions. The General Functions we are going to learn about are:

* NVL()
* NVL2()
* DECODE()
* COALESCE()
* LNNVL()

### 1.) NVL()

This is one of the functions of SQL extensively used in Structured Query Language (SQL).

This function can hold two input values only. If input values are more than 2 then an error is returned. This functions returns the first NOT NULL value when searched in the function.

If both the inputs are NULL, then there is no output for this function.

The input data type can be Integer, Floating Point Number, String, Character input, etc.

**Syntax**

NVL (input 1, input 2)

SQL> **select** NVL(1, 2) **from** dual;

 NVL(1,2)

\_ \_ \_ \_ \_ \_

         1

SQL> **select** NVL(NULL, 1) **from** dual;

NVL(NULL,1)

\_ \_ \_ \_ \_ \_ \_ \_

          1

SQL> **select** NVL(1.029384, 1.029384) **from** dual;

NVL(1.029384,1.029384)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

              1.029384

SQL> **select** NVL(NULL, 1.029384) **from** dual;

NVL(NULL,1.029384)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

          1.029384

NVL2()

This is one of the functions of SQL extensively used in Structured Query Language (SQL).

This function can hold three input values only. If input values are more than three then an error is returned. This function returns the first value after NOT NULL value is found, when searched in the function.

If the first value is NOT NULL, second value is returned.

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If the first value is NULL and the second value is NOT NULL, third value is returned.

The returned value can also be a NULL value too.

The working of this functioning is as same as NVL () in SQL.

If both the inputs are NULL, then there is no output for this function.

The input data type can be Integer, Floating Point Number, String, Character input, etc.

**Syntax**

1. NVL2(input 1, input 2, input 3)

**Example Queries**

SQL> **select** NVL2(1, 2, 3) **from** dual;

NVL2(1,2,3)

\_ \_ \_ \_ \_ \_ \_ \_

          2

SQL> **select** NVL2(2, 2, 3) **from** dual;

NVL2(2,2,3)

\_ \_ \_ \_ \_ \_ \_ \_

          2

SQL> **select** NVL2(2, 4, 3) **from** dual;

NVL2(2,4,3)

\_ \_ \_ \_ \_ \_ \_ \_

          4

SQL> **select** NVL2(2, NULL, 3) **from** dual;

NVL2(2,NULL,3)

\_ \_ \_ \_ \_ \_ \_ \_ \_

SQL> **select** NVL2('Kevin', 'Pitersen', ' SA / ENG ') **from** dual;

NVL2('KE

\_ \_ \_ \_ \_ \_

Pitersen

DECODE()

This is also one of the expressions used in SQL. This Decode expression is used as IF, ELSE IF, ELSE IF Ladder style. This decode works on the basis of the condition specified.

Any kind of operation specified is going to work here.

The input types must chosen based on the data types specified.

**Syntax**

DECODE (**column**  **name**,  number 1 **to** be searched, result 1 **to** be updated

                    , number 2 **to** be searched, result 2 **to** be updated

                     , number 3 **to** be searched, result 3 **to** be updated

             . . . . . . . . .

                      number n **to** be searched, result n **to** be updated , **default**)

SQL > **select** \* **from** ipla;

SID  SNAME             SAL        AGE

\_ \_ \_    \_ \_ \_ \_ \_       \_ \_ \_ \_    \_ \_ \_ \_

     1   mahi               12           40

     2  kohli                14            33

     3   DK                  6.25         33

     4  warner           6.75         33

     5  rahul               16             29

     6  pandya           14           27

SQL > **SELECT** Sname, sid, sal,

  2         DECODE (sid, 1, 1.5\*sal,

  3                               2, 4\*sal,

  4                               3, 9\*sal,

  5                               4, 10.25\*sal,

  6                sal)

  7         "REVISED SALARY"

  8  **from** ipla ;

SNAME         SID        SAL         REVISED SALARY

\_ \_ \_    \_ \_ \_ \_ \_       \_ \_ \_ \_    \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

mahi                1         12             18

kohli                2         14             56

DK                   3       6.25            56.25

warner           4       6.75            69.1875

rahul               5         16             16

pandya             6         14            14

CREATE TABLE Teacher\_Info

(

Teacher\_ID INT ,

Teacher\_First\_Name VARCHAR (100),

Teacher\_Last\_Name VARCHAR (100),

Teacher\_Dept\_Id INT ,

Teacher\_marks INT,

Teacher\_Address Varchar (80),

Teacher\_City Varchar (80),

Teacher\_Salary FLOAT

);

INSERT INTO Teacher\_Info (Teacher\_ID, Teacher\_First\_Name, Teacher\_Last\_Name, Teacher\_Dept\_Id,Teacher\_marks, Teacher\_Address, Teacher\_City, Teacher\_Salary) VALUES

(1001, 'Arush', 'Sharma', 4001,0, '22 street', 'New Delhi', NULL),

(NULL, 'Bulbul', 'Roy', 4002,45, '120 street', 'New Delhi', 3800.560),

(1004, 'Saurabh', 'Sharma', NULL,-78, '221 street', 'Mumbai', 4500.760),

(NULL, 'Shivani', 'Singhania', 4001,-56, '501 street', 'Kolkata', 4200.650),

(NULL, 'Avinash', 'Sharma', NULL,0, '12 street', 'Delhi', 3800.560),

(1007, 'Shyam', 'Besas', NULL,54, '202 street', 'Lucknow', 3000.340);

