Introduction to JavaScript

Introduction

- JavaScript is a **scripting language** most often used for client-side web development.

JavaScript is an implementation of the **ECMAScript (European Computer Manufacturers Association)** standard.

- The ECMAScript only defines the syntax/characteristics of the language and a basic set of commonly used objects such as Number, Date, Regular Expression, etc.

- The JavaScript supported in the browsers typically support additional objects.
  - e.g., Window, Frame, Form, DOM object, etc.

JavaScript / JScript

- JavaScript allows for interactivity.
- JavaScript was **developed by Netscape** as a simple programming language (often referred to as a scripting language).
- It is easy to learn and small sections of JavaScript can be added to a web page rather than needing to develop complicated programs.
- It is often used to respond to user actions such as mouse clicks.
- Different brands or/and different versions of browsers may support different implementation of JavaScript.
  - They are not fully compatible
- **JScript** is the Microsoft version of JavaScript.

What can we do with JavaScript?

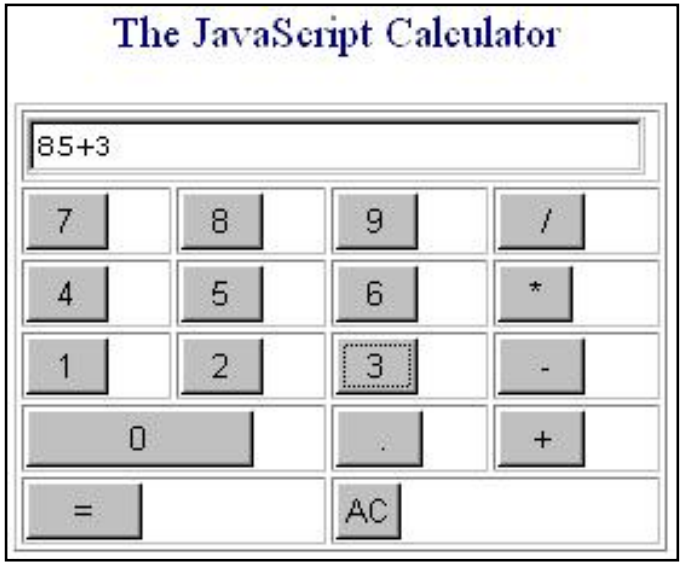
- To create interactive user interface in a web page (e.g., menu, pop-up alert, windows, etc.)

- Manipulating web content dynamically
  - Change the content and style of an element
  - Replace images on a page without page reload
  - Hide/Show contents

- Generate HTML contents on the fly
- Form validation
- AJAX etc…

JavaScript Allows Interactivity

- Improve appearance
  - Especially graphics
  - Visual feedback
- Site navigation
- Perform calculations
- Validation of input
- Other technologies



Features of JavaScript

- **Embedded within HTML page**
  - JavaScript is embedded/included within HTML. You can often see JavaScript in the source of a web page or it is provided for information on the page.
- **Executes on client**
  - JavaScript is mainly used as a client-side language - it downloads with the web page. Once the page has downloaded and is on the users' machine, it is actually the web browser which then interprets the JavaScript instructions. JavaScript pages run quickly, you are not relying on an internet connection to a web server.
- **Simple programming statements combined with HTML tags**
  - Short pieces of JavaScript can be combined with HTML without the need to develop a fully blown program.

Features of JavaScript

- Interpreted (not compiled)
  - There are two types of computer language,
    - **Compiled**
    - **Interpreted**
  - To write or edit a compiled language requires a special piece of software called a compiler.
  - JavaScript belongs to the other category, called interpreted. In the case of JavaScript, this interpretation is done by the browser software at run-time.
  - Because JavaScript is interpreted, this means that no special tools are required to write or edit JavaScript, just a normal text editor. JavaScript web pages can be platform independent i.e. they will run on different browsers and computers (as long as the browser is JavaScript enabled). If you see a JavaScript web page that you like, you may be able to take that JavaScript and use it for your own purposes.

Advantages of JavaScript

- An Interpreted Language
- Embedded Within HTML
- Minimal Syntax – Easy to Learn
- Quick Development
- Designed for Simple, Small Programs
- Performance
- Procedural Capabilities
- Designed for Programming User Events
- Easy Debugging and Testing
- Platform Independence/ Architecture Neutral

Disadvantages of JavaScript

- **Security:** Because the code executes on the users' computer, in some cases it can be exploited for malicious purposes. This is one reason some people choose to disable JavaScript.

