Contents

SQL TABLE

SQL SELECT

The SQL 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;
```

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;
```

SQL SELECT DISTINCT

The SQL 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 Examples

The following SQL statement selects only the DISTINCT values from the "Country" column in the "Customers" table:

Example

```
SELECT DISTINCT Country FROM Customers;
```

Try it Yourself »

SQL WHERE

The SQL WHERE Clause

The WHERE clause is used to filter records.

The WHERE clause is used to extract only those records that fulfill a specified condition.

WHERE Syntax

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

WHERE Clause Example

The following SQL statement selects all the customers from the country "Mexico", in the "Customers" table:

Example

```
SELECT * FROM Customers
WHERE Country='Mexico';
```

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:

Example

```
SELECT * FROM Customers
WHERE CustomerID=1;
```

Operators in The WHERE Clause

The following operators can be used in the WHERE clause:

Operator	Description
=	Equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
<>	Not equal. **Note:** In some versions of SQL this operator may be written as !=
BETWEEN	Between a certain range
LIKE	Search for a pattern
IN	To specify multiple possible values for a column

SQL AND, OR, NOT

The SQL 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;
```

Combining AND, OR and NOT

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

The following SQL statement selects all fields from "Customers" where country is "Germany" AND city must be "Berlin" OR "München" (use parenthesis to form complex expressions):

Example

```
SELECT * FROM Customers
WHERE Country='Germany' AND (City='Berlin' OR City='München');
```

The following SQL statement selects all fields from "Customers" where country is NOT "Germany" and NOT "USA":

Example

```
SELECT * FROM Customers
WHERE NOT Country='Germany' AND NOT Country='USA';
```

SQL ORDER BY

The SQL 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;
```

ORDER BY Several Columns Example

The following SQL statement selects all customers from the "Customers" table, sorted by the "Country" and the "CustomerName" column. This means that it orders by Country, but if some rows have the same Country, it orders them by CustomerName:

Example

```
SELECT * FROM Customers
ORDER BY Country, CustomerName;
```

ORDER BY Several Columns Example 2

The following SQL statement selects all customers from the "Customers" table, sorted ascending by the "Country" and descending by the "CustomerName" column:

Example

```
SELECT * FROM Customers
ORDER BY Country ASC, CustomerName DESC;
```

The SQL 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.

The first way specifies both the column names and the values to be inserted:

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

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. The INSERT INTO syntax would be as follows:

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

Example

```
INSERT INTO Customers (CustomerName, ContactName, Address, City, PostalCode, Country)
VALUES ('Cardinal', 'Tom B. Erichsen', 'Skagen 21', 'Stavanger', '4006', 'Norway');
```

Insert Data Only in Specified Columns

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

The following SQL statement will insert a new record, but only insert data in the "CustomerName", "City", and "Country" columns (CustomerID will be updated automatically):

Example

```
INSERT INTO Customers (CustomerName, City, Country)
VALUES ('Cardinal', 'Stavanger', 'Norway');
```

SQL NULL VALUES

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.

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 SQL 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;
```

Example

```
UPDATE Customers
SET ContactName = 'Alfred Schmidt', City= 'Frankfurt'
WHERE CustomerID = 1;
```

Update Warning!

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

SQL DELETE

The SQL DELETE Statement

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

DELETE Syntax

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

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 table_name;
```

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

Example

```
DELETE FROM Customers;
```

SQL SELECT TOP

SQL Server / MS Access Syntax:

```
SELECT TOP number|percent column_name(s)
FROM table_name
WHERE condition;
```

MySQL Syntax:

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

Oracle Syntax:

```
SELECT column_name(s)
FROM table_name
WHERE ROWNUM <= number;
```

Example

```
SELECT TOP 3 * FROM Customers;
```

The following SQL statement shows the equivalent example using the LIMIT clause (for MySQL):

