

Web Programming Technologies

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JavaScript



Session-1

Topics to be covered...

- What is Scripting Language
- Client vs. Server Side Scripting
- Introduction to JavaScript
- Where JavaScript is used
- Variables in Javascript
- JavaScript Console
- Let keyword
- Use Strict Keyword
- Javascript Hoisting
- JS Operators
- Function
- Control Structure and loops
- Write(),alert(),confirm() and prompt() box
- DOM Events
- Global Properties and methods

A Script is a program or sequence of instructions that is interpreted or carried out by another program rather than by computer processor.

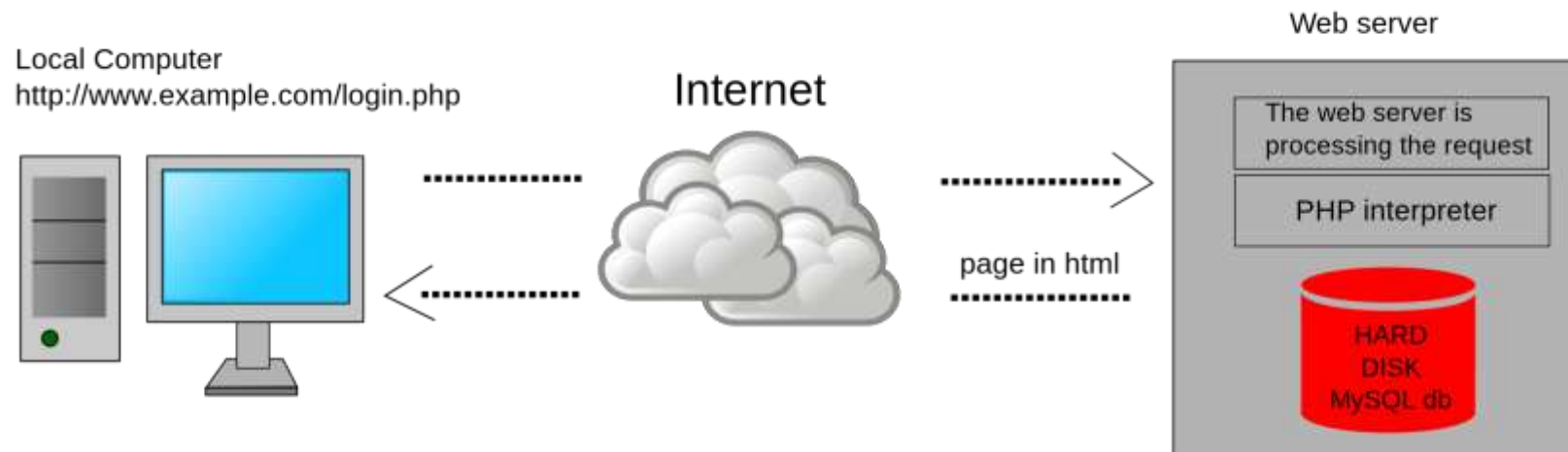
The scripting language is basically a language where instructions are written for a run time environment. They do not require the compilation step and are rather interpreted.

Server Side Scripting

Server side scripting is used to connect to the database that reside on the web server.

Server side scripting can access the file system residing at the web server.

Response from a server-side script is slower as compared to a client-side script because the scripts are processed on the remote computer.



Advantage: Your scripts are hidden from view. Users only see the HTML output , even when they view the source.

Client Side Scripting

Program that execute on client side, by the web browser instead of server side.

Upon request, the necessary files are sent to the user's computer by the web server on which they reside.

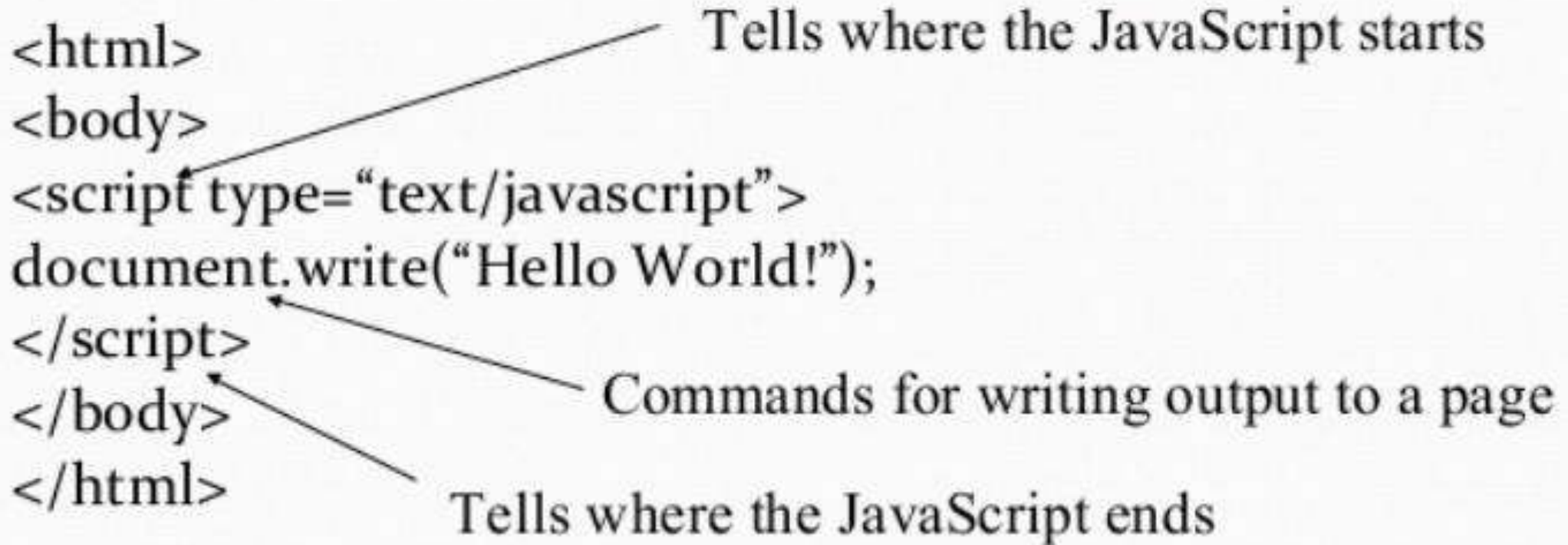


Advantages:

Allow for more interactive by immediately responding to user actions.

Execute quickly because they don't require a trip to the server.

Can give developers more control over the look and behavior of their web apps.



```

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

```

Tells where the JavaScript starts

Commands for writing output to a page

Tells where the JavaScript ends

This code produce the output on an HTML page:
Hello World!

What is ECMAScript?

ECMAScript (European Computer Manufacturers Association) is a scripting language standard and specification

JavaScript

Jscript

ActionScript

What is JavaScript?

JavaScript is used to program the behaviour of web pages (performing dynamic tasks).

JavaScript are scripts (code) that is executed on the client's browser instead of the web-server (Client-side scripts).

JavaScript is lightweight and cross-platform and loosely coupled.

JavaScript was created by Brendan Eich, a Netscape Communications Corporation programmer, in September 1995.