- **Reliance on End User:** JavaScript is sometimes interpreted differently by different browsers. Whereas server-side scripts will always produce the same output, client-side scripts can be a little unpredictable. Don't be overly concerned by this though - as long as you test your script in all the major browsers you should be safe

Types of JavaScript

- **External Java Script :** Java Scripts can reside in a separate page.

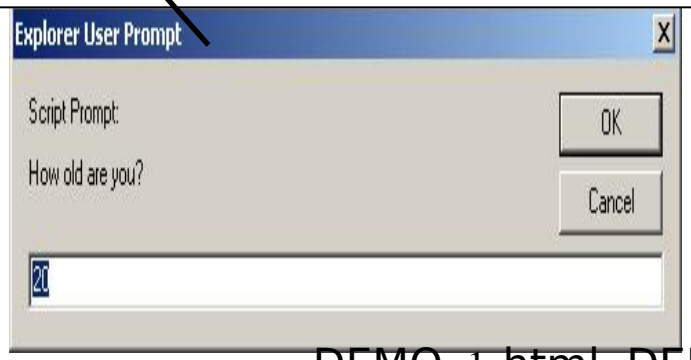
- **Internal JavaScript :** JavaScript can be embedded in HTML documents -- in the <head>, in the <body>, or in both.

- **In line JavaScript :** JavaScript object attributes can be placed in HTML element tags.
  - e.g., <body onLoad="alert('WELCOME')">

Embedding JavaScript in HTML

- The scripts inside an HTML document is interpreted in the order they appear in the document.
  - Scripts in a function is interpreted when the function is called.
- So where you place the <script> tag matt

```
<script type="text/javascript">
alert("This is an Alert method");
confirm("Are you OK?");
prompt("What is your name?");
prompt("How old are you?","20");
</script>
```



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Using Separate JavaScript Files (External)

- Linking can be advantageous if many pages use the same script.
- Use the src attribute to include JavaScript codes from an external file.
- The included code is inserted in place.

```
<html>
<head><title>First JavaScript Program</title></head>
<body>
<script type="text/javascript“
      src="your_source_file.js"></script>
</body> </html>
```

Inside your_source_file.js

```
document.write("<hr>");
document.write("Hello World Wide Web");
document.write("<hr>");
```

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JavaScript Syntax

- Unlike HTML, JavaScript is case sensitive.
- Dot Syntax is used to combine terms.
  - e.g., document.write("Hello World")
- Certain characters and terms are reserved.
- JavaScript is simple text (ASCII).

Using Comment Tags

- HTML comment tags should bracket any script.
- The <!-- script here --> tags hide scripts in HTML and prevent scripts from displaying in browsers that do not interpret JavaScript.
- Double slashes // are the signal characters for a JavaScript single-line comment.

Java Script Variables

JavaScript variables are containers for storing data values.

Example:

```
var x = 5;
var y = 6;
var z = x + y;
```

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Java Script Identifiers

- All JavaScript variables must be identified with unique names.
- These unique names are called identifiers.

  Identifiers can be short names (like x and y), or more descriptive names (age, sum, totalVolume).

The general rules for constructing names for variables (unique identifiers) are:

- Names can contain letters, digits, underscores, and dollar signs.
- Names must begin with a letter
- Names can also begin with $ and _ (but we will not use it in this tutorial)
- Names are case sensitive (y and Y are different variables)
- Reserved words (like JavaScript keywords) cannot be

Data Types

Primitive data types

- Number: integer & floating-point numbers
- Boolean: true or false
- String: a sequence of alphanumeric characters

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Data Types

Composite data types (or Complex data types)

- Object: a named collection of data
- Array: a sequence of values (an array is actually a predefined object)

Special data types

- Null: the only value is "null" – to represent nothing.
- Undefined: the only value is "undefined" – to represent the value of an uninitialized variable

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Strings

- A string variable can store a sequence of alphanumeric characters, spaces and special characters.
- A string can be enclosed by a pair of single quotes (') or double quote ("). You can use escaped character sequence to represent special character (e.g.: \", \n, \t).

typeof operator

```
var x = "hello", y;
alert("Variable x value is " + typeof x );
alert("Variable y value is " + typeof y );
alert("Variable x value is " + typeof z );
```

- This unary operator that tells the type of its operand.
  - Returns a string which can be "number", "string", "boolean", "object", "function", "undefined", and "null".

