



JAVASCRIPT

javascript language

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Part 1: JavaScript Basics

1.JAVASCRIPT – OVERVIEW

What is JavaScript?

JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.

JavaScript was first known as **LiveScript**, but Netscape changed its name to JavaScript, possibly because of the excitement being generated by Java. JavaScript made its first appearance in Netscape 2.0 in 1995 with the name **LiveScript**. The general-purpose core of the language has been embedded in Netscape, Internet Explorer, and other web browsers.

The [ECMA-262 Specification](#) defined a standard version of the core JavaScript language.

- JavaScript is a lightweight, interpreted programming language.
- Designed for creating network-centric applications.
- Complementary to and integrated with Java.
- Complementary to and integrated with HTML.
- Open and cross-platform.

Client-Side JavaScript

Client-side JavaScript is the most common form of the language. The script should be included in or referenced by an HTML document for the code to be interpreted by the browser.

It means that a web page need not be a static HTML, but can include programs that interact with the user, control the browser, and dynamically create HTML content.

The JavaScript client-side mechanism provides many advantages over traditional CGI server-side scripts. For example, you might use JavaScript to check if the user has entered a valid e-mail address in a form field.

The JavaScript code is executed when the user submits the form, and only if all the entries are valid, they would be submitted to the Web Server.

JavaScript can be used to trap user-initiated events such as button clicks, link navigation, and other actions that the user initiates explicitly or implicitly.

Advantages of JavaScript

The merits of using JavaScript are:

- **Less server interaction:** You can validate user input before sending the page off to the server. This saves server traffic, which means less load on your server.
- **Immediate feedback to the visitors:** They don't have to wait for a page reload to see if they have forgotten to enter something.
- **Increased interactivity:** You can create interfaces that react when the user hovers over them with a mouse or activates them via the keyboard.
- **Richer interfaces:** You can use JavaScript to include such items as drag-and-drop components and sliders to give a Rich Interface to your site visitors.

Limitations of JavaScript

We cannot treat JavaScript as a full-fledged programming language. It lacks the following important features:

- Client-side JavaScript does not allow the reading or writing of files. This has been kept for security reason.
- JavaScript cannot be used for networking applications because there is no such support available.
- JavaScript doesn't have any multithreading or multiprocessor capabilities.

Once again, JavaScript is a lightweight, interpreted programming language that allows you to build interactivity into otherwise static HTML pages.

JavaScript Development Tools

One of major strengths of JavaScript is that it does not require expensive development tools. You can start with a simple text editor such as Notepad. Since it

is an interpreted language inside the context of a web browser, you don't even need to buy a compiler.

To make our life simpler, various vendors have come up with very nice JavaScript editing tools. Some of them are listed here:

- **Microsoft FrontPage:** Microsoft has developed a popular HTML editor called FrontPage. FrontPage also provides web developers with a number of JavaScript tools to assist in the creation of interactive websites.
- **Macromedia Dreamweaver MX:** Macromedia Dreamweaver MX is a very popular HTML and JavaScript editor in the professional web development crowd. It provides several handy prebuilt JavaScript components, integrates well with databases, and conforms to new standards such as XHTML and XML.
- **Macromedia HomeSite 5:** HomeSite 5 is a well-liked HTML and JavaScript editor from Macromedia that can be used to manage personal websites effectively.

Where is JavaScript Today?

The ECMAScript Edition 5 standard will be the first update to be released in over four years. JavaScript 2.0 conforms to Edition 5 of the ECMAScript standard, and the difference between the two is extremely minor.

The specification for JavaScript 2.0 can be found on the following site:
<http://www.ecmascript.org/>

Today, Netscape's JavaScript and Microsoft's JScript conform to the ECMAScript standard, although both the languages still support the features that are not a part of the standard.

2.JAVASCRIPT – SYNTAX

JavaScript can be implemented using JavaScript statements that are placed within the **<script>... </script>** HTML tags in a web page.

You can place the **<script>** tags, containing your JavaScript, anywhere within your web page, but it is normally recommended that you should keep it within the **<head>** tags.

The **<script>** tag alerts the browser program to start interpreting all the text between these tags as a script. A simple syntax of your JavaScript will appear as follows.

```
<script ...>
    JavaScript code
</script>
```

The script tag takes two important attributes:

- **Language:** This attribute specifies what scripting language you are using. Typically, its value will be javascript. Although recent versions of HTML (and XHTML, its successor) have phased out the use of this attribute.
- **Type:** This attribute is what is now recommended to indicate the scripting language in use and its value should be set to "text/javascript".

