**MySQL Tutorial**

MySQL is a widely used relational database management system (RDBMS).

MySQL is free and open-source.

MySQL is ideal for both small and large applications.

# Introduction to MySQL

MySQL is a very popular open-source relational database management system (RDBMS).

## What is MySQL?

* MySQL is a relational database management system
* MySQL is open-source
* MySQL is free
* MySQL is ideal for both small and large applications
* MySQL is very fast, reliable, scalable, and easy to use
* MySQL is cross-platform
* MySQL is compliant with the ANSI SQL standard
* MySQL was first released in 1995
* MySQL is developed, distributed, and supported by Oracle Corporation
* MySQL is named after co-founder Monty Widenius's daughter: My

## Who Uses MySQL?

* Huge websites like Facebook, Twitter, Airbnb, Booking.com, Uber, GitHub, YouTube, etc.
* Content Management Systems like WordPress, Drupal, Joomla!, Contao, etc.
* A very large number of web developers around the world

## Show Data On Your Web Site

To build a web site that shows data from a database, you will need:

* An RDBMS database program (like MySQL)
* A server-side scripting language, like PHP
* To use SQL to get the data you want
* To use HTML / CSS to style the page

# MySQL RDBMS

## What is RDBMS?

RDBMS stands for Relational Database Management System.

RDBMS is a program used to maintain a relational database.

RDBMS is the basis for all modern database systems such as MySQL, Microsoft SQL Server, Oracle, and Microsoft Access.

RDBMS uses [SQL queries](https://www.w3schools.com/sql/default.asp) to access the data in the database.

## What is a Database Table?

A table is a collection of related data entries, and it consists of columns and rows.

A column holds specific information about every record in the table.

A record (or row) is each individual entry that exists in a table.

Look at a selection from the Northwind "Customers" table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CustomerID** | **CustomerName** | **ContactName** | **Address** | **City** | **PostalCode** | **Country** |
| 1 | Alfreds Futterkiste | Maria Anders | Obere Str. 57 | Berlin | 12209 | Germany |
| 2 | Ana Trujillo Emparedados y helados | Ana Trujillo | Avda. de la Constitución 2222 | México D.F. | 05021 | Mexico |
| 3 | Antonio Moreno Taquería | Antonio Moreno | Mataderos 2312 | México D.F. | 05023 | Mexico |
| 4 | Around the Horn | Thomas Hardy | 120 Hanover Sq. | London | WA1 1DP | UK |
| 5 | Berglunds snabbköp | Christina Berglund | Berguvsvägen 8 | Luleå | S-958 22 | Sweden |

The columns in the "Customers" table above are: CustomerID, CustomerName, ContactName, Address, City, PostalCode and Country. The table has 5 records (rows).

## What is a Relational Database?

A relational database defines database relationships in the form of tables. The tables are related to each other - based on data common to each.

Look at the following three tables "Customers", "Orders", and "Shippers" from the Northwind database:

### Customers Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CustomerID** | **CustomerName** | **ContactName** | **Address** | **City** | **PostalCode** | **Country** |
| **1** | Alfreds Futterkiste | Maria Anders | Obere Str. 57 | Berlin | 12209 | Germany |
| **2** | Ana Trujillo Emparedados y helados | Ana Trujillo | Avda. de la Constitución 2222 | México D.F. | 05021 | Mexico |
| **3** | Antonio Moreno Taquería | Antonio Moreno | Mataderos 2312 | México D.F. | 05023 | Mexico |
| **4** | Around the Horn | Thomas Hardy | 120 Hanover Sq. | London | WA1 1DP | UK |
| **5** | Berglunds snabbköp | Christina Berglund | Berguvsvägen 8 | Luleå | S-958 22 | Sweden |

The relationship between the "Customers" table and the "Orders" table is the CustomerID column:

### Orders Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OrderID** | **CustomerID** | **EmployeeID** | **OrderDate** | **ShipperID** |
| 10278 | **5** | 8 | 1996-08-12 | **2** |
| 10280 | **5** | 2 | 1996-08-14 | **1** |
| 10308 | **2** | 7 | 1996-09-18 | **3** |
| 10355 | **4** | 6 | 1996-11-15 | **1** |
| 10365 | **3** | 3 | 1996-11-27 | **2** |
| 10383 | **4** | 8 | 1996-12-16 | **3** |
| 10384 | **5** | 3 | 1996-12-16 | **3** |

The relationship between the "Orders" table and the "Shippers" table is the ShipperID column:

### Shippers Table

|  |  |  |
| --- | --- | --- |
| **ShipperID** | **ShipperName** | **Phone** |
| **1** | Speedy Express | (503) 555-9831 |
| **2** | United Package | (503) 555-3199 |
| **3** | Federal Shipping | (503) 555-9931 |

# MySQL SQL

## What is SQL?

SQL is the standard language for dealing with Relational Databases.

SQL is used to insert, search, update, and delete database records.

## How to Use SQL

The following SQL statement selects all the records in the "Customers" table:

### Example

SELECT \* FROM Customers;

## Keep in Mind That...

* SQL keywords are NOT case sensitive: select is the same as SELECT

In this tutorial we will write all SQL keywords in upper-case.

## Semicolon after SQL Statements?

Some database systems require a semicolon at the end of each SQL statement.

