Chapter 2 – JAVA SCRIPT, XML

Java Script: Introduction to Javascript, variables, primitive data types, control flow statements, Built-in objects, arrays, functions, event handling, DHTML - Object model.
Bootstrap: Introduction to Bootstrap, Structure of the page, Typography, Forms.

INTRODUCTION TO JAVA SCRIPT:

- Web pages are two types
    i. *Static web page:* there is no specific interaction with the client
    ii. *Dynamic web page:* web page which is having interactions with client and as well as validations can be added.
- Script means small piece of Code.
- Scripting Language is a high-level programming language, whose programs are interpreted by another program at run time rather than compiled by the computer processor.
- BY using JavaScript we can create interactive web pages. It is designed to add interactivity to HTML pages.
- Previously JavaScript was known as LiveScript, but later it was changed to JavaScript. As Java was very popular at that time and introducing a new language with the similarity in names would be beneficial they thought.
- Scripting languages are of 2 types.
    - *client-side scripting languages*
    - *servers-side scripting languages*
- In general Client-side scripting is used for performing simple validations at client-side;
  Server-side scripting is used for database verifications.
- **Examples:**
  Client-side scripting languages: VBScript, JavaScript and Jscript.

Server-side scripting languages: ASP, JSP, Servlets and PHP etc.

- Simple HTML code is called static web page, if you add script to HTML page it is called dynamic page.
- Netscape Navigator developed JavaScript and Microsoft's version of JavaScript is Jscript.

Features of JavaScript:

- JavaScript is a lightweight, interpreted programming language means that scripts execute without preliminary compilation.
- It is an Object-based Scripting Language.
- Java script is case sensitive language
- Complementary to and integrated with Java.
- Open and cross-platform.

Advantages of JavaScript:

1. **Less server interaction:**

You can validate the user input before sending the page off to the server. This saves server traffic, which means less load on server.

2. **Immediate feedback to the visitors or end-users:**

If you submit a form if there is any error in form filling immediately visitor get the feedback, because validation performed at client side.

3. Can put dynamic text into an HTML page
4. Used to Validate form input data
5. Java script code can react to user events
6. Can be used to detect the visitor's browser

Limitations of JavaScript:

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

- JavaScript doesn't have any multithreading or multiprocessor capabilities.

JAVA Vs JAVASCRIPT:

JAVA	JAVASCRIPT
1. Object Oriented Programming Language	2.1 Object based Scripting Language
2. Platform Independent	2.2 Browser Dependant
3. It is both compiled and interpreted	2.3 It is interpreted at runtime
4. It is used to create server side applications and standalone programming	2.4 It is used to make the web pages more interactive
5. Java is a strongly typed language	2.5 JavaScript is not strongly typed(Loosely Typed)
6. Developed by sun Microsystems	2.6 Developed by Netscape
7. Java Programs can be standalone	2.7 JavaScript must be placed inside an HTML document to function

Embedding JavaScript in an HTML Page:

Embed a JavaScript in an HTML document by using <script> and </script> html tags.

Syntax:

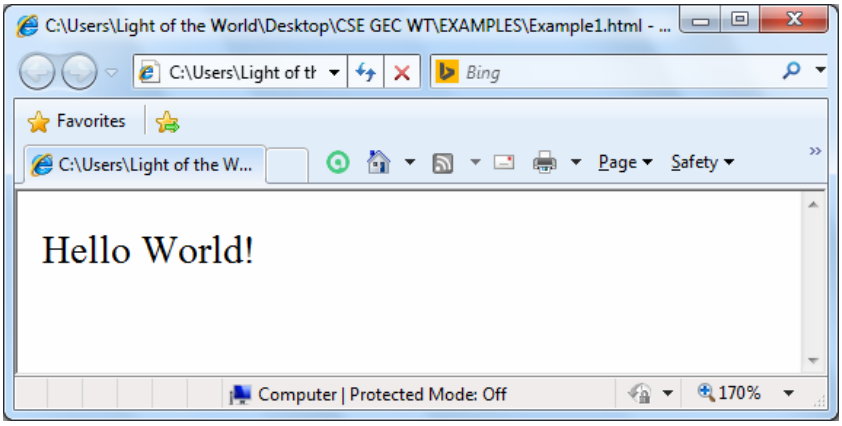
```
<script ...>
        JavaScript code
</script>
```

<script > tag has the following attributes.

Type	Refers to the MIME (Multipurpose Internet Mail Extensions) type of the script.
Language	This attribute specifies what scripting language you are using. Typically, its value will be javascript. Although recent versions of HTML (and XHTML, its successor) have phased out the use of this attribute.

Example:

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

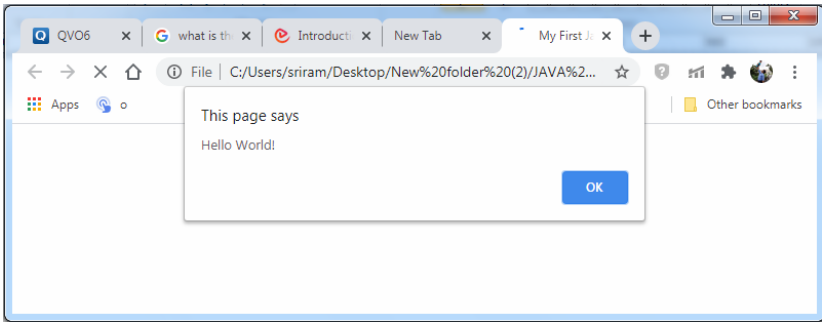


Alert Message Example:

```
<html>
<head>
<title>My First JavaScript code!!!</title>
```

```
<script type="text/javascript">
alert("Hello World!");
</script>
</head&gt;
<body>
</body>
</html>
```

Output:



Alert("Hello World");

Var d= Confirm("Do you want to continue?");

Var i=prompt("Enter your name:","SRGEC");

Comments in JavaScript:

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

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

VARIABLES:

- Like any programming language JavaScript has variables.
- Stores data items used in the script.
- Strict rules governing how you name your variables (Much like other languages):

Naming Conventions for Variables:

- Variable names **must** begin with a alphabet([a-z]/[A-Z]) or underscore;
- You can't use spaces in names
- Names are **case sensitive** so the variables fred, FRED and frEd all refer to **different** variables,
- It is not a good idea to name variables with similar names
- You **can't use a reserved word** as a variable name, **e.g.** var.

Creating Variables

- Before you use a variable in a JavaScript program, you must declare it. Variables are declared with the **var** keyword as follows.

```
<script type="text/javascript">
        var name;
        var rollno;
</script>
```

- Storing a value in a variable is called **variable initialization**. You can do variable initialization at the time of variable creation or at a later point in time when you need that variable.

```
<script type="text/javascript">
        var name = "Aziz";
        var rollno=501;
</script>
```

Scope of Variables in JavaScript:

The scope of a variable is the region of your program in which it is defined and is accessible. JavaScript variables have only two scopes.

- **Global Variables:** A global variable has global scope which means it can be defined and used anywhere in your JavaScript code.

- **Local Variables:** A local variable will be visible only within a function where it is defined. Function parameters are always local to that function.

Automatically Global:

- If you assign a value to a variable that has not been declared, it will automatically become a **GLOBAL** variable.
- This code example will declare a global variable **price**, even if the value is assigned inside a function.

Example:

```
myFunction();
// code here can use price
function myFunction()
{
   price = 250; //has Global scope
}
```

Example:

```
<script language="javascript" type="text/javascript">
var  collegename="GEC college"; //global scope
function function1()
{
var studentname="Anand";//local scope
document.write("<center>"+studentname+"</center><br>");
document.write("<center>"+collegename+"</center><br>");//global
scope
```

```
}
function function2()
{
var branchname="Information Technology";//local scope
document.write("<center>"+branchname+"</center><br>");
document.write("<center>"+collegename+"</center><br>");//global
scope
document.write("<center>"+studentname+"</center>");//not
displayed because of local scope
}
function1();
function2();
</script>
```

DATA TYPES:

- JavaScript has only four types of data
  - Numeric
  - String
  - Boolean
  - Null
- **Numeric :**
  - Integers such as 108 or 1120 or 2016
  - Floating point values like 23.42, -56.01 and 2E45.
  - No need to differentiate between.
  - In fact variables can change type within program.
- **String:**
  - A String is a Collection of character.
  - All of the following are strings:

    "Computer", "Digital" , "12345.432".
  - Put quotes around the value to a assign a variable:

    name = "Uttam K.Roy";

- **Boolean:**
  - Variables can hold the values true and false.
  - Used a lot in conditional tests (later).
- **Null:**
  - Used when you don't yet know something.
  - A null value means one that has not yet been decided.
  - It does not mean **nil** or **zero** and **should NOT** be used in that way.

FUNCTIONS:

- A function is a group of reusable code which can be called anywhere in your program.
- This eliminates the need of writing the same code again and again.
- It helps programmers in writing modular codes. Functions allow a programmer to divide a big program into a number of small and manageable functions.
- Like any other advanced programming language, JavaScript also supports all the features necessary to write modular code using functions.
- We were using these functions again and again, but they had been written in core JavaScript only once.
- JavaScript allows us to write our own functions as well.
- **Function Definition**
  - Before we use a function, we need to define it.
  - The most common way to define a function in JavaScript is
  - By using keyword **function**, followed by a unique function name, a list of parameters (that might be empty), and a statement block surrounded by curly braces.