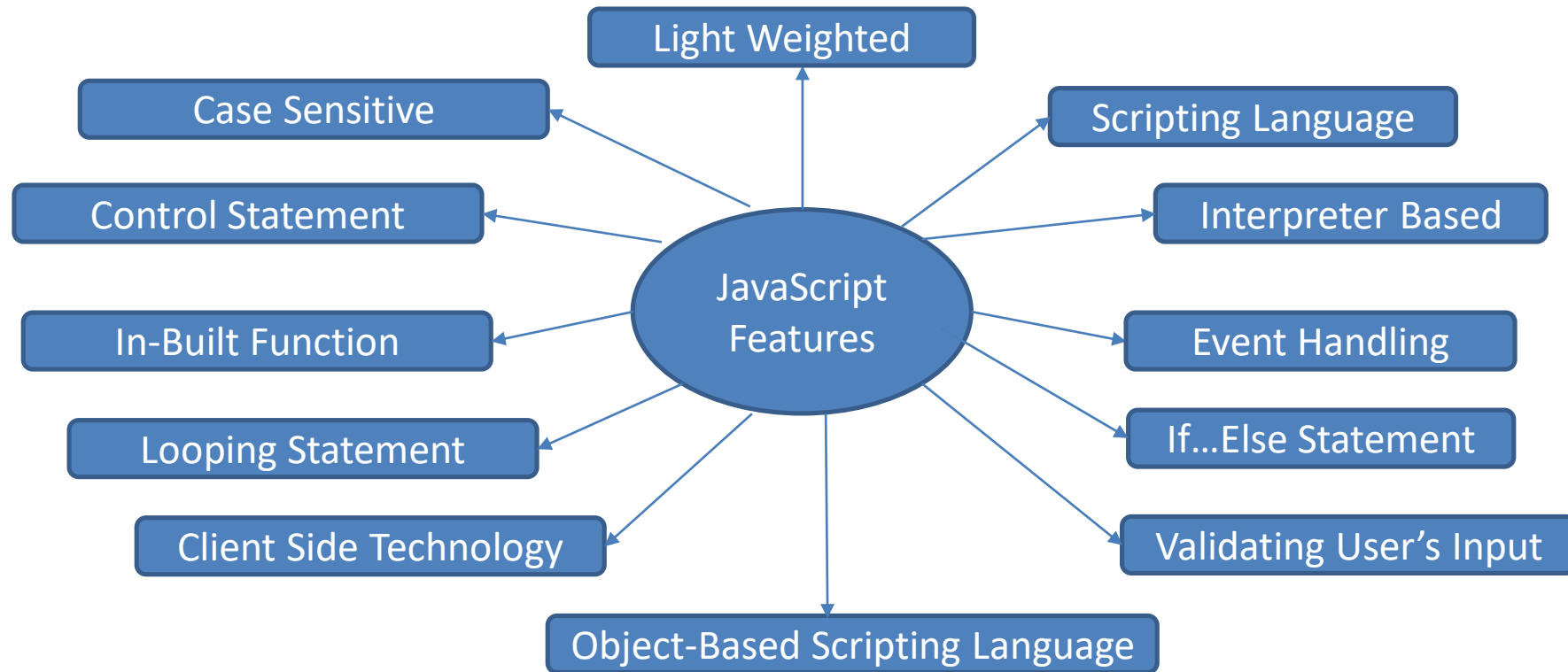
- **HTML**
 - Hypertext Markup Language
 - Structure of Page
- **JavaScript**
 - Interactivity with User
 - Dynamic Updates in a Web Page
- **CSS**
 - Cascading Style Sheets
 - Presentation/Styling



Why we need client side programming

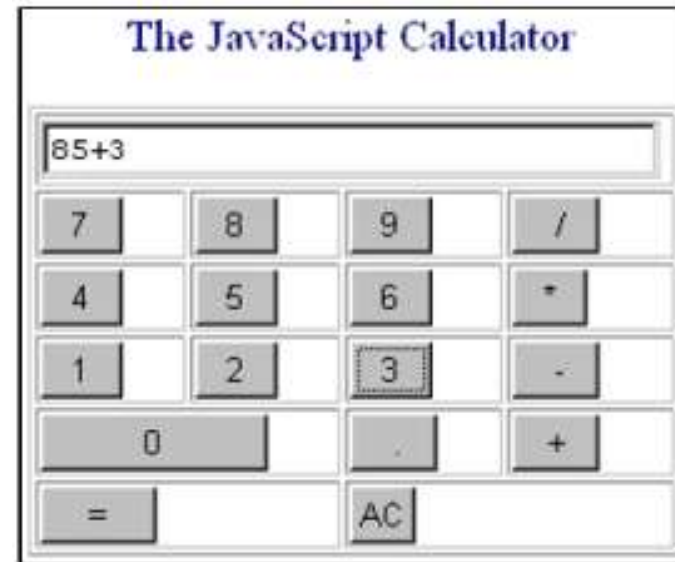
- The user's actions will result in an immediate response because they don't require a trip to the server.
- Allows the creation of faster and more responsive web applications.
- Make web pages more interactive
- Fewer resources are used and needed on the web-server.

JavaScript Features



What Javascript can do?

- Javascript can change HTML Content
- Javascript can change HTML Attributes
- Javascript can change HTML Styles (CSS)
- Javascript can validate Data
- Javascript can Make Calculations



Embedding JavaScript in HTML

1. Anywhere in the html file between <script></script> tags.

```
<!DOCTYPE html>
<html>
<body>

<h2>JavaScript Demo</h2>

<p id="demo"></p>

<script>
document.write("My First JavaScript");
</script>
|
</body>
</html>
```

2. In an external file and refer to it using the SRC attribute.

```
<!DOCTYPE html>
<html>
<head>
<title>External Javascript</title>
<script src="myScript.js"></script>
</head>
<body>
<p id="demo">A Paragraph.</p>
</body>
</html>
```


JavaScript Display Possibilities

JavaScript can "display" data in different ways:

1. Writing into the browser console, using **console.log()**.
2. Writing into the HTML output using **document.write()**.
3. Writing into an alert box, using **window.alert()**.
4. Writing into an HTML element, using **innerHTML**.

The Console object provides access to the browser's debugging console.

Console Object Methods:

log() method: writes a message to the console.

Syntax

`console.log(message)`

```
<!DOCTYPE html>
<html>
<body>
<script>
console.log("Hello world!");
</script>
</body>
</html>
```

table() Method: writes a table in the console view.

```
<!DOCTYPE html>
<html>
<body>
<script>
console.table(["Audi", "Volvo", "Ford"]);
</script>
</body>
</html>
```

VM1440:4

(index)	Value
0	"Audi"
1	"Volvo"
2	"Ford"

► Array(3)

```
<!DOCTYPE html>
<html>
<body>
<script>
var car1 = { name : "Audi", model : "A4" }
var car2 = { name : "Volvo", model : "XC90" }
var car3 = { name : "Ford", model : "Fusion" }

console.table([car1, car2, car3]);
</script>
</body>
</html>
```

VM116:1:6

(index)	name	model
0	"Audi"	"A4"
1	"Volvo"	"XC90"
2	"Ford"	"Fusion"

► Array(3)

clear() Method: clears the console.

The `console.clear()` method will also write a message in the console: "Console was cleared".

Syntax

```
console.clear()
```

An alert box is often used if you want to make sure information comes through to the user.

Syntax

```
window.alert("sometext");
```

```
alert("I am an alert box!");
```

An embedded page on this page says

I am an alert box!