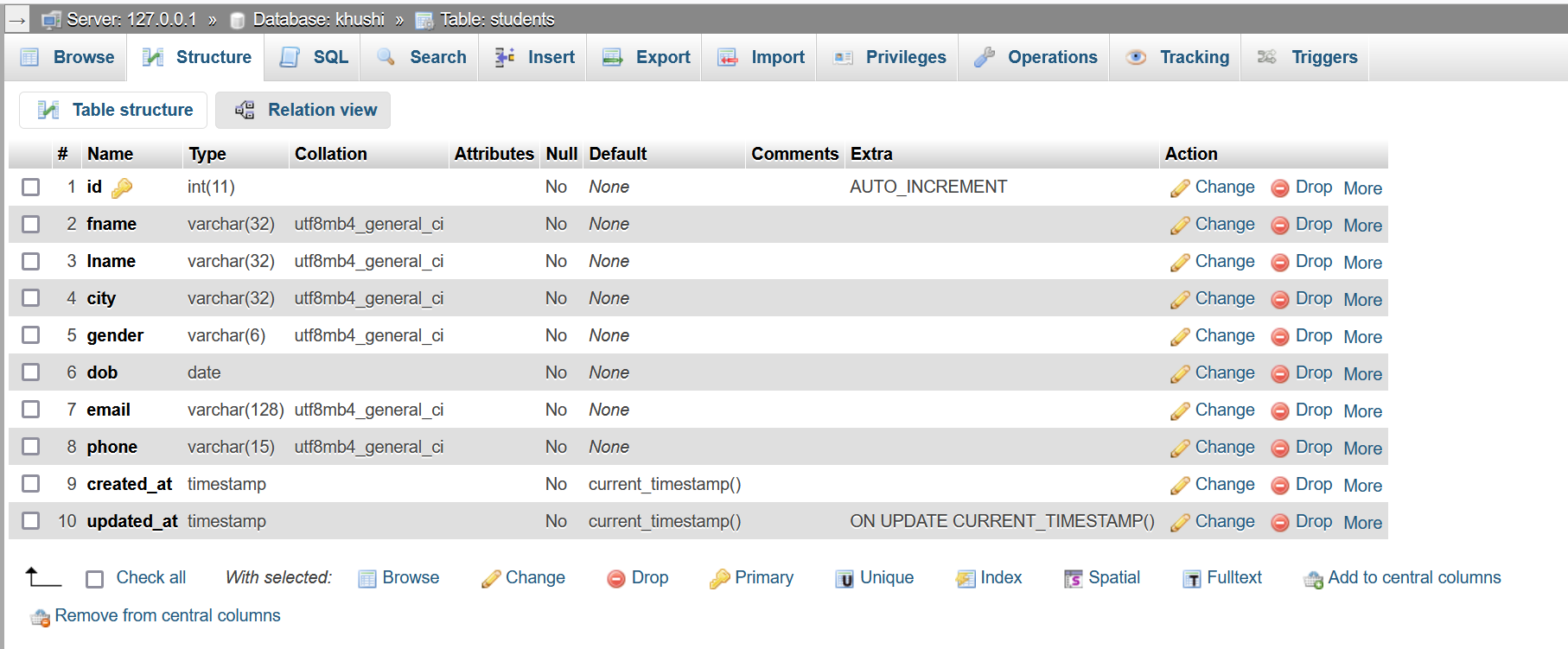
Semicolon is the standard way to separate each SQL statement in database systems that allow more than one SQL statement to be executed in the same call to the server.

In this tutorial, we will use semicolon at the end of each SQL statement.

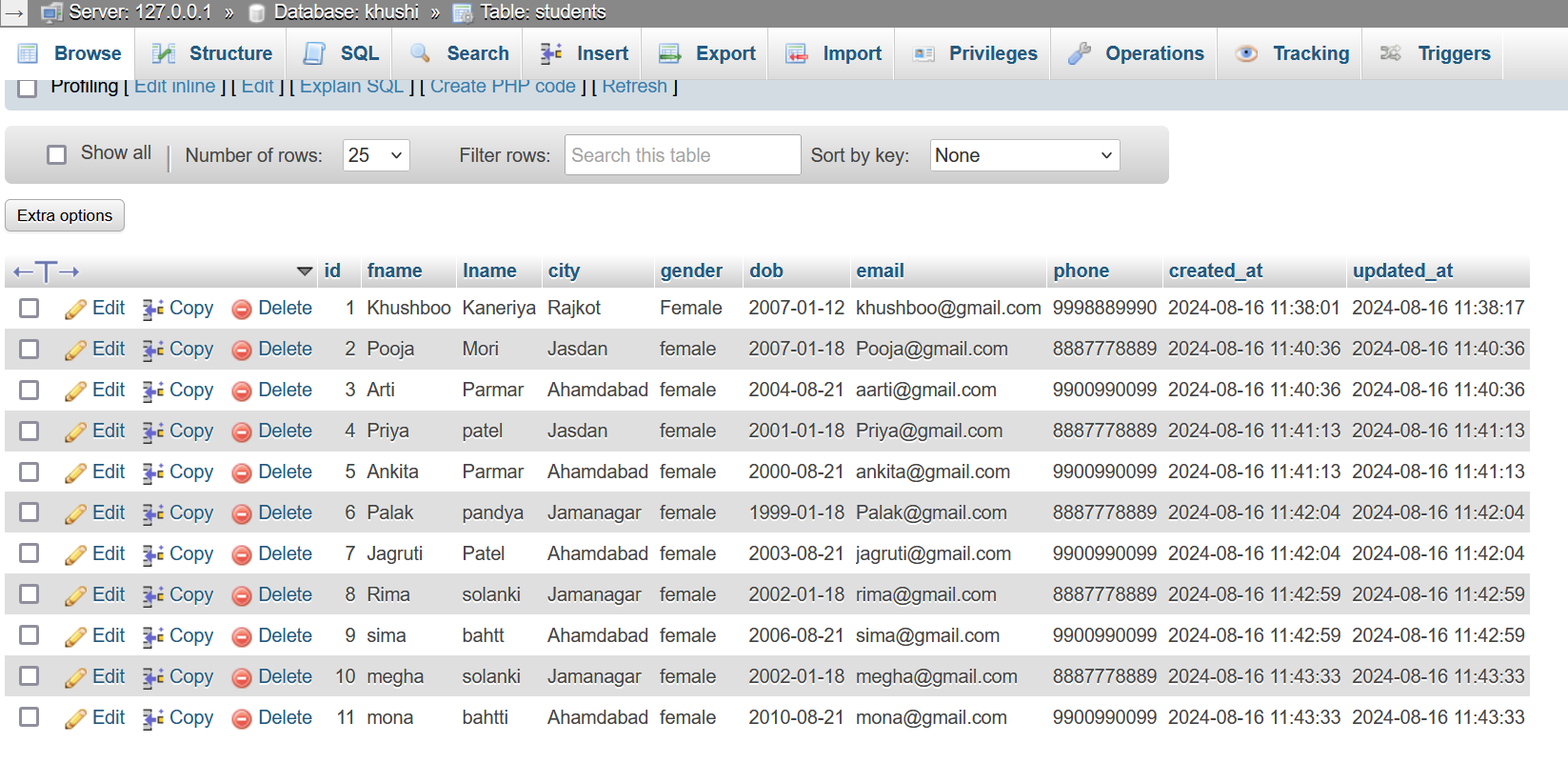
## Some of The Most Important SQL Commands