Example

```
SELECT * FROM Customers
LIMIT 3;
```

SQL TOP PERCENT Example

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

Example

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

Il est possible d'ajouter une clause WHERE

The SQL 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;
```

MIN() Example

The following SQL statement finds the price of the cheapest product:

Example

```
SELECT MIN(Price) AS SmallestPrice
FROM Products;
```

MAX() Example

The following SQL statement finds the price of the most expensive product:

Example

```
SELECT MAX(Price) AS LargestPrice
FROM Products;
```

SQL COUNT, AVG, SUM

The SQL COUNT(), AVG() and SUM() Functions

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

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

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

COUNT() Syntax

```
SELECT COUNT(column_name)
FROM table_name
WHERE condition;
```

AVG() Syntax

```
SELECT AVG(column_name)
FROM table_name
WHERE condition;
```

SUM() Syntax

```
SELECT SUM(column_name)
FROM table_name
WHERE condition;
```

COUNT() Example

The following SQL statement finds the number of products:

Example

```
SELECT COUNT(ProductID)
FROM Products;
```

AVG() Example

The following SQL statement finds the average price of all products:

Example

```
SELECT AVG(Price)
FROM Products;
```

SUM() Example

The following SQL statement finds the sum of the "Quantity" fields in the "OrderDetails" table:

Example

```
SELECT SUM(Quantity)
FROM OrderDetails;
```

Note: NULL values are ignored.

(Pour tous les cas)

SQL LIKE

The SQL 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 represents a single character

Note: MS Access uses an asterisk (*) instead of the percent sign (%), and a question mark (?) instead of the underscore (_).

LIKE Syntax

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

The following SQL statement selects all customers with a CustomerName starting with "a":

Example

```
SELECT * FROM Customers
WHERE CustomerName LIKE 'a%';
```

SQL WILDCARDS (JOKER)

SQL Wildcard Characters

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

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

Wildcard Characters in MS Access

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
[]	Represents any single character within the brackets	h[oa]t finds hot and hat, but not hit
!	Represents any character not in the brackets	h[!oa]t finds hit, but not hot and hat
-	Represents a range of characters	c[a-b]t finds cat and cbt
#	Represents any single numeric character	2#5 finds 205, 215, 225, 235, 245, 255, 265, 275, 285, and 295

Wildcard Characters in SQL Server

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
[]	Represents any single character within the brackets	h[oa]t finds hot and hat, but not hit
^	Represents any character not in the brackets	h[^oa]t finds hit, but not hot and hat
-	Represents a range of characters	c[a-b]t finds cat and cbt

All the wildcards can also be used in combinations!

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

LIKE Operator	Description
WHERE CustomerName LIKE 'a%'	Finds any values that starts with "a"
WHERE CustomerName LIKE '%a'	Finds any values that ends 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 starts with "a" and are at least 3 characters in length
WHERE ContactName LIKE 'a%o'	Finds any values that starts with "a" and ends with "o"

The following SQL statement selects all customers with a City starting with "b", "s", or "p":

Example

```
SELECT * FROM Customers
WHERE City LIKE '[bsp]%';
```

SQL IN

The SQL 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, ...);
```

or:

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

IN Operator Examples

The following SQL statement selects all customers that are located in "Germany", "France" or "UK":

Example

```
SELECT * FROM Customers
WHERE Country IN ('Germany', 'France', 'UK');
```

Try it Yourself »

The following SQL statement selects all customers that are NOT located in "Germany", "France" or "UK":

Example

```
SELECT * FROM Customers
WHERE Country NOT IN ('Germany', 'France', 'UK');
```

The following SQL statement selects all customers that are from the same countries as the suppliers:

Example

```
SELECT * FROM Customers
WHERE Country IN (SELECT Country FROM Suppliers);
```

SQL BETWEEN

The SQL 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;
```

BETWEEN Example

The following SQL statement selects all products with a price BETWEEN 10 and 20:

Example