OK

Prompts and Confirm

Prompts :The return is the data the user entered

```
<script type="text/javascript">  
window.prompt('Message', 'Initial Value');  
</script>
```

Confirm: The confirm returns true and false

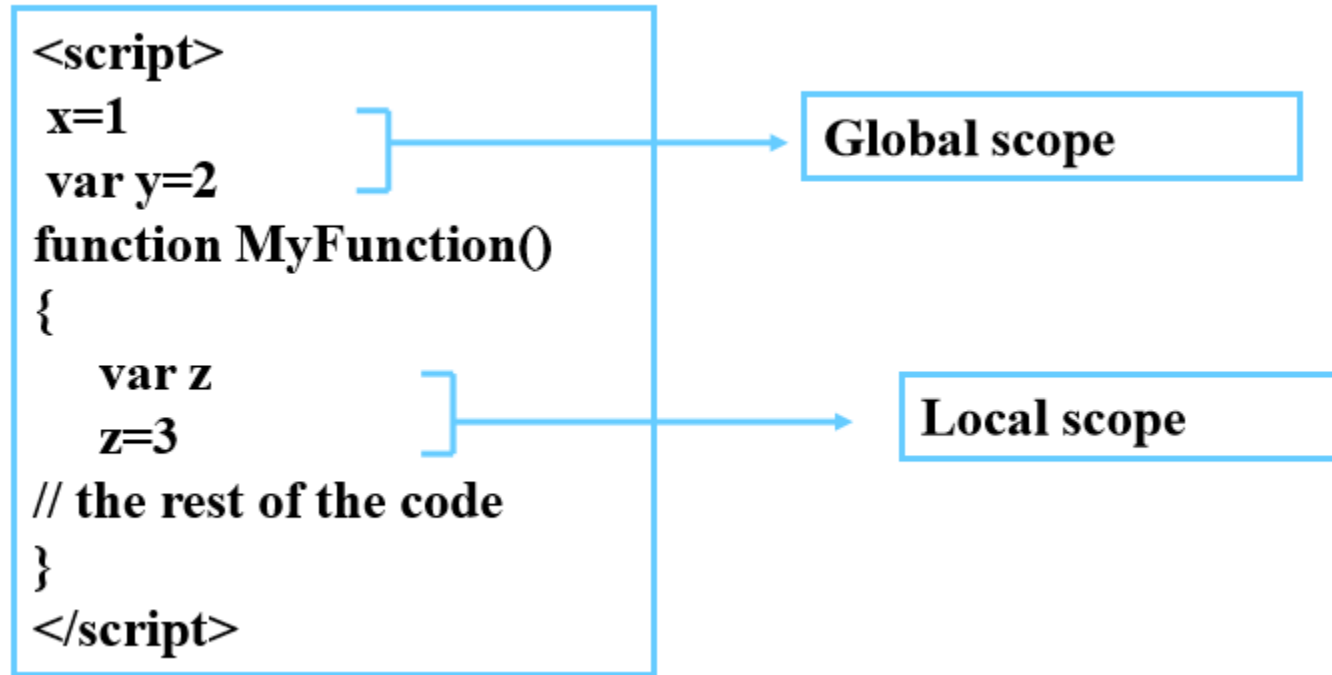
```
<script type="text/javascript">  
window.confirm('Message');  
</script>
```

Variables

JavaScript variables are containers for storing data values..

Variables are declared with the '**var**' keyword.

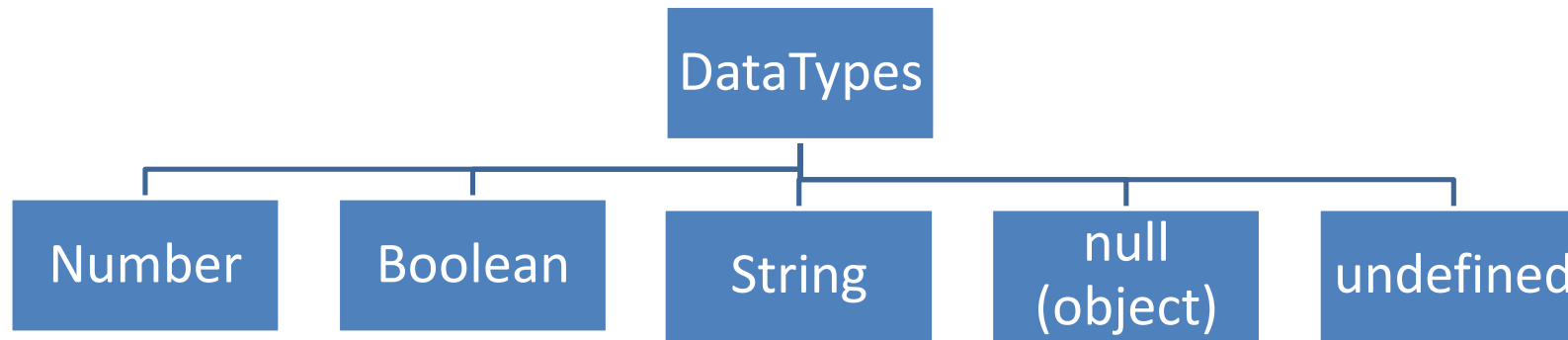
var a=10;



Lexical Scoping:

Depending on position meaning changes.

Data Types



```
var x=10;  
alert(typeof(x));
```


undefined value and null value

Undefined value means the variable is declared but not assigned.

Ex.

```
var x;  
  
console.log(x);  
  
x=10;
```

null value means the variable is declared and assigned as null means noting neighter number nor string or boolean.

```
var x=null;  
  
console.log(x);
```

Declaring and Assigning variables

```
var x=10; //Declare and Assigning
```

```
var t; //Declaring  
var t=20; //Assigning
```

```
y=10; //Declaring auto and Assigning
```

"use strict"

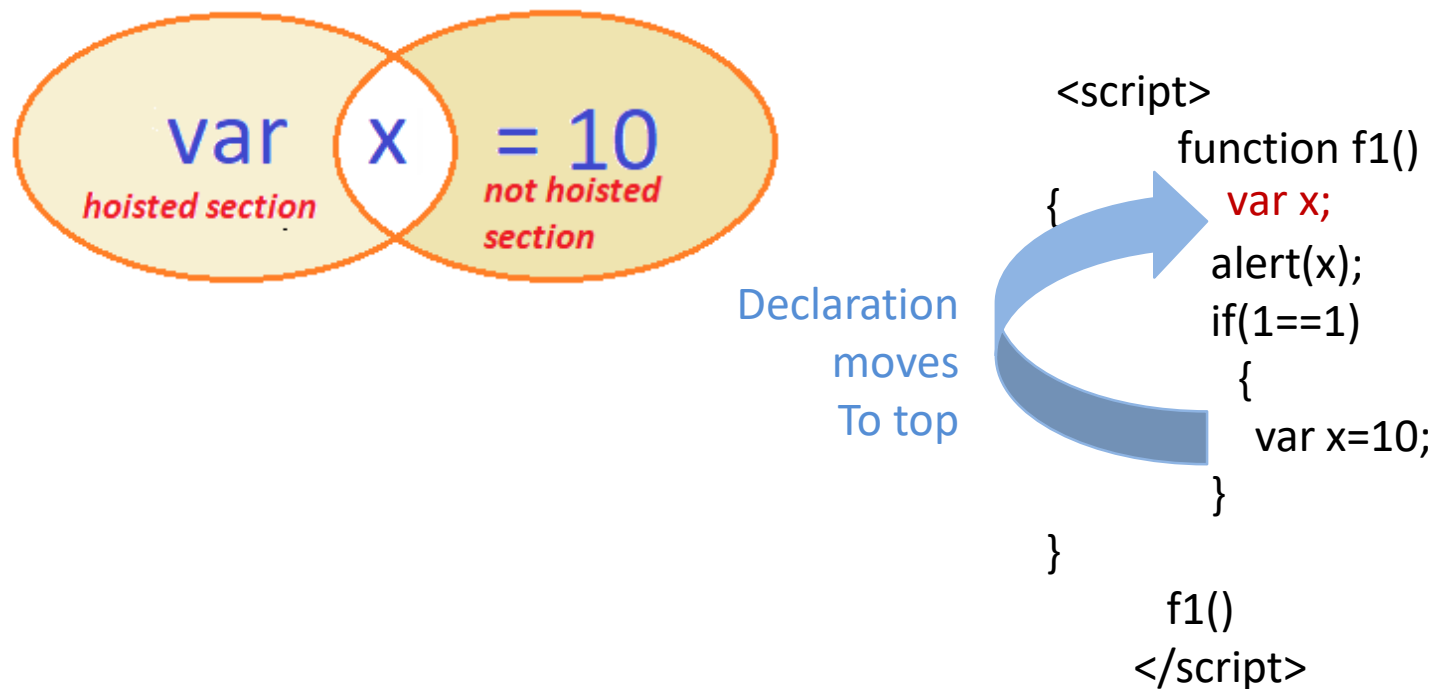
The strict mode in JavaScript does not allow following things:

- Use of undefined variables
- Use of reserved keywords as variable or function name
- Duplicate properties of an object
- Duplicate parameters of function
- Assign values to read-only properties
- Modifying arguments object

```
"use strict";  
x = 3.14;           // This will cause an error because x is not declared
```

JavaScript Hoisting

Hoisting is JavaScript's **default behavior of moving all declarations to the top of the current scope** (to the top of the **current script** or the **current function**).



Javascript Operators

typeof: operator returns a string indicating the type of the unevaluated operand.

Syntax:

typeof operand

The following table summarizes the possible return values of typeof

Type	Result
Undefined	"undefined"
Null	"object"
Boolean	" <u>boolean</u> "
Number	"number"
String	"string"

Arithmetic Operator

Addition (+) Operator:

The addition operator produces the sum of numeric operands or string concatenation.

Type	Result
Number + Number (addition)	$10 + 10 = 20$
Boolean + Number (addition)	$true + 10 = 11$
Boolean + Boolean (addition)	$true + true = 2$ / $false + false = 0$
Boolean + Boolean + Number (addition)	$true + true + 1 = 3$ / $true + false + 1 = 2$
String + String (concatenation)	<u>"Infoway"</u> + <u>"Kothurd"</u> = <u>InfowayKothrud</u>
String + Number (concatenation)	<u>'Infoway'</u> + 10 = Infoway10
String + Boolean (concatenation)	"A" + true = Atrue
Number + String (concatenation)	10 + <u>"Infoway"</u> = 10Infoway
Number + String + Number (concatenation)	10 + <u>'Infoway'</u> + 10 = 10Infoway10
Number + Number + String (addition & concatenation)	10+10 + <u>"Infoway"</u> = 20Infoway
Boolean + Boolean + String (addition & concatenation)	true + true + <u>"Infoway"</u> = 2Infoway

Subtraction (-) Operator

Type	Result
Number - String	10 - 'A' = NaN
String - Number	"A" - 10 = NaN

Multiplication (*) Operator

Type	Result
Number * String	10 * 'A' = NaN
String * Number	"A" * 10 = NaN

Division (/) Operator

Type	Result
Number / String	10 / 'A' = NaN
Number / Number	10 / 0 = Infinity

Comparisons 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

Equality (==) operators

The **equality (==)** operator converts the operands if they are not of the same type, then applies strict comparison.

Syntax:

A==B

```
1 == 1           // true
'1' == 1         // true
1 == '1'         // true
0 == false       // true
0 == null        // false
```

Identity / strict equality (===) operators

The `identity (===)` operator returns true if the operands are strictly equal with no type conversion.

Syntax:

`A===B`

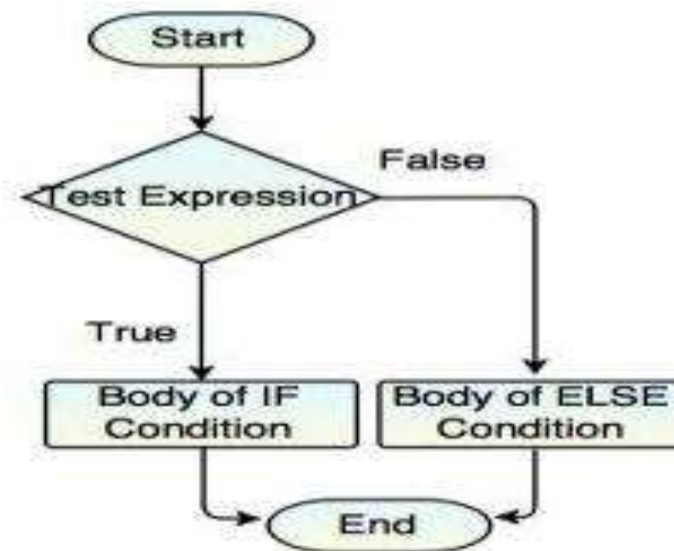
```
1 === 1      // true
```

```
1 === '1'    // false
```

if Statements

if-else statement is used to execute the code whether condition is true or false.

```
if(condition)
{
    //Statement 1;
}
Else
{
    //Statement 2;
}
```



Switch Statement

Switch is used to perform different actions on different conditions. It is used to compare the same expression to several different values.

```
switch(expression)
{
    case condition 1:
        //Statements;
        break;
    case condition 2:
        //Statements;
        break;
    .
    .
    case condition n:
        //Statements;
        break;
    default:
        //Statement;
}
```

Loops

for Loop:

```
for(initialization; test-condition;
increment/decrement)
{
    //Statements;
}
```

While Loop

```
while (condition)
{
    //Statements;
}
```

Do-While Loop

```
do
{
    //Statements;
}
while(condition);
```

for...in loop is used to loop through an object's properties.

Events are actions or occurrences that happen in the system you are programming, which the system tells you about so you can respond to them in some way if desired.

For example, if the user clicks a button on a webpage, you might want to respond to that action by displaying an information box.

```
<script type="text/javascript">  
  function click_event()  
  {  
    document.write("Button is clicked");  
  }  
</script>  
</head>  
<body>  
  <button onclick="click_event()">Click Me</button>  
</body>
```

Events	Description
onclick	occurs when element is clicked.
ondblclick	occurs when element is double-clicked.
onfocus	occurs when an element gets focus such as button, input, textarea etc.
onblur	occurs when form loses the focus from an element.
onsubmit	occurs when form is submitted.
onmouseover	occurs when mouse is moved over an element.
onmouseout	occurs when mouse is moved out from an element (after moved over).
onmousedown	occurs when mouse button is pressed over an element.
onmouseup	occurs when mouse is released from an element (after mouse is pressed).
onload	occurs when document, object or frameset is loaded.
onunload	occurs when body or frameset is unloaded.
onscroll	occurs when document is scrolled.
onresize	occurs when document is resized.
onreset	occurs when form is reset.
onkeydown	occurs when key is being pressed.
onkeypress	occurs when user presses the key.
onkeyup	occurs when key is released.

window.open()

Opens the new window.

syntax

```
var window = window.open(url, windowName, [windowFeatures]);
```

A DOM String indicating the URL of the resource to be loaded. This can be a path or URL to an HTML page, image file, or any other resource which is supported by the browser. If the empty string ("") is specified as url, a blank page is opened into the targeted browsing context.

```
<script>  
    function openwin(){  
        mywin=window.open("Page1.html","", "width=200,height=200,top=200,left=100");  
    }  
</script>
```


window.close()

closes the current window

syntax

```
window.close();
```

```
<script>  
    window.close();  
</script>
```

prints the contents of the window.

syntax

```
window.print();
```

```
<script>  
    window.print();  
</script>
```

JavaScript Global Properties & methods

Infinity: A numeric value that represents positive/negative infinity

NaN: "Not-a-Number" value

eval(): Evaluates a string and executes it as if it was script code

isFinite(): Determines whether a value is a finite, legal number

isNaN(): Determines whether a value is an illegal number

Number(): Converts an object's value to a number

parseFloat(): Parses a string and returns a floating point number

parseInt(): Parses a string and returns an integer

END

Session-2

Topics to be covered...

