Software requirements

Download Xampp from https://www.apachefriends.org/download.html

Download latest version of php 8.2.12 + (Feb 2024)

How to open mysql server

Go to xampp control panel and start apache server and mysql server

Then go to browser and enter URL http://localhost/phpmyadmin/

From home page of mysql server select databases section and create new database.

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 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

The columns in the "Customers" table above are: CustomerID, CustomerName, ContactName, Address, City, PostalCode and Country.

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:

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

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

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

What is SQL? (Structured Query Language)

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:

```
SELECT * FROM Customers;
```

Keep in Mind That...

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

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.

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

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 roll, fname, lname, city, email 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 * Example

The following SQL statement selects ALL the columns from the "Customers" table:

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 DISTINCT fname 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 city from students

Select count(distinct city) from students

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.!

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 * from students where city = 'rajkot'

Select * from students where roll > 5

Select * from students where not roll > 5;

Select * from students where roll != 5;
```

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 roll = 1

SELECT * FROM `students` WHERE roll = 1 and fname = 'udit';

SELECT * FROM `students` WHERE roll = 1 or roll = 2;

SELECT * FROM `students` WHERE roll = 1 or city = 'rajkot';

SELECT * FROM `students` WHERE roll = 1 and  city = 'rajkot' or city = 'surat';

SELECT * from students WHERE not city = 'rajkot'
```

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 ORDER by fname

SELECT * from students ORDER by fname desc;

SELECT * FROM students ORDER by fname, city

SELECT * FROM students ORDER by fname, city desc

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, email, gender, dateofbirth, phone) values ("Rachit", "Chauhan", "Baroda", "rachit@gmail.com", "male", "2002-02-02", "9900009900")

INSERT into students values ("Rachit", "Chauhan", "Baroda", "rachit@gmail.com", "male", "2002-02-02", "9900009900")

Error : `Column count doesn't match value count at row 1`

Insert Data Only in Specified Columns

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

INSERT into students (fname, lname, city, email, gender) values ("Rachit", "Chauhan", "Baroda", "rachit@gmail.com", "male");

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 phone = '';

SELECT * FROM `students` WHERE dateofbirth = 'NULL'; // no data

SELECT * FROM `students` WHERE dateofbirth is NULL;

SELECT * FROM `students` WHERE dateofbirth is not NULL;
```

IS NULL Syntax

```
SELECT column_names
FROM table_name
WHERE column_name IS NULL;
```

IS NOT NULL Syntax

```
SELECT column_names
FROM table_name
WHERE column_name IS NOT NULL;
```

The IS NULL Operator

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

Tip: Always use IS NULL to look for NULL values.

The IS NOT NULL Operator

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

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 city = 'Gandhinagar' //always use where while update data

update students set fname = 'Yagnik', lname = 'Yadav', city = 'Bhavanagar' WHERE roll = 3

update students set fname = 'Yagnik', lname = 'Yadav', city = 'Bhavanagar' WHERE roll > 3 and roll < 6;

UPDATE students set city = 'Rajkot' WHERE roll >= 5

UPDATE Multiple Records

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

Update Warning!

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

UPDATE students set fname = 'tushar', lname = 'kadam' WHERE roll = 4

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 column_name(s) FROM table_name WHERE condition LIMIT number;
```

```
SELECT * FROM `students`
```

```
SELECT * FROM `students` Limit 5
```

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)":

```
SELECT * FROM `students` Limit 5 OFFSET 5;
```

ADD a WHERE CLAUSE

```
SELECT * FROM `students` where city = ‘rajkot’ Limit 5
```

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(roll) FROM students;
```

```
SELECT max(roll) FROM students
```

```
SELECT max(fees) FROM students
```

```
SELECT min(fees) FROM students;
```

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;
```

```
SELECT COUNT(fees) FROM students
```

```
SELECT COUNT(fees) FROM students WHERE fees > 10000;
```

```
SELECT sum(fees) FROM students WHERE fees > 10000;
```

```
SELECT count(fees), sum(fees) FROM students WHERE fees > 10000;
```

```
SELECT count(fees), sum(fees), avg(fees) FROM students
```

