**SQL Aliases**

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

### 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;

## SQL JOIN

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

Let's look at a selection from the "Orders" table:

|  |  |  |
| --- | --- | --- |
| OrderID | CustomerID | OrderDate |
| 10308 | 2 | 1996-09-18 |
| 10309 | 37 | 1996-09-19 |
| 10310 | 77 | 1996-09-20 |

Then, look at a selection from the "Customers" table:

|  |  |  |  |
| --- | --- | --- | --- |
| CustomerID | CustomerName | ContactName | Country |
| 1 | Alfreds Futterkiste | Maria Anders | Germany |
| 2 | Ana Trujillo Emparedados y helados | Ana Trujillo | Mexico |
| 3 | Antonio Moreno Taquería | Antonio Moreno | Mexico |

Notice that the "CustomerID" column in the "Orders" table refers to the "CustomerID" in the "Customers" table. The relationship between the two tables above is the "CustomerID" column.

Then, we can create the following SQL statement (that contains an INNER JOIN), that selects records that have matching values in both tables:

### Example

SELECT Orders.OrderID, Customers.CustomerName, Orders.OrderDate  
FROM Orders  
INNER JOIN Customers ON Orders.CustomerID=Customers.CustomerID;

and it will produce something like this:

|  |  |  |
| --- | --- | --- |
| OrderID | CustomerName | OrderDate |
| 10308 | Ana Trujillo Emparedados y helados | 9/18/1996 |
| 10365 | Antonio Moreno Taquería | 11/27/1996 |
| 10383 | Around the Horn | 12/16/1996 |
| 10355 | Around the Horn | 11/15/1996 |
| 10278 | Berglunds snabbköp | 8/12/1996 |

## 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 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;



## Demo Database

In this tutorial we will use the well-known Northwind sample database.

Below is a selection from the "Orders" table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OrderID | CustomerID | EmployeeID | OrderDate | ShipperID |
| 10308 | 2 | 7 | 1996-09-18 | 3 |
| 10309 | 37 | 3 | 1996-09-19 | 1 |
| 10310 | 77 | 8 | 1996-09-20 | 2 |

And a selection from the "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 |

## SQL INNER JOIN Example

The following SQL statement selects all orders with customer information:

### Example

SELECT Orders.OrderID, Customers.CustomerName  
FROM Orders  
INNER JOIN Customers ON Orders.CustomerID = Customers.CustomerID;

**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

The following SQL statement selects all orders with customer and shipper information:

### Example

SELECT Orders.OrderID, Customers.CustomerName, Shippers.ShipperName  
FROM ((Orders  
INNER JOIN Customers ON Orders.CustomerID = Customers.CustomerID)  
INNER JOIN Shippers ON Orders.ShipperID = Shippers.ShipperID);

## SQL LEFT JOIN Keyword

The LEFT JOIN keyword returns all records from the left table (table1), and the matched records from the right table (table2). The result is NULL from the right side, if there is no match.

### LEFT JOIN Syntax

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

**Note:** In some databases LEFT JOIN is called LEFT OUTER JOIN.



## Demo Database

In this tutorial we will use the well-known Northwind sample database.

Below is a selection from the "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 |

And a selection from the "Orders" table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OrderID | CustomerID | EmployeeID | OrderDate | ShipperID |
| 10308 | 2 | 7 | 1996-09-18 | 3 |
| 10309 | 37 | 3 | 1996-09-19 | 1 |
| 10310 | 77 | 8 | 1996-09-20 | 2 |

## SQL LEFT JOIN Example

The following SQL statement will select all customers, and any orders they might have:

### Example

SELECT Customers.CustomerName, Orders.OrderID  
FROM Customers  
LEFT JOIN Orders ON Customers.CustomerID = Orders.CustomerID  
ORDER BY Customers.CustomerName;

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

## SQL RIGHT JOIN Keyword

The RIGHT JOIN keyword returns all records from the right table (table2), and the matched records from the left table (table1). The result is NULL from the left side, when there is no match.

### RIGHT JOIN Syntax

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

**Note:** In some databases RIGHT JOIN is called RIGHT OUTER JOIN.



## Demo Database

In this tutorial we will use the well-known Northwind sample database.

Below is a selection from the "Orders" table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OrderID | CustomerID | EmployeeID | OrderDate | ShipperID |
| 10308 | 2 | 7 | 1996-09-18 | 3 |
| 10309 | 37 | 3 | 1996-09-19 | 1 |
| 10310 | 77 | 8 | 1996-09-20 | 2 |

And a selection from the "Employees" table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| EmployeeID | LastName | FirstName | BirthDate | Photo |
| 1 | Davolio | Nancy | 12/8/1968 | EmpID1.pic |
| 2 | Fuller | Andrew | 2/19/1952 | EmpID2.pic |
| 3 | Leverling | Janet | 8/30/1963 | EmpID3.pic |

## SQL RIGHT JOIN Example

The following SQL statement will return all employees, and any orders they might have placed:

### Example

SELECT Orders.OrderID, Employees.LastName, Employees.FirstName  
FROM Orders  
RIGHT JOIN Employees ON Orders.EmployeeID = Employees.EmployeeID  
ORDER BY Orders.OrderID;

**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 FULL OUTER JOIN Keyword

The FULL OUTER JOIN keyword returns all records when there is a match in left (table1) or right (table2) table records.

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

**Tip:** FULL OUTER JOIN and FULL JOIN are the same.

### FULL OUTER JOIN Syntax

SELECT column\_name(s)  
FROM table1  
FULL OUTER JOIN table2ON table1.column\_name = table2.column\_nameWHERE condition;



## Demo Database

In this tutorial we will use the well-known Northwind sample database.