```
SELECT * FROM Products
WHERE Price BETWEEN 10 AND 20;
```

NOT BETWEEN Example

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

Example

```
SELECT * FROM Products
WHERE Price NOT BETWEEN 10 AND 20;
```

BETWEEN with IN Example

The following SQL statement selects all products with a price BETWEEN 10 and 20. In addition; do not show products with a CategoryID of 1,2, or 3:

Example

```
SELECT * FROM Products
WHERE Price BETWEEN 10 AND 20
AND CategoryID NOT IN (1,2,3);
```

BETWEEN Dates Example

The following SQL statement selects all orders with an OrderDate BETWEEN '01-July-1996' and '31-July-1996':

Example

```
SELECT * FROM Orders
WHERE OrderDate BETWEEN #01/07/1996# AND #31/07/1996#;
```

SQL ALIASES

SQL Aliases

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

Aliases are often used to make column names more readable.

An alias only exists for the duration of the query.

Alias Column Syntax

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

Alias for Columns Examples

The following SQL statement creates two aliases, one for the CustomerID column and one for the CustomerName column:

Example

```
SELECT CustomerID AS ID, CustomerName AS Customer
FROM Customers;
```

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

Example

```
SELECT CustomerName AS Customer, ContactName AS [Contact Person]
FROM Customers;
```

The following SQL statement creates an alias named "Address" that combine four columns (Address, PostalCode, City and Country):

Example

```
SELECT CustomerName, Address + ', ' + PostalCode + ' ' + City + ', ' + Country AS Address
FROM Customers;
```

Try it Yourself »

Note: To get the SQL statement above to work in MySQL use the following:

```
SELECT CustomerName, CONCAT(Address,', ',PostalCode,', ',City,', ',Country) AS Address
FROM Customers;
```

Alias for Tables Example

The following SQL statement selects all the orders from the customer with CustomerID=4 (Around the Horn). We use the "Customers" and "Orders" tables, and give them the table aliases of "c" and "o" respectively (Here we use aliases to make the SQL shorter):

Example

```
SELECT o.OrderID, o.OrderDate, c.CustomerName
FROM Customers AS c, Orders AS o
WHERE c.CustomerName='Around the Horn' AND c.CustomerID=o.CustomerID;
```

The following SQL statement is the same as above, but without aliases:

Example

```
SELECT Orders.OrderID, Orders.OrderDate, Customers.CustomerName
FROM Customers, Orders
WHERE Customers.CustomerName='Around the Horn' AND Customers.CustomerID=Orders.CustomerID;
```

Try it Yourself »

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

SQL JOINS

SQL JOIN

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

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

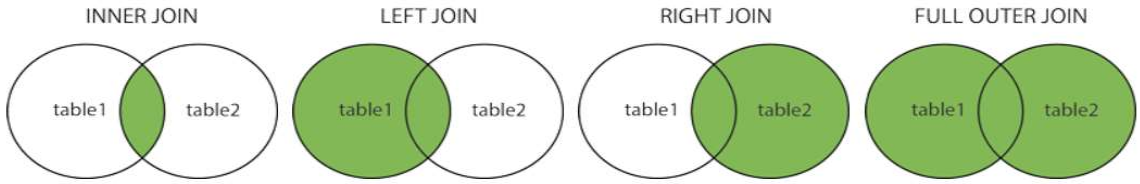
Example

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

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

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 table2
ON table1.column_name = table2.column_name;
```

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;
```

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

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 table2
ON table1.column_name = table2.column_name;
```

SQL RIGHT JOIN

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 table2
ON table1.column_name = table2.column_name;
```

SQL FULL JOIN

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 table2
ON table1.column_name = table2.column_name
WHERE condition;
```

SQL SELF JOIN

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;
```

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;
```

SQL UNION

The 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;
```

SQL GROUP BY

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);
```

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;
```

SQL HAVING

The SQL HAVING Clause

The HAVING clause was added to SQL because the WHERE keyword could not 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);
```

