

Web Basics – JavaScript for JEE Abridged

Lesson 00:

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Document History

Date	Course Version No.	Software Version No.	Developer / SME	Change Record Remarks
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Course Goals and Non Goals

- Course Goals:

- At the end of this course you will be able to:
 - Add interactivity to the static HTML pages
 - Validate the input data provided by users, on the client side
 - Manipulate style sheets on the fly to give a sophisticated look to any website

- Course Non Goals:

- Server-side scripting not covered.



Pre-requisites

- Prerequisites for this course are:
 - Familiarity with Windows, GUI Concept and Web Browser Application
 - HTML
 - Experience of creation of a web page using HTML
 - Object Oriented Programming Concepts



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Intended Audience

- This course is designed for:
 - Trainee Programmers
 - Software Professionals



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Day Wise Schedule

■ Day 1

- Lesson 1: Introduction to JavaScript
- Lesson 2: JavaScript Language
- Lesson 3: Working with Predefined Core Objects
- Lesson 4: Working with Arrays
- Lesson 5: Document Object Model

■ Day 2

- Lesson 6: Working with Document object
- Lesson 7: Working with Form object



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Table of Contents

- Lesson 1: Introduction to JavaScript
 - 1.1. Basic Concepts of JavaScript
 - 1.2. Embedding JavaScript in HTML
 - 1.3 Writing JavaScript
- Lesson 2: JavaScript Language
 - 2.1. Data Types and Variables
 - 2.2. JavaScript Operators
 - 2.3. Control Structures and Loops
 - 2.4. JavaScript Functions
- Lesson 3: Working with Predefined Core Objects
 - 3.1. Data Types in JavaScript
 - 3.2. Overview of String object
 - 3.3. Math object
 - 3.4 Date object



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Table of Contents

- Lesson 4: Working with Arrays
 - 4.1. Array Object
 - 4.2. Properties and Methods of Array object
- Lesson 5: Document Object Model
 - 5.1. JavaScript Document Object Model
 - 5.2. Window object
 - 5.3. Navigator Object
 - 5.4. Location Object
 - 5.5. History Object
- Lesson 6: Working With Document Object
 - 6.1. Document Objects
 - 6.2. Cookies



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Table of Contents

- Lesson 7: Working with Form Object
 - 7.1. Form properties, Methods & Event handlers
 - 7.2. Text-Related Objects
 - 7.3. Button Objects
 - 7.4. Check Box and Radio Objects
 - 7.5. Select Objects



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References

- JavaScript: A Beginner's Guide - by John Pollock
- <http://www.w3schools.com/>



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Next Step Courses (if applicable)

- Servlet
- JSP



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Other Parallel Technology Areas

- VBScript



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Web basics- JavaScript

Lesson 1: Introduction to
JavaScript

Lesson Objectives

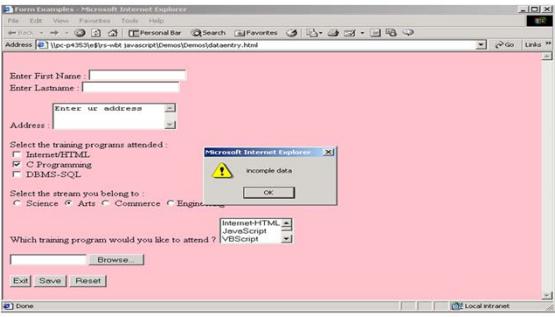
- To understand the following topics:
 - Basic Concepts of JavaScript
 - Embedding JavaScript in HTML
 - Writing JavaScript



1.1: Basic Concepts of JavaScript

Basic Concepts of JavaScript

- JavaScript is the scripting language of the Web
- JavaScript is used for placing dynamic content into HTML page and for client side validation which cannot be performed with HTML 5 elements and attributes



The screenshot shows a Microsoft Internet Explorer window displaying a form titled "Form Examples". The form contains fields for "Enter First Name", "Enter Lastname", and "Address". Below these, there is a section for selecting training programs with checkboxes for "InternetHTML", "C Programming", and "DBMS-SQL". Another section asks to select a stream with radio buttons for "Science", "Arts", "Commerce", and "Engineering". A dropdown menu at the bottom shows "InternetHTML" selected. A warning dialog box titled "Microsoft Internet Explorer" with the message "incomplete data" and an "OK" button is overlaid on the form. At the bottom of the browser window, there are "Exit", "Save", and "Reset" buttons.

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Basic Concepts of JavaScript

JavaScript History :

Web pages made using only HTML are somewhat static with no interactivity and negligible user involvement.

HTML tags are just instructions on document and the display of the document is dependent on the browser.

Interactive pages cannot be built with only HTML, we need a programming language.

So Netscape came out with a client-side language called as JavaScript.

What is JavaScript?

JavaScript is THE scripting language of the Web.

JavaScript is used in Web pages to add functionality, validate forms, detect browsers, and much more.

JavaScript is the most popular scripting language on the internet and works on all major browsers available like IE, Firefox, Chrome etc..

Need of JavaScript:

For placing dynamic content into an HTML Page.

For client side Validation.

For storing and retrieving client's information in the form of Cookies.

1.1: Basic Concepts of JavaScript

Overview

- JavaScript is Netscape's cross-platform, object-based scripting language
- JavaScript code is embedded into HTML pages
- It is a lightweight programming language
- Client-side JavaScript extends the core language by supplying objects to control a browser and its Document Object Model
- Server-side JavaScript extends the core language by supplying objects relevant to running JavaScript on a server

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What is JavaScript?

JavaScript is Netscape's cross-platform, object-based scripting language. Core JavaScript contains a core set of objects, such as Array, Date, and Math, and a core set of language elements such as operators, control structures, and statements. Core JavaScript can be extended for a variety of purposes by supplementing it with additional objects; for example:

Client-side JavaScript extends the core language by supplying objects to control a browser (Navigator or another web browser) and its Document Object Model (DOM). For example, client-side extensions allow an application to place elements on an HTML form and respond to user events such as mouse clicks, form input, and page navigation.

Server-side JavaScript extends the core language by supplying objects relevant to running JavaScript on a server. For example, server-side extensions allow an application to communicate with a relational database, provide continuity of information from one invocation to another of the application, or perform file manipulations on a server.

JavaScript lets you create applications that run over the Internet. Client applications run in a browser, such as Internet Explorer/Firefox, and server applications run on a server, such as Netscape Enterprise Server. Using JavaScript, you can create dynamic HTML pages that process user input and maintain persistent data using special objects, files, and relational databases.

1.1: Basic Concepts of JavaScript

How does it work ?

- When JavaScript code is inserted into an HTML document, and the HTML document is opened in a web browser:
 - The browser will read the HTML .
 - The JavaScript interpreter which is built-in within the browser interprets the JavaScript.
 - It executes the JavaScript immediately, or at a later event i.e could be based on user action or system event.

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How does JavaScript work?

When a JavaScript is inserted into an HTML document, the JavaScript interpreter which is built-in within the Internet browser will read the HTML and interpret the JavaScript. The JavaScript can be executed immediately, or at a later event.

1.1: Basic Concepts of JavaScript

Why use JavaScript?

- JavaScript:
 - Provides HTML designers a programming tool
 - Places dynamic text into an HTML page
 - Reacts to events
 - Reads and writes to HTML elements
 - Can be used to validate form data.
 - for validation not possible using HTML 5 elements and attributes

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Why use JavaScript?

JavaScript gives HTML designers a programming tool :

JavaScript is a simple scripting language which can be used by HTML authors who essentially are not familiar with programming. Hence the HTML authors can easily put small JavaScript code snippets into HTML pages.

JavaScript can place dynamic text into an HTML page : A simple HTML text which displays static content such as <h1>Welcome</h1> can be written in JavaScript to display dynamic content using document.write("<h1>" + orgname + "</h1>")

JavaScript can react to events : A JavaScript can be set to execute when some action takes place, like when a page has finished loading or when a user clicks on an HTML element.

JavaScript can reads and writes HTML elements: A JavaScript can read values of HTML elements and also write/change the content of an HTML element.

JavaScript can be used to validate data : Client side validation can easily taken care of by JavaScript. This reduces the burden on the server.

With the advent of HTML 5, most of the form data validation can be easily performed using HTML 5 elements like input type=email and attributes like required, pattern, maxlength etc

Apart from this JavaScript can also be used to create cookies which is stores and retrieves information about the user preferences. JavaScript can also be used to detect browser which helps in loading a page specifically designed for the browser.

1.2: Embedding JavaScript in HTML

Embedding JavaScript in HTML

- The <SCRIPT> tag

```
<SCRIPT>
    JavaScript statements ...
</SCRIPT>
```

- Specifying the JavaScript version

```
<SCRIPT LANGUAGE="JavaScript 1.2">
```

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Embedding JavaScript in HTML:

The <SCRIPT> tag is an extension to HTML that can enclose any number of JavaScript statements as shown on the slide.

A document can have multiple <SCRIPT> tags, and each can enclose any number of JavaScript statements.

The Script tag has the following attributes:

Language – This attribute specifies the scripting language. It can have values like VBScript, JavaScript. Optionally you can also specify the scripting language version as mentioned on the slide.

Type – Specifies the MIME type of the scripting language

Src – This attribute is for specifying the path and filename of an external .js file which contains the script code.

Some browsers may not support JavaScript and the JavaScript code is displayed as page content. To prevent this, the HTML comment should be used which will hide the JavaScript as shown on the slide. Note the two forward slashes at the end of the comment line. This is JavaScript comment symbol which prevents JavaScript from executing the --> tag.

Note that Javascript is a case-sensitive scripting language.

1.2: Embedding JavaScript in HTML

Embedding JavaScript in HTML(contd)

- Hiding Scripts with Comment tags

```
<script type="text/javascript">  
  <!--  
    some statements ...  
  // -->  
</script>
```



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1.2: Embedding JavaScript in HTML

Embedding JavaScript in HTML (Contd.)

- Using Quotation Marks

```
document.write("<A HREF='A.HTML'>Link to next page")
```

- Specifying alternate content with the NOSCRIPT tag

```
<NOSCRIPT>
  Your browser has JavaScript turned off.
</NOSCRIPT>
```

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Embedding JavaScript in HTML (contd..):

Whenever you want to indicate a quoted string inside a string literal, use single quotation marks ('') to delimit the string literal. This allows the script to distinguish the literal inside the string. In the following example,

The attribute values are in double quotes, but in the call to the function myfunc the argument passed is a string which is enclosed in a single quotes.

```
<INPUT TYPE="button" VALUE="Press Me" onClick="myfunc('astring')">
```

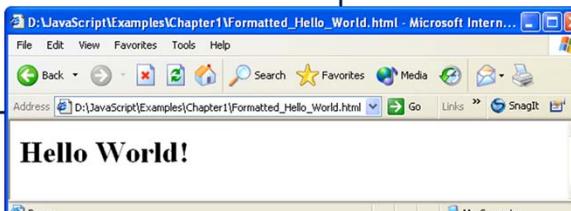
Use the <NOSCRIPT> tag to specify alternate content for browsers that do not support JavaScript. HTML enclosed within a <NOSCRIPT> tag is displayed by browsers that do not support JavaScript; code within the tag is ignored by browser. In case, if the user has disabled JavaScript from the Advanced tab of the Preferences dialog, the browser displays the code within the <NOSCRIPT> tag.

1.2: Embedding JavaScript in HTML

Embedding JavaScript in HTML (Contd.)

- Including text-formatting features

```
<!DOCTYPE html>
<html>
<head> </head>
<body>
<script>
document.write("<H1>Hello World!</H1>")
</script>
</body>
</html>
```



The screenshot shows a Microsoft Internet Explorer window displaying the text "Hello World!" in a large, bold, black font, indicating that the embedded JavaScript code has successfully written the specified HTML content to the page.

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1.3: Writing JavaScript

Where to write JavaScript?

- Head Section
- Body Section
- External File

```
<script>  
</script>
```

<head></head>

<body></body>

Html Page

//script statement

External file

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Embedding JavaScript in HTML: Where to Write JavaScript?

Physically the script code can be placed at three different places in the html file.

Head Section: If you want the Scripts to be executed when they are called, or whenever a user action happens, put script tag in the head section.

Body Section : If you want the Scripts to be executed when the page loads then put script tag in the body section

External File : If you want to run the same JavaScript on several pages, without having to write the same script on every page, you can write a JavaScript in an external file.

1.3: Writing JavaScript

Java Script in Head Section

- Syntax

```
<!DOCTYPE html>
<html>
<head>
<script type="text/javascript">
function message()
{
    alert("This alert box was called with the
          onload event")
}
</script>
</head>
<body onload="message()">
</body>
</html>
```

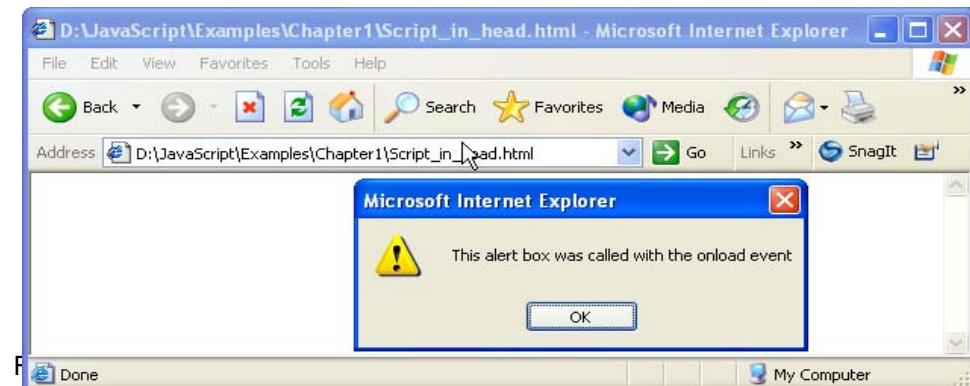
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Where to Write JavaScript? In the Head Section:

Head Section : JavaScripts in an HTML page will be executed when the page loads. This might always not be the case. Sometimes we want to execute a JavaScript when an event occurs, such as when a user clicks a button. In such scenarios, we can put the script inside a function. Scripts that contain functions go in the head section of the document. Then we can be sure that the script is loaded before the function is called.

The example shown on the slide shows the following output:



1.3: Writing JavaScript

JavaScript in Body Section

- Syntax

```
<!DOCTYPE html>
<html>
<head>
<title>script tag in body</title>
</head>
<body >
<script language="javascript">
    document.write("this message is written when
the page loads")
</script>
</body>
</html>
```

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Where to Write JavaScript? In the Body Section:

Body Section : Execute a script that is placed in the body section. The example on the slide shows script written in the body section.
And it produces this output:

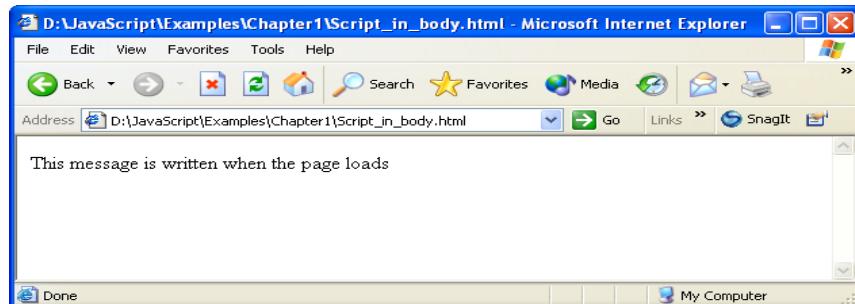


Figure 1.4 Output of Example 1.4 (Script_in_body.html).

1.3: Writing JavaScript

JavaScript in External File

- Content of common.js
 - var msg
msg="

declared in external js file

"
- HTML page using the external script file
 - <!DOCTYPE html>
<html>
<head><title>script tag in external file</title>
<script src="common.js">
<!-- no javascript statements can be written here-->
</script>
</head>
<body> <script>
document.write("display value of a variable"+msg)
</script> </body>
</html>

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Where to Write JavaScript? In External File:

The example on the slide demonstrates how to write JavaScript code in an external file. The extension of the external file has to be .js and it does not contain the script tag.

Demo

- Hello.html
- Head_section.html
- Extern_file.html
- Comm.js
- Var_ex.html



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Lab

- Lab 1:
- Basic concepts of JavaScript



Summary

- JavaScript is the client side scripting language
- When JavaScript code is placed inside a web page, the browser loads the page & the built-in interpreter reads the script & executes the same
- JavaScript is used in Web pages for
 - Validating client side data.
 - Placing dynamic content into an HTML page.
 - Storing client's information in the form of Cookies.



Review Question

- Question 1: JavaScript, a scripting language, is:
 - Option 1: Cross-platform, object-oriented
 - Option 2: Cross-platform, object-based
 - Option 3: Non cross-platform, object-oriented

- Question 2: The <SCR> tag is an extension to HTML that can enclose any number of JavaScript statements.
 - True/False

- Question 3: HTML enclosed within a _____ tag is displayed by browsers that do not support JavaScript.



Review Question: Match the Following

1. Embed JavaScript in an HTML document as statements and functions within this tag
2. To specify alternate content for browsers that do not support JavaScript
3. Feature of JavaScript
4. JavaScript can be written in these sections

1. <NOSCRIPT>
2. Head, Body
3. SCRIPT
4. To validate and process user data



Web basics- JavaScript

Lesson 2: JavaScript Language

Lesson Objectives

- Data Types and Variables
- JavaScript Operators
- Control Structures and Loops
- JavaScript Functions



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2.1: Data Types and Variables

Data Types in JavaScript

- JavaScript is a free-form language. You do not have to declare all variables, classes, and methods
- Variables in JavaScript can be of type:
 - Number (4.156, 39)
 - String ("This is JavaScript")
 - Boolean (true or false)
 - Null (null)

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Data Types in JavaScript:

Although the number of data types is small, they are sufficient for the tasks that JavaScript performs. Notice that there is no distinction between integers and real numbers; both types are just numbers. JavaScript does not provide an explicit data type for a date. However, there are related functions and a built-in date object that enable the Web page designer to manage dates.

2.1: Data Types and Variables

Data Types in JavaScript (Contd..)

- JavaScript variables are said to be loosely typed
- Defining variables: var variableName = value
- JavaScript variables
 - Can include letters of the alphabet, digits 0-9 and the underscore (_) character and is case-sensitive.
 - Cannot include spaces or any other punctuation characters.
 - First character of the variable name must be either a letter or the underscore character.
 - No official limit on the length of a variable name, but must fit within a line.

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Defining Variables:

There are specific rules you must follow when choosing variable names.

Variable names can include letters of the alphabet, both upper and lowercase. They can also include the digits 0-9 and the underscore (_) character.

Variable names cannot include spaces or any other punctuation characters.

The first character of the variable name must be either a letter or the underscore character.

Variable names are case-sensitive; totalnum, Totalnum, and TotalNum are separate variable names.

There is no official limit on the length of a variable name, but it must fit within one line.

JavaScript variables are said to be loosely typed. To declare a variable for a JavaScript program, you would write this:

```
var variablename = value ;
```

2.2: JavaScript Operators

Arithmetic Operator

Operator	Description	Example	Result
+	Addition	$2 + 2$	4
-	Subtraction	$5 - 2$	3
*	Multiplication	$4 * 5$	20
/	Division	$5 / 2$	2.5
%	Modulus	$10 \% 8$	2
++	Increment	$x = 5; x++$	$x = 6$
--	Decrement	$x = 5; x--$	$x = 4$

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2.2: JavaScript Operators

Comparison Operator

Operator	Description	Example	Result
<code>==</code>	is equal to	<code>5 == 8</code>	false
<code>!=</code>	is not equal	<code>5 != 8</code>	true
<code>></code>	is greater than	<code>5 > 8</code>	false
<code><</code>	is less than	<code>5 <= 8</code>	true
<code>>=</code>	is greater or equal	<code>5 >= 8</code>	false
<code><=</code>	is less or equal	<code>5 <= 8</code>	true

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2.2: JavaScript Operators

Assignment Operator

Operator	Example	Is same as
<code>+=</code>	<code>x += y</code>	<code>x = x + y</code>
<code>-=</code>	<code>x -= y</code>	<code>x = x - y</code>
<code>*=</code>	<code>x *= y</code>	<code>x = x * y</code>
<code>/=</code>	<code>x /= y</code>	<code>x = x / y</code>
<code>%=</code>	<code>x %= y</code>	<code>x = x % y</code>

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2.2: JavaScript Operators

Logical Operator

Operator	Description	Example
&&	and	x = 6; y = 3 x < 10 && y > 1 returns true
	or	x = 6; y = 3 x < 10 y > 5 returns true
!	not	x = false !x returns true

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2.2: JavaScript Operators

String Operator

```

graph LR
    A["txt1 = \"What a very\"  
txt2 = \"nice day!\"  
txt3 = txt1 + txt2"] -- Output --> B["What a verynice day!"]
    C["txt1 = \"What a very\"  
txt2 = \"nice day!\"  
txt3 = txt1 + \" \" + txt2"] -- Output --> D["What a very nice day!"]

