**HTML, JAVA Script and SQL**

[**https://www.itskillslearn.com**](https://www.itskillslearn.com)

**<IMAGE>**

* Use the HTML <img> element to define an image
* Use the HTML src attribute to define the URL of the image
* Use the HTML alt attribute to define an alternate text for an image, if it cannot be displayed
* Use the HTML width and height attributes to define the size of the image
* Use the CSS width and height properties to define the size of the image (alternatively)
* Use the CSS float property to let the image float
* Use the HTML <map> element to define an image-map
* Use the HTML <area> element to define the clickable areas in the image-map
* Use the HTML <img>'s element usemap attribute to point to an image-map
* Use the HTML <picture> element to show different images for different devices

|  |  |
| --- | --- |
| **Tag** | **Description** |
| [<img>](https://www.w3schools.com/tags/tag_img.asp) | Defines an image |
| [<map>](https://www.w3schools.com/tags/tag_map.asp) | Defines an image-map |
| [<area>](https://www.w3schools.com/tags/tag_area.asp) | Defines a clickable area inside an image-map |
| [<picture>](https://www.w3schools.com/tags/tag_picture.asp) | Defines a container for multiple image resources |

**By default, a link will appear like this (in all browsers):**

* **An unvisited link is underlined and blue**
* **A visited link is underlined and purple**
* **An active link is underlined and red**

HTML Links - The target Attribute

The target attribute specifies where to open the linked document.

The target attribute can have one of the following values:

* \_blank - Opens the linked document in a new window or tab
* \_self - Opens the linked document in the same window/tab as it was clicked (this is default)
* \_parent - Opens the linked document in the parent frame
* \_top - Opens the linked document in the full body of the window
* *framename* - Opens the linked document in a named frame

A description list is a list of terms, with a description of each term.

The <dl> tag defines the description list, the <dt> tag defines the term (name), and the <dd> tag describes each term:

### Example

<dl>  
  <dt>Coffee</dt>  
  <dd>- black hot drink</dd>  
  <dt>Milk</dt>  
  <dd>- white cold drink</dd>  
</dl>

**A Description List**

Coffee

- black hot drink

Milk

- white cold drink

## HTML List Tags

|  |  |
| --- | --- |
| **Tag** | **Description** |
| [<ul>](https://www.w3schools.com/tags/tag_ul.asp) | Defines an unordered list |
| [<ol>](https://www.w3schools.com/tags/tag_ol.asp) | Defines an ordered list |
| [<li>](https://www.w3schools.com/tags/tag_li.asp) | Defines a list item |
| [<dl>](https://www.w3schools.com/tags/tag_dl.asp) | Defines a description list |
| [<dt>](https://www.w3schools.com/tags/tag_dt.asp) | Defines a term in a description list |
| [<dd>](https://www.w3schools.com/tags/tag_dd.asp) | Describes the term in a description list |

## HTML Grouping Tags

|  |  |
| --- | --- |
| **Tag** | **Description** |
| [<div>](https://www.w3schools.com/tags/tag_div.asp) | Defines a section in a document (block-level) |
| [<span>](https://www.w3schools.com/tags/tag_span.asp) | Defines a section in a document (inline) |

Block level elements in HTML:

[<address>](https://www.w3schools.com/tags/tag_address.asp)[<article>](https://www.w3schools.com/tags/tag_article.asp)[<aside>](https://www.w3schools.com/tags/tag_aside.asp)[<blockquote>](https://www.w3schools.com/tags/tag_blockquote.asp)[<canvas>](https://www.w3schools.com/tags/tag_canvas.asp)[<dd>](https://www.w3schools.com/tags/tag_dd.asp)[<div>](https://www.w3schools.com/tags/tag_div.asp)[<dl>](https://www.w3schools.com/tags/tag_dl.asp)[<dt>](https://www.w3schools.com/tags/tag_dt.asp)[<fieldset>](https://www.w3schools.com/tags/tag_fieldset.asp)