Syntax:

```
<script type="text/javascript">
function functionname(parameter-list)
 {
        statements
 }
</script>
```

Example:

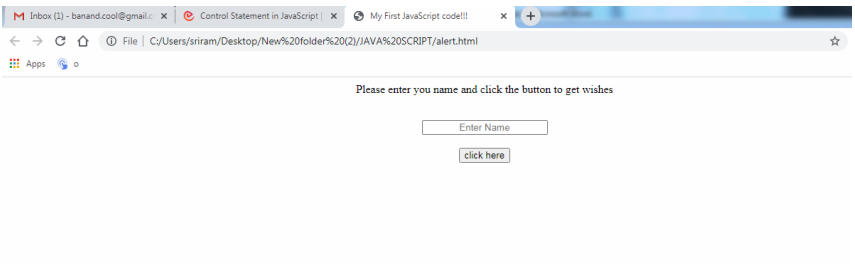
```
<html>
<head>
<title>My First JavaScript code!!!</title>
<script type="text/javascript">
                    function sayHello()
                    {
                      document.write("Hello Anand How are
                      you...?");
                    }
                    sayHello();//calling function
</script>
</head>;
<body>
</body>
</html>
```

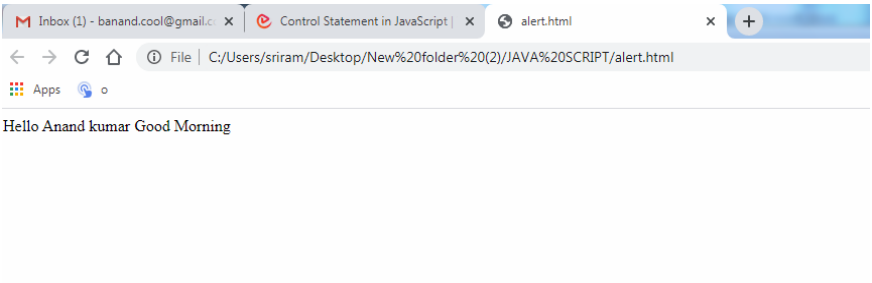
Calling a Function:

To invoke a function somewhere later in the script, you would simply need to write the name of that function as shown in the following code.

```
<html>
<head>
<title>Calling a function</title>
        <style type='text/css'>
        {
```

Output:





OPERATORS:

JavaScript supports the following types of operators.

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

Arithmetic Operators:

- JavaScript supports the following arithmetic operators:
- Assume variable A holds 10 and variable B holds 20, then:

Operator	Descrition	Example
+	Adds two numbers or joins two strings	20+10 returns 30
-	Subtracts two numbers or represents a negative number	20-10 returns 10

*	Multiplies two numbers	20*10 returns 200
/	Divides two numbers evenly and returns the quotient	20/10 returns 2
%	Divides two numbers and returns the remainder	20%10 returns 0
++	Increments the value of a number by 1 • Prefix (Pre-increment) • Suffix (Post-increment)	m = 20 n=++m assigns 21 to n
		m = 20 n=m++ assigns 20 to n
- -	Decrements the value of a number by 1 • Prefix (Pre-Decrement) • Suffix (Post-Decrement)	m = 20 n=--m assigns 19 to n
		m = 20 n=m++ assigns 20 to n

Assignment Operators:

Operator	Description	Example
=	Assigns the value on the right hand side to the variable on left hand side	m=20
+=	Adds the right hand side operand to the left hand side operand and assigns the result to the left hand side operand.	m = 20 n = 10 m+=n assigns 30 to m
	Subtracts the right hand side	m = 20

-=	operand from the left hand side operand and assigns the result to the left hand side operand.	n = 5 m-=n assigns 15 to m
***=**	Multiplies the right hand side operand and the left hand side operand and assigns the result to the left hand side operand.	m = 20 n = 10 m*=n assigns 200 to m
/=	Devides the left hand side operand by the right hand side operand and assigns the quotient to the left hand side operand.	m = 20 n = 10 m/=n assigns 2 to m
%=	Divides the left hand side operand by the right hand side operand and assigns the remainder to the left hand side operand.	m = 20 n = 10 m%=n assigns 0 to m

Comparison Operators:

Operator	Description	Example
==	Returns true if both the operands are equal otherwise returns false	20==10 returns false
!=	Returns true if both the operands are not equal otherwise returns false	20 !=10 returns true
>	Returns true if left hand side operand Is greater than the right hand side operand. otherwise	20 > 10 returns true

	returns false	
>=	Returns true if left hand side operand is greater than or equal to the right hand side operand. otherwise returns false	20 >= 10 returns true
<	Returns true if left hand side operand Is less than the right hand side operand. otherwise returns false	20 < 10 returns false
<=	Returns true if left hand side operand is less than or equal to the right hand side operand. otherwise returns false	20 <= 10 returns false

Logical (or Relational) Operators:

Operator	Descrition	Example
&&	Returns true only if both the operands are true, otherwise returns false	True && True returns True
||	Returns true only if either of the operands are true. It returns false when both the operands are false	True || False returns True
!	Negates the operand	!true returns false

Conditional (or ternary) Operators:

-

Operator	Description	Example
?:	Returns the second operand if the first operand is true, otherwise returns the third operand.	Result=(20 > 10)? 20 : 10 Here, 20 is assigned to Result

---

CONTROL FLOW STATEMENTS: These statements allow you to control the flow of your program's execution based upon conditions known only during run time.

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

Syntax

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

The else Statement

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

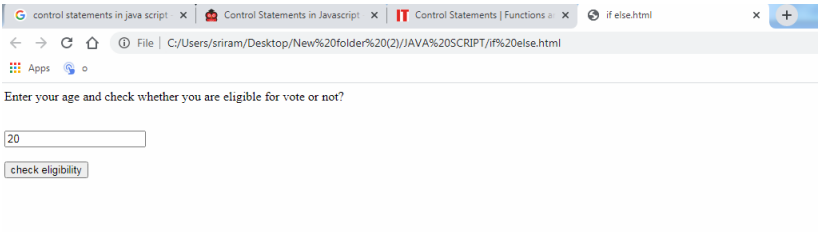
```
if (condition)
{
   block of code to be executed if the condition is true

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

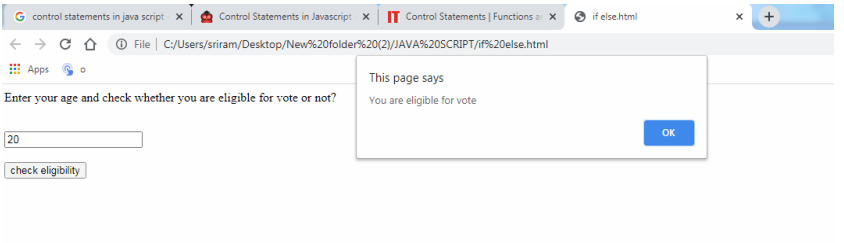
Example:

```
<HTML>
 <HEAD>
                    <script>
                     function check()
                     {
                     var age=form.age.value;
                     if(age>=18)
                     {
                     alert("You are eligible for vote");
                     }
                     else
                     {
                     alert("You are not eligible for vote");
                     }
                     }
                    </script>
</HEAD>

<BODY>
                    <form name='form'>
```

```
<p>Enter your age and check whether you are eligible
for vote or not?</p><br>
<input type='text' name='age'><br><br>
<input type='button' value='check eligibility'
onclick='check();'>
</form>
</BODY>
</HTML>
```

Output:





The else if Statement

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

Syntax:

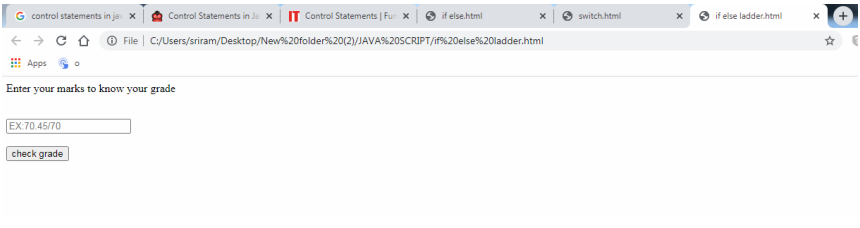
Example:

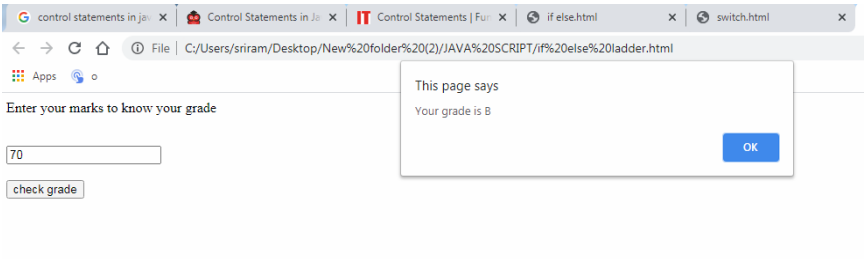
```
<HTML>
if (condition1)
{
    block of code to be executed if condition1 is true
}
else if (condition2)
{
    block of code to be executed if the condition1 is false and
condition2 is true
}
else
{
    block of code to be executed if the condition1 is false and
```

```
<HEAD>
        <script>
         function check()
         {
         var percentage=form.percentage.value;
         if(percentage>=90&&percentage<=100)
         {
         alert("Your grade is A+");
         }
         else if(percentage>=75&&percentage<90)
         {
         alert("Your grade is A");
         }
         else if(percentage>=60&&percentage<75)
         {
         alert("Your grade is B");
         }
         else if(percentage>=40&&percentage<60)
         {
         alert("Your grade is C");
         }
         else if(percentage>100)
         {
         alert("Wrong details.....");
         }
         else
         {
         alert("You are failed");
         }
         }
        </script>
```

```
</HEAD>

<BODY>
        <form name='form'>
        <p>Enter your marks to know your grade</p><br>
        <input type='text' name='percentage'
        placeholder='EX:70.45/70'><br><br>
        <input type='button' value='check grade'
        onclick='check();'>
        </form>
</BODY>
</HTML>
```

Output:





Switch Statement:

Use the switch statement to select one of many blocks of code to be executed.

Syntax:

```
switch(expression) {
  case 1:
    code block
```

```
        break;
    case 2:
        code block
        break;
          .
          .
     case n:
    code block
        break;
    default:
        default code block
}
```

This is how it works:

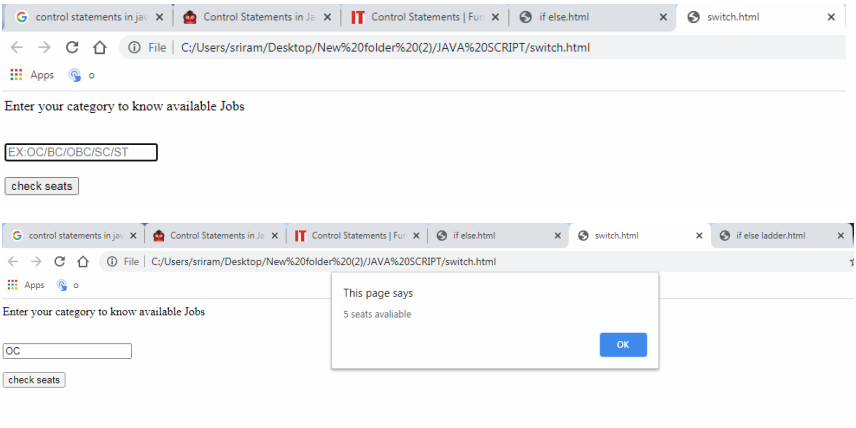
- The switch expression is evaluated once.
- The value of the expression is compared with the values of each case.
- If there is a match, the associated block of code is executed.

Example:

```
<HTML>
 <HEAD>
                <script>
                function check()
                {
                var category=form.category.value;
                switch(category)
                {
                        case "SC":
                        alert("50 vanacies");
                        break;
                        case "OC":
                        alert("5 vacanices");
```

```
                    break;
                    case "BC":
                    alert("30 vanacies");
                    break;
                    case "ST":
                    alert("45 vanacies");
                    break;
                    case "OBC":
                    alert("20 vanacies");
                    break;
                    default:
                    alert("please enter valid category");
                    break;
                }
                }
                </script>
 </HEAD>
 <BODY>
                <form name='form'>
                <p>Please enter your category to check no of
                vacanices</p><br>
                <input type='text' name='category'
                placeholder='EX:OC/BC/OBC/SC/ST'><br><br>
                <input type='button' value='Check Vacancies'
                onclick='check();'>
                </form>
 </BODY>
</HTML>
```

Output:



The While Loop

Syntax:

```
while (condition)
 {
    code block to be executed
}
```

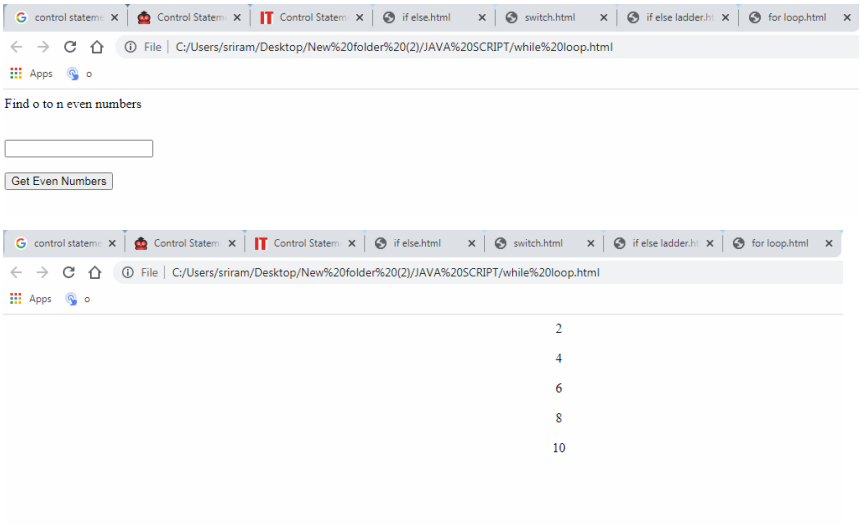
Example:

Write a JavaScript code to print 0 to n even numbers using while loop.

```
   <HTML>
 <HEAD>
                    <script>
                     function check()
                     {
                     var number=form.number.value;
                     var i=1;
                     while(i<=number)
                     {
                     if(i%2==0)
                     document.write("<center>"+i+"</center><br>");
```

```
                    i++;
                    }
                    }
                </script>
</HEAD>

<BODY>
                <form name='form'>
                <p>Find o to n even numbers</p><br>
                <input type='text' name='number'><br><br>
                <input type='button' value='Get Even Numbers'
onclick='check();'>
                </form>
</BODY>
</HTML>
```

Output:



The Do/While Loop

The do/while loop is a variant of the while loop. This loop will execute the code block once, before checking if the condition is true, then it will repeat the loop as long as the condition is true.

Syntax

```
do
 {
   code block to be executed
}while (condition);
```

The for Loop: The for loop has the following syntax:

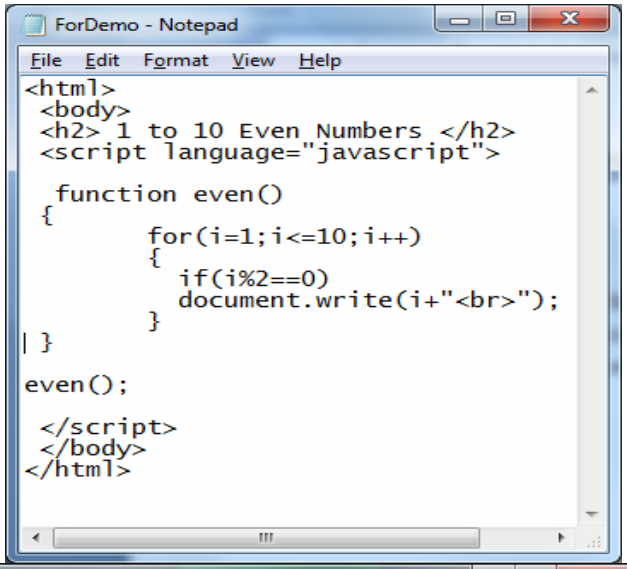
```
for (initialization; condition; iteration)
 {
                code block to be executed
}
```

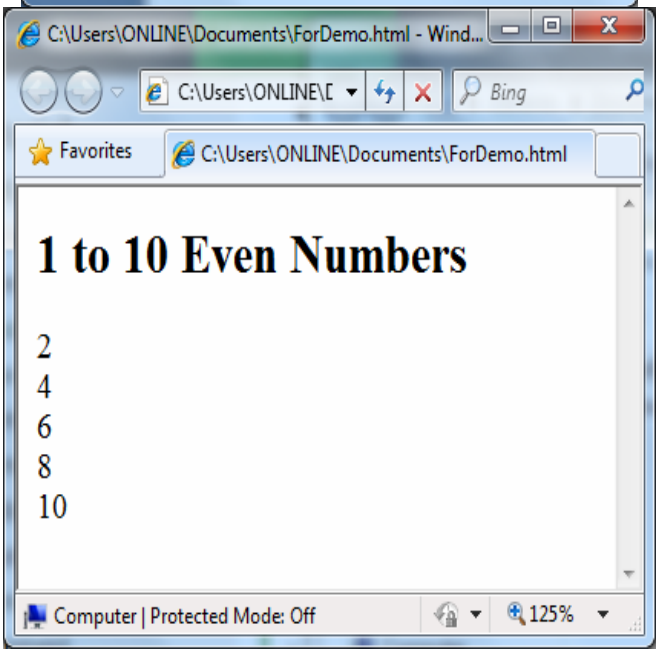
Statement 1 is executed before the loop (the code block) starts.

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.

Write a JavaScript code to print 1 to 10 even numbers using

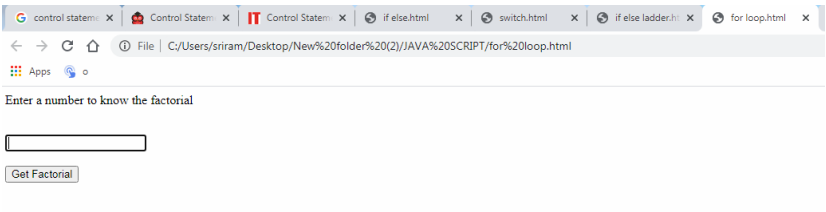


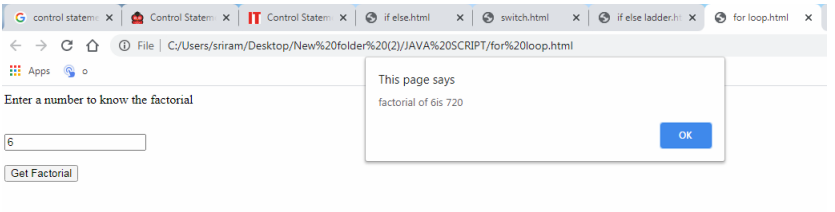


Example 2:

```
<HTML>
 <HEAD>
                <script>
                 function check()
                 {
                 var number=form.number.value;
                 var fact=1;
                 for(var i=1;i<=number;i++)
                 {
                 fact=fact*i;
                 }
                 alert("factorial of "+number+"is "+fact);
                 }
                </script>
 </HEAD>