```

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String Operator:

```
txt1="What a very"
txt2="nice day!"
txt3=txt1+txt2
```

A string is most often a text, for example "Hello World!". To stick two or more string variables together, use the + operator.

The variable txt3 now contains "What a verynice day!". To add a space between two string variables, insert a space into the expression, OR in one of the strings.

```
txt1="What a very"
txt2="nice day!"
txt3=txt1+" "+txt2
```

Or

```
txt1="What a very "
txt2="nice day!"
txt3=txt1+txt2
```

The variable txt3 now contains "What a very nice day!".

2.2: JavaScript Operators

Type of Operator

typeof	undefinedvariable	“undefined”
typeof	33	“number”
typeof	“abcdef”	“string”
typeof	true	“boolean”
typeof	null	“object”

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Typeof Operator:

The typeof operator returns the type of data that its operand currently holds.

```
<HTML>
<HEAD>
<TITLE>Using typeof</TITLE>
</HEAD>
<BODY>
<SCRIPT LANGUAGE="JavaScript">

</SCRIPT>
</BODY>
</HTML>
```

Example 2.1 typeof operator (typeof_ex.html)

Demo

- Typeof_ex.html



2.3: Control Structures and Loops

Control Structures and Loops

- JavaScript supports the usual control structures:
 - the conditionals:
 - if,
 - if...else
 - If ... else if ... else
 - switch
 - iterations:
 - for
 - while

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Control Structures and Loops

Conditional statements are used to perform different actions based on different conditions. Loops execute a block of code for specified number of times or while a specified condition is true.

2.3: Control Structures and Loops

The if Statement

```
if(condition) {
    statement 1
} else {
    statement 2
}
```

```
if(a>10) {
    document.write("Greater than 10")
} else {
    document.write("Less than 10")
}
```

▪ Shorthand

```
document.write( (a>10) ? "Greater than 10" : "Less than 10" );
```

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The if Statement:

The condition is any JavaScript expression that evaluates to the Boolean type, either true or false.

The example as shown on the slide.

A shorthand method can also be used for these types of statements, where ? indicates the 'if' portion and : indicates the 'else' portion. This statement is equivalent to the previous example:

The equivalent shorthand method is also seen on the slide.

2.3: Control Structures and Loops

The Switch Statement

■ Syntax

```
switch (variable) {  
    case outcome1 :{  
        //stmts for outcome 1  
        break; }  
    case outcome2 :{  
        //stmts outcome 2  
        break; }  
    ...  
    default: {  
        //none of the outcomes  
        is chosen } }
```



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2.3: Control Structures and Loops

The Switch Statement

Code Snippet

```
switch (day) {  
    case "Monday": {  
        document.write("weekday")  
        break;  
    }  
    case "Saturday": {  
        document.write("weekday")  
        break;  
    }  
    ...  
    default: {  
        document.write("Invalid day of the week")  
    }  
}
```



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15

2.3: Control Structures and Loops

The for Statement

- Syntax

```
for( [initial expression;][condition;][increment expression] )  
{  
    statements  
}
```

- Code Snippet

```
for(var i=0;i<10;i++){  
    document.write("Hello");}
```

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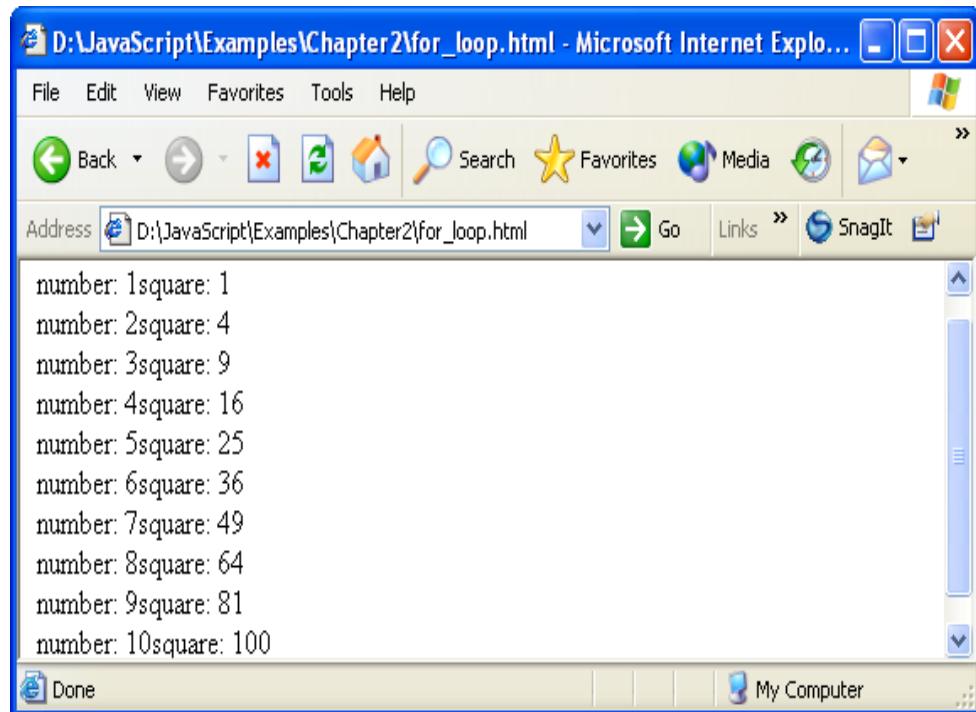
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Looping Statements

The 'for' Statement:

```
<HTML>  
<HEAD>  
<SCRIPT LANGUAGE="JavaScript">  
<!-- hide script<br/>for (i=1; i<=10; i++)  
{  
    sq=i*i  
    document.write("number: " + i + "square: " + sq + "<BR>")  
}  
// end script hiding -->  
</SCRIPT>  
</HEAD>  
<BODY></BODY></HTML>
```

Example 2.2 For Construct (for_ex.html)
And it produces the output as:



The 'while' Statement

The while statement continues to repeat the loop as long as the condition is true. The syntax for the while statement is as follows:

while (condition):

```
{  
    statements  
}
```

```
<HTML>  
<HEAD>  
<SCRIPT LANGUAGE="JavaScript">  
<!-- hide script  
i=1  
while (i<=10)  
{  
    sq=i*i  
    document.write("number: " + i + "square: " + sq + "<BR>")  
    i++  
}  
// end script hiding -->  
</SCRIPT>  
</HEAD>  
<BODY></BODY>  
</HTML>
```

Example 2.3 While Construct

And it produces the output as in the previous screen shot.

2.3: Control Structures and Loops

The break and continue Statements

- **break**
 - Writing break inside a switch, for, while control structure will cause the program to jump to the end of the block. Control resumes after the block, as if the block had finished
- **continue**
 - Writing continue inside a loop will cause the program to jump to the test condition of the structure and re-evaluate and perform instruction of the loop. Control resumes at the next iteration of the loop

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The break statement:

This statement is used to break out of the current 'for' or 'while' loop. Control resumes after the loop, as if it had finished.

The continue Statement:

This statement continues a 'for' or 'while' loop without executing the rest of the loop. Control resumes at the next iteration of the loop.

Demo

- For_ex.html



2.4: JavaScript Functions

JavaScript Functions

- The function statement

```
function myFunction (arg1, arg2, arg3)
{
    statements
    return
}
```

//The return keyword returns a value.

- How to call a function
- ```
myFunction("abc", "xyz", 4)
```

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### The function Statement:

A function contains some code that will be executed by an event or a call to that function. A function is a set of statements. You can reuse functions within the same script, or in other documents. You define functions at the beginning of a file (in the head section), and call them later in the document.

The syntax of a typical function is as follows:

```
function myfunction(arg1, arg2, arg3)

{
 statements
}
```

### How to Call a Function?

A function is not executed before it is called. You can call a function containing arguments:

```
myfunction("abc","xyz",4)
```

2.4: JavaScript Functions

## Predefined Functions (Contd..)

- **parseInt and parseFloat**
  - Returns a numeric value for string argument.

`parseInt (str)  
parseFloat (str)`

`parseInt(str, radix)`  
//returns an integer of specified radix of the string argument

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### parseInt and parseFloat Functions:

The two "parse" functions, parseInt and parseFloat, return a numeric value when given a string as an argument.

The syntax of parseFloat is:

`parseFloat(str)`

where parseFloat parses its argument, the string str, and attempts to return a floating-point number. If it encounters a character other than a sign (+ or -), a numeral (0-9), a decimal point, or an exponent, then it returns the value up to that point and ignores that character and all succeeding characters. If the first character cannot be converted to a number, it returns "NaN" (not a number).

The syntax of parseInt is:

`parseInt(str [, radix])`

where parseInt parses its first argument, the string str, and attempts to return an integer of the specified radix (base), indicated by the second, optional argument, radix. For example, a radix of ten indicates to convert to a decimal number, eight octal, sixteen hexadecimal, and so on. For radices above ten, the letters of the alphabet indicate numerals greater than nine. For example, for hexadecimal numbers (base 16), A through F are used.

If parseInt encounters a character that is not a numeral in the specified radix, it ignores it and all succeeding characters and returns the integer value parsed up to that point. If the first character cannot be converted to a number in the specified radix, it returns "NaN." The parseInt function truncates the string to integer values.

2.4: JavaScript Functions

## Predefined Functions (Contd..)

- Number and string
  - Converts an object to a number or a string.

Number (objectReference)  
String (objectReference)

```
today = new Date (430054663215)
now = String(today)
// returns "Thu Aug 18 04:37:43 GMT-0700 (PDT) 1983"
```

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### Number and String Functions:

The Number and String functions let you convert an object to a number or a string. The syntax of these functions is:

Number(objRef)

String(objRef)

where objRef is an object reference. The following example converts the Date object to a readable string.

```
D = new Date (430054663215)
```

```
// The following returns
```

```
// "Thu Aug 18 04:37:43 GMT-0700 (Pacific Daylight Time) 1983"
```

```
x = String(D)
```

2.4: JavaScript Functions

## Global and Local Variables

- Code Snippet for scope of variables

```
<script>
 var companyName="CAPGEMINI"
 function displayName(){
 var employeeName="Tom"
 document.write("Welcome to "+companyName+", "+employeeName)
 }
</script>
```



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### Scope of Variables:

JavaScript supports two variable scopes:

    Global variables

    Local variables

The local variable applies only within a function and limits the scope of the variable to that function. To declare a local variable, the variable name must be preceded by var, as shown following:

```
var MaxValue=0;
```

Any variable declaration that is not within a function, is treated as a global variable. The syntax to declare a global variable is the same as that for local variable.

2.4: JavaScript Functions

## Global and Local Variables

- Variables that exist only inside a function are called Local variables
- The values of such Local variables cannot be changed by the main code or other functions
- Variables that exist throughout the script are called Global variables
- Their values can be changed anytime in the code and even by other functions

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### Using Global and Local Variables:

You can choose between local and Global variables by using the following guidelines :

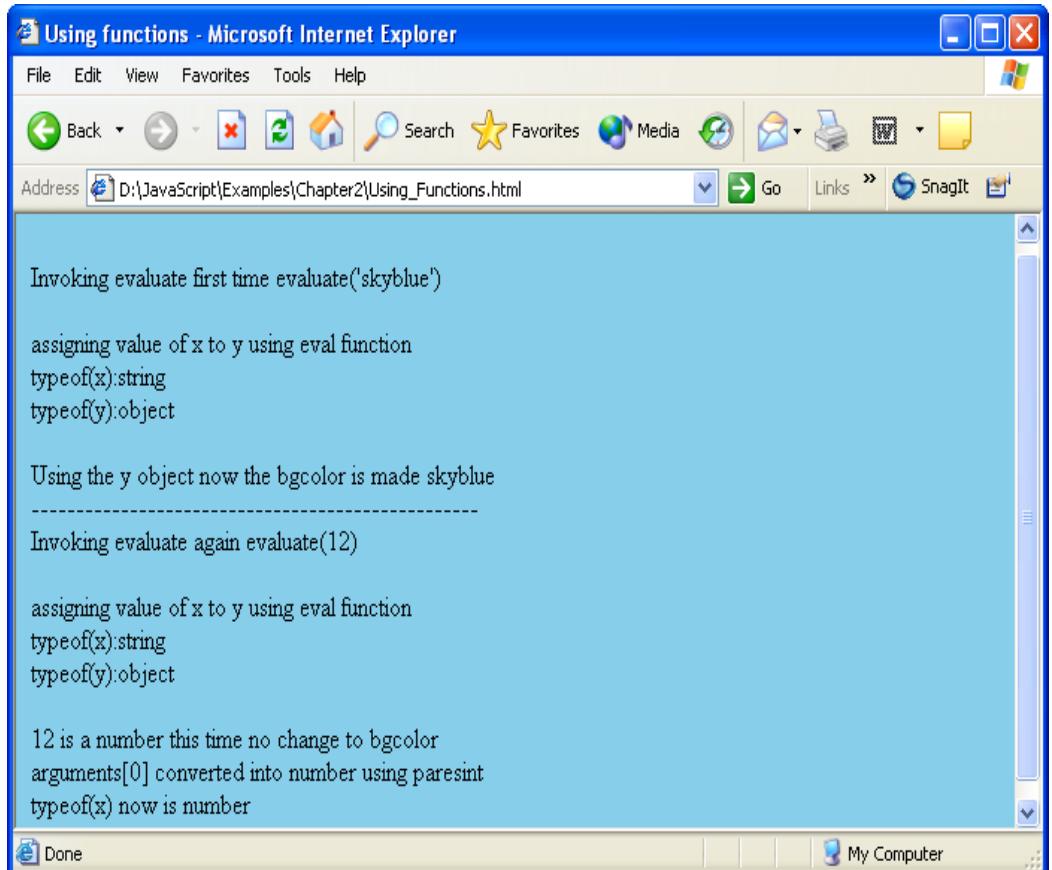
If the value of a variable is meant to be used by any part of the program, both inside and outside functions, the variable should be declared outside any function. This has the effect of making it global and modifiable by any part of the program. The best place to declare global variables is in the <head> block of the HTML document.

If the variable is needed only within a particular function, the variable should be declared inside that function.

If you want the value of a variable to be modified only by the main script of a single function, but you need to use it in another function, pass the variable as an argument to that function. This has the effect of making a copy of the variable and assigning its value to the argument. As the function works and modifies its own copy of the variable, it will not effect the original. Argument variables are automatically declared as local to that function. Even if the argument has the same name as the variable being passed, making changes to it does not effect the variable that was passed. The only exception to this is objects. When an object is passed as an argument, it is passed by reference as opposed to being passed by value. Instead of making a copy of the object, the function uses the original object. Changes made to an object's properties within the function have an effect on the original object.

```
<HTML>
<HEAD>
<META NAME="GENERATOR" Content="Microsoft Visual Studio 6.0">
<TITLE>Using functions</TITLE>
<script language="Javascript">
<!--
function evaluate()
{
 var x;
 var y;
 x = "document"
 document.write("
assigning value of x to y using eval function");
 y = eval(x);
 document.write("
typeof(x):");
 document.write(typeof(x)+"
");
 document.write("typeof(y):");
 document.write(typeof(y)+"
");
 if(isNaN(arguments[0]))
 {
 document.write("
Using the y object now the bgcolor is made
 "+arguments[0]);
 y.bgColor=arguments[0] ;
 }
 else
 {
 document.write("
"+arguments[0]+" is a number this time no
 change to bgcolor");
 x=parseInt(arguments[0]);
 document.write("
 arguments[0] converted into number using
 parseInt ");
 document.write("
typeof(x) now is ");
 document.write(typeof(x)+"
");
 }
}
-->
</script></HEAD><BODY><script>
document.write("
Invoking evaluate first time evaluate('skyblue')
");
evaluate("skyblue");
document.write("
");
for(var i=0;i<50;i++)
document.write("-");
document.write("
Invoking evaluate again evaluate(12)
");
evaluate(12);
</script>
</BODY>
</HTML>
```

Example 2.5 Demo of creating functions and predefined function  
(num\_string\_fun.html)  
And it produces the output as:



The screenshot shows a Microsoft Internet Explorer window titled "Using functions - Microsoft Internet Explorer". The address bar displays "D:\JavaScript\Examples\Chapter2\Using\_Functions.html". The page content is as follows:

```
Invoking evaluate first time evaluate('skyblue')

assigning value of x to y using eval function
typeof(x):string
typeof(y):object

Using the y object now the bgcolor is made skyblue

Invoking evaluate again evaluate(12)

assigning value of x to y using eval function
typeof(x):string
typeof(y):object

12 is a number this time no change to bgcolor
arguments[0] converted into number using paresint
typeof(x) now is number
```

## Demo

- If\_else.html
- Switch\_ex.html
- For\_ex.html
- Break\_con\_ex.html
- Fun\_ex.html
- Num\_string\_fun.html



## Lab

- Lab 2 :
- The JavaScript language



## Summary

- Data Types & Variables
  - Numbers, Strings, Boolean, and Null
- Operators & Expressions
- Functions
- Predefined Functions
  - parseInt & parseFloat, Number & String
- Global and Local variables



## Review Question

- Question 1: Which of the following two variable scopes is supported by JavaScript:
  - Global, Local
  - Functional, Non functional
  - Static, Dynamic



## Review Question: Match the Following

1. Loop statements
2. Arithmetic operators
3. Predefined function
4. Assignment operators
5. Logical operators

1. parseInt
2. +=, -=
3. &&, ||
4. For, While
5. ++, --, %, \*



# **Web Basics - JavaScript**

Lesson 3: Working with  
Predefined Core Objects

## Lesson Objectives

- Data Types in JavaScript
- String Object
- Math Object
- Date Object



3.1: Data Types in JavaScript

## Data Types in JavaScript

- JavaScript has predefined objects and uses standard browser objects. Some of them are discussed here
- Predefined objects in JavaScript are:
  - String
  - Math
  - Date

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3.2: String Object

## String Object

- Properties of a string object:
  - Length: The length property returns the number of characters in a string.
    - Syntax : stringObject.length
    - “Lincoln”.length // result = 7

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### String Objects: Creating a String

A string consists of one or more standard text characters between matching quote marks. JavaScript is forgiving in one regard: You can use single or double quotes, as long as you match two single quotes or two double quotes around a string.