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;
```

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!

SQL DELETE Example

DELETE FROM students WHERE roll = 5

DELETE FROM students WHERE city = 'rajkot'

Delete All Records

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

DELETE FROM students

INSERT into students (fname, lname, city, email, gender, dateofbirth, phone, fees) values ("Rachit", "Chauhan", "Baroda", "rachit@gmail.com", "male", "2002-02-02", "9900009900", 15000);

- Add multiple rows and check for roll number

It is possible to delete all the data from table and reset complete structure of the table with truncate clause

TRUNCATE TABLE students

INSERT into students (fname, lname, city, email, gender, dateofbirth, phone, fees) values ("Rachit", "Chauhan", "Baroda", "rachit@gmail.com", "male", "2002-02-02", "9900009900", 15000);

- Add multiple rows and check for roll number // started from 1

Insert some data in table

INSERT INTO `students` (`roll`, `fname`, `lname`, `city`, `email`, `gender`, `dateofbirth`, `phone`, `fees`, `admissiondate`) VALUES (NULL, 'udit', 'ghetiya', 'Rajula', 'udit@gmail.com', 'male', '2004-02-11', '998899889900', '18000', current_timestamp()),(NULL, 'Gaurang', 'Pandya', 'Baroda', 'gaurang@gmail.com', 'male', '2004-02-11', '998899889900', '15000', current_timestamp()),(NULL, 'yograjsinh', 'Rana', 'Junagadh', 'yorajsinh@gmail.com', 'male', '2004-02-11', '998899889900', '22000', current_timestamp()),(NULL, 'yadav', 'yagnik', 'Bhavanagar', 'yagnik@gmail.com', 'male', '2004-02-11', '998899889900', '19000', current_timestamp()),(NULL, 'Rachit', 'Chauhan', 'Jamnagar', 'rachit@gmail.com', 'male', '2004-02-11', '998899889900', '12000', current_timestamp()),(NULL, 'adarsh', 'chavda', 'amreli', 'adarsh@gmail.com', 'male', '2004-02-11', '998899889900', '12000', current_timestamp()),(NULL, 'rohan', 'dasadiya', 'Bhuj', 'rohan@gmail.com', 'male', '2004-02-11', '998899889900', '13000', current_timestamp()),(NULL, 'Tushar', 'Kadam', 'Morbi', 'Tushar@gmail.com', 'male', '2004-02-11', '998899889900', '19000', current_timestamp()),(NULL, 'Yash', 'Vaghela', 'Vadodara', 'yash@gmail.com', 'male', '2004-02-11', '998899889900', '22000', current_timestamp()),(NULL, 'Jayrajsinh', 'Parmar', 'Limdi', 'jayrajsinh@gmail.com', 'male', '2004-02-11', '998899889900', '24000', current_timestamp());

The 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 'a%'

SELECT * FROM students WHERE fname like '%t';

SELECT * FROM students WHERE fname like '%i%';

SELECT * FROM students WHERE fname like '_a%';

SELECT * FROM students WHERE fname like 'a_%';

SELECT * FROM students WHERE fname like 'r__%';

SELECT * FROM students WHERE fname like 'r%t';

SELECT * FROM students WHERE fname not like 'r%t';
```

MySQL Wildcard Characters

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

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

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 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 = 'baroda' or city = 'morbi';
SELECT * FROM students WHERE city in ('rajkot', 'baroda', 'amreli', 'bhuj', 'junagadh')

SELECT *column_name(s)* FROM *table_name* WHERE *column_name* IN (*SELECT STATEMENT*);

SELECT * FROM students WHERE roll in (SELECT roll from students WHERE not city = 'rajkot');

Outer query (sub query),

First Execute sub query and get result from database, place this result data between in () and execute outer query,

