Introduction to JavaScript

Unit – 4 Java Script

- Introduction of Java Script
- Advantages & disadvantages
- Types of Java Script
- Dynamic HTML
- Basic Programming Techniques
- Operators and Expression
- Function
- Conditional And Looping Statements
- Dialog Box
- Build in Objects – Strings , Maths, Date

Introduction

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

- JavaScript is an implementation of the **ECMAScript** 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?

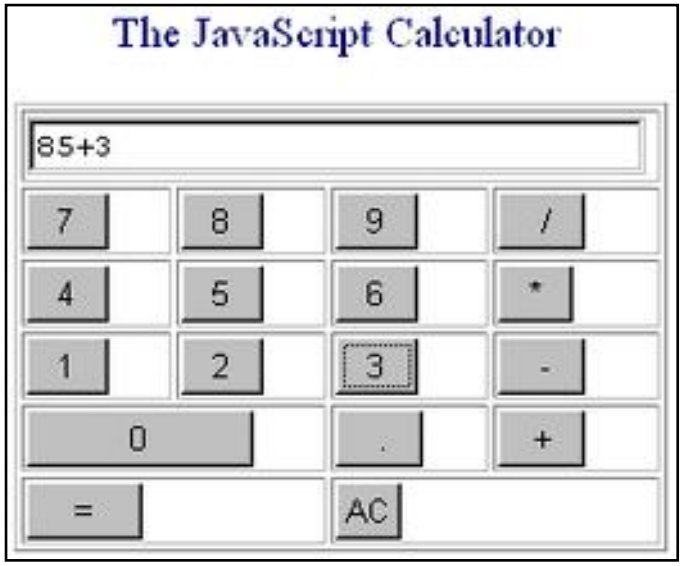
- To create interactive user interface in a web page (e.g., menu, pop-up alert, windows, etc.)

- 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.

- **Depending 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 matters.

```
<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>
```

DEMO_1.html, DEMO_2.html, DEMO_3.html

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>");
```

DEMO_4.html

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;
```

DEMO_5.html

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 used as names

Data Types

Primitive data types

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

DEMO_6.html

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

DEMO_6.html

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";
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”.

DEMO_7.html

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.

DEMO_8.html

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).

Operator	Description	Operator	Description
+	Addition	++	Increment
-	Subtraction	--	Decrement
*	Multiplication		
/	Division		
%	Modulo		

DEMO_9.html

Comparison Operators

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

Operator	Desription	Operator	Description
==	Equal to	!==	Not equal to & not Eqyal Type
===	Equal to and Equal type	<	Less than
!=	Not equal to	>	Grater than

DEMO_10.html

Logical Operators

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

Operator	Description
&&	And
||	Or
!	Not

DEMO_11.html

Assignment Operators

- Assignment operators assign values to JavaScript variables.

Operator	Description
=	Assignment
+=	Increment & assignment
-=	Decrement & Assignment
*=	Multiplication & Assignment
/=	Division & Assignment
%=	Modulo & Assignment

DEMO_12.html

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.

DEMO_13.html

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.

DEMO_14.html

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.

DEMO_15.html DEMO_16.html

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 to start with a latter.

DEMO_17.html

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**.

DEMO_18.html DEMO_19.html

Class Work for Function in Java Script

- Write a Java script which will take input as a FAHRENHEIT and convert it in to CELSIUS.

FORMULA FOR °F TO °C IS

°C = (°F - 32) x 5/9

DEMO_20.html

Home Work for Function in Java Script

- Write a Java script which will take input as a KILOMETER and convert it in to METERS.

FORMULA FOR KM TO M IS

1 Kilo Meter = 1000 Meters

Class Work for Function in Java Script

Write a Java script which will take user's AGE from prompt and pass it to the function, which return that whether the he is young boy or man.

AGE OF YOUNG BOY BELLOW 18 YEARS

AGE OF MAN ABOVE 18 YEARS

DEMO_21.html

Class Work for Function in Java Script

Write a Java script which will takes student's THREE SUBJECTS MARKS from prompt and pass it to the function "*calc_percentage*", this function calculate percentage and passes percentage to the other function "*result*", which show the student result (PERCENTAGE) and also result (PASS or Fail).

ALL SUBJECT MAXIMUM MARK IS 100 and MINIMUM MARKS IS 35

DEMO_22.html

Class Work for Function in Java Script

Write a Java script program to calculate are of circle. Take necessary input from prompt and passes it to the function”area”, which return the calculated area of circle.

*Equation for the area of circle is (3.14 * r * r)*

Class Work for Function in Java Script

Write a Java script program to calculate Simple Interest. Take necessary input from prompt and passes it to the function”Simple_Interest”, which return the calculated Interest of the given principle.