JavaScript draws a fine line between a string value and a string object. Both let you use the same methods on their contents, so by and large, you do not have to create a string object (with the new String() constructor) every time you want to assign a string value to a variable. A simple assignment operation (var myString = “fred”) is all you need to create a string value that behaves on the surface very much like a full-fledged string object.

```
var myString = new String("characters")
var myString = "fred"
```

### Properties of String Objects:

#### Length:

The most frequently used property of a string is length. To derive the length of a string, extract its property as you would extract the length property of any object. The length value represents an integer count of the number of characters within the string. Spaces and punctuation symbols count as characters. Any backslash special characters embedded in a string count as one character, including such characters as newline and tab.

```
“Four score”.length // result = 10
“One\nTwo”.length // result = 7
“”.length // result = 0
```

3.2: String Object

## String Object(Parsing Methods )

- **charAt(index):** The charAt() method returns the character at a specified position.
  - Syntax: String charAt(index)
  - "HelloWorld".charAt(5)// result "W"
- **concat()**
  - The concat() method is used to join two or more strings
  - One or more string objects to be joined to a string
  - Syntax: stringObject.concat(stringX,stringX,...,stringX)

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### String Objects (Parsing Methods):

String.charAt(index)

Use the string.charAt() method to extract a single character from a string when you know the position of that character. For this method, you specify an index value in the string as a parameter to the method. The index value of the first character of the string is 0. If your script needs to get a range of characters, use the string.substring() method. It is a common mistake to use string.substring() to extract a character from inside a string, when the string.charAt() method is more efficient.

string.concat( string2)

Returns: Combined string.

"abc".concat("def") // result: "abcdef"

JavaScript's add-by-value operator (+=) provides a convenient way to concatenate strings. N4 and IE4, however, introduces a string object method that performs the same task. The base string to which more text is appended is the object or value to the left of the period. The string to be appended is the parameter of the method, as the example demonstrates. Like the add-by-value operator, the concat() method doesn't know about word endings. You are responsible for including the necessary space between words if the two strings require a space between them in the result.

3.2: String Object

## String Object(Parsing Methods Contd )

- **match(regExpression)**
  - Searches for a specified value in a string
  - Syntax: string.match(regExpression)
- **replace(regExpression, replaceString)**
  - Replaces some characters with some other characters in a string.
  - Syntax: string.replace( regExpression, replaceString)
- **substr(start [, length])**
  - Extracts a specified number of characters in a string, from a start index .
  - Syntax: string.substr(start [, length])

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### String Objects (Parsing Methods contd..):

string.match(regExpression) :Returns Array of matching strings.

The string.match() method relies on the RegExp (regular expression) object. The parameter must be a regular expression object. This method returns an array value when at least one match turns up; otherwise the returned value is null.

string.replace( regExpression, replaceString): Returns Changed string.

Regular expressions are commonly used to perform search-and-replace operations. JavaScript's string.replace() method provides a simple framework in which to perform this kind of operation on any string.

```
var str = "To be, or not to be: that is the question."
var regexp = /be/
str.replace(regexp, "exist")
```

string.substr(start [, length]) :Returns Characters of the string from the first character of the given string to the specified length.

3.2: String Object

## String Object(Converting Methods )

- **toLowerCase()**
  - Displays a string in lowercase letters
  - `string.toLowerCase()`
- **toUpperCase()**
  - Displays a string in uppercase letters
  - `string.toUpperCase()`

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### String Objects (Parsing Methods contd..):

`string.toLowerCase()` and `string.toUpperCase()`

Returns: The string in all lower- or uppercase, depending on which method you invoke.

A great deal of what takes place on the Internet (and in JavaScript) is case-sensitive. URLs on some servers, for instance, are case-sensitive for directory names and filenames. These two methods, the simplest of the string methods, convert any string to either all lowercase or all uppercase. Any mixed-case strings get converted to a uniform case. If you want to compare user input from a field against some coded string without worrying about matching case, you should convert both strings to the same case for the comparison.

3.2: String Object

## String Object (Formatting Methods)

- **Formatting Methods:**
  - `string.bold()` : Displays a string in bold
  - `string.italics()` : Displays a string in italic
  - `string.fontcolor (colorValue)` : Displays a string in a specified color
  - `string.fontsize(integer1to7)` : Displays a string in a specified size
  - `string.big()` : Displays a string in a big font
  - `string.small()` : Displays a string in a small font

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### String Objects (Formatting Methods):

Now we come to the other group of string object methods, which ease the process of creating the numerous string display characteristics when you use JavaScript to assemble HTML code.

You can still use the standard HTML tags instead of by calling the string methods in your web pages. The choice is up to you. One advantage to the string methods is that they never forget the ending tag of a tag pair.

`string.fontsize()` and `string.fontcolor()` also affect the font characteristics of strings displayed in the HTML page. The parameters for these items are pretty straightforward —an integer between 1 and 7 corresponding to the seven browser font sizes and a color value (as either a hexadecimal triplet or color constant name) for the designated text.

3.2: String Object

## URL String Encoding and Decoding

- JavaScript includes two functions for encoding & decoding escape()
  - encodes the string that is contained in the string argument to make it portable.
  - So it can be transmitted across any network to any computer that supports ASCII characters.
- unescape()
  - Use the unescape function to decode an encoded sequence that was created using escape.

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### URL String Encoding and Decoding

```
escape("Howdy Pardner") // result = "Howdy%20Pardner"
unescape("Howdy%20Pardner") // result = "Howdy Pardner"
```

When browsers and servers communicate, some nonalphanumeric characters that we take for granted (such as a space) cannot make the journey in their native form. Only a narrower set of letters, numbers, and punctuation is allowed. To accommodate the rest, the characters must be encoded with a special symbol (%)and their hexadecimal ASCII values. For example, the space character is hex 20 (ASCII decimal 32). When encoded, it looks like %20. You may have seen this symbol in browser history lists or URLs.

JavaScript includes two functions, escape() and unescape(), that offer instant conversion of whole strings. To convert a plain string to one with these escape codes, use the escape function, as in `escape("Howdy Pardner") // result = "Howdy%20Pardner"`. The unescape() function converts the escape codes into human-readable form.

## Demo

- string\_len.html
- string\_method.html
- string\_style.html



### 3.3: Math Object

#### Math Object - Properties & Methods

Property/ Method	Description
Math.PI	PI (3.141592653589793116)
Math.SQRT2	Square root of 2 (1.4142)
Math.random()	Random number between 0 and 1
Math.round(val)	N+1 when val >= n.5; otherwise N
Math.max(val1, val2)	The greater of val1 or val2
Math.min(val1, val2)	The lesser of val1 or val2



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#### Math Object – Properties & Methods:

The Math object allows you to perform mathematical tasks. All properties and methods can be called without creating the Math object.

You can use them in your regular arithmetic expressions since they return constant values. For example, to obtain the circumference of a circle whose diameter is in variable d, you use the statement shown below.

circumference = d \* Math.PI

The Math.random() method returns a floating-point value between 0 and 1. If you are designing a script to act like a card game, you need random integers between 1 and 52; for dice, the range is 1 to 6 per die. To generate a random integer between zero and any top value, use the first formula shown where n is the top number.

To generate random numbers between a different range use the second formula where m is the lowest possible integer value of the range and n equals the top number of the range minus m. In other words n+m should add up to the highest number of the range you want. For the dice game, use the third formula for each throw of the die.

`Math.round(Math.random() * n)`

`Math.round(Math.random() * n) + m`

`newDieValue = Math.round(Math.random() * 5) + 1`

## Demo

- Rand\_fun.html



3.4: Date Object

## Date

- Properties and Methods:
- `var dateObject = new Date([parameters])`

Properties	Description
<code>dateObj.getTime()</code>	Milliseconds since 1/1/70 00:00:00 GMT
<code>dateObj.getYear()</code>	Specified year minus 1900
<code>dateObj.getMonth()</code>	Month within the year (January = 0)
<code>dateObj.getDate()</code>	Date within the month

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### Date Object: Creating a Date object

```
var dateObject = new Date([parameters])
new Date("Month dd, yyyy hh:mm:ss")
new Date("Month dd, yyyy")
new Date(yy,mm,dd,hh,mm,ss)
new Date(yy,mm,dd)
new Date(milliseconds)
```

The Date object evaluates to an object rather than to some string or numeric value. If you leave the parameters empty, JavaScript takes that to mean you want today's date and the current time to be assigned to that new Date object. To create a Date object for a specific date or time, you have five ways to send values as a parameter to the new Date() constructor function.

The Date object has only a prototype property, which enables you to apply new properties and methods to every Date object created in the current page.

3.4: Date Object

## Date and Time Arithmetic

- To simplify the tasks of formatting and manipulating dates, JavaScript provides a Date object along with some extra functions that help you work with dates.

```
var oneMinute = 60 * 1000
var oneHour = oneMinute * 60
var oneDay = oneHour * 24
var oneWeek = oneDay * 7
targetDate = new Date()
dateInMs = targetDate.getTime()
dateInMs += oneWeek
targetDate.setTime(dateInMs)
```

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### Date and time arithmetic:

You may need to perform some math with dates for any number of reasons. Perhaps you need to calculate a date at some fixed number of days or weeks in the future or figure out the number of days between two dates. When calculations of these types are required, remember the lingua franca of JavaScript date values: the milliseconds.

What you may need to do in your date-intensive scripts is establish some variable values representing the number of milliseconds for minutes, hours, days, or weeks, and then use those variables in your calculations. On the slide you can see an example that establishes some practical variable values, building on each other. With these values established in a script, you can use one to calculate the date one week from today. Following is the complete example.

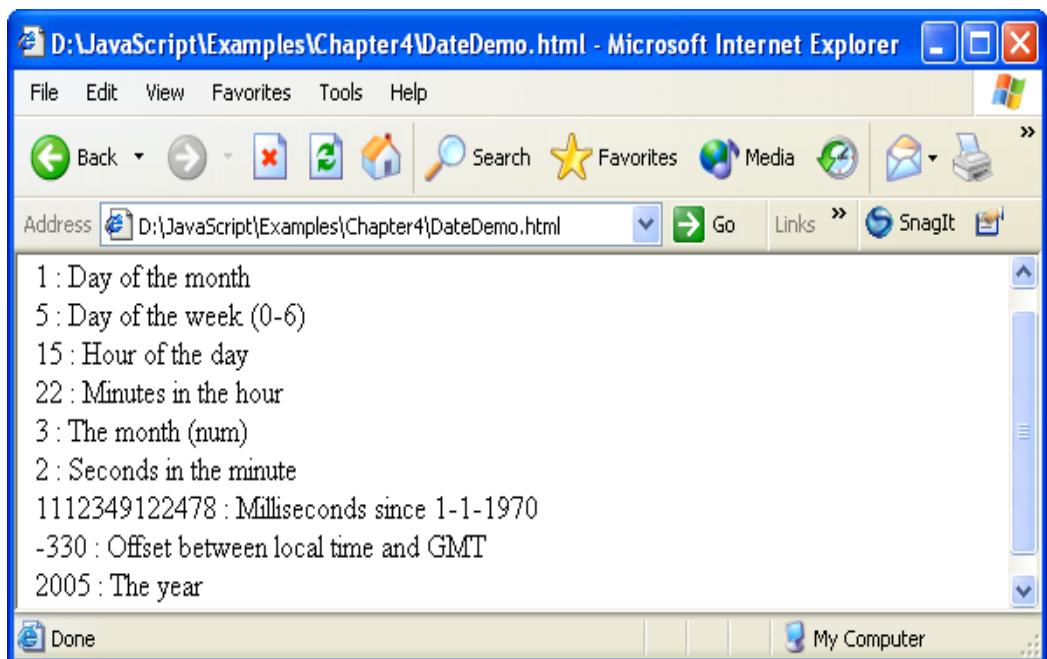
**Date and time arithmetic (contd..):**

```
<!DOCTYPE html>
<HTML>
<HEAD>
<TITLE></TITLE>
</HEAD>
<BODY>
<script>
dateinfo = new Date();
document.write(dateinfo.getDate() + " : Day of the month" + "
")

document.write(dateinfo.getDay() + " : Day of the week (0-6)" +
"
")
document.write(dateinfo.getHours() + " : Hour of the day" + "
")

document.write(dateinfo.getMinutes() + " : Minutes in the hour" + "
")
document.write(dateinfo.getMonth() + " : The month (num)" +
"
")
document.write(dateinfo.getSeconds() + " : Seconds in the minute " +
"
")
document.write(dateinfo.getTime() + " : Milliseconds since 1-1-1970" +
"
")
document.write(dateinfo.getTimezoneOffset() + " : Offset between local time
and GMT" + "
")
document.write(dateinfo.getYear() + " : The year" + "
")
</script>
</BODY>
</HTML>
```

And it produces the output as:



## Demo

- Date\_info.html
- DateDifference.html
- Utc\_ex.html



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Add the notes here.

## Lab

- Lab 3:
- Working with Predefined Core Objects



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Add the notes here.

## Summary

- Predefined objects of JavaScript like String, Math and Date
- How to use predefined objects
- How to manipulate their properties and invoke methods



## Review Question

- Question 1: Which is the method to extract a single character from a string when you know the position of that character.
  - Option 1: `string.charAt()`
  - Option 2: `string.charAtIndex()`
- Question 2: `getDate()` returns the day within the month.
  - True/False
- Question 3: To convert a plain string to one with these escape codes, use the \_\_\_\_\_ function.



# **Web Basics- JavaScript**

Lesson 4: Working with Arrays

## Lesson Objectives

- In this lesson, you will learn about:
  - Array object
  - Properties and methods of Array objects



4.1: Array Object

## Concept of Array Objects

- An array is the sole JavaScript data structure provided for storing and manipulating ordered collections of data
- For creating an array, you can use the following:

var myArray = new Array() //empty array

solarSys = new Array(2) //Array defined with size  
solarSys[0] = "Mercury" // Assigning values to array  
solarSys[1] = "Venus"

solarSys = new Array("Mercury", "Venus", ...) condensed array

solarsys=["Mercury", "Venus",....] // literal array

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### Array Objects:

An array is a kind of variable that can hold more than one value at a time.

However, unlike some other programming languages, JavaScript's arrays are very forgiving as to the kind of data you store in each cell or entry of the array. This allows, for example, an array of arrays, providing the equivalent of multidimensional arrays customized to the kind of data your application needs.

You can see a few examples listed on the slide for creating an array. We see example of creating an empty array. To limit the size of array you can specify the optional integer value as seen in the second example.

Another way of defining an array is called as condensed array which allows you to combine the array and array elements definitions into one step.

Literal arrays are define by assigning the value in square brackets. To create an array with initial undefined values you can simple enter a comma. For eg

```
myarray=["Pune", , , "Mumbai"]
```

4.2: Properties and methods of Array Object

## Concept of Array Object Methods

- JavaScript provides the following array object methods:
  - `arrayObject.length`
  - `arrayObject.join(separatorString)`
  - `arrayObject.reverse()`
- Example for length method
  - `myArray.length// result: 5`
- Code snippet for usage of join method
  - In this, `myArray` contents will be joined and placed into `arrayText` by using the comma separator

```
var arrayText = myArray.join(",")
```

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### Array Object Methods:

After you have information stored in an array, JavaScript provides several methods to help you manage that data.

`arrayObject.join(separatorString)`

It returns string of entries from the array delimited by the `separatorString` value.

```
var arrayText = myArray.join(",")
```

`arrayObject.reverse()`

It returns array of entries in the op.

The element that was last in the array becomes the 0 index item in the array. Note that when you do this, you are restructuring the original array, and not copying it.



Demo of Array object (Arr\_Demo.html) produces the output as shown below:

The screenshot shows a Microsoft Internet Explorer window with the title "arrays - Microsoft Internet Explorer". The address bar displays the URL "D:\JavaScript\Examples\Chapter5\ArrayDemo.html". The main content area of the browser shows the following text output from the JavaScript code:

```
Mercury,Venus,Earth,Mars,Jupiter,Saturn,Uranus,Neptune,Pluto
Slice three elements
Mars,Jupiter,Saturn
REverse and join with ,Pluto,Neptune,Uranus,Saturn,Jupiter,Mars,Earth,Venus,Mercury
solarsys after reversing
Pluto,Neptune,Uranus,Saturn,Jupiter,Mars,Earth,Venus,Mercury
Concat and join
Mercury,Venus,Earth,Mars,Jupiter,Saturn,Uranus,Neptune,Pluto,Mercury,Venus,Earth,Mars,Jupiter,Saturn,Uranus,Neptune,Pluto
Sort and joinEarth,Jupiter,Mars,Mercury,Neptune,Pluto,Saturn,Uranus,Venus
```

## Lab

- Lab 4 :
- Working with Arrays



## Summary

- An array is a set of variables
- You can create an array object by using new operator
- Array Object properties are length
- Array Object Methods are concat, join, reverse, slice etc



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## Review Question

- Question 1: The \_\_\_ method allows you to join array contents and place it into a text
  - Option 1: array.concat()
  - Option 2: array.join()
- Question 2: An array object automatically has a size property.
- True/False



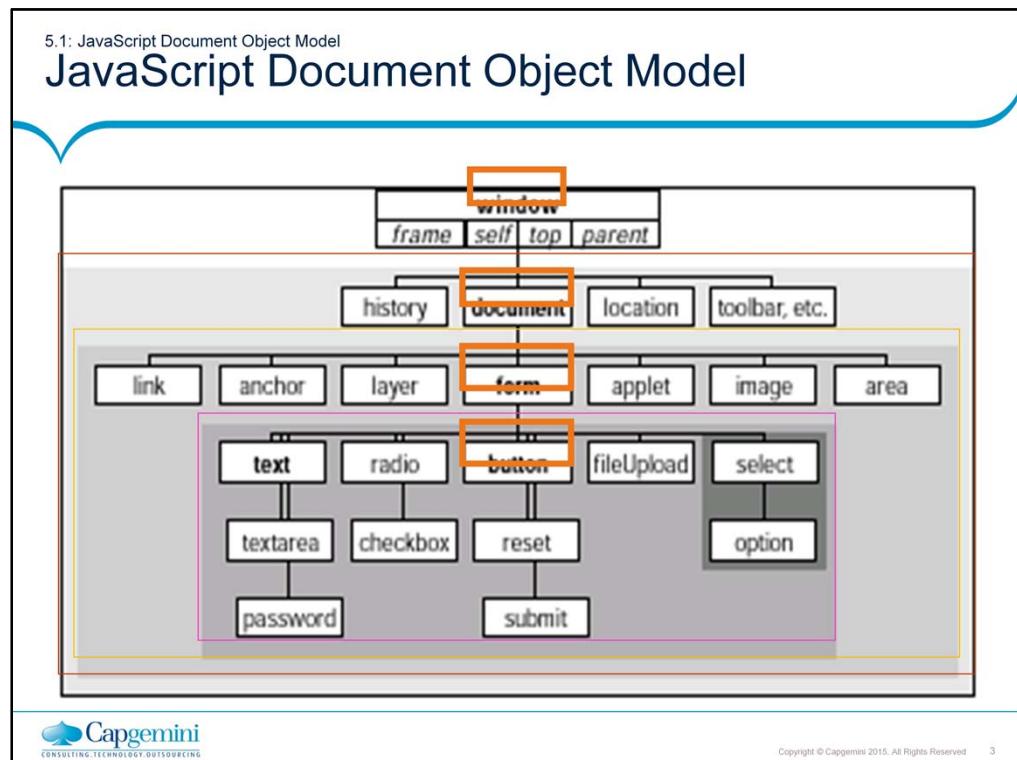
## **Web Basics- JavaScript**

Lesson 5: Document Object  
Model

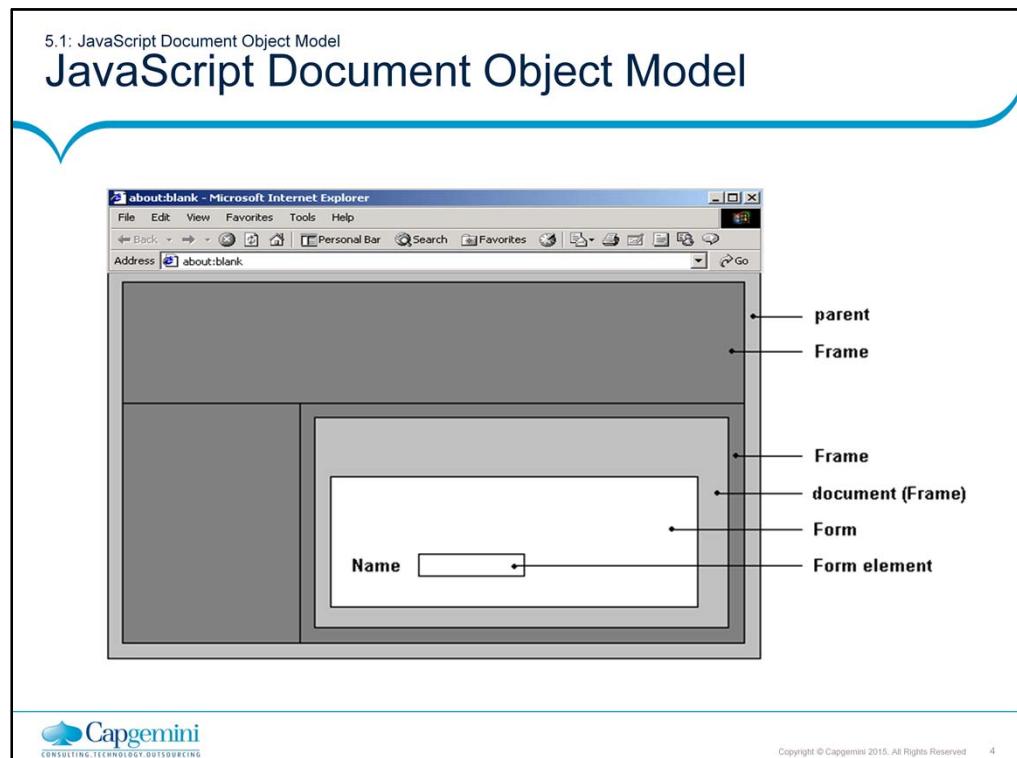
## Lesson Objectives

- After completing this module you will be able to:
  - Understand the JavaScript Object Model
  - Understand the *Window* object and *Navigator* Object
  - Working with Location and History Object





The figure shows the complete JavaScript document object hierarchy as implemented in Netscape Navigator 4. Notice that the **window** object is the topmost object in the entire scheme. Everything you script in JavaScript is in the browser's **window**, be it the **window** itself or a **form** element. Of all the objects shown in the figure, you are likely to work most with the ones that appear in **boldface**. Objects whose names appear in **italics** are synonyms for the **window** object, and are used only in some circumstances. Pay attention to the shading of the concentric rectangles. Every object in the same shaded area is at the same level relative to the **window** object. When a link from an object extends to the next darker shaded rectangle, that object contains all the objects in darker areas. There exists at most one of these links between levels. A **window** object contains a **document** object; a **document** object contains a **form** object; a **form** object contains many different kinds of **form** elements. Study this figure to establish a mental model for the scriptable elements of a Web page. After you script these objects a few times, the object hierarchy will become second nature to you — even if you do not remember every detail (property, method, and event handler) of every object. At least you know where to look for information.



