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**Learn To Write JavaScript**

**JavaScript for Web development**

In order to provide **meaningful information** to corporate intranet users and to **compete for business** on the World Wide Web, organisations must build websites that are **effective and responsive**. Java Script is a **programming language** that provides a **powerful tool** for **rapidly developing highly** **interactive, dynamic web sites**.

This course provides in-depth hands on **experience writing client-side JavaScript**. You will learn how to **integrate** JavaScript **into your web pages** and create an **interactive** and **dynamic web site**.

**You will learn to:**

**Development Skills**

* Write and debug client – side JavaScript that works across multiple browsers
* Create dynamic and interactive web pages
* Add interactivity forms that capture and validate user input
* Personalise pages
* Use Event Handlers (triggers), Event Delegation and Calls To Action (CTA) on JavaScript functions
* Write Unobtrusive JavaScript, manipulate DOM and AJAX operations
* Build and work with JavaScript Libraries

**What will I achieve?**

**Mastery Skills**

* Write and debug JavaScript functions
* Create interactive, self validating forms
* Implement interactive user interface using modal and dialogue boxes.
* Understand unobtrusive JavaScript and Event Delegation techniques.
* Manipulate DOM and AJAX operations

# Synopsis

JavaScript is **Client side interpreted programming language**. A language, that **runs** within the **web browser.**

Its interpreteris **embedded** inside web browser software, such as **Microsoft Internet Explorer** and **Mozilla** browser family, **Chrome**, **Safari** and **Opera** to mention a few.

The language **grants access** to the current page and lets the script determine **properties** of the client, **redirect** the user to another page, **access** cookies and do much more.

The main principle behind **embedded** scripting within an HTML document is to **control the web page from the client-side rather than from the server** in contrast to CGI scripting. In this way the web documents can be read by the browser’s “**JavaScript engine**” whenever the document is loaded into the browsers window.

The JavaScript language contains many impressive features but for **security** reasons it cannot **read or write** (**copy**) files, with the exception of “**cookie**” files that store a small amount of data (maximum size: 4 kilobytes). Referred to as **Cross Domain Policy.**

Combining JavaScript with knowledge of DOM enables powerful creation of dynamic html effects.

1. **Understanding JavaScript**

**1a. JavaScript and the Browser Wars**

The birth of JavaScript was in **September 1995**, originally by Brendan Eich with Netscape version 2 named **Mocha** and later re-named **LiveScript** after marketing deal with Java. Microsoft began to promote and integrate JavaScript and later into their Internet Explorer (IE) browsers. For legal reasons called it **JScript**. The worse was to follow as Microsoft begun computing specific **incompatible library features** and **characteristics** for their JScript engine without **legal commercial licensing.**

In **1997** the European Computer Manufacturers Association( **ECMA** 262) the standard was published, and JavaScript was the **first** implementation. The standard only **specified** the **language** and **not features**. This escalated more inconsistencies and the browser war continued. Netscape **scrapped** the idea of releasing browser **version 5** and decided to start it all over again with **Netscape 6** (the Mozilla project). All this helped Internet Explorer to expand its market share reaching over **90%** by **early 2000**. The Mozilla project gave birth to **Firefox** and other flavours of the **Mozilla** browser derivatives (Epiphany, Camino, Galen etc).

Until IE7, Internet Explorer was far away from supporting the latest JavaScript 1.5 released in 2005. With IE7+ and FF 2.0 + released, developers are now much more comfortable developing for **cross browser compatibility**.

Other browsers, by the way support JavaScript as well. Differences are subtle, but still can be extremely annoying when one is developing a **browser – agnostic** web application. Among the browsers that currently support JavaScript are the following:

* Internet Explorer
* Mozilla and all derivatives (Firefox, Epiphany, Camino and Galeaon)
* Opera
* Konqueror
* Safari
* Chrome

The current modern war is both on **platforms** and **technology**. Some companies are:

* Abandoning platforms or slow to deploy their technology to platforms (delayed Flash on iPads, abandoned on new Android browsers, etc)
* The modern ecology of the web-space continues to be challenging, and there is evangelization of more broad support for the basic structures of the web, but for the bleeding-edge this is still an organic process.

Note, not all browsers may have JavaScript enabled. As such, test your website and applications built with JavaScript first **enabled**, and then **disabled**. **Core** **functionality should be maintained when JavaScript is** **disabled** (you may have to provide alternate solution or strategy for core functionality without JavaScript), and the rendering of your pages should **degrade gracefully**.