SQL HAVING Examples

The following SQL statement lists the number of customers in each country. Only include countries with more than 5 customers:

Example

```
SELECT COUNT(CustomerID), Country
FROM Customers
GROUP BY Country
HAVING COUNT(CustomerID) > 5;
```

The following SQL statement lists the employees that have registered more than 10 orders:

Example

```
SELECT Employees.LastName, COUNT(Orders.OrderID) AS NumberOfOrders
FROM (Orders
INNER JOIN Employees ON Orders.EmployeeID = Employees.EmployeeID)
GROUP BY LastName
HAVING COUNT(Orders.OrderID) > 10;
```

The following SQL statement lists if the employees "Davolio" or "Fuller" have registered more than 25 orders:

Example

```
SELECT Employees.LastName, COUNT(Orders.OrderID) AS NumberOfOrders
FROM Orders
INNER JOIN Employees ON Orders.EmployeeID = Employees.EmployeeID
WHERE LastName = 'Davolio' OR LastName = 'Fuller'
GROUP BY LastName
HAVING COUNT(Orders.OrderID) > 25;
```

SQL EXISTS

The SQL 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);
```

SQL EXISTS Examples

The following SQL statement returns TRUE and lists the suppliers with a product price less than 20:

Example

```
SELECT SupplierName
FROM Suppliers
WHERE EXISTS (SELECT ProductName FROM Products WHERE Products.SupplierID = Suppliers.supplierID AND Price < 20);
```

SQL ANY, ALL

The SQL ANY and ALL Operators

The ANY and ALL operators are used with a WHERE or HAVING clause.

The ANY operator returns true if any of the subquery values meet the condition.

The ALL operator returns true if all of the subquery values meet the condition.

ANY Syntax

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

ALL Syntax

```
SELECT column_name(s)
FROM table_name
WHERE column_name operator ALL
(SELECT column_name FROM table_name WHERE condition);
```

The following SQL statement returns TRUE and lists the product names if it finds ANY records in the OrderDetails table that quantity = 10:

Example

```
SELECT ProductName
FROM Products
WHERE ProductID = ANY (SELECT ProductID FROM OrderDetails WHERE Quantity = 10);
```

The ALL operator returns TRUE if all of the subquery values meet the condition.

The following SQL statement returns TRUE and lists the product names if ALL the records in the OrderDetails table has quantity = 10 (so, this example will return FALSE, because not ALL records in the OrderDetails table has quantity = 10):

Example

```
SELECT ProductName
FROM Products
WHERE ProductID = ALL (SELECT ProductID FROM OrderDetails WHERE Quantity = 10);
```

SQL SELECT INTO

The SQL SELECT INTO Statement

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

The following SQL statement creates a backup copy of Customers:

```
SELECT * INTO CustomersBackup2017
FROM Customers;
```

The following SQL statement uses the IN clause to copy the table into a new table in another database:

```
SELECT * INTO CustomersBackup2017 IN 'Backup.mdb'
FROM Customers;
```

The following SQL statement copies only a few columns into a new table:

```
SELECT CustomerName, ContactName INTO CustomersBackup2017
FROM Customers;
```

The following SQL statement copies only the German customers into a new table:

```
SELECT * INTO CustomersGermany
FROM Customers
WHERE Country = 'Germany';
```

The following SQL statement copies data from more than one table into a new table:

```
SELECT Customers.CustomerName, Orders.OrderID
INTO CustomersOrderBackup2017
FROM Customers
LEFT JOIN Orders ON Customers.CustomerID = Orders.CustomerID;
```

Tip: SELECT INTO can also be used to create a new, empty table using the schema of another. Just add a WHERE clause that causes the query to return no data:

```
SELECT * INTO newtable
FROM oldtable
WHERE 1 = 0;
```

SQL INSERT INTO SELECT

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

- INSERT INTO SELECT requires that data types in source and target tables match
- The existing records in the target table are unaffected

INSERT INTO SELECT Syntax

Copy all columns from one table to another table:

```
INSERT INTO table2
SELECT * FROM table1
WHERE 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;
```

The following SQL statement copies "Suppliers" into "Customers" (the columns that are not filled with data, will contain NULL):

Example

```
INSERT INTO Customers (CustomerName, City, Country)
SELECT SupplierName, City, Country FROM Suppliers;
```

Try it Yourself »

The following SQL statement copies "Suppliers" into "Customers" (fill all columns):

Example

```
INSERT INTO Customers (CustomerName, ContactName, Address, City, PostalCode, Country)
SELECT SupplierName, ContactName, Address, City, PostalCode, Country FROM Suppliers;
```

On peut rajouter des clauses : WHERE , …

SQL CASE

The SQL 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;
```

The following SQL goes through conditions and returns a value when the first condition is met:

Example

```
SELECT OrderID, Quantity,
CASE
    WHEN Quantity > 30 THEN 'The quantity is greater than 30'
    WHEN Quantity = 30 THEN 'The quantity is 30'
    ELSE 'The quantity is under 30'
END AS QuantityText
FROM OrderDetails;
```

The following SQL will order the customers by City. However, if City is NULL, then order by Country:

Example

```
SELECT CustomerName, City, Country
FROM Customers
ORDER BY
(CASE
    WHEN City IS NULL THEN Country
    ELSE City
END);
```

SQL NULL FUNCTIONS

MySQL

The MySQL IFNULL() function lets you return an alternative value if an expression is NULL:

```
SELECT ProductName, UnitPrice * (UnitsInStock + IFNULL(UnitsOnOrder, 0))
FROM Products;
```

or we can use the COALESCE() function, like this:

```
SELECT ProductName, UnitPrice * (UnitsInStock + COALESCE(UnitsOnOrder, 0))
FROM Products;
```

SQL Server

The SQL Server ISNULL() function lets you return an alternative value when an expression is NULL:

```
SELECT ProductName, UnitPrice * (UnitsInStock + ISNULL(UnitsOnOrder, 0))
FROM Products;
```

MS Access

The MS Access IsNull() function returns TRUE (-1) if the expression is a null value, otherwise FALSE (0):

```
SELECT ProductName, UnitPrice * (UnitsInStock + IIF(IsNull(UnitsOnOrder), 0, UnitsOnOrder))
FROM Products;
```

Oracle

The Oracle NVL() function achieves the same result:

```
SELECT ProductName, UnitPrice * (UnitsInStock + NVL(UnitsOnOrder, 0))
FROM Products;
```

SQL STORED PROCEDURES

A stored procedure is a prepared SQL code that you can save, so the code can be reused over and over again.

So if you have an SQL query that you write over and over again, save it as a stored procedure, and then just call it to execute it.

You can also pass parameters to a stored procedure, so that the stored procedure can act based on the parameter value(s) that is passed.

Stored Procedure Syntax

```
CREATE PROCEDURE procedure_name
AS
sql_statement
GO;
```

Execute a Stored Procedure

```
EXEC procedure_name;
```

Example

```
CREATE PROCEDURE SelectAllCustomers
AS
SELECT * FROM Customers
GO;
```

SQL COMMENTS

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;
```

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:

Example

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

SQL OPERATORS

https://www.w3schools.com/sql/sql_operators.asp

SQL DATABASE

SQL CREATE DB

The SQL CREATE DATABASE Statement

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

Syntax

```
CREATE DATABASE databasename;
```

SQL DROP DB

The SQL DROP DATABASE Statement

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

Syntax

```
DROP DATABASE databasename;
```

SQL BACKUP DB

The SQL BACKUP DATABASE Statement

The BACKUP DATABASE statement is used in SQL Server to create a full back up of an existing SQL database.

Syntax

```
BACKUP DATABASE databasename
TO DISK = 'filepath';
```

BACKUP WITH DIFFERENTIAL Example

The following SQL statement creates a differential back up of the database "testDB":

Example