### Creating JavaScript Objects

Most of the objects that a browser creates for you are established when an HTML document loads into the browser. The same kind of HTML code you used to create links, anchors, and input elements tell a JavaScript-enhanced browser to create those objects in memory. The objects are there whether or not your scripts call them into action.

The only visible differences to the HTML code for defining those objects are one or more optional attributes specifically dedicated to JavaScript. By and large, these attributes specify the event you want the user interface element to react to and what JavaScript should do when the user takes that action. If you rely on the document's HTML code to perform the object generation, you spend more time figuring out how to do things with those objects or have them do things for you. Bear in mind that objects are created in their load order, which is why you should put most, if not all, deferred function definitions in the document's Head. If you create a multi-frame environment, a script in one frame cannot communicate with another frame's objects until both frames load.

5.1: JavaScript Document Object Model

## Object Properties

- Define a particular, current setting of an object
- Property names are case-sensitive
- Each property determines its own read-write status
- Any property you set survives as long as the document remains loaded in the window
- For example:

```
document.forms[0].phone.value = "555-1212"
document.forms[0].phone.delimiter = "-"
```

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### Object Properties

A property generally defines a particular, current setting of an object. The setting may reflect a visible attribute, such as a document's background color. It may also contain information that is not so obvious, such as the form action and method when it is submitted.

Document objects have most of their properties assigned by attribute settings of HTML tags that generate the objects. Thus, a property may be a string (for example, a name) or a number (for example, a size). A property can also be an array, such as an array of images contained by a document. If the HTML does not include all attributes, the browser usually provides default value for both attributes and corresponding JavaScript properties.

When used in script statements, property names are case-sensitive. Therefore, if you see a property name listed as bgColor, you must use it in a script statement with that exact case usage. But when you set an initial value of a property by way of an HTML attribute, the attribute name (like all of HTML) is not case-sensitive. Thus, <BODY BGCOLOR="white"> and <body bgcolor="white"> both set the same property value.

### Object Methods

An object's method is a command that a script can give to that object. Some methods return values, but that is not a prerequisite for a method. Also, not every object has methods defined for it. In a majority of cases, invoking a method from a script causes some action to take place. It may be an obvious action, such as resizing a window, or something more subtle, such as processing a mouse click.

5.1: JavaScript Document Object Model

## Event Handlers

- Specify how an object reacts to an event
  - Event can be triggered by a user action or a browser action.
- There are two ways to map functions to events
  - Event handlers as methods:

```
document.formName.button1.onclick=f1()
```
  - Event handlers as properties:

```
<INPUT TYPE="button" NAME="button1" onClick="f1()">
```

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### Object Event Handlers

Event handlers specify how an object reacts to an event, whether the event is triggered by a user action (for example, a button click) or a browser action (for example, the completion of a document load). Event Handlers can be specified as methods or they can be specified using attributes in tags.

5.2: Window Object

## Working with Window Object

- Window object:
  - Unique position at the top of the JavaScript object hierarchy
  - Can be omitted from object references since everything takes place in a window
  - The following two statements are the same
    - `window.alert("Welcome to Javascript ")`
    - `alert("Welcome to Javascript ")`
- Properties
  - `defaultStatus`
  - `status`
  - `closed`

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### About this Object

The window object has the unique position of being at the top of the JavaScript object hierarchy. This exalted location gives it a number of properties and behaviors unlike any other object. Among the list of properties for the window object is one called `self`. This property is synonymous to the window object itself. When you start your browser, it usually opens a window. That window is a valid window object, even if it is blank. This object is also the level at which a script asks the browser to display any of the three styles of the dialog boxes (a plain alert dialog box, an OK-Cancel confirmation dialog box, or a prompt for user text entry).

Property	Description
<code>defaultStatus</code>	<code>window.defaultStatus</code> property is normally an empty string, it sets or returns the default text which is in the statusbar of the window
<code>Status</code>	This property sets a text value to be displayed in the status bar
<code>closed</code>	Returns a boolean value which indicated if the window has been closed or no

5.2: Window Object

## Window Object Methods

- **alert(message)**

```
window.alert("Display Message")
```

- **confirm(message)**

```
window.confirm("Exit Application ?")
```

- **prompt(message,[defaultReply])**

```
var input= window.prompt("Enter value of X")
```

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Method	Description
alert(message)	An alert dialog box is a modal window that presents a message to the user with a single OK button to dismiss the dialog box.
confirm(message)	A confirm dialog box presents a message in a modal dialog box along with OK and Cancel buttons. Such a dialog box can be used to ask a question of the user, usually prior to a script performing actions that will not be undoable.
prompt(message, defaultReply)	The third kind of dialog box that JavaScript can display includes a message from the script author, a field for user entry, and two buttons (OK and Cancel).

5.2: Window Object

## Window Object Methods

- `open("URL", "windowName" [, "windowFeatures"])`

`newwin=window.open("new/URL","NewWindow","toolbar,status,resizable")`
- `close()`
- `moveBy(deltaX,deltaY), moveTo(x,y)`
- `scrollBy(deltaX,deltaY), scrollTo(x,y)`

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<code>open("URL", "windowName" [, "windowFeatures"])</code>	The <code>window.open()</code> method, provides a Web site designer with options for the way a new browser window should look on the user's computer screen. The optional <code>windowFeatures</code> parameter is <i>one string</i> , that comprises a comma-separated list of assignment expressions. Boolean values for true can be either yes, 1, or just the feature name by itself; for false, use a value of no or 0. If you omit any Boolean attributes, they are rendered as false. Therefore, if you want to create a new window that shows only the toolbar and statusbar and is resizable, the method looks like this: <code>window.open("newURL","NewWindow", "toolbar,status,resizable")</code> .
<code>close()</code>	The <code>window.close()</code> method closes the browser window referenced by the window object.
<code>scrollBy(deltaX,deltaY) scrollTo(x,y)</code>	<code>scrollBy(..)</code> method scrolls the content by the specified number of pixels which is relative scroll. <code>scrollTo(..)</code> is an absolute scroll to the specified coordinates
<code>moveBy(deltaX,delta Y) moveTo(x,y)</code>	<code>moveBy(..)</code> moves the window relative to the current position. <code>moveT(..)</code> moves it to the specified coordinates

## 5.2: Window Object

# Window Object Methods

- setTimeOut, clearTimeOut

```
y=setTimeOut('scroll()', '100')
```

```
clearTimeOut(y)
```

- setInterval, clearInterval

```
y=setInterval('scroll()', '100')
```

```
clearInterval(y)
```



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<code>setTimeout("functionOrExpr", msecDelay [, funcarg1, ..., funcargn])</code>	Javascript holds a statement or function from executing for the desired amount of time. The timeout value is in milliseconds
<code>setInterval("functionOrExpr", msecDelay,language )</code>	Use this method when your script needs to call a function or execute some expression repeatedly with a fixed time delay between calls to that function or expression. The timeinterval is in milliseconds. Optional Language i.e Javascript,vbscript
<code>clearInterval (intervalIDnumber)</code>	Use this method to turn off an interval loop action started with the <code>window.setInterval()</code> method. The parameter is the ID number returned by the <code>setInterval()</code> method.
<code>clearTimeout (timeoutIDnumber)</code>	Use the <code>clearTimeout()</code> method in concert with the <code>window.setTimeout()</code> method when you want your script to cancel a timer that is waiting to run its expression. The parameter for this method is the ID number that the <code>setTimeout()</code> method returns when the timer starts ticking.

5.2: Window Object

## Window Object Event Handlers

- Event Handlers for the Window Object
  - onBlur
  - onFocus
  - onLoad

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### Event Handlers

Table 6.3 Window Object Event Handlers

Event Handler	Description
onBlur onFocus	Fired when window or frame has been activated and deactivated respectively.
onLoad	The load event is sent to the current window at the end of the document loading process.

## Demo

- Window\_object.html
- setTimeOut\_method.html
- Window\_ex.html
- setInterval\_method.html



5.3: Navigator Object

## Navigator Object

- Netscape originally defined the navigator object for the Navigator 2 browser
- Microsoft Internet Explorer also supports the object in its object model
- The properties of the navigator object deal with the browser program the user runs to view documents

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### Navigator Object

Netscape originally defined the navigator object for the Navigator 2 browser. Microsoft Internet Explorer also supports the object in its object model. Properties of the navigator object deal with the browser program the user runs to view documents. Properties include those for extracting the version of the browser and the platform of the client running the browser.

5.3: Navigator Object

## Navigator Object

Properties	
appName	appCodeName
appVersion	userAgent
mimeTypes[ ]	Platform
plugins[ ]	cookieEnabled

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Property	Description
appName appCodeName appVersion userAgent Platform cookieEnabled	The <i>appName</i> and <i>appCodeName</i> properties are simply the official name and the internal code name for the browser. <i>appVersion</i> returns version information of the browser and <i>userAgent</i> returns the user-agent header sent by the browser to the server. Platform returns for which platform the browser is compiled. <i>cookieEnabled</i> determines if cookies are enabled in the browser
plugins[]	Returns an array of plugins available on the client browser.
mimeTypes[]	Returns an array of MIME types supported by the browser

## Demo

- property\_bro\_ver\_name.html
- plugin\_object.html
- MIME\_Type.html



## Lab

- Lab 5 :
- Working with Document Object Model (DOM)



5.4: Location Object

## Rationale of Location Object

- The Location object represents information about the URL of any currently open window or of a specific frame of an html document
  - A multiple-frame window displays the parent window's URL in the Location field
  - Each frame also has a location associated with it, although no overt reference to the frame's URL can be seen in the browser

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### Working with Location Object:

To get URL information about a document located in another frame, the reference to the location object must include the window frame reference.

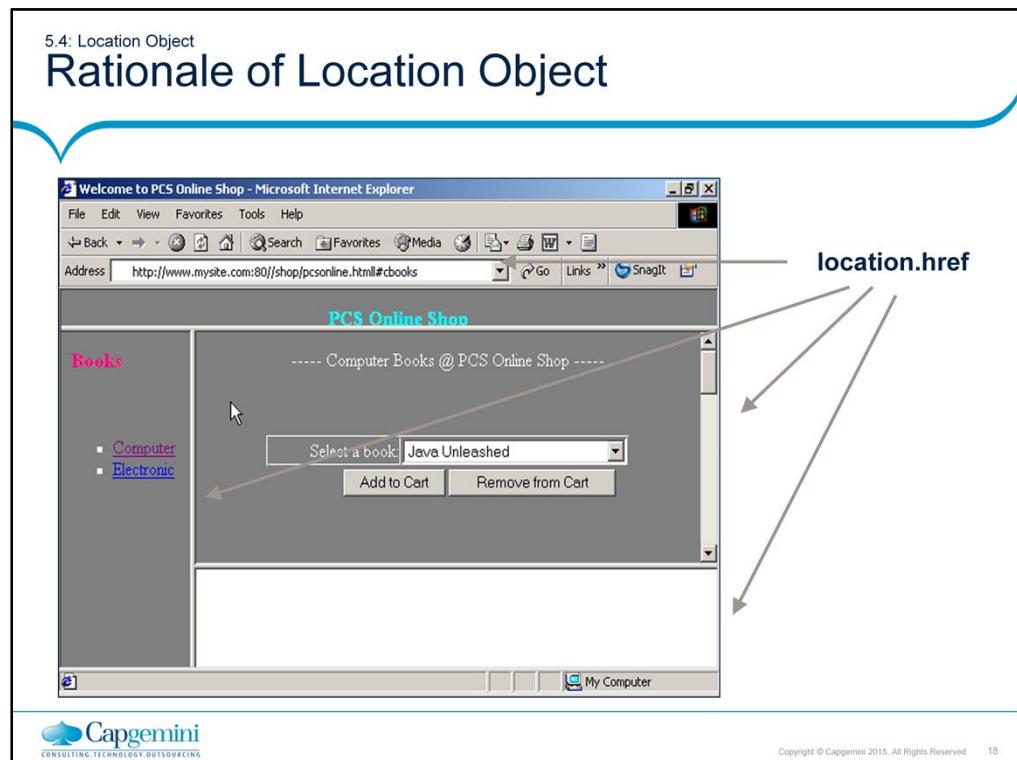
Most properties of a location object deal with network-oriented information.

This information includes various data about the physical location of the document on the network, including the host server, the protocol being used, and other components of the URL

The `window.location` object can be handy when a script needs to extract information about the URL, perhaps to obtain a base reference on which to build URLs for other documents to be fetched as the result of user action.

Setting the value of some location properties is the preferred way to control the document that gets loaded into a window or frame.

### Location object properties and methods



#### Working with Location Object:

Given a complete URL for a typical WWW page, the `window.location` object assigns property names to various segments of the URL as shown in the above slide.

5.4: Location Object

## Location Object Properties

- Let us see some of the Location Object Properties:

Property	Value
protocol	http:
hostname	www.mysite.com
port	80
host	www.mysite.com:80
pathname	/shop/pcsonline.html
hash	#cbook
href	http://www.mysite.com:80/shop/pcsonline.html#cbooks

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### Working with Location Object:

Let us discuss some of the location object properties.

Property	Description
protocol	The first component of any URL is the protocol being used for the particular type of communication. For eg: http,ftp,mailto
hostname	The hostname of a typical URL is the name of the server on the network that stores the document you're viewing in the browser.
port	It retrieves the port number of the URL.
host	The property describes both the hostname and port of a URL.
pathname	The pathname component of a URL consists of the directory structure relative to the server's <i>root</i> volume.
hash	The hash property returns the anchor portion of a URL, including the hash symbol(#).
href	The location.href property supplies a string of the entire URL of the specified window object.
search	It accesses the query string of the URL.

5.4: Location Object

## Location Object Methods

- Let us see some Location Object Methods:
  - assign("URL")
  - reload(uncGet)
  - replace("URL")

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Working with Location Object:

Location Object Methods:

Let us discuss some Location Object Methods:

Property	Description
assign("URL")	Just as you navigate to another page by assigning a new URL to the location object or location.href property, there also exists a method, location.assign(), that does the same task.
reload(uncGet)	The reload() method performs what is known as a <i>conditional-GET</i> , which means that the file is retrieved from the server or the browser's cache according to the cache preferences in the browser. If your page must perform an <i>unconditional-GET</i> to retrieve continually updated server or CGI-based data, then add a true parameter to the reload() method
replace("URL")	In a complex Web site, you may have pages that you do not want to appear in the user's history list. You cannot prevent a document from appearing in the history list (visible in the Go menu) while the user is looking at that page. However, you can instruct the browser to load another document into that window and replace the current history entry with the entry for the new document.

5.5 : History Object

## Rationale of History Object

- The History object contains an array of previously visited URLs by the visitor

Properties	Methods	Event Handlers
current	back()	None
length	forward()	
next	go()	
previous		

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### Working with History Object:

As a user surfs the Web, the browser maintains a list of URLs for the most recent stops. This list is represented in JavaScript by the history object.

Property	Description
current next previous	It retrieves the current, next and previous URLs in the history list.
length	It retrieves the number of items in the history list.
Methods	Description
back() forward()	It navigates backward and forward in the browser history list.
go(relativeNumber “URLstring”)	It uses the history.go() method for navigating to a specific index or URL in the history list. This “go” command only accepts items that already exist in the history listing, so you cannot use it in place of setting the window.location object to a brand-new URL.

## Demo on Working with History Object

- main.html
- Next.html
- Next2.html



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Some additional egs:-

History\_back.html  
History\_forward.html  
History\_go.html  
History\_Property.html  
Location\_Assign\_method.html  
Location\_property.html  
Location\_reload\_method.html  
Location\_replace\_method.html

## Lab

- Lab 6 :
- Working with Location Object.



## Summary

- Document Object Model is a interface that allows programs and scripts to dynamically access and update content, structure and style of documents
- Window object is the topmost object in the entire scheme. It has properties, methods and event handlers
- The history object has an array of history items having details of the URL's visited from within that window
- The Location object contains information about the current URL



## Review Questions

- Question 1: Closed property returns \_\_\_\_\_ if the window object is closed either by a script or by the user.
  - Option 1: 1
  - Option 2: True
  - Option 3: 0
- Question 2: An alert dialog box is a modal window that presents a message for users with a single OK button to dismiss it.
  - True / False



## Review Questions (Contd..)

- Question 4: The \_\_\_\_\_ and appCodeName properties are simply the official name and the internal code name for the browser application.
  - Option 1: Appname
  - Option 2: appName
  - Option 3: applname
- Question 5: The \_\_\_\_\_ property supplies a string of the entire URL of the specified window object.
  - Option 1: location.href
  - Option 2: hostname
  - Option 3: hash
- Question 6: The \_\_\_\_\_ property describes both the hostname and port of a URL.



# **Web Basics- JavaScript**

Lesson 6: Working With  
Document Object

## Lesson Objectives

- To understand the following topics:
  - Document Object and its properties and methods
  - Cookies object



6.1: Document Object

## Working With Document Object

- Container for all HTML HEAD and BODY objects associated within tags
- Provides access to page elements from your script
  - This includes form, link, anchor, as well as global Document properties such as background and foreground colors

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Document object is part of the Window object. It is used to access all elements in a page. It provides access to the elements in an HTML page from within the script. This includes the properties of every form, link and anchor (and, where applicable, any sub-elements), as well as global document properties such as background and foreground colors.