 <BODY>
                <form name='form'>
                <p>Enter a number to know the factorial</p><br>
                <input type='text' name='number'><br><br>
                <input type='button' value='Get Factorial'
onclick='check();'>
                </form>
 </BODY>
</HTML>
```

Output:





OBJECTS IN JAVA SCRIPT: (BUILT-IN OBJECTS)

- An Object is a thing.
- There are pre defined objects and user defined objects in Javascript.
- Each object can have properties and methods:

  A property tells you something about an object.

  A method performs an action
- The following are some of the Pre defined objects/Built-in Objects.
  - Document
  - Window
  - Browser/Navigator
  - Form
  - String
  - Math
  - Array
  - Date

HTML DOM

The way document content is accessed and modified is called the Document Object Model, or DOM.

In the HTML DOM (Document Object Model), everything is a **node**:

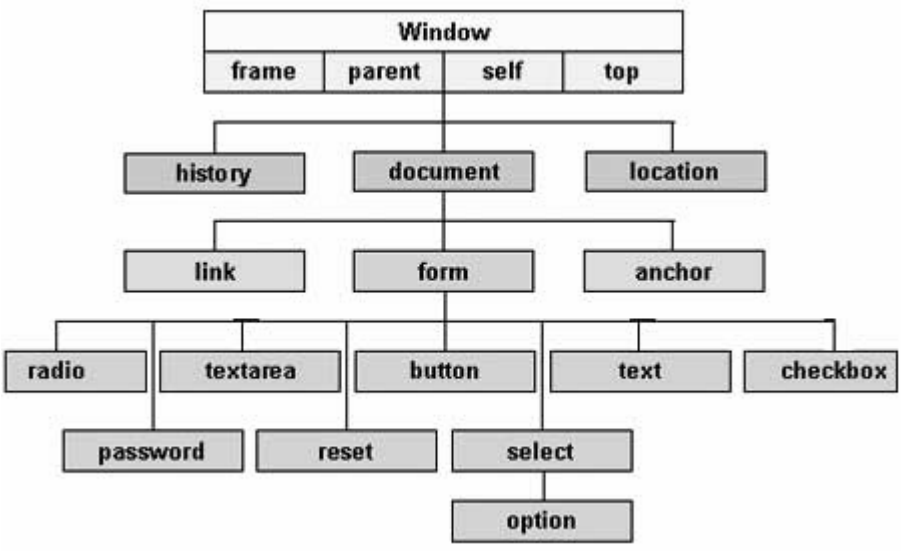
- The document itself is a document node

- All HTML elements are element nodes
- All HTML attributes are attribute nodes
- Text inside HTML elements are text nodes
- Comments are comment nodes

The Objects are organized in a hierarchy. This hierarchical structure applies to the organization of objects in a Web document.

- **Window object** − Top of the hierarchy. It is the outmost element of the object hierarchy.
- **Document object** − Each HTML document that gets loaded into a window becomes a document object. The document contains the contents of the page.
- **Form object** − Everything enclosed in the <form>...</form> tags sets the form object.
- **Form control elements** − The form object contains all the elements defined for that object such as text fields, buttons, radio buttons, and checkboxes.

Here is a simple hierarchy of a few important objects −



THE DOCUMENT OBJECT

- When an HTML document is loaded into a web browser, it becomes a **document object**.
- The document object is the root node of the HTML document and the "owner" of all other nodes:
  (element nodes, text nodes, attribute nodes, and comment nodes).
- The document object provides properties and methods to access all node objects, from within JavaScript.
- **Tip:** The document is a part of the Window object and can be accessed as window.document.

Properties

alinkColor -	The color of active links
bgColor -	Sets the background color of the web page. It is set in the <body> tag. The following code sets the background color to white.
Title -	The name of the current document as described between the header TITLE tags.
URL -	The location of the current document.
vlinkColor -	The color of visited links as specified in the <body> tag fgColor -

Methods

getElementById(*id*) -	Find an element by element id
getElementsByTagName(*name*) -	Find elements by tag name
getElementsByClassName(*name*) -	Find elements by class name
write(text) -	Write into the HTML output

	stream
writeln(text) -	Same as write() but adds a new line at the end of the output

WINDOW OBJECT:

- The **window** object is supported by all browsers. It represents the browser's window.
- All global JavaScript objects, functions, and variables automatically become members of the window object.
- Global variables are properties of the window object.
- Global functions are methods of the window object.
- Even the document object (of the HTML DOM) is a property of the window object:

```
window.document.getElementById("header");
```

is the same as:

```
document.getElementById("header");
```

Properties

- defaultStatus - This is the default message that is loaded into the status bar when the window loads.
- opener The object that caused the window to open.
- status - The status bar is the bar on the lower left side of the browser and is used to display temporary messages
- length - The number of frames that the window contains.

Methods

- alert("message") - The string passed to the alert function is displayed in an alert dialog box.
- open("URLname","Windowname",["options"]) - A new window is opened with the name specified by the second parameter.

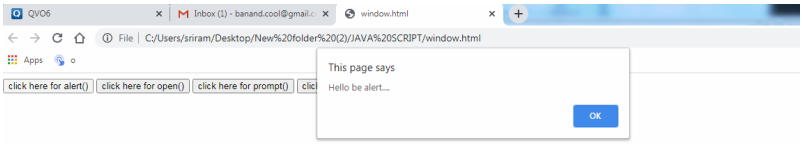
- close() - This function will close the current window or the named window.
- confirm("message") The string passed to the confirm function is displayed in the confirm dialog box.
- prompt("message","defaultmessage") - A prompt dialog box is displayed with the message passed as the prompt question or phrase.

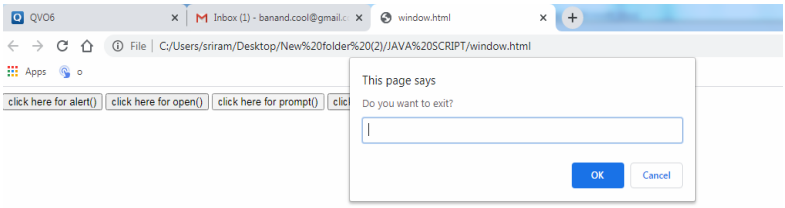
Example:

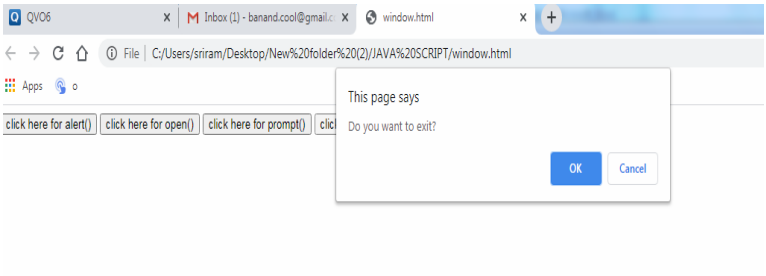
```
<HTML>
 <HEAD>
            <script>
             function funalert()
             {
             window.alert("Hello be alert....");
             }
             function funopen()
             {
             window.open("http://www.gmail.com");
             }
             function funprompt()
             {
             window.prompt("Do you want to exit?");
             }
             function funconfirm()
             {
             window.confirm("Do you want to exit?");
             }
             function funclose()
             {
             window.close();
             }
```

```
        </script>
</HEAD>
<BODY>
        <form>
        <input type='button' value='click here for alert()'
        onclick='funalert()'>
        <input type='button' value='click here for open()'
        onclick='funopen()'>
        <input type='button' value='click here for prompt()'
        onclick='funprompt()'>
        <input type='button' value='click here for cofirm()'
        onclick='funconfirm()'>
        <input type='button' value='click here for close()'
        onclick='funclose()'>
    </form>
</BODY>
</HTML>
```

Output:







FORM OBJECT:

Properties

- action - The action attribute of the Top of Form element
- length - Gives the number of form controls in the form
- method- The method attribute of the Top of Form element
- name - The name attribute of the Top of Form element
- target - The target attribute of the Top of Form element

Methods

- reset()- Resets all form elements to their default values
- submit()- Submits the form

Properties of Form Elements

The following table lists the properties of form elements

- checked - Returns true when checked or false when not
- form - Returns a reference to the form in which it is part of
- length - Number of options in the <select> element.
- name - Accesses the name attribute of the element
- selectedIndex - Returns the index number of the currently selected item
- value - the value attribute of the element or content of a text input

STRING OBJECT:

String The string object allows you to deal with strings of text.

Properties

- length - The number of characters in the string.

Methods:

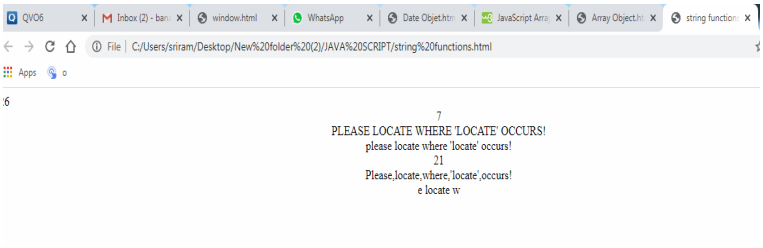
- charAt(index) - Returns a string containing the character at the specified location.
- indexOf(pattern) - Returns -1 if the value is not found and returns the index of the first character of the first string matching the pattern in the string.
- indexOf(pattern, index) - Returns -1 if the value is not found and returns the index of the first character of the first string matching the pattern in the string. Searching begins at the index value in the string.
- lastIndexOf(pattern) - Returns -1 if the value is not found and returns the index of the first character of the last string matching the pattern in the string.
- lastIndexOf(pattern, index) - Returns -1 if the value is not found and returns the index of the first character of the last string matching the pattern in the string. Searching begins at the index value in the string.
- split(separator) - Splits a string into substrings based on the separator character.
- substr(start, length) - Returns the string starting at the "start" index of the string Continuing for the specified length of characters unless the end of the string is found first.
- substring(start, end) - Returns the string starting at the "start" index of the string and ending at "end" index location, less one.
- toLowerCase() - Returns a copy of the string with all characters in lower case.
- toUpperCase() - Returns a copy of the string with all characters in upper case.

  Example:

  <HTML>