[<figcaption>](https://www.w3schools.com/tags/tag_figcaption.asp)[<figure>](https://www.w3schools.com/tags/tag_figure.asp)[<footer>](https://www.w3schools.com/tags/tag_footer.asp)[<form>](https://www.w3schools.com/tags/tag_form.asp)[<h1>-<h6>](https://www.w3schools.com/tags/tag_hn.asp)[<header>](https://www.w3schools.com/tags/tag_header.asp)[<hr>](https://www.w3schools.com/tags/tag_hr.asp)[<li>](https://www.w3schools.com/tags/tag_li.asp)[<main>](https://www.w3schools.com/tags/tag_main.asp)[<nav>](https://www.w3schools.com/tags/tag_nav.asp)[<noscript>](https://www.w3schools.com/tags/tag_noscript.asp)[<ol>](https://www.w3schools.com/tags/tag_ol.asp)[<p>](https://www.w3schools.com/tags/tag_p.asp)[<pre>](https://www.w3schools.com/tags/tag_pre.asp)[<section>](https://www.w3schools.com/tags/tag_section.asp)[<table>](https://www.w3schools.com/tags/tag_table.asp)

[<tfoot>](https://www.w3schools.com/tags/tag_tfoot.asp)[<ul>](https://www.w3schools.com/tags/tag_ul.asp)[<video>](https://www.w3schools.com/tags/tag_video.asp)

## Inline Elements

An inline element does not start on a new line and only takes up as much width as necessary.

This is an inline <span> element inside a paragraph.

### Example

<span>Hello</span>  
<span>World</span>

Difference Between Class and ID

An HTML element can only have one unique id that belongs to that single element, while a class name can be used by multiple elements:

The HTML <head> Element

The <head> element is a container for metadata (data about data) and is placed between the <html> tag and the <body> tag.

HTML metadata is data about the HTML document. Metadata is not displayed.

Metadata typically define the document title, character set, styles, links, scripts, and other meta information.

The following tags describe metadata: <title>, <style>, <meta>, <link>, <script>, and <base>.

The HTML <base> Element

The <base> element specifies the base URL and base target for all relative URLs in a page:

HTML Layout Elements

Websites often display content in multiple columns (like a magazine or newspaper).

HTML5 offers new semantic elements that define the different parts of a web page:

|  |  |
| --- | --- |
| HTML5 Semantic Elements | * <header> - Defines a header for a document or a section * <nav> - Defines a container for navigation links * <section> - Defines a section in a document * <article> - Defines an independent self-contained article * <aside> - Defines content aside from the content (like a sidebar) * <footer> - Defines a footer for a document or a section * <details> - Defines additional details * <summary> - Defines a heading for the <details> element * <https://www.itskillslearn.com> |

HTML Layout Techniques

There are five different ways to create multicolumn layouts. Each way has its pros and cons:

* HTML tables (not recommended)
* CSS float property
* CSS flexbox
* CSS framework
* CSS grid

**URL**

* **scheme** - defines the **type** of Internet service (most common is **http or https**)
* **prefix** - defines a domain **prefix** (default for http is **www**)
* **domain** - defines the Internet **domain name**(like w3schools.com)
* **port** - defines the **port number**at the host (default for http is **80**)
* **path** - defines a **path** at the server (If omitted: the root directory of the site)
* **filename** - defines the name of a document or resource

Common URL Schemes

The table below lists some common schemes:

|  |  |  |
| --- | --- | --- |
| **Scheme** | **Short for** | **Used for** |
| http | HyperText Transfer Protocol | Common web pages. Not encrypted |
| https | Secure HyperText Transfer Protocol | Secure web pages. Encrypted |
| ftp | File Transfer Protocol | Downloading or uploading files |
| file |  | A file on your computer |

## he Most Important Differences from HTML:

### Document Structure

* XHTML DOCTYPE is **mandatory**
* The xmlns attribute in <html> is **mandatory**
* <html>, <head>, <title>, and <body> are **mandatory**

### XHTML Elements

* XHTML elements must be **properly nested**
* XHTML elements must always be **closed**
* XHTML elements must be in **lowercase**
* XHTML documents must have **one root element**

### XHTML Attributes

* Attribute names must be in **lower case**
* Attribute values must be **quoted**
* Attribute minimization is **forbidden**
* Why Study JavaScript?
* JavaScript is one of the **3 languages** all web developers **must** learn:
* 1. **HTML** to define the content of web pages
* 2. **CSS** to specify the layout of web pages
* 3. **JavaScript** to program the behavior of web pages

### Did You Know?

JavaScript and [Java](https://www.w3schools.com/java/default.asp) are completely different languages, both in concept and design.

JavaScript was invented by Brendan Eich in 1995, and became an ECMA standard in 1997.  
ECMA-262 is the official name of the standard. ECMAScript is the official name of the language.