SELECT Teacher\_First\_Name, Teacher\_ID, Teacher\_Salary,

DECODE (Teacher\_ID, 1001, 1.5\*Teacher\_Salary,

1004, 4\*Teacher\_Salary,

1007, 10.25\*Teacher\_Salary,

Teacher\_Salary)

"REVISED SALARY"

from Teacher\_Info ;

### COALESCE()

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This also one of the expression used in SQL. This expression works similar to NVL () expression. The only difference it can accept inputs greater than two. It returns the first NOT NULL input element.

The input data type can be anything. The inputs can be int, float, string, character, number, etc.

**Syntax**

1. COALESCE (input 1, input 2, input 3, . . . . . . . . . ., input n)

**Example Queries**

SQL> **select** COALESCE(NULL, 1) **from** dual;

COALESCE(NULL,1)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

               1

SQL> **select** COALESCE(1, 2, 2) **from** dual;

COALESCE(1,2,2)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

              1

SQL> **select** COALESCE(NULL, 2, 2) **from** dual;

COALESCE(NULL,2,2)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

                 2

SQL> **select** COALESCE(NULL, NULL, 2) **from** dual;

COALESCE(NULL,NULL,2)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

                    2

SQL> **select** COALESCE(NULL, NULL, NULL) **from** dual;

C

\_

SQL> **select** COALESCE(NULL, NULL, NULL, 1, 2, 3, 4, 5, 6) **from** dual;

COALESCE(NULL,NULL,NULL,1,2,3,4,5,6)

\_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

                                   1

SQL> **select** COALESCE(NULL, 'NULL', 'Stuart Broad', 'Adam Gilchrist') **from** dual;

COAL

\_ \_ \_ \_

NULL

LNNVL()

This is one of the function of SQL which is used in SQL. This is used to convert True to False and False to True.

The LNNVL () function has the capacity to hold a condition. This makes the condition go reverse.

If the condition is SID = 2. Then LNNVL (SID = 2) is equivalent to SID ! = 2.

**Syntax**

1. LNNVL (Condition)

**Example Queries**

SQL> **select** \* **from** ipla;

SID  SNAME              SAL        AGE

\_ \_ \_    \_ \_ \_ \_ \_     \_ \_ \_ \_    \_ \_ \_ \_

 1   mahi                12          40

 2  kohli                14           33

 3   DK                  6.25         33

 4  warner               6.75         33

 5  rahul                16           29

 6  pandya               14           27

 7  Tim David            8.25        26

7 **rows** selected.

SQL> **select** \* **from** ipla **where** sid=2;

SID  SNAME             SAL        AGE

\_ \_ \_    \_ \_ \_ \_ \_       \_ \_ \_ \_    \_ \_ \_ \_

   2      kohli              14              33

SQL> **select** \* **from** ipla **where** LNNVL (sid = 2) ;

SID  SNAME             SAL        AGE

\_ \_ \_ \_ \_ \_ \_ \_       \_ \_ \_ \_    \_ \_ \_ \_

1    mahi            12           40

3    DK              6.25         33

4   warner           6.75         33

5   rahul            16            29

6   pandya           14            27

7   Tim David       8.25          26

NANVL ()

If the input value n2 is NaN (not a number), this method returns an alternative value n1, and if n2 is not NaN, it returns n2. Only floating-point numbers of the types BINARY FLOAT or BINARY DOUBLE can be used with this function.

The function accepts any numeric or nonnumeric data type as an input, with the ability to implicitly convert to a numeric data type.

The method returns BINARY DOUBLE if the parameter is BINARY FLOAT. If not, the function returns a numeric data type that matches the parameter.

**Syntax**

NANVL (input 1, input 2)

SID  SNAME             SAL        AGE

\_ \_ \_    \_ \_ \_ \_ \_      \_ \_ \_ \_    \_ \_ \_ \_

     1   mahi            12           40

     2  kohli            14           33

     3   DK              6.25         33

     4  warner           6.75         33

     5  rahul            16           29

     6  pandya           14           27

     7   Tim David       8.25         26

SQL> **select** Sname, sid, sal,

  2          DECODE (SID, 1,  (sal + sid \* 5),

  3                         2, (sal + sid\*4),

  4                         3, NVL(sal\*4, NULL),

  5                         4, NVL2(NULL, sal\*3, sal\*4),

  6                         5, COALESCE(NULL, NULL, sal+4),

  7                         6, 3 \* sal,

  8                         sal\*2)

  9                         "REVISED SALARY "

 10                       **from** ipla;

SID  SNAME             SAL        REVISED SALARY

\_ \_ \_ \_ \_ \_ \_ \_       \_ \_ \_ \_       \_ \_ \_ \_ \_ \_ \_ \_ \_ \_

     1   mahi            12             17

     2  kohli            14             22

     3   DK              6.25           25

     4  warner           6.75           27

     5  rahul            16             20

     6  pandya           14             42

     7   Tim David       8.25           16.5