So your JavaScript syntax will look as follows.

```
<script language="javascript" type="text/javascript">
    JavaScript code
</script>
```

Your First JavaScript Code

Let us take a sample example to print out "Hello World". We added an optional HTML comment that surrounds our JavaScript code. This is to save our code from a browser that does not support JavaScript. The comment ends with a **"//-->"**. Here **"//"** signifies a comment in JavaScript, so we add that to prevent a browser from reading

the end of the HTML comment as a piece of JavaScript code. Next, we call a function **document.write** which writes a string into our HTML document.

This function can be used to write text, HTML, or both. Take a look at the following code.

```
<html>
<body>
<script language="javascript" type="text/javascript">
<!--
    document.write ("Hello World!")
//-->
</script>
</body>
</html>
```

This code will produce the following result:

```
Hello World!
```

Whitespace and Line Breaks

JavaScript ignores spaces, tabs, and newlines that appear in JavaScript programs. You can use spaces, tabs, and newlines freely in your program and you are free to format and indent your programs in a neat and consistent way that makes the code easy to read and understand.

Semicolons are Optional

Simple statements in JavaScript are generally followed by a semicolon character, just as they are in C, C++, and Java. JavaScript, however, allows you to omit this semicolon if each of your statements are placed on a separate line. For example, the following code could be written without semicolons.

```
<script language="javascript" type="text/javascript">
```

```
<!--  
    var1 = 10  
    var2 = 20  
//-->  
</script>
```

But when formatted in a single line as follows, you must use semicolons:

```
<script language="javascript" type="text/javascript">  
<!--  
    var1 = 10; var2 = 20;  
//-->  
</script>
```

Note: It is a good programming practice to use semicolons.

Case Sensitivity

JavaScript is a case-sensitive language. This means that the language keywords, variables, function names, and any other identifiers must always be typed with a consistent capitalization of letters.

So the identifiers **Time** and **TIME** will convey different meanings in JavaScript.

NOTE: Care should be taken while writing variable and function names in JavaScript.

Comments in JavaScript

JavaScript supports both C-style and C++-style comments. Thus:

- Any text between a `//` and the end of a line is treated as a comment and is ignored by JavaScript.
- Any text between the characters `/*` and `*/` is treated as a comment. This may span multiple lines.

- JavaScript also recognizes the HTML comment opening sequence <!--. JavaScript treats this as a single-line comment, just as it does the // comment.
- The HTML comment closing sequence --> is not recognized by JavaScript so it should be written as //-->.

Example

The following example shows how to use comments in JavaScript.

```
<script language="javascript" type="text/javascript">  
<!--  
  
// This is a comment. It is similar to comments in C++  
  
/*  
 * This is a multiline comment in JavaScript  
 * It is very similar to comments in C Programming  
 */  
//-->  
</script>
```

3.JAVASCRIPT – ENABLING

All the modern browsers come with built-in support for JavaScript. Frequently, you may need to enable or disable this support manually. This chapter explains the procedure of enabling and disabling JavaScript support in your browsers: Internet Explorer, Firefox, chrome, and Opera.

JavaScript in Internet Explorer

Here are the steps to turn on or turn off JavaScript in Internet Explorer:

- Follow **Tools -> Internet Options** from the menu.
- Select **Security** tab from the dialog box.
- Click the **Custom Level** button.
- Scroll down till you find the **Scripting** option.
- Select *Enable* radio button under **Active scripting**.
- Finally click OK and come out.

To disable JavaScript support in your Internet Explorer, you need to select **Disable** radio button under **Active scripting**.

JavaScript in Firefox

Here are the steps to turn on or turn off JavaScript in Firefox:

- Open a new tab -> type **about: config** in the address bar.
- Then you will find the warning dialog. Select **I'll be careful, I promise!**
- Then you will find the list of **configure options** in the browser.
- In the search bar, type **javascript.enabled**.
- There you will find the option to enable or disable javascript by right-clicking on the value of that option -> **select toggle**.

If javascript.enabled is true; it converts to false upon clicking **toggle**. If javascript is disabled; it gets enabled upon clicking toggle.