6.1: Document Object

## Document Object Properties

- alinkColor, vlinkColor, bgColor, fgColor, linkColor
- anchors[]
- applets[]
- forms[]
- links[]
- title
- 

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Property	Description
alinkColor vlinkColor bgColor fgColor linkColor	Get and set the properties of document – activated link, visited link, background color, foreground color (text) and hyperlink color.
anchors[], forms[], links[]	These properties retrieve array of values respectively as present in the document object
title	Gets the title of the document which occurs between the TITLE tags.

6.1: Document Object

## Document Object Methods

- write(), writeln()
- getElementsByTagName()
- getElementById()
- getElementsByName()
- getElementsByClassName()

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Property	Description
write("string1", ...) writeln("string1", ..)	Both of these methods send text to a document for display in its window. The only difference between the two methods is that <code>document.writeln()</code> appends a carriage return to the end of the string it sends to the document (you must still write a   to insert a line break).
getElementById("#para1")	This method locates the element whose id has been passed. The text within this element can then be accessed using properties innerHTML or innerText
getElementsByTagName("p")	This method locates all the elements which match the tagname passed. Each element of this type of tag can then be accessed in an array like manner
getElementsByName()	This method locates all the elements which match the name passed. Same name to many elements is usually given for radio buttons.
getElementsByClassName()	This method locates all the elements which match the class name passed.

## Demo

- [Link\\_Anchor\\_object.html](#)
- [Meta\\_information.html](#)
- [locate\\_element\\_by\\_id.html](#)
- [locate\\_elements\\_by\\_tagname.html](#)
- [locate\\_elements\\_by\\_name.html](#)
- [locate\\_element\\_by\\_class\\_name.html](#)



6.2: Working with Cookies

## Working with Cookies

- Text files that Web sites place in your computer to help your browsers remember specific information
- Used to store user preferences for content or personalized pages
- Following function sets cookie values (expiration date is optional):

```
function setCookie(name, value, expire) {
 document.cookie = name + "=" + escape(value)
 +((expire == null) ? "" : ("; expires=" + expire.toGMTString())) }

```

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### Using Cookies

Cookies are a mechanism for storing persistent data on the client in a file called cookies.txt. Because HyperText Transport Protocol (HTTP) is a stateless protocol, cookies provide a way to maintain information between client requests. This section discusses basic uses of cookies and illustrates with a simple example.

Each cookie is a small item of information with an optional expiration date and is added to the cookie file in the following format:

name=value;expires=expDate;

Name is the name of the datum being stored, and value is its value. If name and value contain any semicolon, comma, or blank (space) characters, you must use the escape and unescape functions to encode and decode them respectively.

expDate is the expiration date, in GMT date format:

Wdy, DD-Mon-YY HH:MM:SS GMT

Although it is slightly different from this format, the date string returned by the Date method toGMTString can be used to set cookie expiration dates.

The expiration date is an optional parameter indicating how long to maintain the cookie. If expDate is not specified, the cookie expires when the user exits the current browser session. Browser maintains and retrieves a cookie only if its expiration date has not yet passed.



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8

### Limitations

Cookies have these limitations:

300 total cookies in the cookie file.

4 Kbytes per cookie, for the sum of both the cookie's name and value.

20 cookies per server or domain (completely specified hosts and domains are treated as separate entities and have a 20-cookie limitation for each, not combined).

Cookies can be associated with one or more directories. If your files are all in one directory, then you need not worry about this. If your files are in multiple directories, you may need to use an additional path parameter for each cookie.

### Using Cookies with JavaScript

The document.cookie property is a string that contains all names and values of Navigator cookies. Use this property to work with cookies in JavaScript.

## Demo

- Ch9\_ex1.cookie.html
- Demo\_Cookies.html



## Lab

- Lab 7 :
- Working with Document object.



## Summary

- JavaScript Document Object contains HTML elements contained in the <head> and <body> sections of a web page
- All the anchors are contained in anchor array.
- All the links are contained in link array
- Cookies are small text files stored on the site visitor's computer by their browser



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### Summary

In this chapter, you understood:

- DOM structure
- How to work with Document Object
- How to work with cookies

## Review Questions

- Question 1: The \_\_\_\_\_ is the container for all HTML HEAD and BODY objects.
  - Option 1: Document
  - Option 2: Object
  - Option 3: Container
  
- Question 2: \_\_\_\_\_ property in document object retrieves an indexed array of anchors in a document.



# **Web Basics- JavaScript**

Lesson 7: Working with Form  
Object

## Lesson Objectives

- To understand the following topics:
  - Form Object Properties, Methods & Event Handlers
  - Text-Related Objects
  - Button Objects
  - Check Box and Radio Objects
  - Select Objects



7.1: Form Object Properties, Methods and Event Handlers

## Form Object

Properties	Methods	Event Handlers
action	reset()	onReset
elements[ ]	submit()	onSubmit
enctype		
length		
method		
name		
target		

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### Working with Form Objects: Form Object Properties:

A form element provides the only way that users can enter textual information or make a selection from a predetermined set of choices, whether those choices appear in the form of an on/off checkbox, one of a set of mutually exclusive radio buttons, or a selection from a list.

Property/ Method/ Events	Description
action	This property is the same as the value you assign to the ACTION attribute of a <FORM> tag. The value is typically a URL on the server where queries or postings are sent for submission.
elements[]	Returns an array of elements. It includes all the user interface elements defined for a form: text fields, buttons, radio buttons, checkboxes, selection lists, and more.
encoding	You can define a form to alert a server that the data being submitted is in a MIME type. This property reflects the setting of the ENCTYPE attribute in the form definition. The default value is an empty string.
method	A form's method property is either the GET or POST values assigned to the METHOD attribute in a <FORM> tag.

<code>name</code>	Assigning a name to a form via the NAME attribute is optional but highly recommended when your scripts need to reference a form or its elements. This attribute's value is retrievable as the name property of a form.
<code>target</code>	The purpose of the TARGET attribute of a <FORM> definition is to enable you to specify where the output from the server's query should be displayed. The value of the target property is the name of the window or frame.
<code>reset()</code>	If you want to clear the form i.e return the form elements to its default settings using script control, you must do so by invoking the reset() method for the form.
<code>submit()</code>	Invoking this method is almost the same as a user clicking a form's Submit button
<code>onReset</code>	Immediately before a Reset button returns a form to its default settings, JavaScript sends a reset event to the form. By including an onReset event handler in the form definition, you can trap that event before the reset takes place.
<code>onSubmit</code>	When you define an onSubmit handler as an attribute of a <FORM> definition, JavaScript sends the submit event to the form just before it dashes off the data to the server. Therefore, any script or function that is the parameter of the onSubmit attribute executes before the data is actually submitted. Note that this event handler fires only in response to a genuine Submit-style button, and not from a form.submit() method.

Table 9.1 Form object properties, methods and event handlers

7.2: Text-Related Objects

## Text-Related Objects

- Text
- Password
- TextArea
- Hidden Objects

Enter name

Enter Password

Enter Address

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### Text-Related Objects:

Text Objects : The text object is the primary medium for capturing user-entered text.

Password Object: A password-style field looks like a text object, but when the user types something into the field, only asterisks or bullets (depending on your operating system) appears in the field.

Textarea Object: A textarea object closely resembles a text object, except for attributes that define its physical appearance on the page.

Hidden object: A hidden object is a simple string holder within a form object whose contents are not visible to the user of your Web page. With no methods or event handlers, the hidden object's value to your scripting is as a delivery vehicle for strings that your scripts need for reference values or other hard-wired data.

7.2: Text-Related Objects

## Text-Related Objects (Contd..)

Properties	Methods	Event Handlers
defaultValue	blur()	OnBlur
name	focus()	OnChange
type	select()	OnFocus
value		

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The properties, methods and event handlers are same for text object, text area and Password. For hidden object the properties are same but no methods and event handlers are associated with this object.

Property/ Events/ Methods	Description
defaultValue	Specifies or returns a defaultValue for a text related objects.
name	This property can be used to reference the text object in the script.
type	Returns the type of text related object
value	A reference to an object's value property returns the string currently displayed in the field.

blur()	blur() deselects whatever may be selected in the field, and the text insertion pointer leaves the field. The pointer does not proceed to the next field in tabbing order, as it does if you perform a blur by tabbing out of the field manually.
focus()	For a text object, having focus means that the text insertion pointer is flashing in that text object's field. The cursor usually appears at the beginning of the text. To prepare a field for entry to remove the existing text, use both the focus() and select() methods.
select()	Selecting a field under script control means selecting all text within the text object.
onBlur onFocus	The onBlur event is fired when a text field loses focus because user has clicked somewhere outside the text field. The onFocus event is fired when the user clicks inside the text field.
onChange	This event is fired when the user changes the value in the text field.

Refer to Appendix for more event handlers

7.3: Button Objects

## Button Objects

- Button
- Reset
- Submit

	Properties	Methods	Event Handlers
name		click()	OnClick
type			
value			

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### Button Objects: Button, Submit and Reset

Property	Description
name	You may need to retrieve this property in a general-purpose function handler called by multiple buttons in a document. The function can test for a button name and perform the necessary statements for that button.
type	The precise value of the type property echoes the setting of the TYPE attribute of the <INPUT> tag that defined the object: button; submit; or reset.
value	A button's visible label is determined by the VALUE property.
click()	A button's click() method should replicate, via scripting, the human action of clicking that button.
onClick	Virtually all button action takes place in response to the onClick event handler. A click is defined as a press and release of the mouse button while the screen pointer rests atop the button.

7.4: Check Box and Radio Objects

## Check Box And Radio Objects

- Checkbox
- Radio

Properties	Methods	Event Handlers
checked	click()	OnClick
defaultChecked		
name		
type		
value		

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Checkbox object:

Property/ Events/ Methods	Description
checked	The simplest property of a checkbox gets or lets you set whether or not a checkbox is checked. The value is true for a checked box and false for an unchecked box. Only one radio button in a group can be highlighted checked) at a time. That one button's checked property is set to true, whereas all others in the group are set to false.
defaultChecked	If you add the CHECKED attribute to the <INPUT> definition for a checkbox or radio button, the defaultChecked property for that object is true; otherwise, false.
name	The name property allows user to access name for the checkbox or radio button through script.
type	Use the type property to help you identify a checkbox object or a radio button object from an unknown group of form elements.

value	A checkbox or radio button object's value property is a string of any text you want to associate with. Either you can set or retrieve the value
click()	The intention of the click() method is to enact, via script, the physical act of checking a checkbox or selecting a radio button
onClick	The onClick event of checkboxes or radiobuttons should be handled when through script you need to handle a specific task

Table 9.4 Checkbox object properties, methods and event handlers

7.5: Select Objects

## Select Object

Properties	Methods	Event Handlers
length	blur()	onChange
name	focus()	onFocus
selectedIndex		onBlur
type		

**SELECT**

**OPTION**

**Properties**

Default Selected

text

selected

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Property/ Methods/ Events	Description
length	Returns the number of items available in the list. A select object with three choices in it has a length property of 3.
Name	A select object's name property is the string you assign to the object by way of its NAME attribute in the object's <SELECT> tag which can be
selectedIndex	When a user clicks on a choice in a selection list, the selectedIndex property changes to a number corresponding to that item in the list.
type	Use the type property to help you identify a select object from an unknown group of form elements.
blur() focus()	Your scripts can bring focus to a select object by invoking the object's focus() method. To remove focus from an object, invoke its blur() method. These methods work identically with their counterparts in the text object.
onChange	As a user clicks on a new choice in a select object, the object receives a change event that can be captured by the onChange event handler.

options[index].defaultSelected	If your select object definition includes one option whose SELECTED attribute is included, that option's defaultSelected property is set to true. The defaultSelected property for all other options is false.
options[index].selected	To determine which option a user has selected from a list than looping through all options and examining the selected property this property can be used.
options[index].text	The text property of an option is the text of the item as it appears in the list.

Refer to Appendix for some more properties

### Using 'this' keyword

The 'this' keyword can be used to reference the object which called the function. It can be used within a function scope or global scope and it receives a different value in each scope. Depending on which object has called the function the value of 'this' will differ. The 'this' keyword always points to the object that is calling a particular method.

Consider the example given below:

The 'this' keyword is used in the showColor() function of an object. In this context, this is equal to car, making this code functionality equivalent to the following code snippet

```
var oCar = new Object;
oCar.color = "red";
oCar.showColor = function () {
 alert(this.color); //outputs "red"
};
```

So the reason for using 'this' is you never know what kind of variable names you will use to instantiate an object. By using 'this' you are sure to invoke the correct function with the correct value. Also it allows you to use the same function any number of times. To understand this consider the following code:

```
var oCar = new Object;
oCar.color = "red";
oCar.showColor = function () {
 alert(oCar.color); //outputs "red"
};
```

In the above snippet both oCar1 and oCar2 refer to the same function. The function gives the output according to the object which called the function.

```
function showColor() {
 alert(this.color);
}
var oCar1 = new Object;
oCar1.color = "red";
oCar1.showColor = showColor;
var oCar2 = new Object;
oCar2.color = "blue";
oCar2.showColor = showColor;
oCar1.showColor(); //outputs "red"
oCar2.showColor(); //outputs "blue"
```

## Demo

- Form\_Object.html
- Select\_option.html
- Element\_array.html
- Enctype.html
- Hidden\_value.html



## Lab

- Lab 8:
- Working with Form Object



## Summary

- Form Object corresponds to an HTML input form constructed with the FORM tag
- Forms have their own properties, objects, methods & events
- A form can be submitted by calling the JavaScript submit method or clicking the form submit button
- JavaScript can do entry-level validation & do it very easily



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### Summary

This module provided an understanding of:

Form object and its components.

How to create form objects.

How to handle events.

How to validate data.

How to submit a form.

## Review Questions

- Question 1: A form's \_\_\_\_\_ property is either the GET or POST values assigned to the METHOD attribute in a <FORM> definition.
  - Option 1: Method
  - Option 2: Class
  - Option 3: Object
- Question 2: The intention of the click() method is to enact, via a script, the physical act of clicking a radio button.
  - True / False
- Question 3: A button's \_\_\_\_\_ method should replicate, via scripting, the human action of clicking that button.



# **Web Basics – JavaScript**

Appendices

**Appendix B : Predefined Objects – Methods**

**String** : The string object is used to manipulate a stored piece of text. It has a number of methods and properties.

**String.charCodeAt([index])**: Returns: Integer code number for a character; concatenated string value of code numbers supplied as parameters.

```
String.fromCharCode(num1 [, num2 [, ...numn]])
"abc".charCodeAt() // result = 97
"abc".charCodeAt(0) // result = 97
"abc".charCodeAt(1) // result = 98
```

To convert numeric values to their characters, use the String.fromCharCode() method. Notice that the object beginning the method call is the generic string object, not a string value. Then, as parameters, you can include one or more integers separated by commas. In the conversion process, the method combines the characters for all of the parameters into one string, an example of which is shown here.

```
String.fromCharCode(97, 98, 99) // result "abc"
```

**string.indexOf( searchString [, startIndex])**

**Returns:** Index value of the character within string where searchString begins.

**string.lastIndexOf( searchString [, startIndex])**

**Returns:** Index value of the last character within string where searchString begins. JavaScript's indexOf() method enables your script to obtain the number of the character in the main string where a search string begins. Optionally, you can specify where in the main string the search should begin —but the returned value is always relative to the very first character of the main string. Like all string object methods, index values start their count with 0. If no match occurs within the main string, the returned value is -1. Thus, this method is a convenient way to determine whether one string contains another.

The string.lastIndexOf() method is closely related to the string.indexOf() method. The only difference is that this method starts its search for a match from the end of the string (string.length - 1) and works its way backward through the string. All index values are still counted, starting with 0, from the front of the string. In the examples that follow, we use the same values as in the examples for string.IndexOf so that you can compare the results. In cases where only one instance of the search string is found, the results are the same; but when multiple instances of the search string exist, the results can vary widely — hence the need for this method.

**String Objects (Parsing Methods contd..):**

Example	f = indexOf	f = lastIndexOf
offset = "bananas".f("b")	0	0
offset = "bananas".f("a")	1	5
offset = "bananas".f("a",1)	1	1
offset = "bananas".f("a",2)	3	1
offset = "bananas".f("a",4)	5	3
offset = "bananas".f("nan")	2	2
offset = "bananas".f("nas")	4	4
offset = "bananas".f("s")	6	6
offset = "bananas".f("z")	-1	-1

Table 4.1 Comparison of output of indexOf() and lastIndexOf() functions

**string.split("delimiterCharacter"[, limitInteger])**

Returns: Array of delimited items.

```
var myString = "Anderson,Smith,Johnson,Washington"
var myArray = myString.split(",")
var itemCount = myArray.length // result: 4
```

The function splits a long string into pieces delimited by a specific character and then creates a dense array with those pieces. You do not need to initialize the array via the new Array() constructor. Given the powers of array object methods such as array.sort(), you may want to convert a series of string items to an array to take advantage of those powers. Also, if your goal is to divide a string into an array of single characters, you can still use the split() method, but specify an empty string as a parameter.

**string.substring(indexA, indexB)**

Returns: Characters of string between index values indexA and indexB.

The `string.substring()` method enables your scripts to extract a contiguous range of characters from any string. The parameters to this method are the starting and ending index values (first character of the string object is index value 0) of the main string from which the excerpt should be taken. An important item to note is that the excerpt goes up to, *but does not include*, the character pointed to by the higher index value.

It makes no difference which index value in the parameters is larger than the other: The method starts the excerpt from the lowest value and continues to (but does not include) the highest value. If both index values are the same, the method returns an empty string; and if you omit the second parameter, the end of the string is assumed to be the endpoint.

**string.search(regExpression)**

Returns: Offset Integer.

The results of the `string.search()` method should remind you of the `string.indexOf()` method. In both cases, the returned value is the index number where the matching string first appears in the main string, or -1 if no match occurs. The big difference, of course, is that the matching string for `string.search()` is a regular expression.

**string.slice( startIndex [, endIndex] )**

Returns: String.

`string.substring(4, (string.length-2))`

`string.slice(4, -2)`

The `string.slice()` method (new in Navigator 4) resembles the `string.substring()` method in that both let you extract a portion of one string and create a new string as a result (without modifying the original string). A helpful improvement in `string.slice()`, however, is that it is easier to specify an ending index value relative to the end of the main string. The code snippet compares the `substring` and `slice` methods in extracting a substring that ends before the end of the string. You can assign a negative number to the second parameter of `string.slice()` to indicate an offset from the end of the string. The second parameter is optional. If you omit it, the returned value is a string from the starting offset to the end of the main string.

String object also provides with some formatting methods:

`string.anchor("anchorName")` : Creates an HTML anchor

`string.link(locationOrURL)` : Displays a string as a hyperlink

`string.fixed()` : Displays a string as teletype text

`string.strike()` : Displays a string with a strikethrough

`string.sub()` : Displays a string as subscript

`string.sup()` : Displays a string as superscript

```
<html>
<head>
</script>
</head>
<body>
<script language="JavaScript">
var x="Capgemini "
var y=" at Airoli"
document.write("Welcome to "+x);
document.write("
Length of string the string <u>" +
+y.italics()+"</u> is "+y.length);
document.write("
Concat function works like this"+x.concat(y))
</script>
</body>
</html>
```

Example 4.1 Demo of String Object (StringDemo.html)

And it produces the output as:



**Math :** The Math object allows you to perform mathematical tasks. It is not a constructor. All properties and methods can be called using Math as an object without creating it.