*Equation for the Simple Interest is (p * r * n)/100*

Conditional Checking

- Conditional statements are used to perform different actions based on different conditions.

- In JavaScript we have the following conditional statements:
  - Use **if** to specify a block of code to be executed, if a specified condition is true
  - Use **else** to specify a block of code to be executed, if the same condition is false
  - Use **else if** to specify a new condition to test, if the first condition is false
  - Use **switch** to specify many alternative blocks of code to be executed.

The if Statement

- Use the **if statement** to specify a block of JavaScript code to be executed if a condition is true.

- Syntax:

```
if (condition)
 {
   block of code to be executed if the condition is true
}
```

DEMO_1_1.html

The else Statement

- Use the **else statement** to specify a block of code to be executed if the condition is false.

- Syntax:

```
if (condition)
{
   block of code to be executed if the condition is true
}
 else
 {
   block of code to be executed if the condition is false
}
```

DEMO_2_1.html

The else if Statement

- Use the **else if statement** to specify a new condition if the first condition is false.
- Syntax:

```
if (condition1) {
  block of code to be executed if condition1 is true
}
else if (condition2) {
  block of code to be executed if the condition1 is false and condition2 is true
} else {
  block of code to be executed if the condition1 is false and condition2 is false
}
```

DEMO_3_1.html

The loop Statement

- Loops can execute a block of code a number of times.
- Loops are handy, if you want to run the same code over and over again, each time with a different value.
- JavaScript supports different kinds of loops:
  - **for -** loops through a block of code a number of times
  - **while -** loops through a block of code while a specified condition is true

The for loop Statement

- Loops can execute a block of code a number of times.
- The for loop has the following syntax:

for (statement 1; statement 2; statement 3) {

code block to be executed

}

- **Statement 1** is executed before the loop (the code block) starts.
- **Statement 2** defines the condition for running the loop (the code block).
- **Statement 3** is executed each time after the loop (the code block) has been executed.

DEMO_5_1.html

The While loop Statement

- The while loop loops through a block of code as long as a specified condition is true.
- The while loop has the following syntax:

while (condition) {

code block to be executed

}

- **Statement 1** is executed before the loop (the code block) starts.
- **Statement 2** defines the condition for running the loop (the code block).
- **Statement 3** is executed each time after the loop (the code block) has been executed.

DEMO_6_1.html

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.**

DEMO_23.html DEMO_24.html

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.

String Objects

- Every string in Java Script is an object.
- The string object has a properties, methods to perform a variety of string operation.

Property	Description
length	An Integer value represting the number of character in string

String Objects

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Method	Description
Slice() **Syntax :** slice(start, end)	extracts a part of a string and returns the extracted part in a new string.
substr() **Syntax :** substr(start, length)	substr() is similar to slice(). The difference is that the second parameter specifies the length of the extracted part.
Substring() **Syntax :** substring(start, end)	It is used to fetch the part of the given string on the basis of the specified index. If you omit the second parameter, substring() will slice out the rest of the string.

replace() **syntax** : replace(“old string” , “new string”)	replaces a specified value with another value in a string **replaces only the first match**
toUpperCase()	A string is converted to upper case
toLowerCase()	A string is converted to lower case
concat()	joins two or more strings
charAt()	returns the character at a specified index (position) in a string
search()	The JavaScript string search() method is used to search the regular expression in the given string. returns its position if a match occurs.
	This method returns -1, if match is not found.

Math Objects

- The math object has a properties, methods to move beyond simple arithmetic manipulations offered by arithmetic operators.

Properties	Description
LN10	The Natural logoritham base 10
PI	3.14 or 22 / 7

Math Objects

- The math object has a properties, methods to move beyond simple arithmetic manipulations offered by arithmetic operators.

Method	Description
abs()	Absolute value of number
ceil()	Return the next integer grater than or equal to number
floor()	Return the next integer less than or equal to number
pow()	Calculate the value of one number to the power of second number
random()	Return the random number between 0 to 1

Method	Description
sqrt()	Calculate the square root of the number
round ()	returns the nearest integer:
min()	can be used to find the lowest value in a list of arguments:
max()	can be used to find the highest value in a list of arguments:

Date Objects

- The date object enables Java Script Programers to create an object that can contain information about a particular date.

Methods	Description	Methods	Description
getDate	It returns the integer value between 1 and 31	getHours	It returns the integer value between 0 and 23
getDay	It returns the integer value between 0 and 6	getMinutes	It returns the integer value between 0 and 59
getFullYear	It returns the integer value that represents the year	getSeconds	It returns the integer value between 0 and 60
getMonth	It returns the integer value between 0 and 11		

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