```
<HEAD>
                    <script>

        var txt = ABCDEFGHIJKLMNOPQRSTUVWXYZ";
       var sln = txt.length;
       document.writeln(sln);
         var str = "Please locate where 'locate' occurs!";
       var pos = str.indexOf("locate");
       document.write("<center>"+pos+"</center>");
       document.write("<center>"+str.toUpperCase()+
       "</center>");

document.write("<center>"+str.toLowerCase()+"</center>");

document.write("<center>"+str.lastIndexOf("locate")+"</center
>");
 document.write("<center>"+str.split(" ")+"</center>");
document.write("<center>"+str.substr(5,10)+"</center>");
                    </script>
 </HEAD>

 <BODY>

 </BODY>
</HTML>
```

Output:



ARRAY OBJECT:

The Array object is used to store multiple values in a single variable.

Properties:

- length - Sets or returns the number of elements in an array

Methods:

- concat() - Joins two or more arrays, and returns a copy of the joined arrays
- indexOf() - Search the array for an element and returns its position
- join() - Joins all elements of an array into a string
- lastIndexOf() - Search the array for an element, starting at the end, and returns its position
- pop() - Removes the last element of an array, and returns that element
- push()- Adds new elements to the end of an array, and returns the new length
- reverse() - Reverses the order of the elements in an array
- shift() - Removes the first element of an array, and returns that element
- slice() - Selects a part of an array, and returns the new array
- sort() - Sorts the elements of an array
- splice() - Adds/Removes elements from an array
- toString() - Converts an array to a string, and returns the result.

  Example:

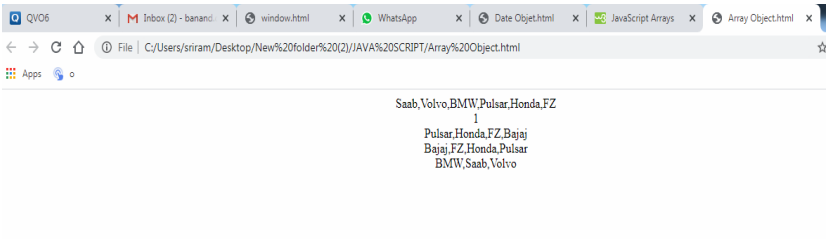
  <HTML>

  <HEAD>

  <script>

```
                var cars = new Array("Saab", "Volvo", "BMW");
                var bikes = new Array("Pulsar", "Honda", "FZ");
                document.write("<center>"+cars.concat(bikes)+
               "</center>");

                document.write("<center>"+cars.indexOf("Volvo")+"<
                /center>");
            bikes.push("Bajaj");
              document.write("<center>"+bikes+"</center>");
               bikes.reverse();
                document.write("<center>"+bikes+"</center>");
               cars.sort();
                document.write("<center>"+cars+"</center>");
        </script>
</HEAD>
        <BODY>

        </BODY>
</HTML>
```

Output:



BROWSER OBJECT/NAVIGATOR OBJECT:

It is used to obtain information about client browser.

Properties

- appName- Returns Browser Name

- appVersion- Returns Browser Version
- appUserAgent- It Returns User Agent
- plugins- It will display Plugins.
- mimeTypes – It will Return Mime type supported by browser

DATE OBJECT:

The Date object is used to work with dates and times

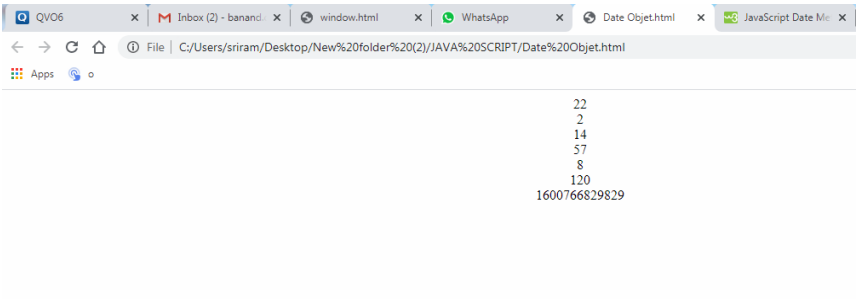
- getDate() - Get the day of the month. It is returned as a value between 1 and 31.
- getDay() - Get the day of the week as a value from 0 to 6
- getHours() - The value returned is 0 through 23.
- getMinutes() - The value returned is 0 through 59.
- getMonth() - Returns the month from the date object as a value from 0 through 11.
- getSeconds() - The value returned is 0 through 59.
- getTime() - The number of milliseconds since January 1, 1970.
- getYear() - Returns the numeric four digit value of the year.
- setDate(value) - Set the day of the month in the date object as a value from 1 to 31.
- setHours(value) - Set the hours in the date object with a value of 0 through 59.
- setMinutes(value) - Set the minutes in the date object with a value of 0 through 59.
- setMonth(value) - Set the month in the date object as a value of 0 through 11.
- setSeconds(value) - Set the seconds in the date object with a value of 0 through 59.
- setTime(value) - Sets time on the basis of number of milliseconds since January 1, 1970.

- setYear(value) - Set the year in the date instance as a 4 digit numeric value.

Example:

```
<HTML>
 <HEAD>
                    <script>
                     var d=new Date();

document.write("<center>"+d.getDate()+"</center>");

document.write("<center>"+d.getDay()+"</center>");

document.write("<center>"+d.getHours()+"</center>");

document.write("<center>"+d.getMinutes()+"</center>");

document.write("<center>"+d.getMonth()+"</center>");

document.write("<center>"+d.getYear()+"</center>");

document.write("<center>"+d.getTime()+"</center>");

                    </script>
 </HEAD>
 <BODY>

 </BODY>
</HTML>
```

Output:



EVENT HANDLING:

JavaScript is an Event Driven System

Event:

An Event is “any change that the user makes to the state of the browser”

There are 2 types of events that can be used to trigger script:

1. Window Events
2. User Events

1. Window Events, which occurs when
   - A page loads or unloads
   - Focus is being moved to or away from a window or frame
   - After a period of time has elapsed
2. User Events, which occur when the user interacts with elements in the page using mouse or a keyboard.

Event Handlers:

Event handlers are Javascript functions which you associate with an HTML element as part of its definition in the HTML source code.

Syntax: <element attributes eventAttribute=”handler”>

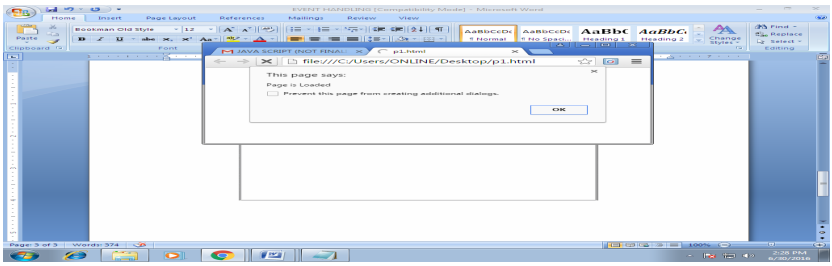
Attribute	Description

Onblur	The input focus is moved from the object
Onchange	The value of a field in a form has been changes by the user by entering or deleting data
Onclick	Invoked when the user clicked on the object.
Ondblclick	Invoked when the user clicked twice on the object.
Onfocus	Input focus is given to an element
Onkeydown	Invoked when a key was pressed over an element.
Onkeypress	Invoked when a key was pressed over an element then released.
Onkeyup	Invoked when a key was released over an element.
Onload	When a page is loaded by the browser
Onmousedown	The cursor moved over the object and mouse/pointing device was pressed down.
Onmousemove	The cursor moved while hovering over an object.
Onmouseout	The cursor moved off the object
onmouseover	The cursor moved over the object (i.e. user hovers the mouse over the object).
Onmouseup	The mouse/pointing device was released after being pressed down.
Onmove	A window is moved, maximized or restored either by the user or by the script
Onresize	A window is resized by the user or by the script
onmousewheel	Invoked when the mouse wheel is being rotated.
Onreset	When a form is reset
Onselect	Invoked when some or all of the contents of an object is selected. For example, the user selected some text within a text field.
Onsubmit	User submitted a form.
Onunload	User leaves the Page

Examples:

1.
```
<html>
<head>
<script language="javascript">
    function fun()
    {
        alert("Page is Loaded");
    }
</script>
</head>
<body onload="fun()">
</body>
</html>
```

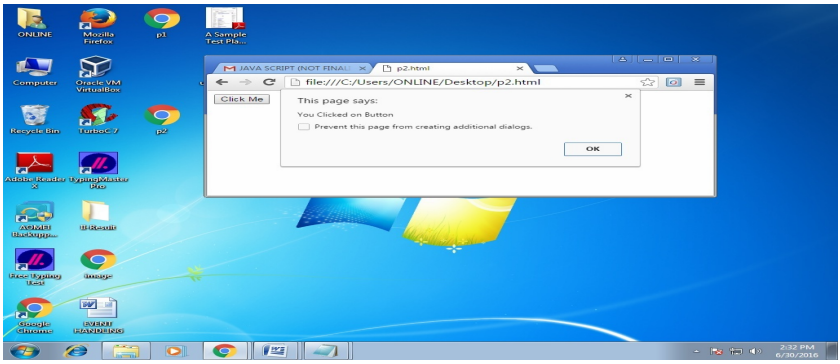
Output:



2.
```
<html>
<head>
<script language="javascript">
    function fun()
    {
        alert("You Clicked on Button");
    }
</script>
</head>
<body>
    <input type="button" value="Click Me" onClick="fun()">
```

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

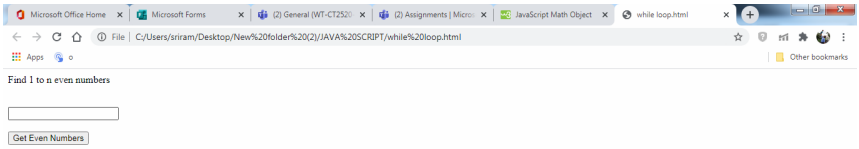
Output:

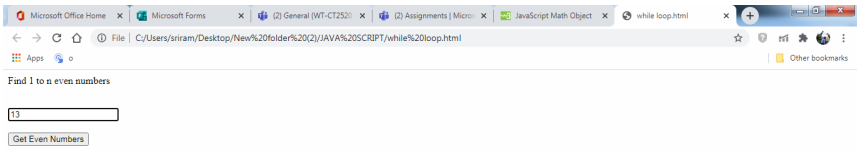


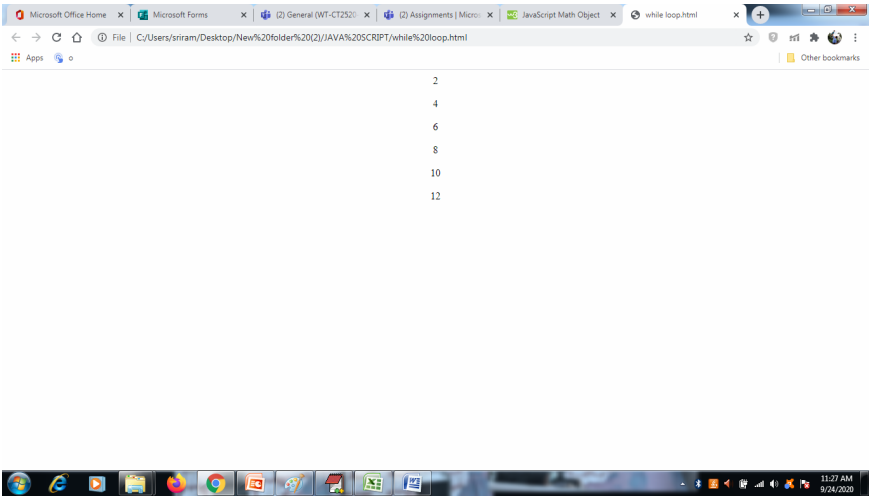