Generally speaking, JavaScript should be used for **progressive enhancement**. Of late **CTM** (**cut the mustard)**  tests (courtesy of the British Broadcasting Corporation - BBC) is used to provide enhanced user experience for modern mobile phones that have higher CPUs and bandwidth.

**The Future**

* JavaScript **performance** will continue to be an important part of each browser's competitive advantage.
* Google has a big interest in JavaScript speed and performance on different browsers due to their **cloud computing** strategies.
* Microsoft is catching up to their competitors' on how well JavaScript performs on IE.
* Popular new web standards such as HTML5 and CSS3 need JavaScript and its associated Frameworks to join them together.

#### 2. Performing Operations and Making Statements

### **2.1 The *<script>* tag**

The **<script>** tag enables us to **include** scripts within an HTML document. It contains the **script block** and usually shares the **HEAD** section of the document with the **TITLE** and the **META** tags. The **LANGUAGE** attribute defines the **type** of scripting language we are using. If omitted the **SCRIPT** tag will assume that **JavaScript** is used. Also, the type **attribute** must be placed in the script tag and must be set to “**text/javascript**”.

When a browser loads a document it **reads,** or **parses,** the code **sequentially**. Top, to bottom. So placing thescript blockin the **head** of the document other than in the **body** ensures that the JavaScript code is **parsed before the rest of the HTML content.** However, it should be noted that depending on the **timely requirement and intervention of resources needed by an application on the page, including DOM elements**, the script can equally be put at the **bottom** of the embedded html document.

A script block looks like this:

**<script language= “javascript” type= “text/javascript” >**

**<!- -**

**//- - >**

**</script>**

**nb :** The actual code will be placed in between the line beginning with <! -- and //- ->. **These lines are there to hide the script from old browsers.**  This syntax is hardly needed these days with the volley of of new devices in the market and enhanced browser.

Alternatively, the script can be written into an **external** JavaScript file and referenced back into the html document using the **src** attribute within the script tag. This is simply a text file saved with a “**.js**” file extension and containing **no** html tags**.** Wherethey **occur,** they should be **escaped** appropriately in order not tostop the page from rendering properly or throwing errors.

In the script tag which is placed in the header will now have a **src** attribute pointing the browser to the **url** (Universal Resource Locator) of the JavaScript file from its repository. As below, assuming this file is called librarycode.js. The closing **</script>** tag **must** persist.

**<script language= “javascript” type = “text/javascript”**

**src = “librarycode.js”></script>**

**Note: The space in between the opening and closed tags MUST be empty.**

### **Syntax rules. [ 5]**

* There is a **semi-colon** at the end of the JavaScript statement to comply with JavaScript syntax rules. This makes it a self contained statement.
* JavaScript is a **case sensitive** language and that “**ALERT**”, “**Alert**” and “**alert**” are all different words.
* All JavaScript **keywords** are ***identifier names*** and are specially, **reserved words**. They are in **lowercase** only.
* **Spaces, tabs and new lines** are collectively known as **white space**  and are completely **ignored** by JavaScript **parser**, so the code maybe **formatted** and **indented** and its appearance made more **human-readable**.
* It is often useful to add **comments** or **annotation** to JavaScript code as **explanation**, or when an **update** needs to happen. The parser sees any text between // and the **end** of that line as a **single-line** comment, which it ignores. Also any text, on **one** or **more lines** between **/\*** **\*/** is ignored.

**2.1 The Message Box.**

The **alert** command - Generating the *message box;*

Ex. 1

<html>

<head>

<title>scripting 1</title>

<script language ="JavaScript" type=”text/javascript”>

**alert** ( "Hello ! this is an alert message, and my first JavaScript programme. ");

</script>

</head>

<body>

</body>

</html>

The message box is achieved by calling the ***alert*** command in the code. When the document is loaded in the browser; the “**JavaScript engine**” implements the instructions contained in the code. **The code causes the browser to open a *grey box* (an alert box) bearing the message contained within the quotation marks inside the brackets**. The quotation marks do not appear and are used as **delimiters** for the string of characters representing the message. The quotation marks **MUST** always be there.