```
BACKUP DATABASE testDB
TO DISK = 'D:\backups\testDB.bak'
WITH DIFFERENTIAL;
```

A differential back up only backs up the parts of the database that have changed since the last full database backup.

SQL CREATE TABLE

The SQL 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,
   ....
);
```

SQL CREATE TABLE Example

The following example creates a table called "Persons" that contains five columns: PersonID, LastName, FirstName, Address, and City:

Example

```
CREATE TABLE Persons (
    PersonID int,
    LastName varchar(255),
    FirstName varchar(255),
    Address varchar(255),
    City varchar(255)
);
```

SQL DROP TABLE

SQL DROP TABLE Example

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

Example

```
DROP TABLE Shippers;
```

SQL 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;
```

SQL ALTER TABLE

ALTER TABLE - ADD Column

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

```
ALTER TABLE table_name
ADD column_name datatype;
```

The following SQL adds an "Email" column to the "Customers" table:

Example

```
ALTER TABLE Customers
ADD Email varchar(255);
```

The following SQL deletes the "Email" column from the "Customers" table:

Example

```
ALTER TABLE Customers
DROP COLUMN Email;
```

My SQL / Oracle (prior version 10G):

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

Oracle 10G and later:

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

SQL CONSTRAINTS

SQL 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,
    ....
);
```

The following constraints are commonly used in SQL:

- **NOT NULL** - Ensures that a column cannot have a NULL value
- **UNIQUE** - Ensures that all values in a column are different
- **PRIMARY KEY** - A combination of a NOT NULL and UNIQUE. Uniquely identifies each row in a table
- **FOREIGN KEY** - Uniquely identifies a row/record in another table
- **CHECK** - Ensures that all values in a column satisfies a specific condition
- **DEFAULT** - Sets a default value for a column when no value is specified
- **INDEX** - Used to create and retrieve data from the database very quickly

SQL NOT NULL

SQL NOT NULL on ALTER TABLE

To create a NOT NULL constraint on the "Age" column when the "Persons" table is already created, use the following SQL:

```
ALTER TABLE Persons
MODIFY Age int NOT NULL;
```

SQL UNIQUE

SQL UNIQUE Constraint on CREATE TABLE

The following SQL creates a UNIQUE constraint on the "ID" column when the "Persons" table is created:

SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL UNIQUE,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int
);
```

MySQL:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    UNIQUE (ID)
);
```

To name a UNIQUE constraint, and to define a UNIQUE constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    CONSTRAINT UC_Person UNIQUE (ID,LastName)
);
```

SQL UNIQUE Constraint on ALTER TABLE

To create a UNIQUE constraint on the "ID" column when the table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD UNIQUE (ID);
```

To name a UNIQUE constraint, and to define a UNIQUE constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CONSTRAINT UC_Person UNIQUE (ID,LastName);
```

SQL PRIMARY KEY

SQL PRIMARY KEY Constraint

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

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

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

SQL PRIMARY KEY on CREATE TABLE

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

MySQL:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    PRIMARY KEY (ID)
);
```

SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL PRIMARY KEY,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int
);
```

To allow naming of a PRIMARY KEY constraint, and for defining a PRIMARY KEY constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    CONSTRAINT PK_Person PRIMARY KEY (ID,LastName)
);
```

Note: In the example above there is only ONE PRIMARY KEY (PK_Person). However, the VALUE of the primary key is made up of TWO COLUMNS (ID + LastName).

SQL FOREIGN KEY

SQL FOREIGN KEY Constraint

A FOREIGN KEY is a key used to link two tables together.

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

The table containing the foreign key is called the child table, and the table containing the candidate key is called the referenced or parent table.