```
<HTML>
 <HEAD>
            <script>
             function check()
             {
             var number=form.number.value;
             var i=1;
             while(i<=number)
             {
             if(i%2==0)
             document.write("<center>"+i+"</center><br>");
             i++;
             }
             }
            </script>
 </HEAD>

 <BODY>
            <form name='form' onSubmit='check();'>
            <p>Find 1 to n even numbers</p><br>
```

```
<input type='text' name='number'><br><br>
<input type='submit' value='Get Even Numbers'>
</form>
</BODY>
</HTML>
```

Output:







Math Object:

The **math** object provides you properties and methods for mathematical constants and functions. Unlike other global objects, **Math** is not a constructor. All the properties and methods of **Math** are static and can be called by using Math as an object without creating it.

Thus, you refer to the constant **pi** as **Math.PI** and you call the *sine* function as **Math.sin(x)**, where x is the method's argument.

Math Properties (Constants)

JavaScript provides 8 mathematical constants that can be accessed with the Math object:

Example

```
Math.E       // returns Euler's number
Math.PI      // returns PI
Math.SQRT2   // returns the square root of 2
Math.SQRT1_2  // returns the square root of 1/2
Math.LN2     // returns the natural logarithm of 2
Math.LN10    // returns the natural logarithm of 10
Math.LOG2E   // returns base 2 logarithm of E
```

Math.LOG10E // returns base 10 logarithm of E

Math Object Methods

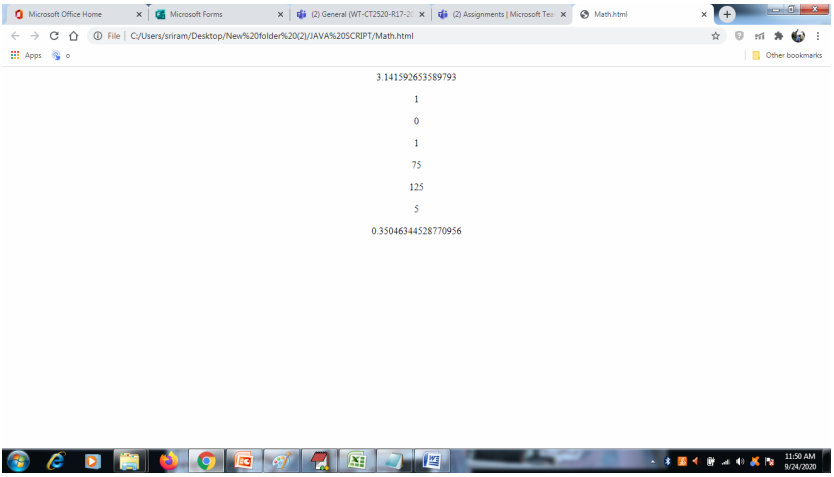
Method	Description
abs(x)	Returns the absolute value of x
acos(x)	Returns the arccosine of x, in radians
acosh(x)	Returns the hyperbolic arccosine of x
asin(x)	Returns the arcsine of x, in radians
asinh(x)	Returns the hyperbolic arcsine of x
atan(x)	Returns the arctangent of x as a numeric value between -PI/2 and PI/2 radians
atan2(y, x)	Returns the arctangent of the quotient of its arguments
atanh(x)	Returns the hyperbolic arctangent of x
cbrt(x)	Returns the cubic root of x
ceil(x)	Returns x, rounded upwards to the nearest integer
cos(x)	Returns the cosine of x (x is in radians)
cosh(x)	Returns the hyperbolic cosine of x
exp(x)	Returns the value of E^x
floor(x)	Returns x, rounded downwards to the nearest integer
log(x)	Returns the natural logarithm (base E) of x
max(x, y, z, ..., n)	Returns the number with the highest value
min(x, y, z, ..., n)	Returns the number with the lowest value
pow(x, y)	Returns the value of x to the power of y
random()	Returns a random number between 0 and 1
round(x)	Rounds x to the nearest integer
sin(x)	Returns the sine of x (x is in radians)
sinh(x)	Returns the hyperbolic sine of x

sqrt(x)	Returns the square root of x
tan(x)	Returns the tangent of an angle
tanh(x)	Returns the hyperbolic tangent of a number
trunc(x)	Returns the integer part of a number (x)

Example:

```
<HTML>
 <HEAD>
   <script>
  document.write("<center>"+Math.PI+"</center><br>");

 document.write("<center>"+Math.ceil(0.991)+"</center><br>");

 document.write("<center>"+Math.floor(0.991)+"</center><br>");

 document.write("<center>"+Math.min(12,3,42,55,75,1)+"</center><br
 >");

 document.write("<center>"+Math.max(12,3,42,55,75,1)+"</center><b
 r>");

 document.write("<center>"+Math.pow(5,3)+"</center><br>");

 document.write("<center>"+Math.sqrt(25)+"</center><br>");

 document.write("<center>"+Math.random()+"</center><br>");
    </script>
 </HEAD>
 <BODY>
 </BODY>
</HTML>
```

Output:



DHTML WITH JAVASCRIPT:

- It refers to the technique of making web pages dynamic by client-side scripting to manipulate the document content and presentation
- Web pages can be made more lively, dynamic or interactive by DHTML techniques.
- DHTML is **not** a markup language or a software tool.
- DHTML involves the following aspects.
    - HTML - For designing static web pages
    - JAVASCRIPT - For browser scripting
    - CSS (Cascading Style Sheets) - For style and presentation control
    - DOM(Document Object Model) - An API for scripts to access and manipulate the web page as a document.

  So, **DHTML = HTML + CSS + JAVASCRIPT + DOM**

HTML Vs DHTML

HTML	DHTML
1. It is used to create static web pages.	1. Used to create dynamic web pages.
2. Consists of simple HTML tags.	2. Made up of HTML tags+CSS+javascript+DOM
3. It is a markup language.	3. It is a technique to make web pages dynamic through client-side programming.
4. Do not allow to alter the text and graphics on the web page unless web page gets changed.	4. DHTML allows you to alter the text and graphics of the web page without changing the entire web page.
5. Creation of HTML web pages is simple.	5. Creation of DHTML web pages is complex.
6. Web pages are less interactive.	6. Web pages are more interactive.
7. HTML sites will be slow upon client-side technologies.	7. DHTML sites will be fast enough upon client-side technologies.

Form Validation:

Form validation normally used to occur at the server, after the client had entered all the necessary data and then pressed the Submit button. If the data entered by a client was incorrect or was simply missing, the server would have to send all the data back to the client and request that the form be resubmitted with correct information. This was really a lengthy process which used to put a lot of burden on the server.

JavaScript provides a way to validate form's data on the client's computer before sending it to the web server. Form validation generally performs two functions.

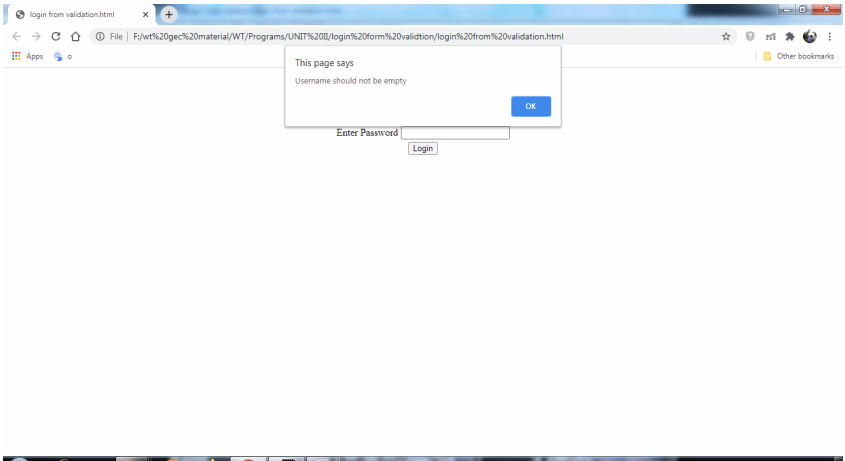
- **Basic Validation** − First of all, the form must be checked to make sure all the mandatory fields are filled in. It would require just a loop through each field in the form and check for data.
- **Data Format Validation** − Secondly, the data that is entered must be checked for correct form and value. Your code must include appropriate logic to test correctness of data.

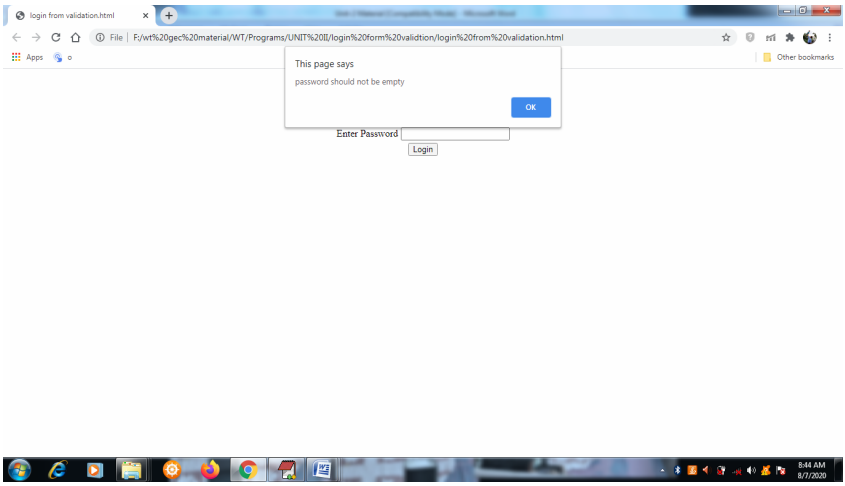
Example:

```
<html>
<head>
<script language="javascript" type="text/javascript">
function validate()
{
if(form.name.value==0)
{
alert("Username should not be empty");
form.name.focus();
return false;
}
if(form.password.value==0)
{
alert("password should not be empty");
form.password.focus();
return false;
}
if(form.password.value.length<6)
```

```
                {
                alert("password length should be greater than 6");
                form.password.focus();
                return false;
                }
                return true;
                }
</script>
</head>
<body>
        <center>
        <form name="form" onsubmit="return validate(this);"
        action="login.jsp">
        <h1>Login Here</h1>
        <table>
        <tr><td>Enter Name</td><td> <input type="text"
        name="name"></td></tr>
        <tr><td>Enter Password</td><td> <input type="password"
        name="password"></td></tr>
        <tr><td colspan='2' align='center'><input type="submit"
        value="Login"></td></tr>
        </table>
        </form>
        </center>
</body>
</html>
```

Output:





Registration page validation Example:

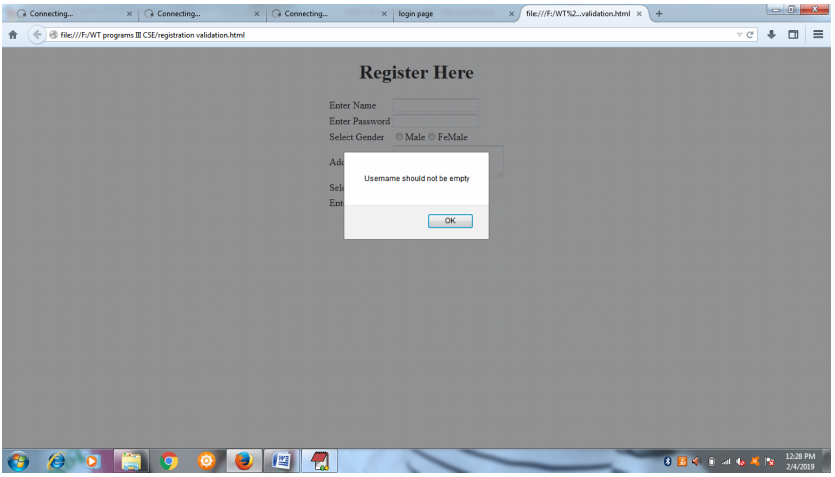
```
<html>
<head>
<script language="javascript" type="text/javascript">
                function validate()
                {
                if(form.name.value==0)
                {
                alert("Username should not be empty");
```

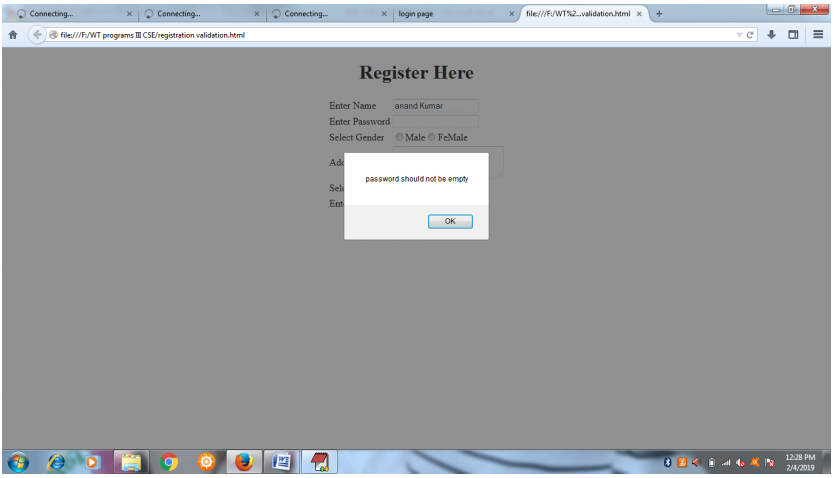
```
form.name.focus();
return false;
}
if(form.name.value.length<8)
{
alert("Username should be minimum 8 characters");
form.name.focus();
return false;
}
if(form.password.value==0)
{
alert("password should not be empty");
form.password.focus();
return false;
}
if(form.password.value.length<6)
{
alert("password length should be greater than 6");
form.password.focus();
return false;
}
if(form.gender.value==0)
{
alert("please select gender");
form.name.focus();
return false;
}
if(form.address.value==0)
{
alert("Address should not be empty");
form.name.focus();
```

```
                return false;
                }
                if(form.mobile.value==0)
                {
                alert("Mobile num should not be empty");
                form.name.focus();
                return false;
                }
                if(form.mobile.value.length<10)
                {
                alert("Mobile num should be 10 digits");
                form.name.focus();
                return false;
                }
                return true;
                }
</script>
</head>
<body>
        <center>
        <form name="form" onsubmit="return validate(this);"
        action="login.jsp">
        <h1>Register Here</h1>
        <table>
        <tr><td>Enter Name</td><td> <input type="text"
        name="name"></td></tr>
        <tr><td>Enter Password</td><td> <input type="password"
        name="password"></td></tr>
        <tr><td>Select Gender</td><td><input type="radio"
        name="gender" value="male">Male<input type="radio"
        name="gender" value="female">FeMale</td></tr>
```