* SELECT - extracts data from a database
* UPDATE - updates data in a database
* DELETE - deletes data from a database
* INSERT INTO - inserts new data into a database
* CREATE DATABASE - creates a new database
* ALTER DATABASE - modifies a database
* CREATE TABLE - creates a new table
* ALTER TABLE - modifies a table
* DROP TABLE - deletes a table
* CREATE INDEX - creates an index (search key)
* DROP INDEX - deletes an index

Create Database and table as following



Add some data in students table



# MySQL SELECT Statement

## The MySQL SELECT Statement

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

The data returned is stored in a result table, called the result-set.

### SELECT Syntax

SELECT column1, column2, ... FROM table\_name;

SELECT id, fname, lname FROM students

Here, column1, column2, ... are the field names of the table you want to select data from. If you want to select all the fields available in the table, use the following syntax:

SELECT \* FROM *table\_name*;

SELECT \* FROM students;

## The MySQL SELECT DISTINCT Statement

The SELECT DISTINCT statement is used to return only distinct (different) values.

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

### SELECT DISTINCT Syntax

SELECT DISTINCT column1, column2, ... FROM table\_name;

SELECT DISTINCT(city) FROM students

## SELECT Example Without DISTINCT

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

SELECT COUNT(DISTINCT(city)) FROM students

# MySQL WHERE Clause

## The MySQL WHERE Clause

The WHERE clause is used to filter records.

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

### WHERE Syntax

SELECT column1, column2, ... FROM table\_name WHERE condition;

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

SELECT \* FROM students WHERE city = 'Rajkot'

SELECT id, fname, lname, city FROM students WHERE city = 'Rajkot';

## Text Fields vs. Numeric Fields

SQL requires single quotes around text values (most database systems will also allow double quotes).

However, numeric fields should not be enclosed in quotes:

SELECT id, fname, lname, city FROM students WHERE id > 5

SELECT id, fname, lname, city FROM students WHERE id = 5;

SELECT id, fname, lname, city FROM students WHERE id >= 5;

SELECT id, fname, lname, city FROM students WHERE id < 5;

SELECT id, fname, lname, city FROM students WHERE id <= 5;

SELECT id, fname, lname, city FROM students WHERE id <> 5;

SELECT id, fname, lname, city FROM students WHERE not id = 5;

# MySQL AND, OR and NOT Operators

## The MySQL AND, OR and NOT Operators

The WHERE clause can be combined with AND, OR, and NOT operators.

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

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

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

### AND Syntax

SELECT column1, column2, ... FROM table\_name WHERE condition1 AND condition2 AND condition3 ...;

### OR Syntax

SELECT column1, column2, ... FROM table\_name WHERE condition1 OR condition2 OR condition3 ...;

### NOT Syntax

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

SELECT \* FROM students WHERE id = 1

SELECT \* FROM students WHERE id = 1 and city = 'Surat';

SELECT \* FROM students WHERE id = 1 or city = 'Surat';

SELECT \* FROM students WHERE not city = 'Surat';

## Combining AND, OR and NOT

You can also combine the AND, OR and NOT operators.

SELECT \* FROM students WHERE id = 1 and city = 'Rajkot' or city = 'Surat';

SELECT \* FROM students WHERE id = 1 and (city = 'Rajkot' or city = 'Surat');

SELECT \* FROM students WHERE id = 1 and (not city = 'Rajkot' and not city = 'Surat');

# MySQL ORDER BY Keyword

## The MySQL ORDER BY Keyword

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

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

### ORDER BY Syntax

SELECT column1, column2, ... FROM table\_name ORDER BY column1, column2, ... ASC|DESC;

SELECT \* FROM students

SELECT \* FROM students ORDER by (fname);

SELECT \* FROM students ORDER by (fname) DESC;

## ORDER BY Several Columns Example

SELECT \* FROM students ORDER by fname, city;

SELECT \* FROM students ORDER by fname asc, city DESC;

# MySQL INSERT INTO Statement

## The MySQL INSERT INTO Statement

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

### INSERT INTO Syntax

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

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

INSERT INTO table\_name (column1, column2, column3, ...) VALUES (value1, value2, value3, ...);

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

INSERT INTO table\_name VALUES (value1, value2, value3, ...);

INSERT into students (fname, lname, city, gender, dob, email, phone) VALUES ('Dhruvisha', 'Bhatt', 'Junagadh', 'female', '2008-09-09', 'dhruvisha@gmail.com', '9900999999')

**Did you notice that we did not insert any number into the CustomerID field?**  
The CustomerID column is an **auto-increment** field and will be **generated automatically** when a new record is inserted into the table.