Property/Method	Description
Math.E	Euler's Constant (2.718)
Math.LN	Natural Log of 2 (0.693)
Math.LN10	Natural Log of 10 (2.302)
Math.LOG2E	Log base-2 of E (1.442)
Math.LOG10E	Log base-10 of E (0.434)
Math.SQRT1_2	Square Root of $\frac{1}{2}$ (0.707)
Math.abs(x)	Returns the absolute value of x
Math.acos(val)	Arc cosine (in radians) of val
Math.asin(val)	Arc sine (in radians) of val
Math.atan(val)	Arc tangent (in radians) of val
Math.atan2(val1, val2)	Angle of polar coordinates x and y
Math.cos(val)	Cosine of val
Math.exp(val)	Euler's constant to the power of val
Math.pow(val1, val2)	Val1 to the val2 power
Math.sin(val)	Sine (in radians) of val
Math.sqrt(val)	Square root of val
Math.tan(val)	Tangent (in radians) of val
Math.log(val)	Natural logarithm (base e) of val
Math.ceil(x)	Returns x, rounded upwards to nearest integer
Math.Floor(x)	Returns x, rounded downwards to the nearest integer

**Number:** The number object is rarely used, because for the most part, JavaScript satisfies day-to-day numeric needs with a plain number value. But the number object contains some information and power of value to serious programmers. Primarily, there are properties that define the ranges for numbers in the language. The largest number (in both Navigator and Internet Explorer) is 1.79E+308; the smallest number is 2.22E-308. Any number larger than the maximum is POSITIVE\_INFINITY; any number smaller than the minimum is NEGATIVE\_INFINITY. It will be a rare day on which you accidentally encounter these values.

Similar to the string prototype property , the Number.prototype property adds a method to a Number object's prototype such that every newly created object contains that method. values. If you have a need to add common functionality to every number object, this is where to do it.

This prototype facility is unique to objects and does not apply to plain number values. JavaScript number objects and values are defined internally as IEEE double-precision 64-bit

```
var val = new Number(number)
```

Properties	Methods
MAX_VALUE	toString()
MIN_VALUE	
NaN	
NEGATIVE_INFINITY	
POSITIVE_INFINITY	
prototype	

### Boolean Objects: Properties and Methods

```
var val = new Boolean(BooleanValue)
```

You work with Boolean values a lot in JavaScript - especially as the result of conditional tests. Just as string values benefit from association with string objects and their properties and methods, so, too, do Boolean values receive aid from the Boolean object. For example, when you display a Boolean value in a text box, the "true" or "false" string is provided by the Boolean object's `toString()` method, even though you don't have to invoke it directly.

The only time you need to even think about a Boolean object is if you wish to attach some property or method to Boolean objects that you create with the new `Boolean()` constructor. Parameter values for the constructor include the string versions of the values, numbers (0 for false; any other integer for true), and expressions that evaluate to a Boolean value. Any such new Boolean object would be imbued with the new properties or methods you have added to the prototype property of the core Boolean object.

Property	Method
Prototype	<code>toString()</code>

Date: The date object is used to work with Date and time values. JavaScript maintains its date information in the form of a count of milliseconds starting from January 1, 1970, in the GMT time zone

Properties	Description
dateObj.getDate()	Date within the month
dateObj.getDay()	Day of week (Sunday = 0)
dateObj.getHours()	Hour of the day in 24-hour time
dateObj.getMinutes()	Minute of the specified hour
dateObj.getSeconds()	Second within the specified minute
dateObj.setTime(val)	Milliseconds since 1/1/70 00:00:00 GMT
dateObj.setYear(val)	Specified year minus 1900
dateObj.setMonth(val)	Month within the year (January = 0)
dateObj.setDate(val)	Date within the month
dateObj.setDay(val)	Day of week (Sunday = 0)
dateObj.setHours(val)	Hour of the day in 24-hour time
dateObj.setMinutes(val)	Minute of the specified hour
dateObj.setSeconds(val)	Second within the specified minute
Date.parse("dateString")	Converts string date to milliseconds
Date.UTC(date values)	Generates a date value from GMT values

For example:

```
myBirthday = new Date("September 11, 1996")
result = myBirthday.getDay() // result = 3, a Wednesday
myBirthday.setYear(97) // bump up to next year
result = myBirthday.getDay() // result = 4, a Thursday
```

Array object and its methods:

After you have information stored in an array, JavaScript provides several methods to help you manage that data.

```
arrayObject.concat(array2)
var array1 = new Array(1,2,3)
var array2 = new Array("a","b","c")
var array3 = array1.concat(array2)
// result: array with values 1,2,3,"a","b","c"
```

The **array.concat()** method allows you to join together two array objects into a new, third array object. The action of concatenating the arrays does not alter the contents or behavior of the two original arrays. To join the arrays together, you refer to the first array object to the left of the period before the method; a reference to the second array is the parameter to the method.

If an array element is a string or number value (not a string or number object), then the values are copied from the original arrays into the new one. All connection with the original arrays ceases for those items. However, if an original array element is a reference to an object of any kind, then JavaScript copies a reference from the original array's entry into the new array. This means that if you make a change to either array's entry, the change occurs to the object, and both array entries reflect the change to the object.

Array.slice()

Behaving like its like-named string method, **array.slice()** lets you extract a contiguous series of items from an array. The extracted segment becomes an entirely new array object. One parameter is required — the starting index point for the extraction. If you do not specify a second parameter, then the extraction goes all the way to the end of the array. Otherwise the extraction goes to, but does not include, the index value supplied as the second parameter.

```
arrayObject.slice(startIndex [, endIndex])
Returns: Array
var solarSys = new
Array("Mercury","Venus","Earth","Mars","Jupiter","Saturn","Uranus"
,"Nep
tune","Pluto")
var nearby = solarSys.slice(1,4)
// result: new array of "Venus", "Earth", "Mars"
```

**arrayObject.sort([compareFunction])**

It returns array of entries in the order as determined by the compareFunction algorithm.

```
myArray = new Array(12, 5, 200, 80)
function compare(a,b) {
 return a - b
}
myArray.sort(compare)
function compare(a,b) {
 // last character of array strings
 var aComp = a.charAt(a.length - 1)
 var bComp = b.charAt(b.length - 1)
 if (aComp < bComp) {return -1}
 if (aComp > bComp) {return 1}
 return 0
}
```

When no parameter is specified, JavaScript takes a snapshot of the contents of the array and converts items to strings. From there, it performs a string sort of the values. **ASCII values** of characters govern the sort, which means that numbers are sorted by their **string values**, not their **numeric values**. This fact has strong implications if your array consists of numeric data. The value 201 sorts before 88, because the sorting mechanism compares the first characters of the strings ("2" versus "8") to determine the sort order. For simple alphabetical sorting of string values in arrays, the plain **Array.sort()** method should do the trick.

You can define a function that helps the **sort()** method compare items in the array. A comparison function is passed two values from the array and it lets the **sort()** method know which of the two items comes before the other based on the value the function returns.

The array has four numeric values in it. To sort the items in numerical order, you define a comparison function (arbitrarily named **compare()**), which is called from the **sort()** method. Note that unlike invoking other functions, the parameter of the **sort()** method uses a reference to the function, which lacks parentheses.

When the **compare()** function is called, JavaScript automatically sends two parameters to the function in rapid succession until each element has been compared against the others. Every time **compare()** is called, JavaScript assigns two of the array's values to the parameter variables (a and b).

In this example, the returned value is the difference between a and b. If a is larger than b, then a positive value goes back to the **sort()** method, telling it to sort a above b (that is, position a at a lower value index position than b). Therefore, a may end up at **myArray[0]**, whereas b ends up at a higher index-valued location. On the other hand, if b is larger than a, then the returned negative value tells **sort()** to put b in a lower index value spot than a.

The second function sorts alphabetically by the last character of each array string entry.

First, this function extracts the final character from each of the two values passed to it. Then, because strings cannot be added or subtracted like numbers, you compare the ASCII values of the two characters, returning the corresponding values to the **sort()** method to let it know how to treat the two values being checked at that instant.

```
<html>
<head> <title> arrays </title></head>
<script language = "javascript">
solarSys = new Array("Mercury", "Venus", "Earth",
"Mart", "Jupiter", "Saturn", "Uranus", "Neptune",
"Pluto")
var array1 = solarSys.join(",")
document.write(array1)
document.write("
Slice three elements
")
document.write(solarSys.slice(3,6))
document.write("
REverse and join with ,")
s=solarSys.reverse()
var arrayText = s.join(",")
document.write(arrayText)
document.write("
solarsys after reversing
")
array1 = solarSys.join(",")
document.write(array1)
solarSys.reverse()
document.write("
Concat and join
")
s2=solarSys.concat(s)
document.write(s2.join(","))
solarSys.sort();
arrayText = s.join(",")
document.write("
Sort and join")
document.write(arrayText)</script>
</html>
```

JavaScript Document Object Model  
Link Object

Event Handler	Description
onClick onDbClick	By and large, the HREF attribute determines the action that a link makes when a user clicks it — which is generally a navigational action. But if you need to execute a script before navigating to a specific link (or to change the contents of more than one frame), you can include an <i>onClick=</i> or <i>onDbClick=</i> event handler in that link's definition. Any statements or functions called by either click event handler execute before any navigation takes place.
onMouseDown onMouseUp	Events for the mouse being pressed and released supplement the long-standing click event. A click event fires after a matched set of <i>mouseDown</i> and <i>mouseUp</i> events occurs on the same link. If the user presses down on the link and slides the mouse pointer off the link to release the mouse button, only the <i>mouseDown</i> event fires on the link.
onMouseOver onMouseOut Text Related Objects:	As you drag the mouse pointer atop a link in a document, the status line at the bottom of the window shows the URL defined in the link's HREF attribute. You can override the display of a link's URL by triggering a function with the <i>onMouseOver</i> event handler assigned to a link. The <i>onMouseOut</i> handler fires when the pointer leaves the link's rectangular region. If you use <i>onMouseOver</i> to set the status bar, you should return the status bar to its default setting with an <i>onMouseOut</i> event handler.

Event Handler	Description
onSelect	The <i>onSelect</i> event is fired when the user selects the text inside the text field.
onKeyDown onKeyPress onKeyUp	These events let your scripts capture user activity from the keyboard while the field has focus. The <i>keyDown</i> event occurs the instant the user presses the key far enough to make contact; the <i>keyUp</i> event occurs when electrical contact with the key breaks; and a <i>keyPress</i> event occurs after the <i>keyUp</i> event, signaling the completion of a matched pair of <i>keyDown</i> and <i>keyUp</i> events.

## Select Object (Option Object)

Property	Description
options[index]	You typically won't summon this property by itself. Rather, it becomes part of a reference to a specific option's properties within the entire select object. In other words, the options property becomes a kind of gateway to more specific properties, such as the value assigned to a single option within the list.
options[index].Index	The index value of any single option in a select object will likely be a redundant value in your scripting. Because you cannot access the option without knowing the index anyway, you have little need to extract the index value. The value is a property of the item, just the same.
options[index].value	In many instances, the words in the options list appear in a form that is convenient for the document's users but inconvenient for the scripts behind the page. Rather than set up an elaborate lookup routine to match the selectedIndex or options[index].text values with the values your script needs, an easier technique is to store those values in the VALUE attribute of each <OPTION> definition of the select object. You can then extract those values as needed.

RegExp Object

Following table shows properties of RegExp object:

Properties	Methods	Events
input	None	None
lastMatch		
Lastparen		
LeftContext		
Multiline		
RightContext		
\$1..\$9		

Beginning with Navigator 4 and Internet Explorer 4, the browser maintains a single instance of a RegExp object for each window or frame. The object oversees the action of all methods that involve regular expressions (including the few related string object methods). Properties of this object are exposed not only to JavaScript in the traditional manner, but also to a parameter of the *string.replace()* method for some shortcut access.

With one RegExp object serving all regular expression-related methods in your document's scripts, you must exercise care to access or modify this object's properties. You must make sure that the RegExp object has not been affected by another method. Most properties are subject to change as the result of any method that involves a regular expression. This may be reason enough to use the properties of the array object returned by most regular expression methods instead of the RegExp properties. The former stick with a specific regular expression object even after other regular expression objects are used in the same script. RegExp properties reflect the most recent activity, irrespective of the regular expression object involved.

**Properties**

**Input:** *RegExp.input* property is the main string against which a regular expression is compared in search of a match.

However, many text-related document objects have an unseen relationship with `RegExp`. If a text, `textarea`, `select`, or `link` object contains an event handler that invokes a function that contains a regular expression, `RegExp.input` property is set to the relevant textual data from the object. You need not specify parameters for the event handler call or in the function called by it. For text and `textarea` objects, the `input` property value becomes the object content; for the `select` object, it is the text (not the value) of the selected option; and for a `link`, it is the text highlighted in the browser associated with the link (and reflected in the link's `text` property). To have JavaScript set the `RegExp.input` property for you may simplify your script. You can invoke either of the regular expression methods without specifying the main string parameter. When that parameter is empty, JavaScript applies the `RegExp.input` property to the task. You can also set this property on the fly if you like. The short version of this property is `$_` (dollar sign underscore).

**Multiline:** `RegExp.multiline` property determines whether searches extend across multiple lines of a target string. This property is automatically set to true when an event handler of a `textarea` triggers a function containing a regular expression. You can also set this property on the fly if you like. The short version of this property is `$*`.

**lastMatch:** After you execute a regular expression-related method, any text in the main string that matches the regular expression specification is automatically assigned to the `RegExp.lastMatch` property. This value is also assigned to the `[0]` property of the object array returned when a match is found by the `exec()` and `string.match()` methods. The short version of this property is `$&`.

**lastParen:** When a regular expression contains many parenthesized subcomponents, the `RegExp` object maintains a list of the resulting strings in the `$1,...$9` properties. You can also extract the value of the last matching parenthesized subcomponent with the `RegExp.lastParen` property, which is a read-only property. The short version of this property is `$+`.

#### **leftContext, rightContext**

After a match is found in the course of one of the regular expression methods, the `RegExp` object is informed of some key contextual information about the match. The `leftContext` property contains the part of the main string to the left of (up to but not including) the matched string. Be aware that the `leftContext` starts its string from the point at which the most recent search began. Therefore, for second or subsequent times through the same string with the same regular expression, the `leftContext` substring varies widely from the first time through. The `rightContext` consists of a string that starts immediately after the current match and extends to the end of the main string. As subsequent method calls work on the same string and regular expression, this value obviously shrinks in length until no more matches are found. At this point, both properties revert to null. Short versions of these properties are `$`` and `$'` for `leftContext` and `rightContext`, respectively.

**\$1...\$9**

As a regular expression method executes, any parenthesized result is stored in RegExp's nine properties reserved for just that purpose (called backreferences). The same values (and any beyond the nine that RegExp has space for) are stored in the array object returned with the `exec()` and `string.match()` methods.

Values are stored in the order in which the left parenthesis of a pair appears in the regular expression, regardless of nesting of other components.

You can use these backreferences directly in the second parameter of the `string.replace()` method, without using the RegExp part of their address. The ideal situation is to encapsulate components that need to be rearranged or recombined with replacement characters. For example, the following script function turns a name that is last name first into first name last:

```
function swapEm() {
 var re = /(w+),\s*(w+)/;
 var input = "Lincoln, Abraham";
 return input.replace(re,"$2 $1");
}
```

In the `replace()` method, the second parenthesized component ( just the first name) is placed first, followed by a space and the first component. The original comma is discarded. You are free to combine these shortcut references as you like, including multiple times per replacement, if it makes sense to your application.

When you create a regular expression with the literal notation (that is, with the two forward slashes), the expression is automatically compiled for efficient processing as the assignment statement executes. The same is true when you use the new `RegExp()` constructor. Specify a pattern (and optional modifier flags) as a parameter. Whenever the regular expression is fixed in the script, use the literal notation; when some or all of the regular expression is derived from an external source (for example, user input from a text field), assemble the expression as a parameter to the new `RegExp()` constructor.

Use a compiled regular expression at whatever stage the expression is ready to be applied and reused within the script. Compiled regular expressions are not saved to disk or given any more permanence beyond the life of a document's script (that is, it dies when the page unloads).

However, there may be times in which the specification for the regular expression changes with each iteration through a loop construction. For example, if statements in a while loop modify the content of a regular expression, you should compile the expression inside the while loop, as shown in the following skeletal script fragment:

```
var srchText = form.search.value
var re = new RegExp() // empty constructor
while (someCondition) {
 re.compile("\s+" + srchText + "\s+", "gi")
 statements that change srchText
}
```

Each time through the loop, the regular expression object is both given a new expression (concatenated with metacharacters for one or more white spaces on both sides of some search text whose content changes constantly) and compiled into an efficient object for use with any associated methods.

## Web Basics - JavaScript Lab Book

## Document Revision History

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## Table of Contents

<b>Getting Started.....</b>	<b>5</b>
Overview.....	5
Setup Checklist for JavaScript .....	5
<b>Lab 1: Basics Concepts of JavaScript.....</b>	<b>6</b>
1.1: Create a page to display “Welcome to JavaScript”.....	6
1.2: Create prob2.html to display Formatted Hello World by using JavaScript by embedding Hello World in <H1> tag. ....	7
1.3: Create page to show use of external JavaScript.....	8
1.4: Using Variable in many Script tags .....	11
<b>Lab 2: The JavaScript Language .....</b>	<b>14</b>
2.1: For loop in JavaScript.....	14
2.2: Create a web page to calculate the Compound Interest using the formula given below:.....	15
<b>Lab 3: Working with Predefined core objects .....</b>	<b>16</b>
3.1: Displaying Date using Date Object.....	16
3.2: Using indexOf function of String object .....	17
3.3: Using various String methods .....	17
<b>Lab 4: Working with Arrays.....</b>	<b>19</b>
4 .1: Using Array to display values .....	19
<b>Lab 5: Working with Document Object Model(DOM).....</b>	<b>20</b>
5 .1: Window object .....	20
<b>Lab 6: Working with Location Object.....</b>	<b>23</b>
6.1: Location Object.....	23
<b>Lab 7: Working with Document Object .....</b>	<b>24</b>
7.1: Working with Documents.....	24
<b>Lab 8: Working with Form Object.....</b>	<b>27</b>
8.1: Form Validation .....	27
8.2 Validate Field.....	28
<b>Appendices .....</b>	<b>30</b>
Appendix A: JavaScript Standards .....	30
Appendix B: Coding Best Practices.....	37

Appendix C: Table of Figures .....	43
Appendix D: Table of Examples .....	44

## Getting Started

### Overview

These Lab book is a guided tour for Learning JavaScript. It contains solved examples and To Do assignments. Follow the steps provided in the solved examples and then work out the 'to do' Assignments given.

### Setup Checklist for JavaScript

Here is what is expected on your machine in order for the lab to work.

### Minimum System Requirements

- Hardware: Networked PCs with minimum 64 MB RAM and 60 MB HDD.
- Software: Window based Operating System having the latest version of Internet Explorer (IE) or Netscape Navigator installed.

### Please ensure that the following is done:

- A text editor like Notepad, Eclipse Luna or Visual Studio 2008 is installed.

### Instructions

- For coding standards refer Appendix – A.
- All Lab assignments should follow the coding standards.
- Create a directory by your name in drive <drive> for JavaScript assignments.
- In this directory, create subdirectory javascript\_assgn.
- For each lab create directory as lab<lab number>.

### Learning More (Bibliography if applicable)

- Beginning JavaScript by Paul Wilton
- JavaScript: The Definitive Guide by David Flanagan
- JavaScript Application Cookbook by Jerry Bradenbaugh

## Lab 1: Basics Concepts of JavaScript

Goals	<ul style="list-style-type: none"><li>• Learn to embed script tags in different parts of the HTML document.</li></ul>
Time	120 minutes

### 1.1: Create a page to display “Welcome to JavaScript”.

**Solution:**

**Step 1:** Complete the following code and save it as prob1.html

```
<!DOCTYPE html>
<html>
<head>
<title> Welcome to JavaScript</title>
</head>
<body>
<script>
document.write("Welcome to JavaScript - The Scripting Language")
</script>
</body>
</html>
```

### Example 1: Lab 1: Prob1.html

**Step 2:** Start the editor to be used.

**Step 3:** Write the JavaScript program.

**Step 4:** Save the file with extension .html or htm.

**Step 5:** Select **Start → Programs → Internet Explorer**.

Alternatively select **Start → Programs → Netscape Navigator**.