SQL FOREIGN KEY on CREATE TABLE

The following SQL creates a FOREIGN KEY on the "PersonID" column when the "Orders" table is created:

MySQL:

```
CREATE TABLE Orders (
    OrderID int NOT NULL,
    OrderNumber int NOT NULL,
    PersonID int,
    PRIMARY KEY (OrderID),
    FOREIGN KEY (PersonID) REFERENCES Persons(PersonID)
);
```

SQL Server / Oracle / MS Access:

```
CREATE TABLE Orders (
    OrderID int NOT NULL PRIMARY KEY,
    OrderNumber int NOT NULL,
    PersonID int FOREIGN KEY REFERENCES Persons(PersonID)
);
```

To create a FOREIGN KEY constraint on the "PersonID" column when the "Orders" table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Orders
ADD FOREIGN KEY (PersonID) REFERENCES Persons(PersonID);
```

To allow naming of a FOREIGN KEY constraint, and for defining a FOREIGN KEY constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Orders
ADD CONSTRAINT FK_PersonOrder
FOREIGN KEY (PersonID) REFERENCES Persons(PersonID);
```

SQL CHECK

SQL CHECK Constraint

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

If you define a CHECK constraint on a single column it allows only certain values for this column.

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

SQL CHECK on CREATE TABLE

The following SQL creates a CHECK constraint on the "Age" column when the "Persons" table is created. The CHECK constraint ensures that the age of a person must be 18, or older:

MySQL:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    CHECK (Age>=18)
);
```

SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int CHECK (Age>=18)
);
```

SQL CHECK on ALTER TABLE

To create a CHECK constraint on the "Age" column when the table is already created, use the following SQL:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CHECK (Age>=18);
```

To allow naming of a CHECK constraint, and for defining a CHECK constraint on multiple columns, use the following SQL syntax:

MySQL / SQL Server / Oracle / MS Access:

```
ALTER TABLE Persons
ADD CONSTRAINT CHK_PersonAge CHECK (Age>=18 AND City='Sandnes');
```

SQL DEFAULT

SQL DEFAULT Constraint

The DEFAULT constraint is used to provide a default value for a column.

The default value will be added to all new records IF no other value is specified.

SQL DEFAULT on CREATE TABLE

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

My SQL / SQL Server / Oracle / MS Access:

```
CREATE TABLE Persons (
    ID int NOT NULL,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    City varchar(255) DEFAULT 'Sandnes'
);
```

The DEFAULT constraint can also be used to insert system values, by using functions like GETDATE():

```
CREATE TABLE Orders (
    ID int NOT NULL,
    OrderNumber int NOT NULL,
    OrderDate date DEFAULT GETDATE()
);
```

SQL DEFAULT on ALTER TABLE

To create a DEFAULT constraint on the "City" column when the table is already created, use the following SQL:

MySQL:

```
ALTER TABLE Persons
ALTER City SET DEFAULT 'Sandnes';
```

SQL Server:

```
ALTER TABLE Persons
ADD CONSTRAINT df_City
DEFAULT 'Sandnes' FOR City;
```

MS Access:

```
ALTER TABLE Persons
ALTER COLUMN City SET DEFAULT 'Sandnes';
```

SQL INDEX

SQL CREATE INDEX Statement

The CREATE INDEX statement is used to create indexes in tables.

Indexes are used to retrieve data from the database more quickly than otherwise. The users cannot see the indexes, they are just used to speed up searches/queries.

Note: Updating a table with indexes takes more time than updating a table without (because the indexes also need an update). So, only create indexes on columns that will be frequently searched against.

CREATE INDEX Syntax

Creates an index on a table. Duplicate values are allowed:

```
CREATE INDEX index_name
ON table_name (column1, column2, ...);
```

CREATE UNIQUE INDEX Syntax

Creates a unique index on a table. Duplicate values are not allowed:

```
CREATE UNIQUE INDEX index_name
ON table_name (column1, column2, ...);
```

Note: The syntax for creating indexes varies among different databases. Therefore: Check the syntax for creating indexes in your database.

SQL AUTO INCREMENT

AUTO INCREMENT Field

Auto-increment allows a unique number to be generated automatically when a new record is inserted into a table.

Often this is the primary key field that we would like to be created automatically every time a new record is inserted.

Syntax for MySQL

The following SQL statement defines the "Personid" column to be an auto-increment primary key field in the "Persons" table:

```
CREATE TABLE Persons (
    Personid int NOT NULL AUTO_INCREMENT,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    PRIMARY KEY (Personid)
);
```

MySQL uses the AUTO_INCREMENT keyword to perform an auto-increment feature.

By default, the starting value for AUTO_INCREMENT is 1, and it will increment by 1 for each new record.

To let the AUTO_INCREMENT sequence start with another value, use the following SQL statement:

```
ALTER TABLE Persons AUTO_INCREMENT=100;
```

Syntax for SQL Server

The following SQL statement defines the "Personid" column to be an auto-increment primary key field in the "Persons" table:

```
CREATE TABLE Persons (
    Personid int IDENTITY(1,1) PRIMARY KEY,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int
);
```

The MS SQL Server uses the IDENTITY keyword to perform an auto-increment feature.

In the example above, the starting value for IDENTITY is 1, and it will increment by 1 for each new record.

Tip: To specify that the "Personid" column should start at value 10 and increment by 5, change it to IDENTITY(10,5).

Syntax for Access

The following SQL statement defines the "Personid" column to be an auto-increment primary key field in the "Persons" table:

```
CREATE TABLE Persons (
    Personid AUTOINCREMENT PRIMARY KEY,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int
);
```

The MS Access uses the AUTOINCREMENT keyword to perform an auto-increment feature.

By default, the starting value for AUTOINCREMENT is 1, and it will increment by 1 for each new record.

Tip: To specify that the "Personid" column should start at value 10 and increment by 5, change the autoincrement to AUTOINCREMENT(10,5).

SQL DATES

The most difficult part when working with dates is to be sure that the format of the date you are trying to insert, matches the format of the date column in the database.

As long as your data contains only the date portion, your queries will work as expected. However, if a time portion is involved, it gets more complicated.

SQL Date Data Types

MySQL comes with the following data types for storing a date or a date/time value in the database:

- DATE - format YYYY-MM-DD
- DATETIME - format: YYYY-MM-DD HH:MI:SS
- TIMESTAMP - format: YYYY-MM-DD HH:MI:SS
- YEAR - format YYYY or YY

SQL Server comes with the following data types for storing a date or a date/time value in the database:

- DATE - format YYYY-MM-DD
- DATETIME - format: YYYY-MM-DD HH:MI:SS
- SMALLDATETIME - format: YYYY-MM-DD HH:MI:SS
- TIMESTAMP - format: a unique number

Note: The date types are chosen for a column when you create a new table in your database!

SQL VIEWS

SQL CREATE VIEW Statement

In SQL, a view is a virtual table based on the result-set of an SQL statement.

A view contains rows and columns, just like a real table. The fields in a view are fields from one or more real tables in the database.

You can add SQL functions, WHERE, and JOIN statements to a view and present the data as if the data were coming from one single table.

The following SQL creates a view that shows all customers from Brazil:

We can query the view above as follows:

Example

```
SELECT * FROM [Brazil Customers];
```

The following SQL creates a view that selects every product in the "Products" table with a price higher than the average price:

Example

```
CREATE VIEW [Products Above Average Price] AS
SELECT ProductName, Price
FROM Products
WHERE Price > (SELECT AVG(Price) FROM Products);
```

Try it Yourself »

We can query the view above as follows:

Example

```
SELECT * FROM [Products Above Average Price];
```

The following SQL adds the "City" column to the "Brazil Customers" view:

Example

```
CREATE OR REPLACE VIEW [Brazil Customers] AS
SELECT CustomerName, ContactName, City
FROM Customers
WHERE Country = 'Brazil';
```