## Insert Data Only in Specified Columns

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

INSERT into students (fname, lname) VALUES ('Devangi', 'Dave')

Warning: #1364 Field 'city' doesn't have a default value

Warning: #1364 Field 'gender' doesn't have a default value

Warning: #1364 Field 'dob' doesn't have a default value

Warning: #1364 Field 'email' doesn't have a default value

Warning: #1364 Field 'phone' doesn't have a default value

# MySQL NULL Values

## What is a NULL Value?

A field with a NULL value is a field with no value.

If a field in a table is optional, it is possible to insert a new record or update a record without adding a value to this field. Then, the field will be saved with a NULL value.

**Note:** A NULL value is different from a zero value or a field that contains spaces. A field with a NULL value is one that has been left blank during record creation!

## How to Test for NULL Values?

It is not possible to test for NULL values with comparison operators, such as =, <, or <>.

We will have to use the IS NULL and IS NOT NULL operators instead.

SELECT \* FROM `students` WHERE city is null

SELECT \* FROM `students` WHERE city = '';

[ALTER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) `students` CHANGE `city` `city` VARCHAR(32) NULL;

SELECT \* FROM `students` WHERE city is null

SELECT \* FROM `students` WHERE city is not null;

## The IS NULL Operator

The IS NULL operator is used to test for empty values (NULL values).

## The IS NOT NULL Operator

The IS NOT NULL operator is used to test for non-empty values (NOT NULL values).

# MySQL UPDATE Statement

## The MySQL UPDATE Statement

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

### UPDATE Syntax

UPDATE table\_name SET column1 = value1, column2 = value2, ... WHERE condition;

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

UPDATE students set gender = 'Female'

UPDATE students set city = 'Rajkot' WHERE id = 10

## UPDATE Multiple Records

It is the WHERE clause that determines how many records will be updated.

UPDATE students set city = 'Rajkot', gender = 'female', phone = '9998887770' WHERE id = 10;

## Update Warning!

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

# MySQL LIMIT Clause

## The MySQL LIMIT Clause

The LIMIT clause is used to specify the number of records to return.

The LIMIT clause is useful on large tables with thousands of records. Returning a large number of records can impact performance.

### LIMIT Syntax

SELECT \* FROM students

SELECT \* FROM students LIMIT 5;

SELECT \* FROM students LIMIT 5 OFFSET 5;

SELECT \* FROM students LIMIT 10, 5;

## MySQL LIMIT Examples

The following SQL statement selects the first three records from the "Customers" table:

### Example

SELECT \* FROM Customers LIMIT 3;

What if we want to select records 4 - 6 (inclusive)?

MySQL provides a way to handle this: by using OFFSET.

The SQL query below says "return only 3 records, start on record 4 (OFFSET 3)":

### Example

SELECT \* FROM Customers LIMIT 3 OFFSET 3;

SELECT \* from students WHERE city = 'Ahamdabad';

SELECT \* from students WHERE city = 'Ahamdabad' LIMIT 2;

# MySQL MIN() and MAX() Functions

## MySQL MIN() and MAX() Functions

The MIN() function returns the smallest value of the selected column.

The MAX() function returns the largest value of the selected column.

### MIN() Syntax

SELECT MIN(column\_name) FROM table\_name WHERE condition;

### MAX() Syntax

SELECT MAX(column\_name) FROM table\_name WHERE condition;

SELECT min(dob) FROM students;

SELECT max(dob) FROM students;

SELECT MAX(id) FROM students

SELECT min(id) FROM students;

SELECT MIN(dob) FROM students;

SELECT MIN(dob) as "Oldest Student" FROM students;

SELECT MAX(dob) as "Youngest Student" FROM students;

# MySQL COUNT(), AVG() and SUM() Functions

## MySQL COUNT(), AVG() and SUM() Functions

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 WHERE condition;

SELECT COUNT(id) FROM students

SELECT COUNT(id) FROM students WHERE city = 'Ahamdabad';

SELECT COUNT(id) FROM students WHERE city <> 'Ahamdabad';

SELECT sum(id) FROM students

SELECT avg(id) FROM students

# MySQL LIKE Operator

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

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

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

The 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.

SELECT \* from students WHERE fname like 'k%'

SELECT \* from students WHERE fname like '%k';

SELECT \* from students WHERE fname like '%k%';

SELECT \* from students WHERE fname like 'a%';

SELECT \* from students WHERE fname like '\_a%';

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

|  |  |
| --- | --- |
| **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" |

SELECT \* from students WHERE fname like 'p%a';

SELECT \* from students WHERE fname like 'a\_\_\_';

SELECT \* from students WHERE fname like 'a\_\_\_%';

SELECT \* from students WHERE fname not like 'a%';

# MySQL Wildcards

## MySQL Wildcard Characters

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

Wildcard characters are used with the [LIKE](https://www.w3schools.com/MySQL/mysql_like.asp) operator. The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

### Wildcard Characters in MySQL

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Description** | **Example** |
| % | Represents zero or more characters | bl% finds bl, black, blue, and blob |
| \_ | Represents a single character | h\_t finds hot, hat, and hit |

The wildcards can also be used in combinations!