**Step 6:** In the Internet Explorer, select **File → Open → Browse**, and select the file you have just saved.

**Step 7:** Click **OK** in the browser pop-up window.

**Step 8:** Verify that you get the output as shown in the figure given below.



**Figure 1: Welcome to JavaScript**

**Note:** Follow the above steps (3 - 8) for every Lab problem for verifying the output. You can also use other text editors like editplus, WordPad, MS Visual Interdev (if installed) to create your **html** and **.js** pages.

**1.2: Create prob2.html to display Formatted Hello World by using JavaScript by embedding Hello World in <H1> tag.**

**Solution:**

**Step 1:** Create **prob2.html** page to complete the following code and save in lab1 directory.

```
<html>
<head>
<title>Displaying Formatted Text using JavaScript</title>
</head>
<body>

<script>

//TODO: Display hello world embedded in h1 tag with align attribute value right

</script>

</body>
```

```
</html>
```

**Example 2: Lab 1: Prob2.html**

**Step 2:** Open **prob2.html** page in the browser, and verify that you get the same output as required.



**Hello World!**

**Figure 2: Formatting Text in JavaScript**

**1.3: Create page to show use of external JavaScript**

**Solution:**

**Step 1:** Create **Prob3.html** to complete the following code and save it in lab1 directory.

```
<html>
<head><title>Using External Script file in HTML Document</title>

<script src="HelloWorld.js">
</script>

</head>
<body>
<hr>
<p>The actual script is in external script file called "HelloWorld.js"</p>

<script>
//TODO: Insert the code here to invoke the function sayHello() in the file HelloWorld.js
</script>

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

**Example 3: Lab 1: Prob3.html**

**Step 2:** Create a file **HelloWorld.js** which should have a function **sayHello()** that returns a string "Hello World".

```
function sayHello()
{
 //TODO:return the string "Hello World"
}
```

**Example 4: Lab 1: HelloWorld.js**

**Step 3:** Open **prob3.html** page in the browser, and verify that you get the same output as required.

The actual script is in external script file called "HelloWorld.js"  
This text is displayed by Calling external function : **Hello World**

**Figure 3: Using external JavaScript File**

**Step 4:** Create **Prob4.html** page and complete the following code and save it in lab1 directory.

```
<html>
<head><title>Embedding Script tag in HTML Document</title>

<script>

//TODO:use write method in document object to display the desired output

</script>
<hr>
<script src="Hello.js">
</script>

</head>
<body>

<script>
//TODO: use write method in document object to display desired the output

```

```

</script>

<hr>

<p><code>The actual script is in external script file called "Hello.js"</code></p>

<script>
//TODO: Insert your code here to call the function dispHello() from the Hello.js file
</script>

<hr>

</body>
</html>

```

**Figure 4: Lab 1: Prob4.html**

**Step 5:** Create a file **Hello.js** which should have a function **dispHello()** that returns a string “Hello World”.

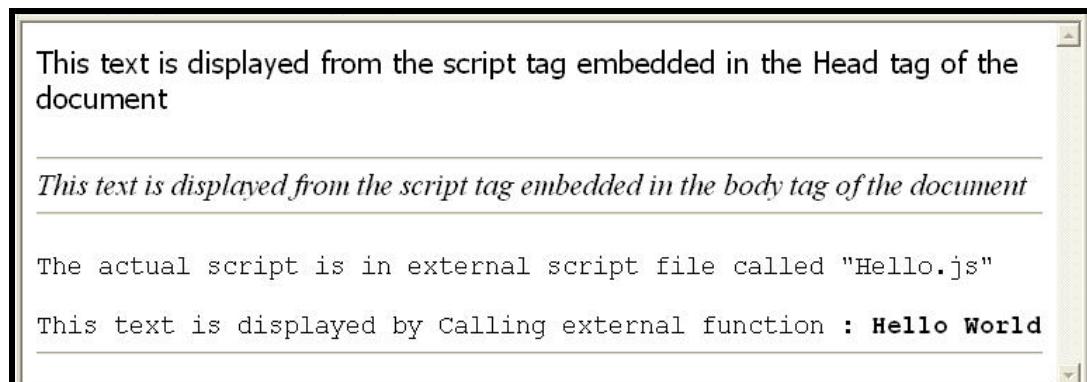
```

function dispHello()
{
 //TODO:return the string "Hello World"
}

```

**Example 5: Lab 1: Hello.js**

**Step 6:** Open **prob4.html** page in the browser, and verify that you get the same output as required.



**Figure 5: Embedding Script tags in HTML document**

#### 1.4: Using Variable in many Script tags

##### Solution:

**Step 1:** Create **Prob5.html** page, and complete the following code and save it in lab1 directory.

```
<html>
<head><title>Embedding Script tag in HTML Document</title>

<script>
/*
TODO:define variable headVar and initialize it to some integer value and display the value as
shown in the Fig 6
*/
</script>

<hr>
</head>
<body>

<script>
/*
TODO:define variable bodyVar and initialize it to some integer value and display the value as
shown in the Fig 6
*/
</script>

<hr>
<script src="common.js">
</script>

<script>
/*
TODO: Invoke the method addNos(headVar,bodyVar) defined in common.js file and pass the
two variables headVar and bodyVar defined in the head and the body script tag and display the
added result as shown in the Fig 6
*/

```

```
</script>
```

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

**Example 6: Lab 1: Prob5.html**

**Step 2:** Create a file **common.js** which has a function **addNos()** that adds two numbers and returns the addition of two numbers.

```
var msg;
msg=<p><code>The actual script is in external script file called common.js</code></p>;

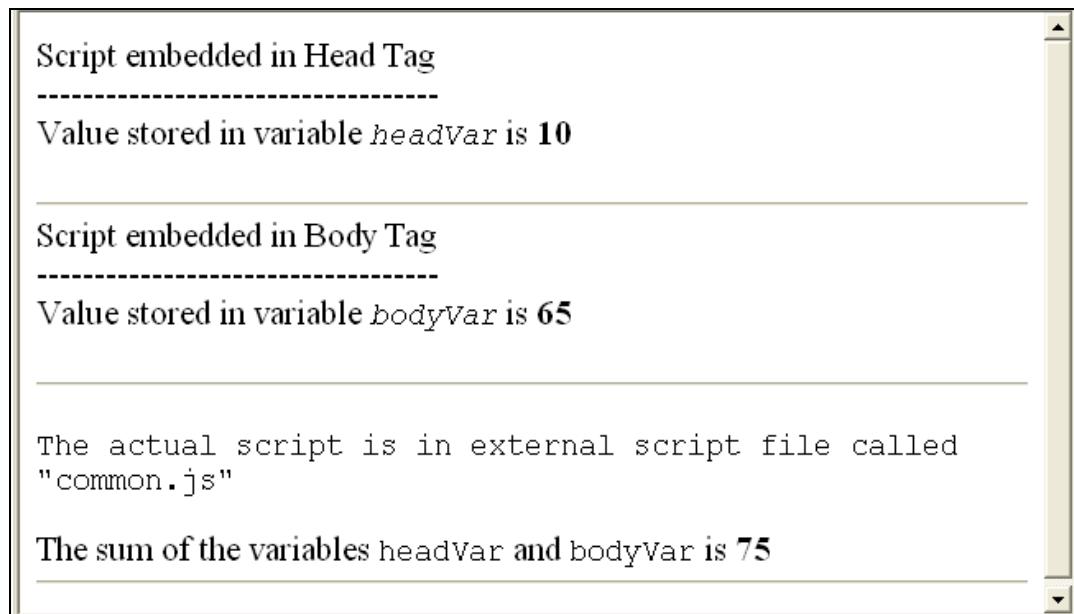
function addNos(headVar,bodyVar)
{
 //TODO: display the contents of the variable "msg"

 //TODO: display the addition of two numbers

}
```

**Example 7: Lab 1: common.js**

**Step 3:** Open prob5.html page in the browser, and verify that you get the same output as required.



Script embedded in Head Tag

-----

Value stored in variable *headVar* is **10**

-----

Script embedded in Body Tag

-----

Value stored in variable *bodyVar* is **65**

-----

The actual script is in external script file called "common.js"

The sum of the variables headVar and bodyVar is **75**

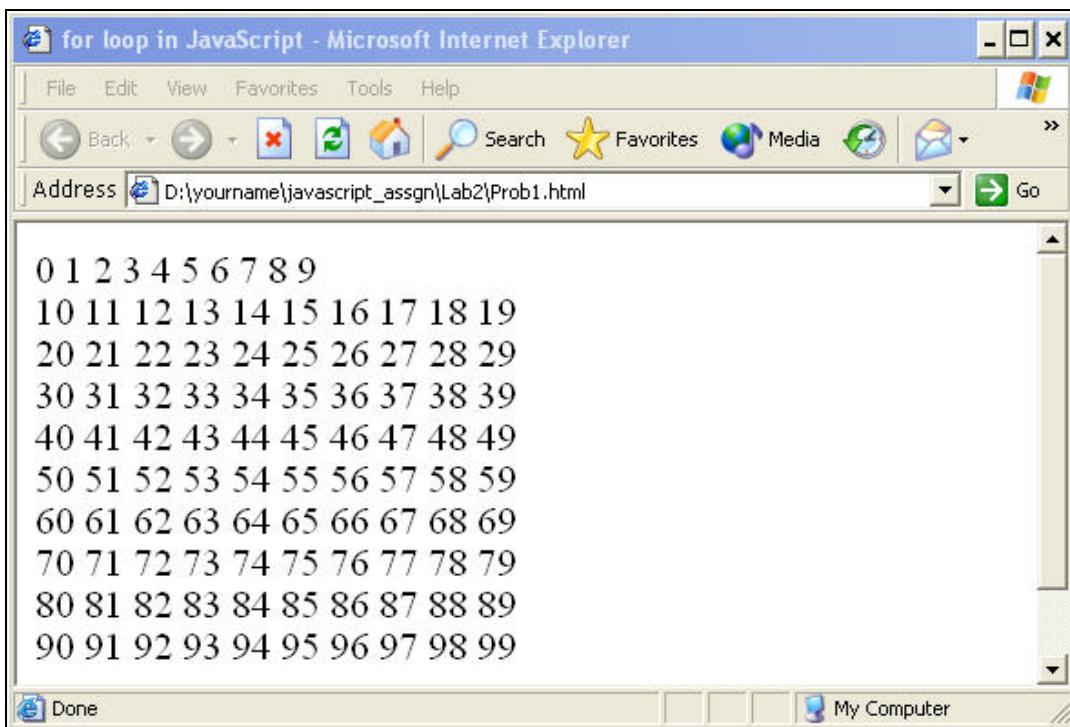
**Figure 6: Using Variable in many Script tags**

## Lab 2: The JavaScript Language

Goals	<ul style="list-style-type: none"><li>• Learn to use looping structures and operators in JavaScript.</li></ul>
Time	20 minutes

### 2.1: For loop in JavaScript

Create a web page containing a heading “Layout is here” followed by a horizontal rule and a table with a single row as shown in the figure given below.



**Figure 7: For loop in JavaScript**

After completing the loop, the variable used, that is “I”, should be equal to **100**.

#### Solution:

**Step 1:** Write the code and save it as **Prob1.html** in lab2 directory.

**Step 2:** Open **prob1.html** page in the browser, and verify that you get the same output as required.

**Step 3:** Create **prob1\_dowhile.html** and **prob1\_whiledo.html** page using **do...while** and **while...do** control statements respectively to display similar output as shown in the figure given above.

**2.2: Create a web page to calculate the Compound Interest using the formula given below:**

**Compound Interest**

$$\left[ P * \left( 1 + \frac{r}{100} \right)^n \right] - P$$

**Where:**

**p = Principal,**

**r = Rate of Interest,**

**n = period in years**

**The values used in the example in the following figure are as follows:**

**P = 1000, n = 1, r = 10**

-----  
\*\*\*\*\*Calculate Compound Interest\*\*\*\*\*  
-----

Prinicipal	-	1000 rs
Rate of Interest	-	10%
Period	-	1 yr
Comp Interest	-	100

**Figure 8: Operators and Arithmetic Expression**

**Solution:**

**Step 1:** Write the code, and save it in lab2 directory.

**Step 2:** Open page in the browser, and verify that you get the same output as required.

## Lab 3: Working with Predefined core objects

<b>Goals</b>	Understand Date, String Object  Learn to use Date and String objects in HTML pages
<b>Time</b>	45 minutes

### 3.1: Displaying Date using Date Object

Create a web page **Prob1.html**. In this web page, create a **date** object and use the **getXXXX** functions of the date object to display today's date in the format as shown below in the figure and also greet the user depending on the time the user visits the page. The message to be displayed is given in the following table. The time column shows the current date hour value.

Time	Msg to be displayed
< 12	Good Morning
= 12 and <= 17	Good Afternoon
> 17	Good Evening



**Figure 9: Displaying Date using Date Object**

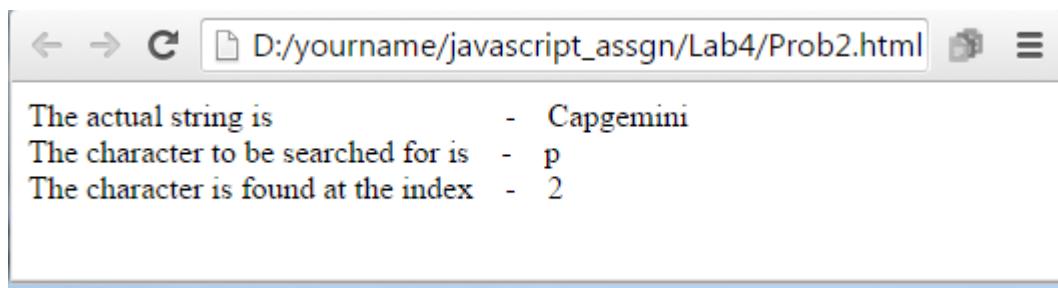
#### Solution:

**Step 1:** Write the Code, and save it as Prob1.html in lab4 directory.

**Step 2:** Open prob1.html page in the browser, and verify that you get the same output as required.

### 3.2: Using indexOf function of String object

Create a web page **prob2.html**, which uses the **indexOf** method of string object and displays the index number of the substring searched for within the string.



**Figure 10: Using indexOf method of String object**

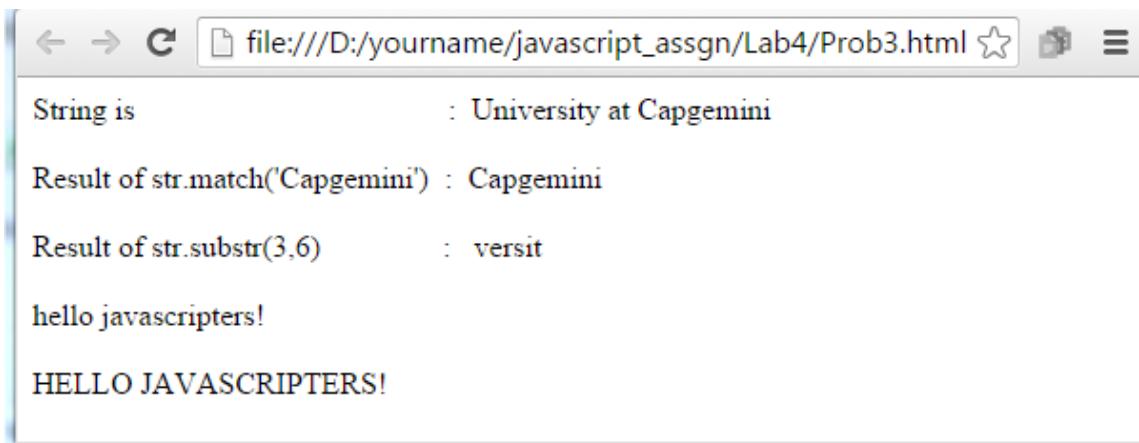
#### Solution:

**Step 1:** Write the Code and save it as **Prob2.html**.

**Step 2:** Open **prob2.html** page in the browser, and verify that you get the same output as required.

### 3.3: Using various String methods

Write **prob3.html** page by completing the following code that demonstrates some of the methods of the String objects like **match**, **substr**, **lowerCase**, and **upperCase** to produce the output as shown in the figure given below:



**Figure 11: Using various String methods**

**Solution:**

**Step 1:** Write the Code and save it as **Prob3.html**.

**Step 2:** Open **prob3.html** page in the browser, and verify that you get the same output as required.

## Lab 4: Working with Arrays

<b>Goals</b>	Work with Array Object
<b>Time</b>	10 minutes

### 4.1: Using Array to display values

Create a **prob1.html** web page containing script. In this script, declare an array of 6 employee names and display it in the browser as shown below:

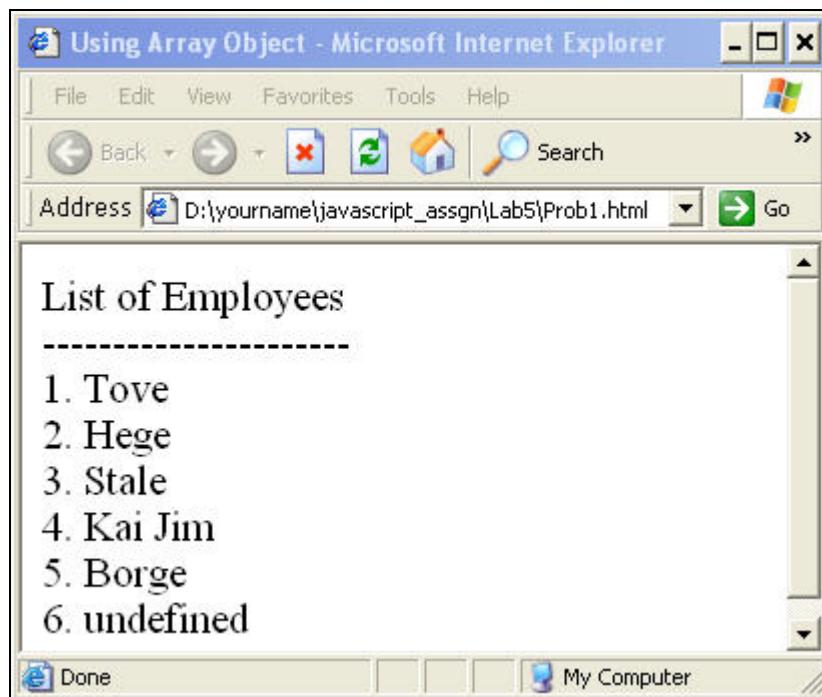


Figure 12: Using Array to display values

#### Solution:

**Step 1:** Write the Code, and save it as **Prob1.html**.

**Step 2:** Open **prob1.html** page in the browser, and verify that you get the same output as required.

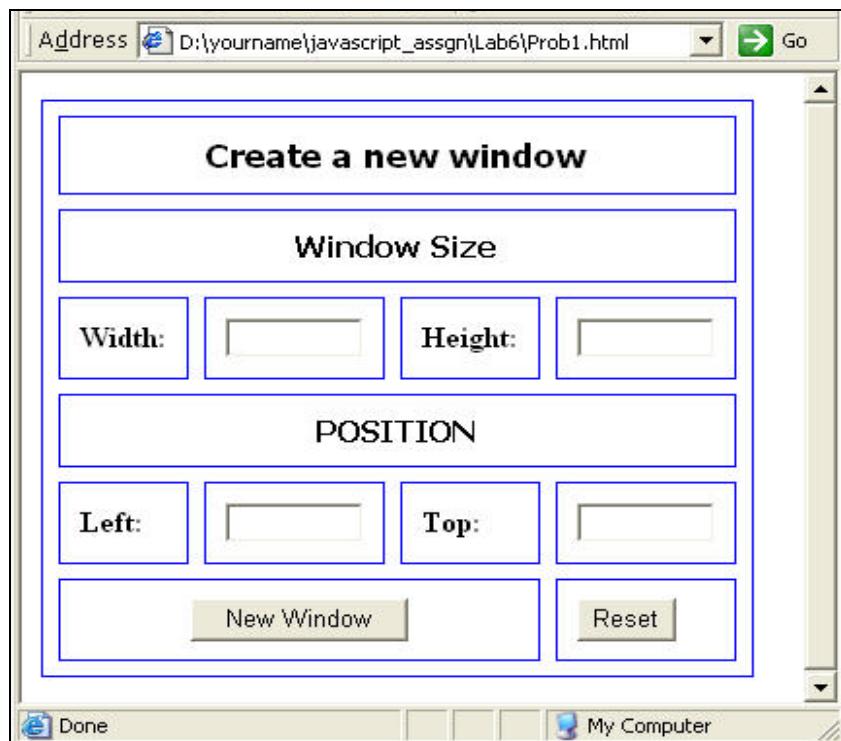
## Lab 5: Working with Document Object Model(DOM)

<b>Goals</b>	Understand Window Object Dynamically create windows Handle window events
<b>Time</b>	90 minutes

### 5 .1: Window object

Create a **prob1.html** web page which has the following items as shown in the figure given below:

- a form that accepts window parameters width, height, title, left and top parameters from text field, and
- two buttons with the labels **New Window** and **Reset** to the web page

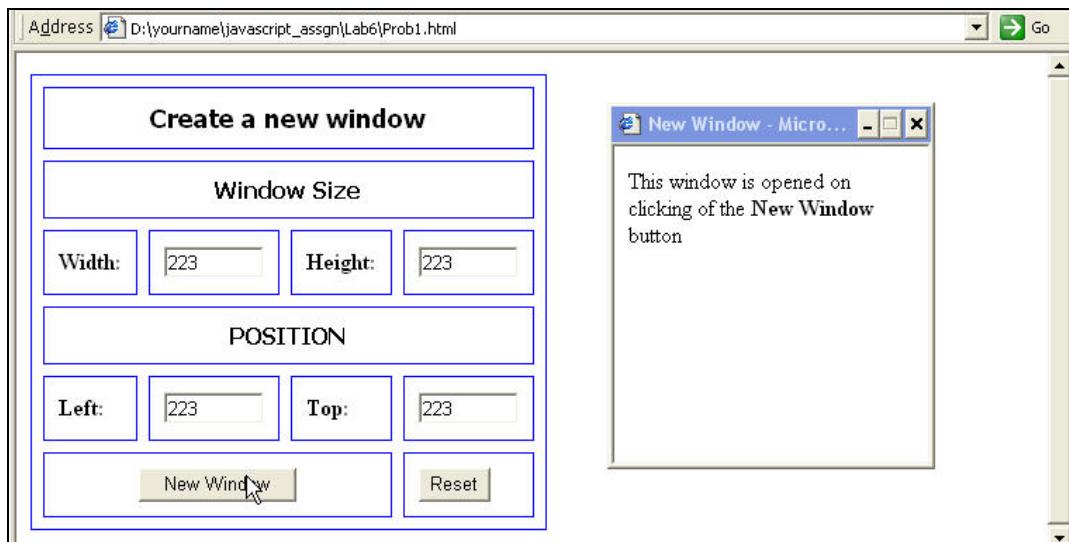


The screenshot shows a web browser window with the address bar containing "D:\yourname\javascript\_assgn\Lab6\Prob1.html". The main content area displays a form titled "Create a new window". The form is divided into sections: "Window Size" (with "Width:" and "Height:" input fields), "POSITION" (with "Left:" and "Top:" input fields), and buttons for "New Window" and "Reset". The browser interface includes standard buttons like "Done" and "My Computer" at the bottom.

Figure 13: Interface to accept window coordinates

If **Reset** button is clicked, then clear all text fields. If **New Window** button is clicked, then open a new window with specifications entered in the text fields as shown in the figure given below.

**Note:** By default, the new window opens at the top left corner of the screen.



**Figure 14: Opening a window**

### Solution:

**Step 1:** Complete the following Code and save it as **Prob1.html**.