SELECT * from students WHERE **roll** in (SELECT **roll** FROM marks WHERE result = 'pass');

SELECT * from students WHERE roll not in (SELECT roll FROM marks WHERE result = 'pass');

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 fees BETWEEN 5000 and 15000

SELECT * FROM students WHERE fees not BETWEEN 5000 and 15000;

SELECT * FROM students WHERE fname BETWEEN 'adarsh' and 'tushar'

SELECT * FROM students WHERE dateofbirth BETWEEN '2000-01-01' and '2005-12-31'
```

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 FirstName FROM students

SELECT fname as "First Name" FROM students;

SELECT roll as "Roll Number", fname as "First Name", lname as "Last Name" FROM students;

SELECT concat_ws(" - ", roll, fname, lname, city) as "Student Data" FROM students

---

Without join and alias

SELECT students.roll, students.fname, students.lname, students.city, students.email, students.gender, students.dateofbirth, students.phone, students.fees, marks.total, marks.result FROM students, marks WHERE students.fname = 'bhavdeep' and students.roll = marks.roll;

With alias

SELECT s.roll, s.fname, s.lname, s.city, s.email, s.gender, s.dateofbirth, s.phone, s.fees, m.total, m.result FROM students as s, marks as m WHERE s.fname = 'bhavdeep' and s.roll = m.roll;

SELECT CURRENT_TIMESTAMP

SELECT CURRENT_TIMESTAMP as "Today is :";

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

MySQL Joins

MySQL Joining Tables

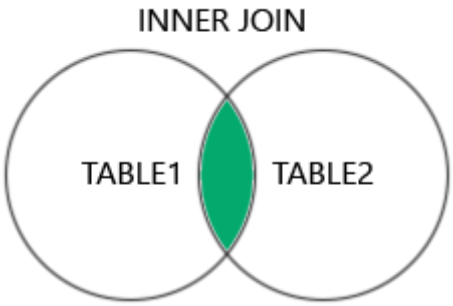
A `JOIN` clause is used to combine rows from two or more tables, based on a related column between them.

SELECT students.roll, students.fname, students.lname, students.city, students.email, students.gender, students.dateofbirth, students.phone, students.course, students.course, students.admissiondate, marks.total, marks.result from students inner JOIN marks on students.roll = marks.roll

SELECT s.roll, s.fname, s.lname, s.city, s.email, s.gender, s.dateofbirth, s.phone, s.course, s.course, s.admissiondate, m.total, m.result from students s inner JOIN marks m on s.roll = m.roll;

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 *table2* ON *table1.column_name* = *table2.column_name*;

SELECT s.roll, s.fname, s.lname, s.city, s.email, s.gender, s.dateofbirth, s.phone, s.course, s.course, s.admissiondate, m.total, m.result, a.absents, a.presents from students s inner JOIN marks m on s.roll = m.roll INNER join attendance a on s.roll = a.roll;

SELECT s.*, m.total, m.result, a.absents, a.presents from students s inner JOIN marks m on s.roll = m.roll INNER join attendance a on s.roll = a.roll;

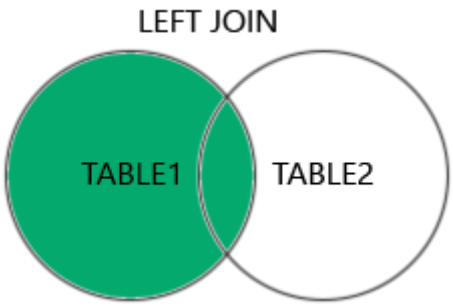
SELECT s.*, m.*, a.absents, a.presents from students s inner JOIN marks m on s.roll = m.roll INNER join attendance a on s.roll = a.roll;

/// never do this

SELECT s.*, m.*, a.* from students s inner JOIN marks m on s.roll = m.roll INNER join attendance a on s.roll = a.roll;

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 *table2* ON *table1.column_name* = *table2.column_name*;

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

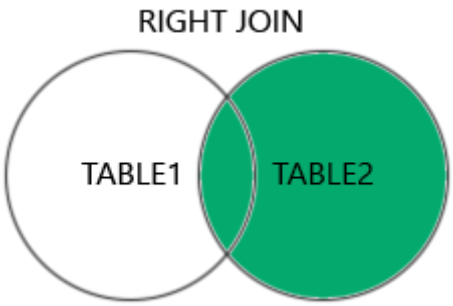
select s.roll, s.fname, s.lname, s.city, s.email, s.gender, s.dateofbirth, s.phone, s.fees, s.course, s.admissiondate, m.total, m.result from students s left join marks m on s.roll = m.roll;

grab all the data from left table (students) if there is no data in right table (marks) then sql show NULL for empty values

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

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

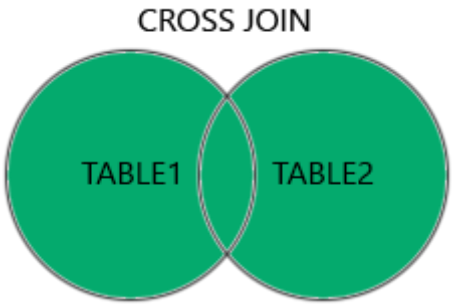
SELECT *column_name(s)* FROM *table1* RIGHT JOIN *table2* ON *table1.column_name* = *table2.column_name*;

select s.roll, s.fname, s.lname, s.city, s.email, s.gender, s.dateofbirth, s.phone, s.fees, s.course, s.admissiondate, m.total, m.result from students s right join marks m on s.roll = m.roll;

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

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 * from students CROSS join marks;
```