- JavaScript Array
- JavaScript Array Methods
- JavaScript String
- String Methods
- JavaScript Dates Get/Set Methods
- JavaScript Math Object
- JavaScript RegEx

Array

JavaScript array is an object that represents a collection of similar type of elements.

Array indexes start with 0. [0] is the first array element, [1] is the second, [2] is the third ...

By array literal:

```
var arrayname=["value1","value2"....."valueN"];
```

By using an Array constructor (using new keyword):

```
var arrayname=new Array("value1","value2","value3");
```

```
<script>
var emp=new Array("one","two","three");
for (i=0;i<emp.length;i++){
document.write(emp[i] + "<br>");
}
</script>
```

Output:

one
two
three

Array Properties

length property: The `length` property of an object which is an instance of type Array sets or returns the number of elements in that array.

Syntax: `array.length`

```
<script type="text/javascript">  
var arr = new Array( 10, 20, 30 );  
document.write("array length is : " + arr.length);  
</script>
```

Array-methods

concat(): Returns a new array comprised of this array joined with other array(s) and/or value(s).

Syntax:

```
array.concat(value1, value2, ..., valueN);
```

toString(): Returns a string representing the array and its elements.

Syntax:

```
array.toString();
```

join(): Joins all elements of an array into a string.

It behaves just like toString(), but in addition we can specify the separator.

Syntax:

```
array.join(separator);
```

pop():

Removes the last element from an array and returns that element.

Syntax:

```
array.pop();
```

push():

Adds one or more elements to the end of an array and returns the new length of the array.

Syntax:

```
array.push(element1, ..., elementN);
```

shift(): Removes the first element from an array and returns that element.

Syntax:

```
array.shift();
```

unshift(): Adds one or more elements to the front of an array and returns the new length of the array.

Syntax:

```
array.unshift( element1, ..., elementN );
```

splice(): Adds and/or removes elements from an array.

Syntax:

```
array.splice(index, howMany, [element1][, ..., elementN]);
```

index – Index at which to start changing the array.

howMany – An integer indicating the number of old array elements to remove.

If **howMany** is 0, no elements are removed.

element1, ..., elementN – The elements to add to the array. If you don't specify any elements, splice simply removes the elements from the array.

slice(): Extracts a section of an array and returns a new array.

Syntax:

```
array.slice( begin [,end] );
```

It does not remove any elements from the source array.

sort() Sorts the elements of an array

Syntax:

```
array.sort( );
```

```
array.sort(compareFunction);
```

When the sort() function compares two values, it sends the values to the compare function, and sorts the values according to the returned (*negative, zero, positive*) value

```
<script type="text/javascript">
    var num = [10,20,20,10];
    num.sort(function (a , b) {
        console.log(a +" & " + b + " " + (a-b));
    });
</script>
```

indexOf(): Returns the first (least) index of an element within the array equal to the specified value, or -1 if none is found.

Syntax:

```
array.indexOf(searchElement[, fromIndex]);
```

lastIndexOf(): Returns the last (greatest) index of an element within the array equal to the specified value, or -1 if none is found.

Syntax:

```
array.lastIndexOf(searchElement[, fromIndex]);
```

reverse(): Reverses the order of the elements of an array -- the first becomes the last, and the last becomes the first.

Syntax:

```
array.reverse();
```

Array.forEach()

The forEach() method calls a function (a callback function) once for each array element.

Array.map()

The map() method creates a new array by performing a function on each array element.

The map() method does not execute the function for array elements without values.

The map() method does not change the original array.

Array.filter()

The filter() method creates a new array with array elements that passes a test.

Array.reduce()

The reduce() method reduces the array to a single value.

String Object

The String object is a constructor for strings, or a sequence of characters.

Syntax:

```
var s = new String(string);
```

Length: Returns the length of the string.

Special Characters:

Code	Result	Description
\'	'	Single quote
\"	"	Double quote
\\	\	Backslash

String Methods

[charAt\(\)](#):Returns the character at the specified index

Syntax:

```
string.charAt(index);
```

index – An integer between 0 and 1 less than the length of the string.

Return Value

Returns the character from the specified index.

[charCodeAt\(\)](#)Returns a number indicating the Unicode value of the character at the given index.

Syntax:

```
string.charCodeAt(index);
```

[match\(\)](#):Used to match a regular expression against a string.

Syntax:

```
string.match( param )
```

param – A regular expression object.

[replace\(\)](#) Used to find a match between a regular expression and a string, and to replace the matched substring with a new substring.

Syntax:

```
string.replace(regex/substr, newSubStr/function[, flags]);
```

```
<script>
```

```
var re = "apples";
```

```
var str = "Apples are round, and apples are juicy.";
```

```
var newstr = str.replace(re, "oranges");
```

```
document.write(newstr );
```

```
</script>
```

To replace case insensitive, use a **regular expression** with an **/i** flag (insensitive):

To replace all matches, use a **regular expression** with a **/g** flag (global match)

search() Executes the search for a match between a regular expression and a specified string.

Syntax:

```
string.search(regex);
```

Str.toLowerCase(): Returns the calling string value converted to lower case.

Str.toUpperCase(): Returns the calling string value converted to uppercase.

endsWith(): Checks whether a string ends with specified string/characters

split() Splits a String object into an array of strings by separating the string into substrings.

Syntax:

`string.split([separator][, limit]);`

```
var x1 = ("Welcome to infoway technologies pune ".split());
var x2 = (" Welcome to infoway technologies pune ".split(" "));
var x3= (" Welcome to infoway technologies pune ".split(" ", 2));
```

substr() Returns the characters in a string beginning at the specified location through the specified number of characters.

Syntax:

`string.substr(start[, length]);`

```
document.write( str.substr(-2,2));
```

```
document.write(str.substr(1));
```

```
document.write( str.substr(-20,2));
```

substring() Returns the characters in a string between two indexes into the string.

Syntax:

```
string.substring(indexA, [indexB])
```

localeCompare(): Returns a number indicating whether a reference string comes before or after or is the same as the given string in sort order.

Syntax:

```
string.localeCompare( param )
```

0 – If the string matches 100%.

1 – no match, and the parameter value comes before the *string* object's value in the locale sort order

-1 –no match, and the parameter value comes after the *string* object's value in the local sort order

Math object

The JavaScript Math object allows you to perform mathematical tasks on numbers.

`Math.round(x)` returns the value of x rounded to its nearest integer

`Math.pow(x, y)` returns the value of x to the power of y

`Math.sqrt(x)` returns the square root of x

`Math.abs(x)` returns the absolute (positive) value of x

`Math.ceil(x)` returns the value of x rounded **up** to its nearest integer

`Math.floor(x)` returns the value of x rounded **down** to its nearest integer

`Math.min()` and `Math.max()` can be used to find the lowest or highest value in a list of arguments

Math.random() returns a random number between 0 (inclusive), and 1 (exclusive).

```
Math.floor(Math.random() * 10);    // returns a number between 0
                                   // and 9
```

```
Math.floor(Math.random() * 11);    // returns a number between 0
                                   // and 10
```

```
Math.floor(Math.random() * 100);   // returns a number between 0
                                   // and 99
```

```
Math.floor(Math.random() * 10) + 1; // returns a number between 1
                                   // and 10
```

```
Math.floor(Math.random() * 100) + 1; // returns a number between 1
                                   // and 100
```

Date Object

A date consists of a year, a month, a day, an hour, a minute, a second, and milliseconds.