Using the console tab and break points in modern browsers, you can debug your code

**Note**: Using escapes. Alternate single, and double quotes: Both are interchangeable and must be consistent.

Ex. 2

<html>

<head>

<title>Alternating with single and double quotes</title>

<script language ="JavaScript" type=”text/javascript”>

**alert** ( "Hello ! this is an alert message for the ‘cool’ guys ");

**// alert** ( "Hello ! this is an alert message for the \”cool\” guys ");

</script>

</head>

<body>

</body>

</html>

## 2.2 Keywords

These **should not be used when using identifier names** and are part of the JavaScript language syntax (reserved words). In a professional editor all keywords will come out **bolded.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| break | do | function | null | typeof |
| case | else | if | return | var |
| continue | export | import | switch | void |
| default | false | in | this | while |
| delete | for | new | true | with |
| abstract | debugger | goto | package | synchronised |
| boolean | enum | implements | private | throws |
| byte | extends | instanceof | protected | transient |
| catch | final | Int | public | try |
| char | finally | interface | short | call |
| class | float | long | static | apply |
| const | double | native | super |  |

**2.3 Variables**

A **variable** is a **place** where **data** is **stored** and can be **manipulated** within a JavaScript **program**. Any **letter, digit** or the **underscore** (i.e. a[A], 1[n], \_ ) may be used to name a variable. The only exception is **not to begin with a digit**.

In the following example a new variable called ***message*** has been created using the JavaScript keyword “**var**”. The text string is stored inside the variable named *message*. This variable is used in the **call** to the JavaScript alert function that opens an **alert dialogue box** displaying the **string** that is stored in the variable. Note the call also known as ***initialisation***to the variable name inside alert has no **delimiters.**

Ex 4

<script language = “javascript” type=”text/javascript”>

<!- -

var message = “First JavaScript variable”;

alert (**message**);

//- - >

</script>

**2.4** **Data types & Escape Sequences**

Variables in JavaScript can be used to store **numbers, text strings** or **boolean** values **(true/false)**.This is unlike certain programming languages like C++ and Java where specific data types have to be declared and can store data of declared type.

The example below creates variables with initial values of the **three different** data types supported by JavaScript. These three values are *first* passed to the *alert ( )* function, then the JavaScript keyword **typeof**  is used to **return** their data types for display in the alert dialog box.

The syntax “**+\n+**” inside the brackets displays the output for each value on a **new line** in the alert dialog box.

Ex 5

<script language=”javascript” type=”text/javascript”>

var

a = 0.06,

b = “Is JavaScript easy?”,

c = false;

alert (**typeof** a + “\n” + **typeof** b + “\n” + **typeof** c );

</script>

**Escape sequence**:

When a **character** in a string is **preceded** by the **backslash** character **“\”** there is a **special effect** on the **character immediately following it**. This is referred to as **escape sequence** as it allows the *letter* **following it to escape recognition but present a meaning as part of the JavaScript syntax**. The table below lists more escape sequences:

|  |  |  |
| --- | --- | --- |
| \b | Backspace |  |
| \f | Form feed |  |
| \n | New line |  |
| \r | Carriage return |  |
| \t | Tab |  |
| \' | Single quote that will not terminate a string |  |
| \" | Double quote that will not terminate a string |  |
| \\ | Single backslash character |  |

The escape sequence “ **\”** “ (be careful) is useful to incorporate quotation marks within a string without the string terminating early as shown in the example below.

alert (“We all say **\”** Javascript is handy **\”** “);

**3.1 Arithmetical Operators**

|  |  |  |  |
| --- | --- | --- | --- |
| Arithmetical Operators |  |  |  |
|  |  |  |  |
| Operator | Operation |  |  |
| + | Addition(numeric), and concatenates strings–depending on operands |  |  |
| - | Subtraction |  |  |
| \* | Multiplication |  |  |
| / | Division |  |  |
| % | Modulo – returns remainder |  |  |
| ++ | Increment (alters the given value by 1 and returns resulting value) |  |  |
| - - | Decreases a given value by 1 and returns result. |  |  |

Care should be taken to **bracket expressions when more than one operator is being used** to clarify the operations. Use BODMAS (bracket of DIVISION, MULTIPLICATION, ADDITION and SUBTRACTION) in that order if possible.