You can read more about the different JavaScript versions in the chapter [JS Versions](https://www.w3schools.com/js/js_versions.asp).

HTTP Methods

* **GET**
* **POST**
* **PUT**
* **HEAD**
* **DELETE**
* **PATCH**
* **OPTIONS**

The GET Method

**GET is used to request data from a specified resource.**

**GET is one of the most common HTTP methods.**

Note that the query string (name/value pairs) is sent in the URL of a GET request:

/test/demo\_form.php?name1=value1&name2=value2

**Some other notes on GET requests:**

* GET requests can be cached
* GET requests remain in the browser history
* GET requests can be bookmarked
* GET requests should never be used when dealing with sensitive data
* GET requests have length restrictions
* GET requests is only used to request data (not modify)

The POST Method

**POST is used to send data to a server to create/update a resource.**

The data sent to the server with POST is stored in the request body of the HTTP request:

POST /test/demo\_form.php HTTP/1.1  
Host: w3schools.com  
name1=value1&name2=value2

**POST is one of the most common HTTP methods.**

**Some other notes on POST requests:**

* POST requests are never cached
* POST requests do not remain in the browser history
* POST requests cannot be bookmarked
* POST requests have no restrictions on data length

The PUT Method

**PUT is used to send data to a server to create/update a resource.**

The difference between POST and PUT is that PUT requests are idempotent. That is, calling the same PUT request multiple times will always produce the same result. In contrast, calling a POST request repeatedly have side effects of creating the same resource multiple times.

The HEAD Method

**HEAD is almost identical to GET, but without the response body.**

In other words, if GET /users returns a list of users, then HEAD /users will make the same request but will not return the list of users.

HEAD requests are useful for checking what a GET request will return before actually making a GET request - like before downloading a large file or response body.

The DELETE Method

**The DELETE method deletes the specified resource.**

The OPTIONS Method

**The OPTIONS method describes the communication options for the target resource.**

**JAVA SCRIPT**

The "equal to" operator is written like == in JavaScript.

JavaScript Display Possibilities/output

JavaScript can "display" data in different ways:

* Writing into an HTML element, using innerHTML.
* Writing into the HTML output using document.write().
* Writing into an alert box, using window.alert().
* Writing into the browser console, using console.log().
* Using console.log()
* For debugging purposes, you can use the console.log() method to display data.

## For best readability, programmers often like to avoid code lines longer than 80 characters. avaScript Values

The JavaScript syntax defines two types of values: Fixed values and variable values.

Fixed values are called **literals**. Variable values are called **variables**.

## JavaScript Comparison Operators

|  |  |
| --- | --- |
| **Operator** | **Description** |
| == | equal to |
| === | equal value and equal type |
| != | not equal |
| !== | not equal value or not equal type |
| > | greater than |
| < | less than |
| >= | greater than or equal to |
| <= | less than or equal to |
| ? | ternary operator |

Comparison operators are fully described in the [**JS Comparisons**](https://www.w3schools.com/js/js_comparisons.asp) chapter.

## JavaScript Logical Operators

|  |  |
| --- | --- |
| **Operator** | **Description** |
| && | logical and |
| || | logical or |
| ! | logical not |

Logical operators are fully described in the [**JS Comparisons**](https://www.w3schools.com/js/js_comparisons.asp) chapter.

## JavaScript Type Operators

|  |  |
| --- | --- |
| **Operator** | **Description** |
| typeof | Returns the type of a variable |
| instanceof | Returns true if an object is an instance of an object type |

Type operators are fully described in the [**JS Type Conversion**](https://www.w3schools.com/js/js_type_conversion.asp) chapter.

## JavaScript Bitwise Operators

Bit operators work on 32 bits numbers.