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Null & Undefined

- An undefined value is represented by the keyword "**undefined**".
  - It represents the value of an uninitialized variable.
- The keyword "null" is used to represent “nothing”
  - Declare and define a variable as “null” if you want the variable to hold nothing.
  - Avoid leaving a variable undefined.

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Objects

- Objects refers to windows, documents, images, tables, forms, buttons or links, etc.
- Objects should be named.
- Objects have properties that act as modifiers.

Properties

- Properties are object attributes.
- Object properties are defined by using the object's name, a period, and the property name.
  - e.g., background color is expressed by: document.bgcolor where:
    - document is the object and
    - bgcolor is the property.

Operators & Expression

- Arithmetic Operators
- Logical Operators
- Comparison Operators
- String Operators
- Assignment Operators

Arithmetic Operators

- Arithmetic operators are used to perform arithmetic on numbers (literals or variables).

Operators	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulus
++	Return the value then Increment
--	Return the value then Decrement

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Comparison Operators

- Comparison operators are used in logical statements to determine equality or difference between variables or values

Operator	Description
==	Equal
!=	Not Equal
<	Greater Than
>	Less Than
<=	Less than or equal to
>=	Greater than or equal to
===	Strictly equal
!==	Strictly Not equal

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Logical Operators

- Logical operators are used to determine the logic between variables or values.

Operator	Description
&&	**Logical AND**
||	**Logical OR**
!	**Logical NOT**

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Assignment Operators

Assignment operators assign values to JavaScript variables.

Operator	Description
=	Sets the variable on the left of the = operator to the value of the expression on its right.
+=	Increment the variable on te left of the += operator by the value of expression on its right.
-=	Decrement the variable on te left of the -= operator by the value of expression on its right.
*=	Multiply the variable on te left of the *= operator by the value of expression on its right.
/=	Divides the variable on te left of the /= operator by the

String Operators

- The **+** operator can also be used to add (concatenate) strings.
- When used on strings, the + operator is called the concatenation operator.
- The **+=** assignment operator can also be used to add (concatenate) strings.

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Conditional Expression : Ternary Operator

- The conditional expression operator is a ternary operator since it takes three operands,

condition ? Value 1 : value 2

- A condition to evaluated and two alternative values to be returned based on the truth or falsity of the condition.

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Function in Java Script

- Function are **blocks of Java Script code** that perform a specific task and often return value.
- Function are two types:
  - Built – in Function
  - User Define Function

Built – in Function

- Java script provides several built-in functions that can be used to perform explicit type conversions.
- Eval() - used to convert a string expression to a numeric value.
- parseInt() - used to convert a string value to an integer.
- Parsefloat() - return the first floating point number contained in a string or 0 if the string does not begin with a valid floating point number.

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User Defined Function in Java Script

- Functions offer the ability to group together Java Script program code that performs a specific task into a single unit that can be used repeatedly whenever required in a Java Script program.
- User defined function
  - Need to be declared
  - Coded
  - Invoked
  - Can be return value

User Define Function in Java Script

- Functions are declared and created using the "***function***" keyword
- A function can comprise of following:
  - A name of the function
  - A list of parameters that will accept values passed to the function when called.
  - A block of Java script code that defines what the function does.
- Syntax:

function function_name (parameter1, parameter2, ….)

{

…… // block of java script code

}

- function_name is case sensitive, can include (_) and has

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Function with parameter passing and returnin value

- Function can be **declared anywhere** within an HTML file.
- Function can be called **by function name**.
- Function can **accept parameter/s** and also **return value**.

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Dialog Box alert() and confirm()

```
alert("Text to be displayed");
```

Display a message in a dialog box.
The dialog box will block the browser.

```
var answer = confirm("Are you sure?");
```

Display a message in a dialog box with two buttons: "OK" or "Cancel“.
confirm() returns **true if the user click "OK". Otherwise it returns false.**

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prompt()

```
prompt("What is your student id number?");
prompt("What is your name?”, "No name");
```

Display a message and allow the user to enter a value

The second argument is the "default value" to be displayed in the input textfield.

Without the default value, "undefined" is shown in the input textfield.

If the user click the "OK" button, prompt() returns the value in the input textfield as a string.

If the user click the "Cancel" button, prompt() returns null.