JavaScript in Chrome

Here are the steps to turn on or turn off JavaScript in Chrome:

- Click the Chrome menu at the top right hand corner of your browser.
- Select **Settings**.
- Click **Show advanced settings** at the end of the page.
- Under the **Privacy** section, click the Content settings button.
- In the "Javascript" section, select "Do not allow any site to run JavaScript" or "Allow all sites to run JavaScript (recommended)".

JavaScript in Opera

Here are the steps to turn on or turn off JavaScript in Opera:

- Follow **Tools-> Preferences** from the menu.
- Select **Advanced** option from the dialog box.
- Select **Content** from the listed items.
- Select **Enable JavaScript** checkbox.
- Finally click OK and come out.

To disable JavaScript support in Opera, you should not select the **Enable JavaScript checkbox**.

Warning for Non-JavaScript Browsers

If you have to do something important using JavaScript, then you can display a warning message to the user using **<noscript>** tags.

You can add a **noscript** block immediately after the script block as follows:

```
<html>
<body>

<script language="javascript" type="text/javascript">
<!--
```

```
    document.write ("Hello World!")  
//-->  
</script>  
  
<noscript>  
    Sorry...JavaScript is needed to go ahead.  
</noscript>  
</body>  
</html>
```

Now, if the user's browser does not support JavaScript or JavaScript is not enabled, then the message from </noscript> will be displayed on the screen.

4.JAVASCRIPT – PLACEMENT

There is a flexibility given to include JavaScript code anywhere in an HTML document. However the most preferred ways to include JavaScript in an HTML file are as follows:

- Script in <head>...</head> section.
- Script in <body>...</body> section.
- Script in <body>...</body> and <head>...</head> sections.
- Script in an external file and then include in <head>...</head> section.

In the following section, we will see how we can place JavaScript in an HTML file in different ways.

JavaScript in <head>...</head> Section

If you want to have a script run on some event, such as when a user clicks somewhere, then you will place that script in the head as follows.

```
<html>
<head>
<script type="text/javascript">
<!--
function sayHello() {
    alert("Hello World")
}
//-->
</script>
</head>
<body>
Click here for the result
<input type="button" onclick="sayHello()" value="Say Hello" />
```

```
</body>  
</html>
```

This code will produce the following results:

Click here for the result

Say Hello

JavaScript in <body>...</body> Section

If you need a script to run as the page loads so that the script generates content in the page, then the script goes in the <body> portion of the document. In this case, you would not have any function defined using JavaScript. Take a look at the following code.

```
<html>  
<head>  
</head>  
<body>  
<script type="text/javascript">  
<!--  
document.write("Hello World")  
//-->  
</script>  
<p>This is web page body </p>  
</body>  
</html>
```

This code will produce the following results:

Hello World

This is web page body

JavaScript in <body> and <head> Sections

You can put your JavaScript code in <head> and <body> section altogether as follows.

```
<html>
<head>
<script type="text/javascript">
<!--
function sayHello() {
    alert("Hello World")
}
//-->
</script>
</head>
<body>
<script type="text/javascript">
<!--
document.write("Hello World")
//-->
</script>
<input type="button" onclick="sayHello()" value="Say Hello" />
</body>
</html>
```

This code will produce the following result.

HelloWorld

Say Hello

JavaScript in External File

As you begin to work more extensively with JavaScript, you will be likely to find that there are cases where you are reusing identical JavaScript code on multiple pages of a site.

You are not restricted to be maintaining identical code in multiple HTML files. The **script** tag provides a mechanism to allow you to store JavaScript in an external file and then include it into your HTML files.

Here is an example to show how you can include an external JavaScript file in your HTML code using **script** tag and its **src** attribute.

```
<html>
<head>
<script type="text/javascript" src="filename.js" ></script>
</head>
<body>
.....
</body>
</html>
```

To use JavaScript from an external file source, you need to write all your JavaScript source code in a simple text file with the extension ".js" and then include that file as shown above.

For example, you can keep the following content in **filename.js** file and then you can use **sayHello** function in your HTML file after including the filename.js file.

```
function sayHello() {
    alert("Hello World")
}
```

6.JAVASCRIPT – OPERATORS

What is an Operator?

Let us take a simple expression **4 + 5 is equal to 9**. Here 4 and 5 are called **operands** and '+' is called the **operator**. JavaScript supports the following types of operators.