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

# MySQL IN Operator

## The MySQL IN Operator

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

The IN operator is a shorthand for multiple OR conditions.

### IN Syntax

SELECT column\_name(s) FROM table\_name WHERE column\_name IN (value1, value2, ...);

SELECT \* from students WHERE city = 'surat' or city = 'Rajkot' or city = 'Ahamdabad'

SELECT \* from students WHERE city in('surat', 'Rajkot', 'Ahamdabad');

SELECT \* from students WHERE city not in('surat', 'Rajkot', 'Ahamdabad');

# MySQL BETWEEN Operator

## The MySQL BETWEEN Operator

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

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

### BETWEEN Syntax

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

SELECT \* from students WHERE id BETWEEN 1 and 5;

SELECT \* from students WHERE dob BETWEEN '2000-01-01' and '2007-12-31';

SELECT \* from students WHERE fname BETWEEN 'arti' and 'palak'

SELECT \* from students WHERE fname not BETWEEN 'arti' and 'palak';

# MySQL Aliases

## MySQL Aliases

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

Aliases are often used to make column names more readable.

An alias only exists for the duration of that query.

An alias is created with the AS keyword.

### Alias Column Syntax

SELECT column\_name AS alias\_name FROM table\_name;

### Alias Table Syntax

SELECT column\_name(s) FROM table\_name AS alias\_name;

SELECT fname as "First Name", lname as "Last Name" from students;

The following SQL statement creates two aliases, one for the CustomerName column and one for the ContactName column. **Note:** Single or double quotation marks are required if the alias name contains spaces:

SELECT id as ID, fname as "First Name", lname as "Last Name" from students;

SELECT id as "Student ID", fname as "First Name", lname as "Last Name" from students;

SELECT concat\_ws(" ", id, fname, lname, city, email, phone, dob) as "Student Details" FROM students;

SELECT concat\_ws(" \_ ", id, fname, lname, city, email, phone, dob) as "Student Details" FROM students;

## Alias for Tables Example

SELECT students.id, students.fname, students.lname, students.city, students.gender, students.dob, students.email, students.phone, attendance.absents, attendance.presents from students, attendance

SELECT students.id, students.fname, students.lname, students.city, students.gender, students.dob, students.email, students.phone, attendance.absents, attendance.presents from students, attendance WHERE students.id = attendance.stduent\_id;

SELECT s.id, s.fname, s.lname, s.city, s.gender, s.dob, s.email, s.phone, a.absents, a.presents from students s, attendance a WHERE s.id = a.stduent\_id;

Aliases can be useful when:

* There are more than one table involved in a query
* Functions are used in the query
* Column names are big or not very readable
* Two or more columns are combined together

SELECT COUNT(id) FROM students WHERE city = 'Rajkot';

SELECT COUNT(id) as "Students From Rajkot" FROM students WHERE city = 'Rajkot';

# MySQL Joins

## MySQL Joining Tables

A JOIN clause is used to combine rows from two or more tables, based on a related column between them.

SELECT students.\*, attendance.absents, attendance.presents from students INNER join attendance

SELECT students.\*, attendance.absents, attendance.presents from students INNER join attendance on students.id = attendance.stduent\_id;

## Supported Types of Joins in MySQL

* INNER JOIN: Returns records that have matching values in both tables
* LEFT JOIN: Returns all records from the left table, and the matched records from the right table
* RIGHT JOIN: Returns all records from the right table, and the matched records from the left table
* CROSS JOIN: Returns all records from both tables

# MySQL INNER JOIN Keyword

## MySQL INNER JOIN Keyword

The INNER JOIN keyword selects records that have matching values in both tables.



### INNER JOIN Syntax

SELECT column\_name(s) FROM table1 INNER JOIN table2ON table1.column\_name = table2.column\_name;

SELECT students.id, students.fname, students.lname, students.city, students.gender, students.dob, students.email, students.phone, attendance.absents, attendance.presents from students INNER JOIN attendance on students.id = attendance.stduent\_id

**Note:** The INNER JOIN keyword selects all rows from both tables as long as there is a match between the columns. If there are records in the "Orders" table that do not have matches in "Customers", these orders will not be shown!

## JOIN Three Tables

SELECT students.id, students.fname, students.lname, students.city, students.gender, students.dob, students.email, students.phone, attendance.absents, attendance.presents, marks.total, marks.result from students INNER JOIN attendance on students.id = attendance.stduent\_id INNER JOIN marks on students.id = marks.stduent\_id;

SELECT s.id, s.fname, s.lname, s.city, s.gender, s.dob, s.email, s.phone, a.absents, a.presents, m.total, m.result from students s INNER join attendance a on s.id = a.stduent\_id INNER join marks m on s.id = m.stduent\_id

# MySQL LEFT JOIN Keyword

## MySQL LEFT JOIN Keyword

The LEFT JOIN keyword returns all records from the left table (table1), and the matching records (if any) from the right table (table2).



### LEFT JOIN Syntax

SELECT column\_name(s) FROM table1 LEFT JOIN table2ON table1.column\_name = table2.column\_name;

SELECT students.id, students.fname, students.lname, students.city, students.gender, students.dob, students.email, students.phone, attendance.absents, attendance.presents FROM students LEFT join attendance on students.id = attendance.stduent\_id

**Note:** The LEFT JOIN keyword returns all records from the left table (Customers), even if there are no matches in the right table (Orders).