Date objects are created with the **new Date()** constructor.

`new Date()`

`new Date(milliseconds)`

`new Date(dateString)`

`new Date(year, month, day, hours, minutes, seconds, milliseconds)`

Method	Description
<code>getDate()</code>	Get the day as a number (1-31)
<code>getDay()</code>	Get the weekday as a number (0-6)
<code>getFullYear()</code>	Get the four digit year (yyyy)
<code>getHours()</code>	Get the hour (0-23)
<code>getMilliseconds()</code>	Get the milliseconds (0-999)
<code>getMinutes()</code>	Get the minutes (0-59)
<code>getMonth()</code>	Get the month (0-11)
<code>getSeconds()</code>	Get the seconds (0-59)
<code>getTime()</code>	Get the time (milliseconds since January 1, 1970)


```
<script>
var d = new Date();
document.write(d.getDay());
</script>
```

Date set Methods:

Method	Description
setDate()	Set the day as a number (1-31)
setFullYear()	Set the year (optionally month and day)
setHours()	Set the hour (0-23)
setMilliseconds()	Set the milliseconds (0-999)
setMinutes()	Set the minutes (0-59)
setMonth()	Set the month (0-11)
setSeconds()	Set the seconds (0-59)
setTime()	Set the time (milliseconds since January 1, 1970)

```
<script>
var d= new Date();
    d.setFullYear(2020, 0, 14);
    document.write(d);
</script>
```

Regular Expressions

Regular Expression Modifiers

Modifier	Description
i	Perform case-insensitive matching
g	Perform a global match (find all matches rather than stopping after the first match)

Quantifiers

Quantifier	Description
n+	Matches any string that contains at least one <i>n</i>
n*	Matches any string that contains zero or more occurrences of <i>n</i>
n?	Matches any string that contains zero or one occurrences of <i>n</i>

\$: Matches character at the end of the line.

. : Matches only period.

^ : Matches the beginning of a line or string.

- : Range indicator. [a-z, A-Z]

- [0-9] : Find any character between the brackets (any digit)
- [^0-9] : Find any character NOT between the brackets (any non-digit)
- [abc] : Find any character between the brackets
- [^abc] : Find any character NOT between the brackets
- (x|y) Find any of the alternatives specified
- [a-z] : It matches characters from lowercase 'a' to lowercase 'z'.
- [A-Z] : It matches characters from uppercase 'A' to lowercase 'Z'.
- \w: Matches a word character and underscore. (a-z, A-Z, 0-9, _).
- \W: Matches a non word character (% , # , @ , !).
- \d: Find a digit
- \s: Find a whitespace character
- {M, N} : Donates minimum M and maximum N value.

RegEx Object Methods:

exec(): Tests for a match in a string. Returns the first match

test(): Tests for a match in a string. Returns true or false

END

Session-3 & 4

Topics to be covered...

- DOM Methods
- DOM Document
- DOM Elements
- DOM HTML
- DOM CSS
- DOM Animations
- DOM Event Listener
- JavaScript Form Validation
- DOM Nodes

HTML DOM

The **document object** represents the whole html document.

When a webpage loads in the browser. browser creates a DOM for the page.

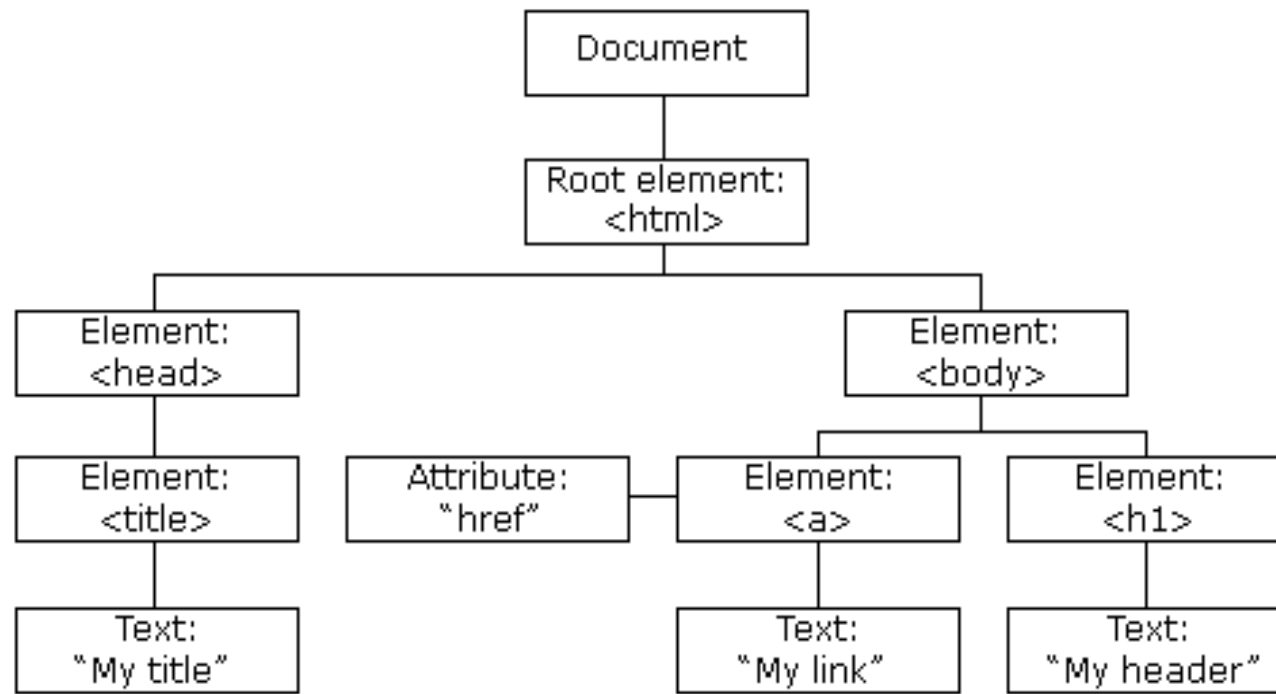
Document:- Html Page

Object:- Elements and attributes

Model:- Tree Structure of HTML elements

By the help of document object, we can add dynamic content to our web page.

The DOM is a W3C (World Wide Web Consortium) standard.



Why we should learn HTML DOM: w3 standard to understand the structure of html page so that we can create ,read, update and delete and manage DOM elements using JavaScript and jQuery methods.

HTML DOM helps you to understand and control the element structure using JavaScript methods.

document.write("string")

writes the given string on the document.

document.getElementById()

returns the element having the given id value.

getElementsByTagName()

returns all the elements having the given name value.

getElementsByTagName()

returns all the elements having the given tag name.

getElementsByClassName()

returns all the elements having the given class name

The **innerHTML** property can be used to write the dynamic html on the html document.

Syntax:

```
document.getElementById(id).innerHTML = new HTML
```

```
<script>  
document.getElementById("para").innerHTML = "New text!";  
</script>
```

```
<p id="para">Old text!</p>
```

The innerText property sets or returns the text content of the specified node.