- Arithmetic Operators
- Comparison Operators
- Logical (or Relational) Operators
- Assignment Operators
- Conditional (or ternary) Operators

Let's have a look at all the operators one by one.

Arithmetic Operators

JavaScript supports the following arithmetic operators:

Assume variable A holds 10 and variable B holds 20, then:

S. No.	Operator and Description
1	+ (Addition) Adds two operands Ex: A + B will give 30
2	- (Subtraction) Subtracts the second operand from the first Ex: A - B will give -10

3	* (Multiplication) Multiply both operands Ex: A * B will give 200
4	/ (Division) Divide the numerator by the denominator Ex: B / A will give 2
5	% (Modulus) Outputs the remainder of an integer division Ex: B % A will give 0
6	++ (Increment) Increases an integer value by one Ex: A++ will give 11
7	-- (Decrement) Decreases an integer value by one Ex: A-- will give 9

Note: Addition operator (+) works for Numeric as well as Strings. e.g. "a" + 10 will give "a10".

Example

The following code shows how to use arithmetic operators in JavaScript.

```
<html>
<body>

<script type="text/javascript">
<!--
var a = 33;
```

```
var b = 10;
var c = "Test";
var linebreak = "<br />";

document.write("a + b = ");
result = a + b;
document.write(result);
document.write(linebreak);

document.write("a - b = ");
result = a - b;
document.write(result);
document.write(linebreak);

document.write("a / b = ");
result = a / b;
document.write(result);
document.write(linebreak);

document.write("a % b = ");
result = a % b;
document.write(result);
document.write(linebreak);

document.write("a + b + c = ");
result = a + b + c;
document.write(result);
document.write(linebreak);
```

```

a = a++;
document.write("a++ = ");
result = a++;
document.write(result);
document.write(linebreak);

b = b--;
document.write("b-- = ");
result = b--;
document.write(result);
document.write(linebreak);

//-->
</script>

<p>Set the variables to different values and then try...</p>
</body>
</html>

```

Output

```

a + b = 43
a - b = 23
a / b = 3.3
a % b = 3
a + b + c = 43Test
a++ = 33
b-- = 10

```

Set the variables to different values and then try...

Comparison Operators

JavaScript supports the following comparison operators:

Assume variable A holds 10 and variable B holds 20, then:

S.No	Operator and Description
1	== (Equal) Checks if the value of two operands are equal or not, if yes, then the condition becomes true. Ex: (A == B) is not true.
2	!= (Not Equal) Checks if the value of two operands are equal or not, if the values are not equal, then the condition becomes true. Ex: (A != B) is true.
3	> (Greater than) Checks if the value of the left operand is greater than the value of the right operand, if yes, then the condition becomes true. Ex: (A > B) is not true.
4	< (Less than) Checks if the value of the left operand is less than the value of the right operand, if yes, then the condition becomes true. Ex: (A < B) is true.
5	>= (Greater than or Equal to) Checks if the value of the left operand is greater than or equal to the value of the right operand, if yes, then the condition becomes true. Ex: (A >= B) is not true.

Try the following code to learn how to implement Logical Operators in JavaScript.

```
<html>
<body>

<script type="text/javascript">
<!--
var a = true;
var b = false;
var linebreak = "<br />";

document.write("(a && b) => ");
result = (a && b);
document.write(result);
document.write(linebreak);

document.write("(a || b) => ");
result = (a || b);
document.write(result);
document.write(linebreak);

document.write("!(a && b) => ");
result = (!(a && b));
document.write(result);
document.write(linebreak);

//-->
</script>
```

```
<p>Set the variables to different values and different operators and then try...</p>
```

```
</body>
```

```
</html>
```

Output

```
(a && b) => false
```

```
(a || b) => true
```

```
!(a && b) => true
```

Set the variables to different values and different operators and then try...

Bitwise Operators

JavaScript supports the following bitwise operators:

Assume variable A holds 2 and variable B holds 3, then:

S.No	Operator and Description
1	& (Bitwise AND) It performs a Boolean AND operation on each bit of its integer arguments. Ex: (A & B) is 2.
2	 (Bitwise OR) It performs a Boolean OR operation on each bit of its integer arguments. Ex: (A B) is 3.
3	^ (Bitwise XOR)