# MySQL RIGHT JOIN Keyword

## MySQL RIGHT JOIN Keyword

The RIGHT JOIN keyword returns all records from the right table (table2), and the matching records (if any) from the left table (table1).



### RIGHT JOIN Syntax

SELECT column\_name(s) FROM table1 RIGHT JOIN table2ON table1.column\_name = table2.column\_name;

SELECT students.id, students.fname, students.lname, students.city, students.gender, students.dob, students.email, students.phone, attendance.absents, attendance.presents FROM students RIGHT join attendance on students.id = attendance.stduent\_id;

**Note:** The RIGHT JOIN keyword returns all records from the right table (Employees), even if there are no matches in the left table (Orders).

# MySQL CROSS JOIN Keyword

## SQL CROSS JOIN Keyword

The CROSS JOIN keyword returns all records from both tables (table1 and table2).



### CROSS JOIN Syntax

SELECT column\_name(s) FROM table1 CROSS JOIN table2;

**Note:** CROSS JOIN can potentially return very large result-sets!

SELECT students.\*, attendance.absents, attendance.presents FROM students CROSS JOIN attendance;

**Note:** The CROSS JOIN keyword returns all matching records from both tables whether the other table matches or not. So, if there are rows in "Customers" that do not have matches in "Orders", or if there are rows in "Orders" that do not have matches in "Customers", those rows will be listed as well.

If you add a WHERE clause (if table1 and table2 has a relationship), the CROSS JOIN will produce the same result as the INNER JOIN clause:

SELECT students.\*, attendance.absents, attendance.presents FROM students CROSS JOIN attendance WHERE students.id = attendance.stduent\_id;

# MySQL Self Join

## MySQL Self Join

A self join is a regular join, but the table is joined with itself.

### Self Join Syntax

SELECT column\_name(s) FROM table1 T1, table1 T2 WHERE condition;

T1 and T2 are different table aliases for the same table.

SELECT s1.id, s1.fname, s1.lname, s1.city FROM students s1, students s2 WHERE s1.city = s2.city and s1.id <> s2.id;

SELECT s1.id, s1.fname, s1.lname, s1.city FROM students s1, students s2 WHERE s1.city = s2.city and s1.id <> s2.id ORDER by s1.city;

## The MySQL UNION Operator

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

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

SELECT \* FROM students WHERE City = 'Rajkot'

SELECT \* FROM students\_1 WHERE City = 'surat';

SELECT \* FROM students WHERE City = 'rajkot'

UNION

SELECT \* FROM students\_1 WHERE City = 'surat';

SELECT \* FROM students WHERE City = 'rajkot'

UNION

SELECT \* FROM students\_1 WHERE City = 'rajkot';

### UNION ALL Syntax

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

SELECT column\_name(s) FROM table1 UNION ALL SELECT column\_name(s) FROM table2;

**Note:** The column names in the result-set are usually equal to the column names in the first SELECT statement.

SELECT \* FROM students WHERE City = 'rajkot'

UNION all

SELECT \* FROM students\_1 WHERE City = 'rajkot';

# MySQL GROUP BY Statement

## The MySQL GROUP BY Statement

The GROUP BY statement groups rows that have the same values into summary rows, like "find the number of customers in each country".

The GROUP BY statement is often used with aggregate functions (COUNT(), MAX(), MIN(), SUM(), AVG()) to group the result-set by one or more columns.

### GROUP BY Syntax

SELECT column\_name(s) FROM table\_name WHERE condition GROUP BY column\_name(s)ORDER BY column\_name(s);

SELECT city, COUNT(city) FROM student

SELECT city, COUNT(city) FROM students GROUP by (city)

SELECT city, COUNT(city) FROM students GROUP by (city) ORDER by COUNT(city);

SELECT city, COUNT(city) FROM students GROUP by (city) ORDER by COUNT(city) desc;

SELECT students.\*, attendance.absents, attendance.presents, sum(attendance.absents+attendance.presents) as "Total Days" FROM students INNER join attendance on students.id = attendance.stduent\_id GROUP by (students.id);

# MySQL HAVING Clause

## The MySQL HAVING Clause

The HAVING clause was added to SQL because the WHERE keyword cannot be used with aggregate functions.

### HAVING Syntax

SELECT column\_name(s) FROM table\_name WHERE condition GROUP BY column\_name(s)HAVING conditionORDER BY column\_name(s);

SELECT city, COUNT(id) FROM students GROUP by (city)

SELECT city, COUNT(id) FROM students GROUP by (city) WHERE count(id) >= 3;

SELECT city, COUNT(id) FROM students GROUP by (city) HAVING count(id) >= 3;

# MySQL EXISTS Operator

## The MySQL EXISTS Operator

The EXISTS operator is used to test for the existence of any record in a subquery.

The EXISTS operator returns TRUE if the subquery returns one or more records.

### EXISTS Syntax

SELECT column\_name(s) FROM table\_name WHERE EXISTS (SELECT column\_name FROM table\_name WHERE condition);

SELECT students.\* FROM students where EXISTS (SELECT marks.stduent\_id FROM marks WHERE marks.stduent\_id = students.id and marks.result = 'pass');

# MySQL ANY and ALL Operators

## The MySQL ANY and ALL Operators

The ANY and ALL operators allow you to perform a comparison between a single column value and a range of other values.

## The ANY Operator

The ANY operator:

* returns a boolean value as a result
* returns TRUE if ANY of the subquery values meet the condition

ANY means that the condition will be true if the operation is true for any of the values in the range.