Any numeric operand in the operation is converted into a 32 bit number. The result is converted back to a JavaScript number.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Operator** | **Description** | **Example** | **Same as** | **Result** | **Decimal** |
| & | AND | 5 & 1 | 0101 & 0001 | 0001 | 1 |
| | | OR | 5 | 1 | 0101 | 0001 | 0101 | 5 |
| ~ | NOT | ~ 5 | ~0101 | 1010 | 10 |
| ^ | XOR | 5 ^ 1 | 0101 ^ 0001 | 0100 | 4 |
| << | Zero fill left shift | 5 << 1 | 0101 << 1 | 1010 | 10 |
| >> | Signed right shift | 5 >> 1 | 0101 >> 1 | 0010 | 2 |
| >>> | Zero fill right shift | 5 >>> 1 | 0101 >>> 1 | 0010 | 2 |

The examples above uses 4 bits unsigned examples. But JavaScript uses 32-bit signed numbers.  
Because of this, in JavaScript, ~ 5 will not return 10. It will return -6.  
~00000000000000000000000000000101 will return 11111111111111111111111111111010

Bitwise operators are fully described in the [**JS Bitwise**](https://www.w3schools.com/js/js_bitwise.asp) chapter.

Top of Form

JavaScript Function Syntax

A JavaScript function is defined with the function keyword, followed by a **name**, followed by parentheses **()**.

Function names can contain letters, digits, underscores, and dollar signs (same rules as variables).

The parentheses may include parameter names separated by commas:  
**(*parameter1, parameter2, ...*)**

The code to be executed, by the function, is placed inside curly brackets: **{}**

function *name*(*parameter1, parameter2, parameter3*) {  
  // *code to be executed*  
}

Function **parameters** are listed inside the parentheses () in the function definition.

Function **arguments** are the **values** received by the function when it is invoked.

Inside the function, the arguments (the parameters) behave as local variables.

A Function is much the same as a Procedure or a Subroutine, in other programming languages.

Function Invocation

The code inside the function will execute when "something" **invokes** (calls) the function:

* When an event occurs (when a user clicks a button)
* When it is invoked (called) from JavaScript code
* Automatically (self invoked)

You will learn a lot more about function invocation later in this tutorial.

## Function Return

When JavaScript reaches a return statement, the function will stop executing.

If the function was invoked from a statement, JavaScript will "return" to execute the code after the invoking statement.

Functions often compute a **return value**. The return value is "returned" back to the "caller":

### Example

Calculate the product of two numbers, and return the result:

var x = myFunction(4, 3);   // Function is called, return value will end up in x  
  
function myFunction(a, b) {  
  return a \* b;             // Function returns the product of a and b  
}

The result in x will be:

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SQL

What is SQL?

* SQL stands for Structured Query Language
* SQL lets you access and manipulate databases
* SQL became a standard of the American National Standards Institute (ANSI) in 1986, and of the International Organization for Standardization (ISO) in 1987

SQL in Your Web Site

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

* An RDBMS database program (i.e. MS Access, SQL Server, MySQL)
* To use a server-side scripting language, like PHP or ASP
* To use SQL to get the data you want
* To use HTML / CSS to style the page

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.

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

Some of The Most Important SQL Commands

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

## 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;

## 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 |

## 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 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;

## RDER BY DESC Example

The following SQL statement selects all customers from the "Customers" table, sorted DESCENDING by the "Country" column:

### Example

SELECT \* FROM Customers  
ORDER BY Country 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, ...);

## 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');

## 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.

### IS NULL Syntax

SELECT column\_namesFROM table\_name  
WHERE column\_name IS NULL;

### IS NOT NULL Syntax

SELECT column\_namesFROM table\_name  
WHERE column\_name IS NOT NULL;

## SQL TOP, LIMIT and ROWNUM Examples

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

### Example

SELECT TOP 3 \* FROM Customers;

The following SQL statement shows the equivalent example using the LIMIT clause:

### Example

SELECT \* FROM Customers  
LIMIT 3;

The following SQL statement shows the equivalent example using ROWNUM:

### Example

SELECT \* FROM Customers  
WHERE ROWNUM <= 3;

## SQL TOP PERCENT Example

The following SQL statement selects the first 50% of the records from the "Customers" table:

### Example

SELECT TOP 50 PERCENT \* FROM Customers;

## he 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;

**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 Table

The following SQL statement updates the first customer (CustomerID = 1) with a new contact person and a new city.