```
<tr><td>Address</td><td><textarea
name="address"></textarea></td></tr>
<tr><td>Select State</td>
<td>
<select name="country">
<option value="Srilanka">Srilanka
<option value="India">India
<option value="Australia">Australia
</select>
</td>
</tr>
<tr><td>Enter Mobile</td><td> <input type="text"
name="mobile"></td></tr>
<tr><td colspan='2' align='center'><input type="submit"
value="Login"></td></tr>
</table>
</form>
</center>
</body>
</html>
```

Output:


Register Here
Enter Name
Enter Password
Select Gender Male FeMale
Username should not be empty
OK


Register Here
Enter Name anand Kumar
Enter Password
Select Gender Male FeMale
password should not be empty
OK

INTRODUCTION TO XML:

- XML stands for eXtensible Markup Language
- XML is a markup language much like HTML
- XML was designed to store and transport data
- XML was designed to be self-descriptive
- XML is a W3C Recommendation
- The first XML version 1.0, published in 1998.
- HTML limits you to use only fixed number of tags, where as XML allows to create new tags.
- For example, you are developing website for a college, then you have tags like <SNO>, <STUDENTNAME>, <DOB> etc.
- HTML, XML languages are derived from Standard Generalized Markup Language (SGML).
- XML and related technologies and those are: SGML, XSL, W3C, SOAP, XSLT, DOM, SAX
- SGML, Standard Generalized Markup Language is basis for all markup languages.
- XSL, eXtensible Stylesheet Language is a combination of XML and Style Sheets.
- XSLT, XSL transformations provides rules for transformations from one XML to another.
- SOAP, Simple Object Access Protocol is communication protocol for Internet to XML documents and it provides notifications for events.

- SAX, Simple API for XML, predefined application package interface.
- DOM, Document Object Model, is another XML Parser.

Uses of XML:

- Easy to organize the document
- Tags or document elements are reusable
- It simplifies data sharing
- Better environment for data transfer
- The XML document is language netural. That means a Java program can generate an XML document and this document can be parsed by Perl.
- XML files are independent of an operating system.
- It simplifies data availability

Applications of XML:

- Electronic Commerce (popularly known as E-Commerce)
- Financial Funds Transfer
- Multimedia Messages and Messaging exchange

Differences between XML and HTML:

XML	HTML
1. It is used to store the data.	1. It is used to present the content.
2. It supports user defined tags.	2. It supports only predefined tags in
3. XML separates content	3. HTML specifies presentation

from presentation.	
4. XML allows users to create new tags	4. HTML doesn't allow users to create
5. You can generate new mark up languages using XML	5. No such possibility.
6. XML is case sensitive	6. HTML is not case sensitive
7. Root element is user defined and only one root element allowed.	7. Root element is <HTML>

XML Features:

- XML allows the user to define his own tags and his own document structure.
- XML document is a pure information wrapped in XML tags.
- XML is a text based language, plain text files can be used to share data.
- XML provides a software and hardware independent way of sharing data.

Elements and Attributes:

In XML the basic entity is element the elements are used for defining the tags. The elements typically consist of opening and closing tag. Mostly only one element is used to define a single tag.

- The syntax of writing any element for opening tag is <element name>
- The syntax of writing any closing element for closing tag is </element name>
- An empty tag can be defined by putting a / (forward slash) before closing bracket.
- A space or a tab character is not allowed in the element name or in attribute name.

Basic Structure / Syntax of an XML Document :

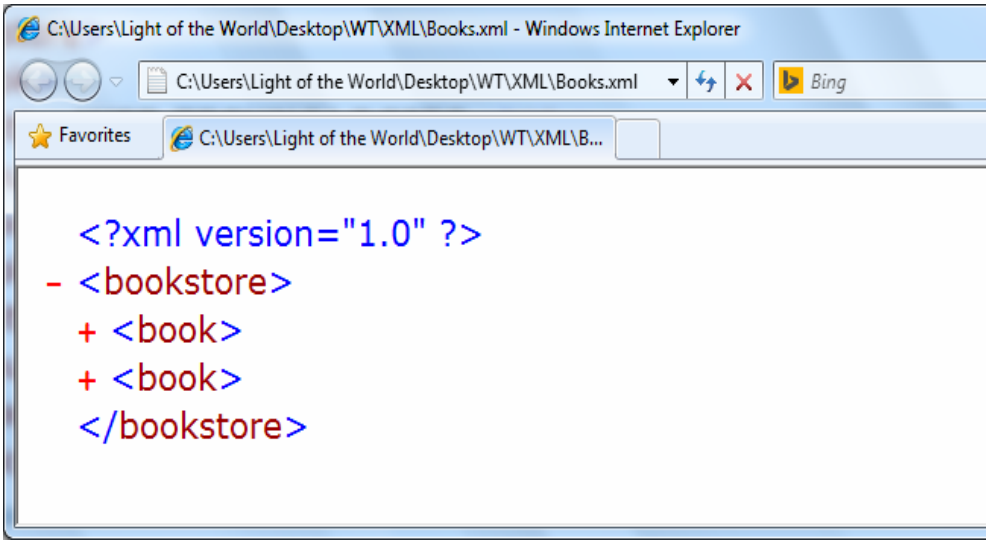
```
<?xml version="1.0"?>
<root>
        <child>
                <subchild>

                 </subchild>
         </child>
</root>
```

Example :

Books.xml

```
<?xml version="1.0"?>
<bookstore>
        <book>
                <title> WEB TECHNOLOGIES </title>
                <author>Uttam.K.Roy </author>
        </book>
        <book>
                <title> JAVA-Complete Reference  </title>
                <author>Herbert Schildt  </author>
        </book>

</bookstore>
```

If the above Books.xml is opened using any of the browsers (Example, Internet Explorer), following is the output.



1. Basic Building Blocks

Building block means which all element or part that make a xml document.

Seen from a DTD point of view, all XML documents are made up by the following building blocks:

- Elements
- Attributes
- Entities
- PCDATA
- CDATA

Elements

Elements are the **main building blocks** of both XML and HTML documents.

Examples of HTML elements are "body" and "table". Examples of XML elements could be "note" and "message". Elements can contain text, other elements, or be empty. Examples of empty HTML elements are "hr", "br" and "img".

Examples:

```
<body>some text</body>
<message>some text</message>
```

Attributes

Attributes provide **extra information about elements**.

Attributes are always placed inside the opening tag of an element. Attributes always come in name/value pairs. The following "img" element has additional information about a source file:

```
<img src="computer.gif" />
```

Entities

Some characters have a special meaning in XML, like the less than sign (<) that defines the start of an XML tag.

Most of you know the HTML entity: " ". This "no-breaking-space" entity is used in HTML to insert an extra space in a document. Entities are expanded when a document is parsed by an XML parser.
The following entities are predefined in XML:

Entity Reference	Character
&lt	<
&gt	>
&amp	&
&quot	"
&apos	'

PCDATA

PCDATA means parsed character data.
Think of character data as the text found between the start tag and the end tag of an XML element.
PCDATA is text that WILL be parsed by a parser. The text will be examined by the parser for entities and markup.

Tags inside the text will be treated as markup and entities will be expanded.

However, parsed character data should not contain any &, <, or > characters; these need to be represented by the & < and > entities, respectively.

CDATA

CDATA means character data.
CDATA is text that will NOT be parsed by a parser. Tags inside the text will NOT be treated as markup and entities will not be expanded.

2. Validating an XML file :

An XML file can be validated using the following specifications.

1. DTD (Document type definition)
2. XML Scheme.

1. **DOCUMENT TYPE DEFINITION(DTD):**
   - The document type definition used to define the basic building block of any xml document.
   - Using DTD we can specify the various elements types, attributes and their relationship with one another.
   - Basically DTD is used to specify the set of rules for structuring data in any XML file.
   - Many developers recommend writing DTDs for the XML applications.
   - DTD standards are defined by the W3C.

A DTD may contain the following:

- Name of the root element
- Reference to an external DTD
- Element declaration
- Entity declaration

Occurrence indicators in DTD

Operator	Syntax	Description
None	a	Exactly one occurrence of a
*	a*	Zero or more occurrences of a
+	a+	One or more occurrences of a
?	a?	Zero or one occurrence of a

There are two ways of writing DTDs

1. Internal DTD
2. External DTD

Internal DTD

The DTD can be embedded directly in the XML docement as a part of it.

The general syntax for an internal DTD is

```
<!DOCTYPE  root-element   [
     <!-- doctype declaration -->
]>
```

The keyword DOCTYPE specifies that a DTD is to be used by the document.

The following rules must be followed:

- The keyword DOCTYPE must be in upper case (Well formedness constraint).
- The document type declaration must appear before the first element in the document(Well formedness constraint).
- The name following the word DOCTYPE (root-element in this case) must match with the name of the root-element(Top-level element) in the xml document.

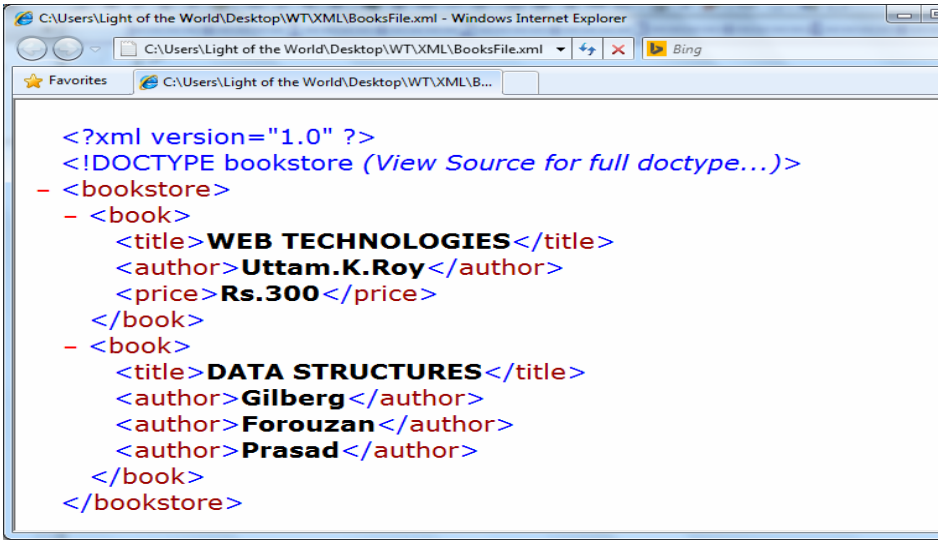
Example:

BooksFile.xml

```
<?xml version="1.0"?>
<!DOCTYPE bookstore  [
        <!ELEMENT bookstore (book+)>
        <!ELEMENT book (title,auther+,price?)>
        <!ELEMENT title (#PCDATA)>
        <!ELEMENT auther (#PCDATA)>]
>
<bookstore>
        <book>
                <title>WEB TECHNOLOGIES</title>
```

```
            <author>Uttam.K.Roy </author>
            <price>Rs.300 </price>
        </book>

        <book>
            <title>DATA STRUCTURES</title>
            <author>Gilberg </author>
            <author>Forouzan</author>
            <author>Prasad</author>
        </book>
</bookstore>
```

If the above BooksFile.xml is opened using a web browser like Internet Explorer, the following is the result.



External DTD

In this type, an external DTD file is created and its name must be specified in the corresponding XML file.

The following example illustrates the use of external DTD.

Step 1: Creation of DTD file [Validatebooks.dtd]

```
<!DOCTYPE bookstore  [
        <!ELEMENT bookstore (book+)>
        <!ELEMENT book (title,auther+)>
        <!ELEMENT title (#PCDATA)>
        <!ELEMENT auther (#PCDATA)>
]>
```

Step 2: Creation of XML document [BooksFile.xml]

```
<?xml version="1.0"?>
<bookstore>
        <book>
                <title>WEB TECHNOLOGIES</title>
                <author>Uttam.K.Roy </author>
                <price>Rs.300 </price>
        </book>

        <book>
                <title>DATA STRUCTURES</title>
                <author>Gilberg </author>
                <author>Forouzan</author>
                <author>Prasad</author>
        </book>
</bookstore>
```