### ANY Syntax

SELECT column\_name(s) FROM table\_name WHERE column\_name operator ANY   (SELECT column\_name  FROM table\_name  WHERE condition);

**Note:** The operator must be a standard comparison operator (=, <>, !=, >, >=, <, or <=).

## The ALL Operator

The ALL operator:

* returns a boolean value as a result
* returns TRUE if ALL of the subquery values meet the condition
* is used with SELECT, WHERE and HAVING statements

ALL means that the condition will be true only if the operation is true for all values in the range.

### ALL Syntax With SELECT

SELECT ALL column\_name(s) FROM table\_name WHERE condition;

SELECT students.id, students.fname, students.lname FROM students WHERE id = any (SELECT marks.stduent\_id from marks WHERE marks.result = 'fail')

## SQL ALL Examples

The following SQL statement lists ALL the product names:

SELECT \* from students WHERE true;

SELECT all fname from students WHERE true;

SELECT fname, lname FROM students WHERE id = all (SELECT marks.stduent\_id from marks WHERE marks.result = 'fail');

[SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) students.\* from students WHERE id = all ([SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) attendance.stduent\_id FROM attendance WHERE attendance.absents = 150);

# MySQL INSERT INTO SELECT Statement

The INSERT INTO SELECT statement copies data from one table and inserts it into another table.

The INSERT INTO SELECT statement requires that the data types in source and target tables matches.

**Note:** The existing records in the target table are unaffected.

### INSERT INTO SELECT Syntax

Copy all columns from one table to another table:

INSERT INTO students\_1 (fname, lname, city, email, phone, gender, dob) SELECT fname, lname, city, email, phone, gender, dob FROM students WHERE City = 'Rajkot'

INSERT INTO table2 SELECT \* FROM table1WHERE condition;

Copy only some columns from one table into another table:

INSERT INTO *table2* (*column1*, *column2*, *column3*, ...) SELECT *column1*, *column2*, *column3*, ... FROM *table1* WHERE *condition*;

# MySQL CASE Statement

## The MySQL CASE Statement

The CASE statement goes through conditions and returns a value when the first condition is met (like an if-then-else statement). So, once a condition is true, it will stop reading and return the result. If no conditions are true, it returns the value in the ELSE clause.

If there is no ELSE part and no conditions are true, it returns NULL.

## CASE Syntax

CASE  
    WHEN condition1 THEN result1  
    WHEN condition2 THEN result2  
    WHEN conditionN THEN resultN  
    ELSE result  
END;

SELECT id, fname, lname, city, email, phone, gender, dob from students

SELECT id, fname, lname, city, case

WHEN city = 'Rajkot' THEN 'Home Town'

WHEN city = 'Ahamdabad' THEN 'Far From Home'

WHEN city = 'Surat' THEN 'Too much Far From Home'

end as "Distance From Home", email, phone, gender, dob from students;

SELECT id, fname, lname, city, case

WHEN city = 'Rajkot' THEN 'Home Town'

WHEN city = 'Ahamdabad' THEN 'Far From Home'

WHEN city = 'Surat' THEN 'Too much Far From Home'

else 'Unkonwn Distance'

end as "Distance From Home", email, phone, gender, dob from students;

# MySQL NULL Functions

## MySQL IFNULL() and COALESCE() Functions

## MySQL IFNULL() Function

The MySQL [IFNULL()](https://www.w3schools.com/MySQL/func_mysql_ifnull.asp) function lets you return an alternative value if an expression is NULL.

The example below returns 0 if the value is NULL:

SELECT stduent\_id, absents, presents from attendance

SELECT stduent\_id, absents, presents, (absents + presents) as "Total Working Days" from attendance;

SELECT stduent\_id, absents, presents, (absents + presents) as "Total Working Days" from attendance;

SELECT stduent\_id, absents, presents, (ifnull(absents,0) + ifnull(presents, 0)) as "Total Working Days" from attendance;

## MySQL COALESCE() Function

Or we can use the [COALESCE()](https://www.w3schools.com/MySQL/func_mysql_coalesce.asp) function, like this:

SELECT stduent\_id, absents, presents, (COALESCE(absents,0) + COALESCE(presents, 0)) as "Total Working Days" from attendance;

# MySQL Comments

## MySQL Comments

Comments are used to explain sections of SQL statements, or to prevent execution of SQL statements.

## Single Line Comments

Single line comments start with --.

Any text between -- and the end of the line will be ignored (will not be executed).

The following example uses a single-line comment as an explanation:

### Example

-- Select all:  
SELECT \* FROM Customers;

The following example uses a single-line comment to ignore the end of a line:

### Example

SELECT \* FROM Customers -- WHERE City='Berlin';

**-- COALESCE function replace null values with specified value**

SELECT stduent\_id, absents, presents, (COALESCE(absents,0) + COALESCE(presents, 0)) as "Total Working Days" from attendance;

## Multi-line Comments

Multi-line comments start with /\* and end with \*/.

Any text between /\* and \*/ will be ignored.

The following example uses a multi-line comment as an explanation:

/\*Select all the columns  
of all the records  
in the Customers table:\*/  
SELECT \* FROM Customers;

-- Example of Multiline / block comment

SELECT stduent\_id, absents, presents **/\*,(COALESCE(absents,0) + COALESCE(presents, 0)) as "Total Working Days" \*/** from attendance;

# MySQL CREATE DATABASE Statement

## The MySQL CREATE DATABASE Statement

The CREATE DATABASE statement is used to create a new SQL database.

### Syntax

CREATE DATABASE databasename;

create database testdb

**Tip:** Make sure you have admin privilege before creating any database. Once a database is created, you can check it in the list of databases with the following SQL command: SHOW DATABASES;

# MySQL DROP DATABASE Statement

## The MySQL DROP DATABASE Statement

The DROP DATABASE statement is used to drop an existing SQL database.