### 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!

### Example

UPDATE Customers  
SET ContactName='Juan';

## The SQL DELETE Statement

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

### DELETE Syntax

DELETE FROM table\_name WHERE condition;

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

Delete 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 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() and SUM() Functions

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

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

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;

**Note:** NULL values are not counted.

## AVG() Example

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

### Example

SELECT AVG(Price)  
FROM Products;

**Note:** NULL values are ignored.

## SUM() Example

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

### Example

SELECT SUM(Quantity)  
FROM OrderDetails;

## 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 (\_).

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

### LIKE Syntax

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

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

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

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

## 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](https://www.w3schools.com/sql/sql_like.asp) 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 |

|  |  |  |
| --- | --- | --- |
| **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 |

### Wildcard Characters in SQL Server

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 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*);

he 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);

## 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;

## 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 Text Values Example

The following SQL statement selects all products with a ProductName BETWEEN Carnarvon Tigers and Mozzarella di Giovanni:

### Example

SELECT \* FROM Products  
WHERE ProductName BETWEEN 'Carnarvon Tigers' AND 'Mozzarella di Giovanni'  
ORDER BY ProductName;

## 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 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.

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### 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;

## 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;

## 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;

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 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;

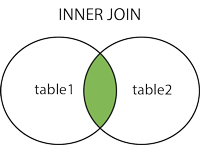
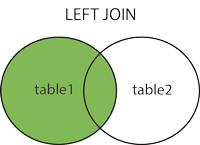
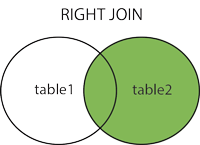
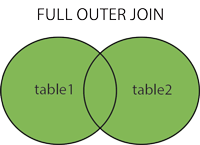
and it will produce something like this:

|  |  |  |
| --- | --- | --- |
| **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;

**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!

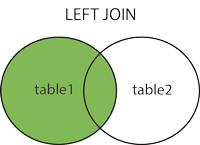
## SQL LEFT JOIN Keyword

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.



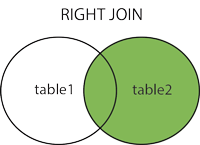
## SQL RIGHT JOIN Keyword

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.



## 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;

## SQL FULL OUTER JOIN Keyword

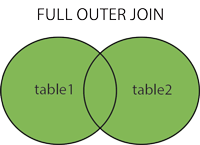
The FULL OUTER JOIN keyword return all records when there is a match in either left (table1) or right (table2) table records.

**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;



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;

## 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 Operator

## 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;

## QL 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;

## 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;

## The SQL GROUP BY Statement

The GROUP BY statement group 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 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 conditionORDER BY column\_name(s);

The following SQL statement lists the number of customers in each country, sorted high to low (Only include countries with more than 5 customers):

### Example

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

## 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 ANY Examples

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

The following SQL statement returns TRUE and lists the productnames 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 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;

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;

**MySQL NULL FUCTION**

The MySQL [IFNULL()](https://www.w3schools.com/sql/func_mysql_ifnull.asp) 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()](https://www.w3schools.com/sql/func_mysql_coalesce.asp) function, like this:

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

**SQL Server**

The SQL Server [ISNULL()](https://www.w3schools.com/sql/func_sqlserver_isnull.asp) 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()](https://www.w3schools.com/sql/func_msaccess_isnull.asp) 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;

## What is a Stored Procedure?

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;

## Stored Procedure Example

The following SQL statement creates a stored procedure named "SelectAllCustomers" that selects all records from the "Customers" table:

### Example

CREATE PROCEDURE SelectAllCustomers  
AS  
SELECT \* FROM Customers  
GO;

Execute the stored procedure above as follows:

### Example

EXEC SelectAllCustomers;

## Stored Procedure With One Parameter

The following SQL statement creates a stored procedure that selects Customers from a particular City from the "Customers" table:

### Example

CREATE PROCEDURE SelectAllCustomers @City nvarchar(30)  
AS  
SELECT \* FROM Customers WHERE City = @City  
GO;

## Stored Procedure With Multiple Parameters

Setting up multiple parameters is very easy. Just list each parameter and the data type separated by a comma as shown below.

The following SQL statement creates a stored procedure that selects Customers from a particular City with a particular PostalCode from the "Customers" table:

### Example

CREATE PROCEDURE SelectAllCustomers @City nvarchar(30), @PostalCode nvarchar(10)  
AS  
SELECT \* FROM Customers WHERE City = @City AND PostalCode = @PostalCode  
GO;

Execute the stored procedure above as follows:

### Example

EXEC SelectAllCustomers City = "London", PostalCode = "WA1 1DP";

## 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;

### xample

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

The following example uses a single-line comment to ignore a statement:

### Example

--SELECT \* FROM Customers;  
SELECT \* FROM Products;

**Thanks for Visit IT SKILLS LEARN**