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 * from students CROSS join marks WHERE students.roll = marks.roll;
```

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*;

SELECT t1.fname, t1.lname from students t1, students t2 WHERE t1.roll != t2.roll and t1.city = t2.city;

SELECT t1.roll, t1.fname, t1.lname, t1.city from students t1, students t2 WHERE t1.roll != t2.roll and t1.city = t2.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

UNION Syntax

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

SELECT * from students

UNION

SELECT * FROM students1

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*;

SELECT * from students

UNION ALL

SELECT * FROM students1;

SELECT * from students

UNION ALL

SELECT * FROM students1 ORDER by city;

SELECT * from students where city = 'rajkot'

UNION ALL

SELECT * FROM students1 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.

```
SELECT city, count(city) FROM students GROUP by (city)
```

GROUP BY With JOIN Example

```
SELECT students.roll, COUNT(marks.marksid), sum(marks.total) from students INNER join marks on students.roll = marks.roll GROUP by (roll);
```

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 condition
ORDER BY column_name(s);
```

```
SELECT city, count(city) from students GROUP by (city) having count(city) = 1;
```

```
SELECT city, count(city) from students GROUP by (city) having count(city) > 1;
```

```
SELECT students.roll, COUNT(marks.marksid), sum(marks.total) from students INNER join marks on students.roll = marks.roll GROUP by (roll) HAVING sum(marks.total) >= 400;
```

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 * from students WHERE EXISTS (SELECT roll FROM marks WHERE result = 'pass');
```

```
SELECT * from students WHERE EXISTS (SELECT roll FROM marks WHERE result = 'ATKT');
```

```
SELECT students.roll, students.fname, students.lname from students where EXISTS (SELECT roll FROM marks WHERE students.roll = marks.roll and marks.result = 'pass')
```

```
SELECT students.roll, students.fname, students.lname from students where not EXISTS (SELECT roll FROM marks WHERE students.roll = marks.roll 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.

SELECT *column_name(s)* FROM *table_name* WHERE *column_name operator* ANY (SELECT *column_name* FROM *table_name* WHERE *condition*);

SELECT * FROM students WHERE roll = any (SELECT roll FROM marks WHERE result = 'pass')