### Syntax

DROP DATABASE databasename;

DROP database testdb;

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

**Tip:** Make sure you have admin privilege before dropping any database. Once a database is dropped, you can check it in the list of databases with the following SQL command: SHOW DATABASES;

show DATABASES

# MySQL CREATE TABLE Statement

## The MySQL CREATE TABLE Statement

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

### Syntax

CREATE TABLE table\_name (  
    column1 datatype,  
    column2 datatype,  
    column3 datatype,  
   ....  
);

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

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

CREATE TABLE users (id int AUTO\_INCREMENT PRIMARY key, fname varchar(20), lname varchar(20), email varchar(128), phone varchar(15), gender varchar(10), city varchar(20), state varchar(20), country varchar(20))

## Create Table Using Another Table

A copy of an existing table can also be created using CREATE TABLE.

The new table gets the same column definitions. All columns or specific columns can be selected.

If you create a new table using an existing table, the new table will be filled with the existing values from the old table.

### Syntax

CREATE TABLE new\_table\_name AS  
    SELECT column1, column2,...  
    FROM existing\_table\_name  
    WHERE ....;

CREATE TABLE students\_backup\_1 as SELECT \* from students

CREATE TABLE students\_backup\_2 as SELECT id, fname, lname, city from students

# MySQL DROP TABLE Statement

## The MySQL DROP TABLE Statement

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

### Syntax

DROP TABLE table\_name;

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

## MySQL DROP TABLE Example

The following SQL statement drops the existing table "Shippers":

### Example

DROP TABLE Shippers;

drop table students\_backup\_2

# MySQL DELETE Statement

## The MySQL DELETE Statement

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

### DELETE Syntax

DELETE FROM table\_name WHERE condition;

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

DELETE from students\_1 WHERE city = 'Rajkot';

DELETE FROM students\_1 WHERE id = 1

DELETE FROM students\_1

INSERT INTO `students\_1` (`id`, `fname`, `lname`, `city`, `gender`, `dob`, `email`, `phone`, `created\_at`, `updated\_at`) VALUES (NULL, 'Devarshi', 'Mer', 'rajkot', 'male', '2007-01-12', 'demo@gmail.com', '9998889990', current\_timestamp(), current\_timestamp());

Auto increment id will be continue from last record before delete all the data from table

## MySQL TRUNCATE TABLE

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

### Syntax

TRUNCATE TABLE table\_name;

TRUNCATE TABLE students\_1

INSERT INTO `students\_1` (`id`, `fname`, `lname`, `city`, `gender`, `dob`, `email`, `phone`, `created\_at`, `updated\_at`) VALUES (NULL, 'Devarshi', 'Mer', 'rajkot', 'male', '2007-01-12', 'demo@gmail.com', '9998889990', current\_timestamp(), current\_timestamp());

# MySQL ALTER TABLE Statement

## MySQL ALTER TABLE Statement

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

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

## ALTER TABLE - ADD Column

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

ALTER TABLE table\_name  
ADD column\_name datatype;

ALTER TABLE users add COLUMN userpassword varchar(64)

## ALTER TABLE - DROP COLUMN

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

ALTER TABLE table\_name  
DROP COLUMN column\_name;

ALTER TABLE users drop column userpassword

ALTER TABLE users add column userpassword varchar(64) after email;

## ALTER TABLE - MODIFY COLUMN

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

ALTER TABLE table\_name  
MODIFY COLUMN column\_name datatype;

ALTER TABLE users MODIFY COLUMN fname varchar(32)

ALTER TABLE users add COLUMN dob date

ALTER TABLE users CHANGE dob date\_of\_Birth date

## DROP COLUMN Example

Next, we want to delete the column named "DateOfBirth" in the "Persons" table.

We use the following SQL statement:

### Example

ALTER TABLE Persons  
DROP COLUMN DateOfBirth;

ALTER TABLE users DROP COLUMN date\_of\_Birth

# MySQL Constraints

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

## Create Constraints

Constraints can be specified when the table is created with the CREATE TABLE statement, or after the table is created with the ALTER TABLE statement.

### Syntax

CREATE TABLE table\_name (  
    column1 datatype *constraint*,  
    column2 datatype *constraint*,  
    column3 datatype *constraint*,  
    ....  
);

## MySQL Constraints

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

Constraints are used to limit the type of data that can go into a table. This ensures the accuracy and reliability of the data in the table. If there is any violation between the constraint and the data action, the action is aborted.

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

The following constraints are commonly used in SQL:

* [NOT NULL](https://www.w3schools.com/MySQL/mysql_notnull.asp) - Ensures that a column cannot have a NULL value
* [UNIQUE](https://www.w3schools.com/MySQL/mysql_unique.asp) - Ensures that all values in a column are different
* [PRIMARY KEY](https://www.w3schools.com/MySQL/mysql_primarykey.asp) - A combination of a NOT NULL and UNIQUE. Uniquely identifies each row in a table
* [FOREIGN KEY](https://www.w3schools.com/MySQL/mysql_foreignkey.asp) - Prevents actions that would destroy links between tables
* [CHECK](https://www.w3schools.com/MySQL/mysql_check.asp) - Ensures that the values in a column satisfies a specific condition
* [DEFAULT](https://www.w3schools.com/MySQL/mysql_default.asp) - Sets a default value for a column if no value is specified
* [CREATE INDEX](https://www.w3schools.com/MySQL/mysql_create_index.asp) - Used to create and retrieve data from the database very quickly