Syntax:

```
document.getElementById(id).innerText = text
```

```
<script>  
document.getElementById("para").innerText = "New text!";  
</script>
```

```
<p id="para">Old text!</p>
```

DOM createElement()

The createElement() method creates an Element Node with the specified name.

syntax

```
var element = document.createElement(tagName);
```

```
var para= document.createElement("p");
```

DOM createTextNode()

To add text to the element we have to create a textnode first.

syntax

```
var node= document.createTextNode("text");
```

```
var node = document.createTextNode("This is a new  
paragraph.");
```

HTML DOM textContent Property

The textContent property sets or returns the textual content of the specified node.

syntax

`node.textContent = text`

```
Para.textContent="This is a new paragraph.";
```

HTML DOM setAttribute() Method

The setAttribute() method adds the specified attribute to an element, and gives it the specified value.

syntax

```
element.setAttribute(attributename, attributevalue)
```

DOM Node.appendChild()

The Node.appendChild() method adds a node to the end of the list of children of a specified parent node.

syntax

Node.appendChild()

```
<div id="div1">  
</div>
```

```
<script>  
var para = document.createElement("p");  
var node =  
document.createTextNode("Infoway");  
para.appendChild(node);
```

```
var element =  
document.getElementById("div1");  
element.appendChild(para);  
</script>
```


The `addEventListener()` method attaches an event handler to the specified element.

You can add many event handlers to one element

Syntax:

```
element.addEventListener(event, function);
```

```
<button id="myBtn">Handler</button>
```

```
<script>
```

```
document.getElementById("myBtn").addEventListener("click",  
myFunction);
```

```
function myFunction() {  
    alert ("Hello World!");  
}
```

```
</script>
```

Event Bubbling or Event Capturing?

Event propagation is a way of defining the element order when an event occurs. If you have a `<p>` element inside a `<div>` element, and the user clicks on the `<p>` element, which element's "click" event should be handled first?

In *bubbling* the inner most element's event is handled first and then the outer: the `<p>` element's click event is handled first, then the `<div>` element's click event.

In *capturing* the outer most element's event is handled first and then the inner: the `<div>` element's click event will be handled first, then the `<p>` element's click event.

Syntax:

```
addEventListener(event, function, useCapture)
```

default value is false which will use the bubbling propagation,

END

Session-5

Topics to be covered...

- Canvas Methods
- JavaScript Window
- JavaScript Screen
- JavaScript Location
- JavaScript History
- JavaScript Navigator
- JavaScript Timing
 - setTimeout()
 - setInterval()
- JavaScript Objects
- Properties and Methods

- a. The HTML <canvas> element is used to draw graphics on a web page.
- b. Canvas has several methods for drawing paths, boxes, circles, text, and adding images.

Step 1: Find the Canvas Element

```
var canvas = document.getElementById("myCanvas");
```

Step 2: Create a Drawing Object

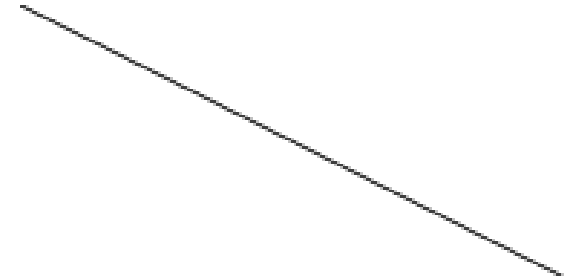
```
var ctx = canvas.getContext("2d");
```

Draw a Line:

moveTo(x,y) - defines the starting point of the line

lineTo(x,y) - defines the ending point of the line

```
var canvas = document.getElementById("CN");  
var ctx = canvas.getContext("2d");  
ctx.moveTo(0, 0);  
ctx.lineTo(200, 100);  
ctx.stroke();
```

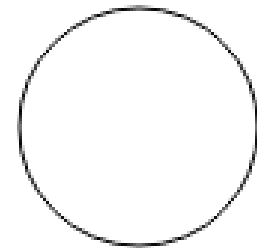


Draw a Circle:

beginPath() - begins a path

arc(x,y,r,startangle,endangle) - creates an arc/curve.

```
var canvas = document.getElementById("CN");  
var ctx = canvas.getContext("2d");  
ctx.beginPath();  
ctx.arc(95, 50, 10, 0, 2 * Math.PI);  
ctx.stroke();
```



Drawing Text on the Canvas:

```
var canvas = document.getElementById("CN");
var ctx = canvas.getContext("2d");
ctx.font = "30px Arial";
ctx.fillText("Welcome", 10, 50);
```



Add Color and Center Text:

```
var canvas = document.getElementById("myCanvas");
var ctx = canvas.getContext("2d");
ctx.font = "30px Comic Sans MS";
ctx.fillStyle = "red";
ctx.textAlign = "center";
ctx.fillText("Welcome", 50, 50);
```



Window location object

The window.location object can be used to get the current page address (URL) and to redirect the browser to a new page.

window.location.href returns the href (URL) of the current page

window.location.hostname returns the domain name of the web host

window.location.pathname returns the path and filename of the current page

window.location.protocol returns the web protocol used (http: or https:)

window.location.port property returns the number of the internet host port (of the current page).

Window History object

The window.history object contains the browsers history.

history.back() - same as clicking back in the browser

history.forward() - same as clicking forward in the browser

history.go() - loads the given page number.

```
history.back();    //for previous page
history.forward(); //for next page
history.go(2);     //for next 2nd page
history.go(-2);    //for previous 2nd page
```

Window navigator object

The **JavaScript navigator object** is used for browser detection. It can be used to get browser information such as appName, appCodeName etc.

appName	returns the name
appVersion	returns the version
appCodeName	returns the code name
cookieEnabled	returns true if cookie is enabled otherwise false
language	returns the language
platform	returns the platform e.g. Win32.
online	returns true if browser is online otherwise false..

Window.setTimeout() Method:

Executes a function, after waiting a specified number of milliseconds.

Syntax:

```
setTimeout(function, milliseconds);
```

The first parameter is a function to be executed.
The second parameter indicates the number of milliseconds before execution.

```
<button onclick="setTimeout(myFunction,  
3000)">SetTimeout</button>
```

```
<script>  
function myFunction() {  
    alert('Hello');  
}  
</script>
```

Window.setInterval() Method

The setInterval() method repeats a given function at every given time-interval.

Syntax:

```
setInterval(function, milliseconds);
```

The first parameter is the function to be executed. The second parameter indicates the length of the time-interval between each execution.

```
<script>
var myVar = setInterval(starttime, 1000);

function starttime() {
    var d = new Date();
    document.write(d.toLocaleTimeString());
}
</script>
```

clearInterval() method:

The clearInterval() method stops the executions of the function specified in the setInterval() method.

Syntax:

```
window.clearInterval(timerVariable)
```

```
<p id="starttime"></p>
```

```
<button onclick="clearInterval(stime)">Stop time</button>
```

```
<script>
```

```
var stime= setInterval(stopWatch, 1000);
```

```
function stopWatch() {
```

```
    var d = new Date();
```


```
    document.getElementById("starttime").innerHTML =  
d.toLocaleTimeString();
```

```
}
```

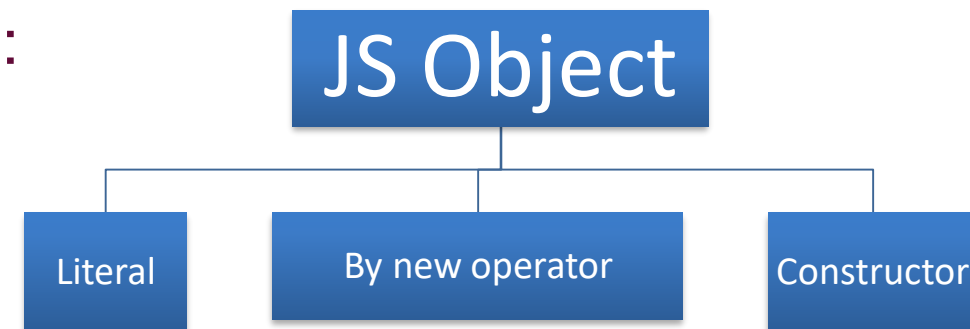
```
</script>
```

Javascript Object

A javascript object is an entity having state and behavior (properties and method).