A = b \* c – d % e / f // this is unclear

A = (b + c ) – ( (d % e) /f ) ; //this is clear

**3.2 Comparison Operators**

|  |  |
| --- | --- |
| Operator | Comparative test |
| = = | Equality |
| ! = | Inequality |
| > | Greater than |
| < | Less than |
| === | Matches equality & Type |
| > = | Greater than or equal to |
| < = | Less than or equal to |

The equality operator “= =” **compares two operands and will return true if both are equal in value**. It could be ***strings containing the same characters in same position or numbers***. **Boolean operands that are both, true, or both false, are equal.**

Conversely the “!=” operator returns true if two operands are not equal using the same rules as the “ = =”

“Greater than” operators compare two operands and will return true if the first operand is greater in value than the second.

“Less than” operators compares two operands, and will return true if the first operand is less in value than the second.

Adding the “ =” operator after a “greater than” or “less than” operator makes it also return true if the two operands are exactly equal in value.

The “greater than” operator “>” is frequently used to test the value of a countdown value in a loop.

4. The String object

The String object is used to manipulate a stored piece of text.

1. Returning the **length** of a string
2. **Length** is a property of the string object

Ex. 6

<html>

<head>

<title> Returning the length of a string</title>

</head>

<body>

<script language= “javascript” type="text/javascript">

var txt = "Hello World!";

document.write(txt.**length**);

</script>

</body>

</html>

*ii)* ***Styling*** *strings*

Ex. 7

<html>

<head>

<title> *Styling strings* </title>

</head>

<body>

<script language= “javascript” type="text/javascript">

var txt = "Hello World!";

document.write("<p>Big: " + txt.**big()** + "</p>");

document.write("<p>Small: " + txt.**small()** + "</p>");

document.write("<p>Bold: " + txt.**bold()** + "</p>");

document.write("<p>Italic: " + txt.**italics()** + "</p>");

document.write("<p>Fixed: " + txt.**fixed()** + "</p>");

document.write("<p>Strike: " + txt.**strike()** + "</p>");

document.write("<p>Fontcolor: " + txt.**fontcolor("green**") + "</p>");

document.write("<p>Fontsize: " + txt.**fontsize(6)** + "</p>");

document.write("<p>Subscript: " + txt.**sub()** + "</p>");

document.write("<p>Superscript: " + txt.**sup()** + "</p>");

document.write("<p>Link: " + txt.**link("http://www.w3schools.com")** + "</p>");

document.write("<p>Blink: " + txt.**blink()** + " (does not work in IE, Chrome, or Safari)</p>");

</script>

</body>

</html>

*iii ) How to convert a string to lowercase or uppercase letters.*

The **toLowerCase()** and **toUpperCase** methods

Ex. 8

<html>

<head>

<title> *How to convert a string to lowercase or uppercase letters* </title>

</head>

<body>

<script language= “javascript” type="text/javascript">

var txt="Hello World!";

document.write(txt.toLowerCase() + "<br />");

document.write(txt.toUpperCase());

</script>

</body>

</html>

iv) *How to search for a specified value within a string.*

The **match()** method

Ex. 9

<html>

<head>

<title> *How to search for a specified value within a string****.***</title>

</head>

<body>

<script type="text/javascript">

var str="Hello world!";

document.write(str.match("world") + "<br />");

document.write(str.match("World") + "<br />");

document.write(str.match("worlld") + "<br />");

document.write(str.match("world!"));

</script>

</body>

</html>

v) *How to replace a specified value with another value in a string.*

**Replace characters in a string – replace()** method

Ex. 10

<html>

<head>

<title> *How to replace a specified value with another value in a string.*</title>

</head>

<body>

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

var str="Visit Microsoft!";

document.write(str.replace("Microsoft","W3Schools"));

</script>

</body>

</html>

vi) *How to return the position of the first found occurrence of a specified value (a character or a word) in a string.*

**The indexOf()** method

NB: If no value is found in the evaluation, -1 is returned. The count position begins from zero.

Ex. 11

<html>

<head>

**<**title**>**

*How to return the* ***position****, of the first found occurrence of a specified value in a string*

</title>

</head>

<body>

<p>Note this can be the **position** of a **character** or position of a **word**</p>

<script type="text/javascript">

var str="Hello world!";

console.log(str.indexOf("d") + "<br />");

console.log (str.indexOf("WORLD") + "<br />");

console.log (str.indexOf("world"));

</script>

</body>

</html>

vii) *charAt (position)*

charAt() simply returns the character at the specified position. The count position begins from zero. For example:

var message="internet"

//alerts "n"

console.log(message.charAt(1)) // Will return character at second position if found.