Below is a selection from the "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 |

And a selection from the "Orders" table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OrderID | CustomerID | EmployeeID | OrderDate | ShipperID |
| 10308 | 2 | 7 | 1996-09-18 | 3 |
| 10309 | 37 | 3 | 1996-09-19 | 1 |
| 10310 | 77 | 8 | 1996-09-20 | 2 |

## SQL FULL OUTER JOIN Example

The following SQL statement selects all customers, and all orders:

SELECT Customers.CustomerName, Orders.OrderID  
FROM Customers  
FULL OUTER JOIN Orders ON Customers.CustomerID=Orders.CustomerID  
ORDER BY Customers.CustomerName;

A selection from the result set may look like this:

|  |  |
| --- | --- |
| CustomerName | OrderID |
| Alfreds Futterkiste |  |
| Ana Trujillo Emparedados y helados | 10308 |
| Antonio Moreno Taquería | 10365 |
|  | 10382 |
|  | 10351 |

**Note:** The FULL OUTER 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.

## SQL 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.

## Demo Database

In this tutorial we will use the well-known Northwind sample database.

Below is a selection from the "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 |

## SQL Self JOIN Example

The following SQL statement matches customers that are from the same city:

### Example

SELECT A.CustomerName AS CustomerName1, B.CustomerName AS CustomerName2, A.City  
FROM Customers A, Customers B  
WHERE A.CustomerID <> B.CustomerID  
AND A.City = B.City   
ORDER BY A.City;

## he SQL UNION Operator

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

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

### UNION Syntax

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

### 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 in the UNION.

## Demo Database

In this tutorial we will use the well-known Northwind sample database.

Below is a selection from the "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 |

And a selection from the "Suppliers" table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SupplierID | SupplierName | ContactName | Address | City | PostalCode | Country |
| 1 | Exotic Liquid | Charlotte Cooper | 49 Gilbert St. | London | EC1 4SD | UK |
| 2 | New Orleans Cajun Delights | Shelley Burke | P.O. Box 78934 | New Orleans | 70117 | USA |
| 3 | Grandma Kelly's Homestead | Regina Murphy | 707 Oxford Rd. | Ann Arbor | 48104 | USA |

## SQL UNION Example

The following SQL statement returns the cities (only distinct values) from both the "Customers" and the "Suppliers" table:

### Example

SELECT City FROM Customers  
UNION  
SELECT City FROM Suppliers  
ORDER BY City;

**Note:** If some customers or suppliers have the same city, each city will only be listed once, because UNION selects only distinct values. Use UNION ALL to also select duplicate values!

## SQL UNION ALL Example

The following SQL statement returns the cities (duplicate values also) from both the "Customers" and the "Suppliers" table:

### Example

SELECT City FROM Customers  
UNION ALL  
SELECT City FROM Suppliers  
ORDER BY City;

## SQL UNION With WHERE

The following SQL statement returns the German cities (only distinct values) from both the "Customers" and the "Suppliers" table:

### Example

SELECT City, Country FROM Customers  
WHERE Country='Germany'  
UNION  
SELECT City, Country FROM Suppliers  
WHERE Country='Germany'  
ORDER BY City;

## SQL UNION ALL With WHERE

The following SQL statement returns the German cities (duplicate values also) from both the "Customers" and the "Suppliers" table:

### Example

SELECT City, Country FROM Customers  
WHERE Country='Germany'  
UNION ALL  
SELECT City, Country FROM Suppliers  
WHERE Country='Germany'  
ORDER BY City;

## Another UNION Example

The following SQL statement lists all customers and suppliers:

### Example

SELECT 'Customer' As Type, ContactName, City, Country  
FROM Customers  
UNION  
SELECT 'Supplier', ContactName, City, Country  
FROM Suppliers;

Notice the "AS Type" above - it is an alias. [SQL Aliases](https://www.w3schools.com/sql/sql_alias.asp) are used to give a table or a column a temporary name. An alias only exists for the duration of the query. So, here we have created a temporary column named "Type", that list whether the contact person is a "Customer" or a "Supplier".

## The SQL 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);

## Demo Database

Below is a selection from the "Customers" table in the Northwind sample 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 |
| 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 |

## SQL GROUP BY Examples

The following SQL statement lists the number of customers in each country:

### Example

SELECT COUNT(CustomerID), Country  
FROM Customers  
GROUP BY Country;

The following SQL statement lists the number of customers in each country, sorted high to low:

### Example

SELECT COUNT(CustomerID), Country  
FROM Customers  
GROUP BY Country  
ORDER BY COUNT(CustomerID) DESC;

## Demo Database

Below is a selection from the "Orders" table in the Northwind sample database:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| OrderID | CustomerID | EmployeeID | OrderDate | ShipperID |
| 10248 | 90 | 5 | 1996-07-04 | 3 |
| 10249 | 81 | 6 | 1996-07-05 | 1 |
| 10250 | 34 | 4 | 1996-07-08 | 2 |

And a selection from the "Shippers" table:

|  |  |
| --- | --- |
| ShipperID | ShipperName |
| 1 | Speedy Express |
| 2 | United Package |
| 3 | Federal Shipping |

## GROUP BY With JOIN Example

The following SQL statement lists the number of orders sent by each shipper:

### Example

SELECT Shippers.

ShipperName, COUNT(Orders.OrderID) AS NumberOfOrders FROM Orders  
LEFT JOIN Shippers ON Orders.ShipperID = Shippers.ShipperID  
GROUP BY ShipperName;