Object	Properties	Methods
	car.name = Fiat	car.start()
	car.model = 500	car.drive()
	car.weight = 850kg	car.brake()
	car.color = white	car.stop()

Creating Objects in JavaScript:



JavaScript Object by object literal

Syntax:

```
object={property1:value1,  
        property2:value2.....propertyN:valueN}
```

```
Var employee=  
{  
  name:"Ram Kumar",  
  salary:40000  
}  
document.write(employee.name+" "+employee.salary);
```


method in JavaScript Object literal

```
<p id="demo"></p>
```

```
<script>
```

```
var person = {
```

```
    firstName: "Sohan",
```

```
    lastName : "Lal",
```

```
};
```

```
person.name = function() {
```

```
    return this.firstName + " " + this.lastName;
```

```
};
```

```
document.getElementById("demo").innerHTML ="Name is " +
```

```
person.name();
```

```
</script>
```

For...in loop

Syntax:

```
for (variable in object) {  
    code to be executed  
}
```

The block of code inside of the for...in loop will be executed once for each property.

```
<script>  
var p;  
var person = {fname:"Ram", lname:"Sharma", age:25};  
  
for (x in person) {  
    p += person[x];  
}  
Document.write(p);  
</script>
```

By The new Operator

All user-defined objects and built-in objects are descendants of an object called **Object**.

Syntax:

```
var objectname=new Object();
```

```
var employee=new Object();
```

```
employee.id=101;
```

```
employee.name="Ram Sharma";
```

```
employee.salary=50000;
```

```
document.write(employee.id+" "+employee.name+" "+employee.salary);
```

Defining method

```
<script>
  var Person = new Object();
  Person.id = 1001;
  Person['n'] = 'Infoway Technologies';
  Person.getName = function () {
    return (Person.n);
  }
  alert(Person.getName());
</script>
```

By using an Object constructor

We need to create function with arguments. Each argument value can be assigned in the current object by using this keyword. The **this keyword** refers to the current object.

```
function employee(){  
  this.name="Smith";  
  this.salary=50000;  
}  
  
var e=new employee();  
Document.write(e.name+"  
"+e.salary);
```

```

<p id="demo"></p>
<script>
// Constructor function for Person objects
function Person(first, last, age) {
    this.firstName = first;
    this.lastName = last;
    this.age = age;
    this.name = function() {
        return this.firstName + " " + this.lastName
    };
}

// Create a Person object
var p= new Person("Sohan", "Lal", 50);

// Display full name
document.getElementById("demo").innerHTML = p.name();

</script>

```

Object Properties

An **object** is a collection of properties, and a property is an association between a **name** (or **key**) and a **value**. A property's value can be a **function**, in which case the property is known as a **method**.

syntax

- `objectName.property` *// person.age*
- `objectName["property"]` *// person["age"]*

```
<script type="text/javascript">  
  var Person = new Object();  
  Person.id = 1001;  
  Person['n'] = 'Infoway Technologies';  
  alert(Person.n);  
</script>
```

Deleting Properties

The **delete** keyword deletes a property from an object.

The delete keyword deletes both the value of the property and the property itself.

It has no effect on variables or functions.

The delete operator should not be used on predefined JavaScript object properties.

```
<script type="text/javascript">  
    var Person = new Object();  
    Person.id = 1001;  
    delete Person.id;  
    console.log(Person.id);  
</script>
```


JavaScript Object Prototypes

All JavaScript objects inherit properties and methods from a prototype.

Prototype Inheritance:

The Object.prototype is on the top of the prototype inheritance chain.
Date objects, Array objects, and Person objects inherit from Object.prototype.

Adding Properties and Methods to Objects

```
Person.prototype.course = "PG-DAC";
```

```
Person.prototype.name = function() {  
    return this.fname + " " + this.lname;  
};  
document.write(p.name());
```

Function Expressions

A JavaScript function can also be defined using an **expression**.

```
var x = function (a, b) {return a * b}; //anonymous function (a function without a name).
var z = x(4, 3);
```

```
function flyToTheMoon()
{
    alert("Zoom! Zoom! Zoom!");
}
flyToTheMoon();
```

function name
function declaration

```
var flyToTheMoon = function
{
    alert("Zoom! Zoom! Zoom!");
}
```

function operator
variable that stores returned object
function body

Function Hoisting:

```
myFunction(5);
```

```
function myFunction(y) {
    return y * y;
}
```

Functions defined using an expression are not hoisted

Self-Invoking Functions

A self-invoking (also called self-executing) function is a nameless (anonymous) function that is invoked immediately after its definition.

An anonymous function is enclosed inside a set of parentheses followed by another set of parentheses (), which does the execution.

```
(function() {  
    ...  
    ...  
}) ();
```

Self-invoking functions are useful for initialization tasks and for one-time code executions, without the need of creating global variables.

```
(function(){  
    console.log(Math.PI);  
})();
```

```
(function(x){  
    console.log(x);  
})("Hello, World!");
```

Closure means that an inner function always has access to the vars and parameters of its outer function, even after the outer function has returned.

Inner function can access variables and parameters of an outer function (however, cannot access arguments object of outer function).

```
var incrementClickCount = (function ()  
{  
    var clickCount = 0;  
    return function ()  
    {  
        return ++clickCount;  
    }  
})();
```

```
<input type="button" value="Click Me" onclick="alert(incrementClickCount());" />
```

When to use Closure?

Closure is useful in hiding implementation detail in JavaScript. In other words, it can be useful to create private variables or functions.

A little “tarball” of information stored on the client machine’s hard drive.

Usually in the cookies.txt file

information can be placed in the cookies.txt file two ways:

- by the client using Javascript
- by the server placing the cookie in the HTTP Response Header
in this case, you’ll usually be asked if it’s OK to save the cookie by your browser

The “tarball” consists of name value pairs

Cookies must be no larger than 4 KB

Setting cookies

```
document.cookie = "cookieName = cookieData  
[ ; expires = timeInGMTString]  
[ ; path = pathName ]  
[ ; domain = domainName ]  
[ ; secure ]"
```

- Name/data - each cookie must have a name and data; data can contain no space
- expires - must be in GMT format (use toGMTString function); if expires is omitted cookie is temporary and won't be written to cookies.txt
- path - for client side cookies just use the default
- Domain - to help synchronize cookie data across a set of documents for the specified domain (this is known as the cookie domain)
- SECURE - this is really for server-side cookies, so omit it.

Cookies

Storage typically used prior to HTML5

- Before HTML5, websites could store only small amounts of text-based information on a user's computer using cookies.
- A website might use a cookie to record user preferences or other information that it can retrieve during the client's subsequent visits.
- When a user visits a website, the browser locates any cookies written by that website and sends them to the server.
- Cookies may be accessed only by the web server and scripts of the website from which the cookies originated. The browser sends these cookies with every request to the server.
- Cookies have a number of problems associated with them.
 - Offline access is not often performed very well.
 - memory is limited.

HTML5 Storage

HTML web storage provides two objects for storing data on the client:

`window.localStorage` - stores data with no expiration date

`window.sessionStorage` - stores data for one session (data is lost when the browser tab is closed)

```
<body>
  <input type="text" id="name"><input type="button" id="btn" value="Set Storage"><br>
  <input type="button" id="btn1" value="Get Storage"><br>
  <div id="data"></div>
  <script>
    document.getElementById('btn').onclick=function(){
      var n=document.getElementById('name').value;
      localStorage.setItem("Username",n);
    }
    document.getElementById('btn1').onclick=function(){
      document.getElementById("data").innerHTML=localStorage.Username
      // sessionStorage.getItem("Username")
    }
  </script>
</body>
```

END

Thank you