```
<html>
<head>
<title> window example </title>
</head>
<script>
function nwwindow()
{
/*TODO: get the height, width, left and top from the form object and pass the values to open
method of window along with the name of the html file to be opened in the new window.*/
}
</script>
<body >
<form id="frmLab">
<table border="1" cellspacing="8" cellpadding="10" bordercolor="blue">
```

```
// Create Table as shown in fig 6.2
</table>
</form>
</body>
</html>
```

**Example 8: Lab 5: Prob1.html**

**Step 2:** Open **prob1.html** page in the browser, and verify that you get the same output as required.

**Step 3:** Open **prob2.html** page in the browser, and verify that you get the same output as required.

## Lab 6: Working with Location Object

<b>Goals</b>	Understand and use Location Object.
<b>Time</b>	20 minutes

### 6.1: Location Object

Create a web page which will display the properties **href**, **protocol**, and the **pathname** of the location object of your current file.

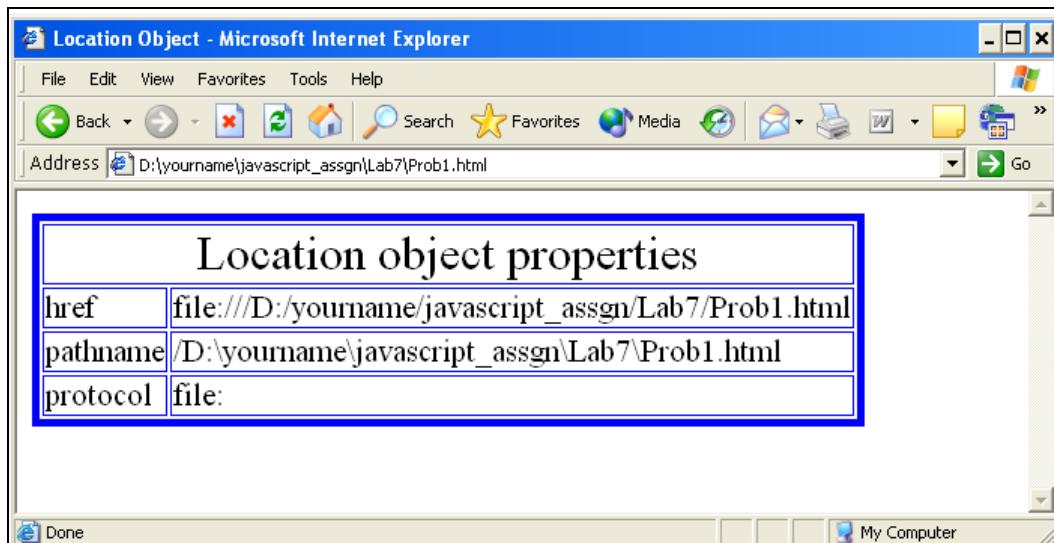


Figure 15: Location Object Properties

#### Solution:

**Step 1:** Write the code and save it as **Prob1.html**.

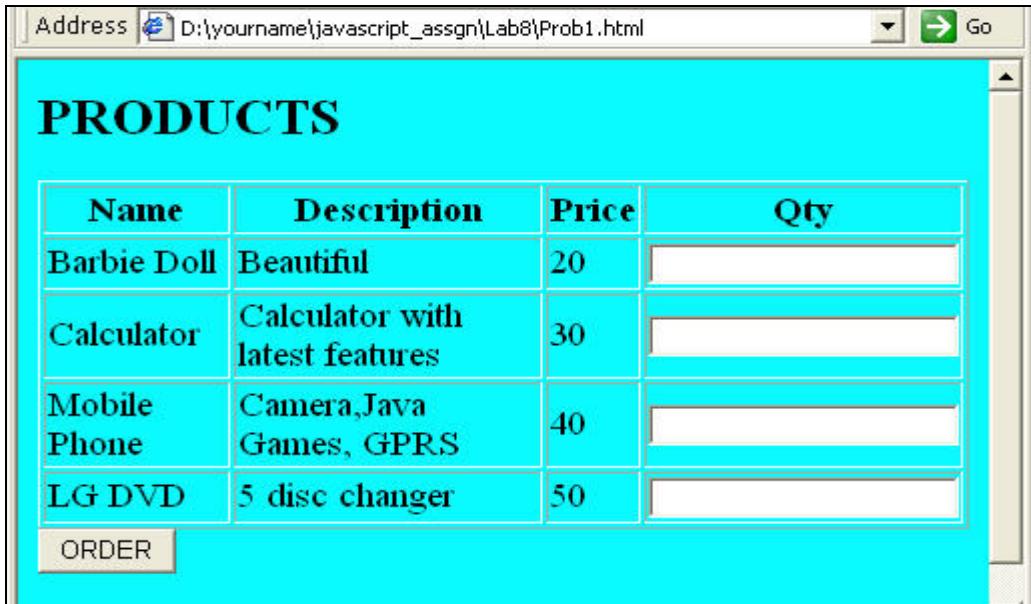
**Step 2:** Open **prob1.html** page in the browser, and verify that you get the same output as required.

## Lab 7:Working with Document Object

<b>Goals</b>	Understand Document Object
<b>Time</b>	120 minutes

### 7.1: Working with Documents

Create a **prob1.html** web page which displays products available as shown in the following figure. The product details comprise Product Name, Product description, and its price.



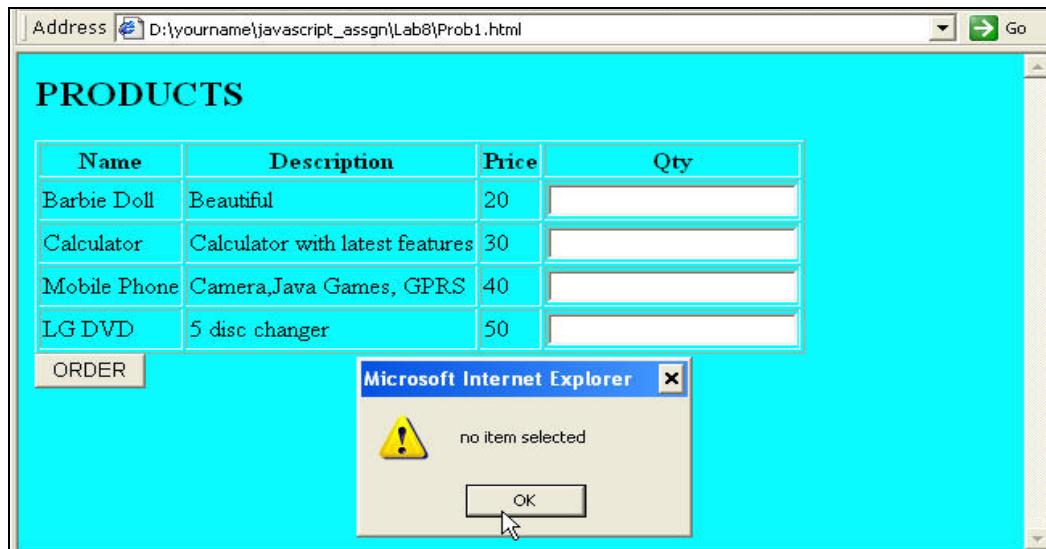
The screenshot shows a web browser window with the address bar containing "D:\yourname\javascript\_assgn\Lab8\Prob1.html". The main content area has a title "PRODUCTS" and a table with four rows. The table columns are "Name", "Description", "Price", and "Qty". The "Qty" column contains empty text input fields for each row. A "ORDER" button is located at the bottom left of the table.

Name	Description	Price	Qty
Barbie Doll	Beautiful	20	<input type="text"/>
Calculator	Calculator with latest features	30	<input type="text"/>
Mobile Phone	Camera,Java Games, GPRS	40	<input type="text"/>
LG DVD	5 disc changer	50	<input type="text"/>

**ORDER**

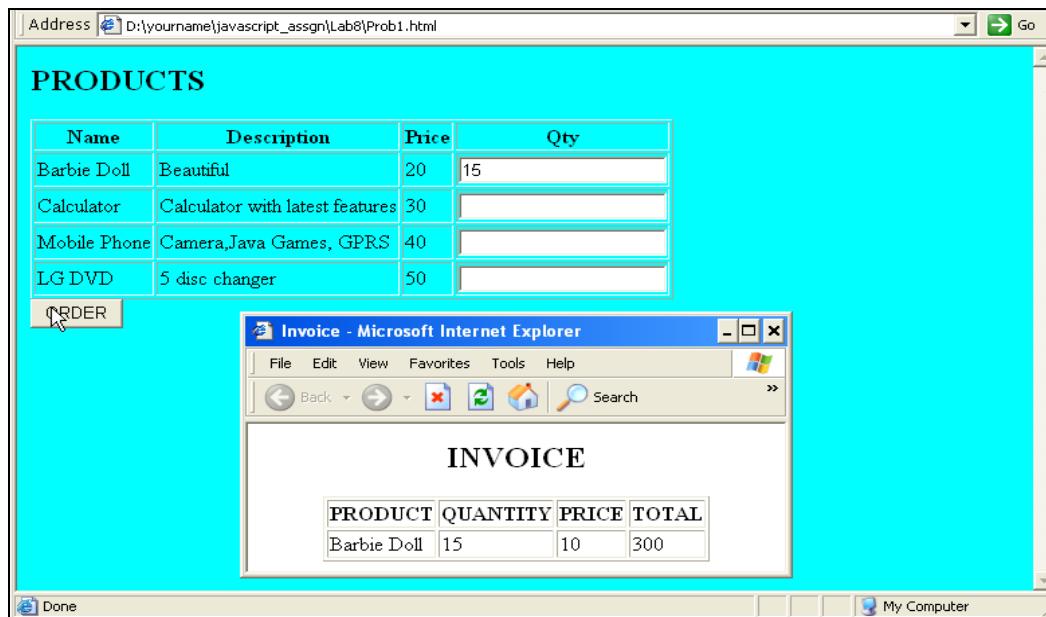
**Figure 16: Displaying Products**

Users can place orders specifying the quantity of each product. If the user does not enter quantity in any of the text fields, then an error message should be displayed as shown in the figure given below:



**Figure 17: Validating Products**

When the user clicks the **Order** button, the invoice for the current products transaction showing the product name, quantity ordered, price and total amount is displayed in a new window as shown in the figure given below:



**Figure 18: Displaying Invoice details in a new window**

**Solution:**

**Step 1:** Write the code and save it as **Prob1.html**.

**Step 2:** Open **prob1.html** page in the browser, and verify that you get the same output as required.

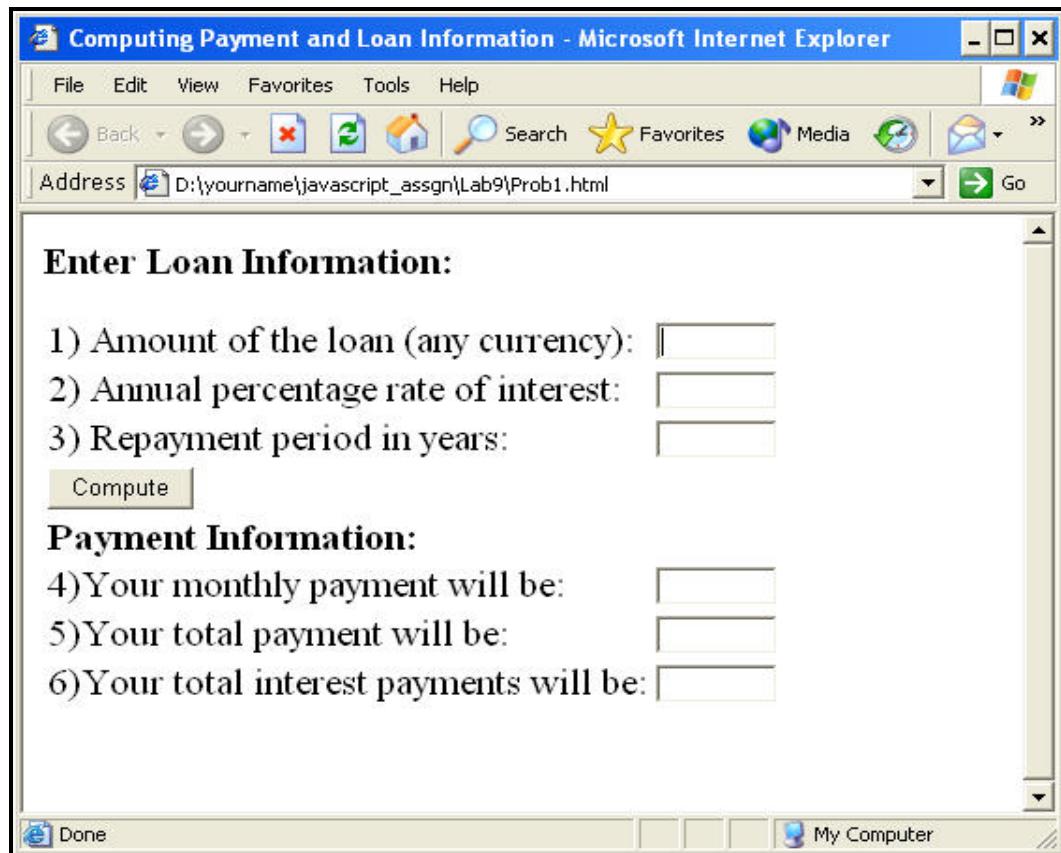
## Lab 8:Working with Form Object

<b>Goals</b>	<ul style="list-style-type: none"> <li>Understand and use Form Object.</li> </ul>
<b>Time</b>	90 minutes

### 8.1: Form Validation

Create a **prob1.html** web page, as shown below, and calculate **Payment Information** based on **Loan Information**. Validate **Loan information** textfields for numbers. The **Payment Information** textfields should be uneditable. The other constraints are as follows:

- Amount of Loan should not be more than 15 lakhs.
- Repayment period should be between 7 yrs to 15 yrs.



The screenshot shows a Microsoft Internet Explorer window with the title "Computing Payment and Loan Information - Microsoft Internet Explorer". The address bar shows the file path "D:\yourname\javascript\_assgn\Lab9\Prob1.html".

**Enter Loan Information:**

- 1) Amount of the loan (any currency):
- 2) Annual percentage rate of interest:
- 3) Repayment period in years:

**Compute**

**Payment Information:**

- 4) Your monthly payment will be:
- 5) Your total payment will be:
- 6) Your total interest payments will be:

At the bottom left is a "Done" button, and at the bottom right is a "My Computer" icon.

Figure 19: Validating Form elements

If the repayment period is not between 7 and 15, then an error message should be displayed next to this control.

Similar kind of error message should be displayed if the amount of loan exceeds 15 lakh.

```
In the function calculatePayment()
/*
TODO:
calculate the monthly payment, total payment, total interest payment on click of the button with
label "compute"
*/
```

#### Example 9: Lab 8: Prob1.html

Open **prob1.html** page in the browser, and verify that you get the same output as required.

#### 8.2 Validate Field

Create a **prob2.html** page as shown in the below figure.



The screenshot shows a web page with a blue header containing the text "Product Details". Below the header is a white rectangular form area. On the left side of the form, there are four labels: "Category:", "Product:", "Quantity:", and "Total Price:". To the right of each label is a corresponding input field or control. The "Category:" field is a dropdown menu with "Electronics" selected. The "Product:" field is also a dropdown menu with "-----" selected. The "Quantity:" field is a simple text input field. The "Total Price:" field is another text input field, which appears to be non-editable as it is shown in a different color. At the bottom left of the form are two buttons: "Submit" and "Clear".

**Figure 20: Lab 8.2 Product Details**

Data should be prepopulated in category list box (Electronics, Grocery). Based on selection of category, product list need to be populated automatically with values as given in the below table. Also Total price need to be calculated for the entered quantity as per the data in the below table. Total price field should be non-editable field.

Category	Product	Price per quantity in Rupees
Electronics	Television	20000
	Laptop	30000
	Phone	10000
Grocery	Soap	40
	Powder	90

While clicking on submit button, if all the text fields contains valid values then display the filled details in a popup window.

## Appendices

### Appendix A: JavaScript Standards

1. Naming conventions for variables in JavaScript:
  - Variables must begin with prefix indicating the type of the variable.
    - All integer must start with "int".
    - All floating data types must start with "flt".
    - All string must start with "str".
    - All object name must start with "obj".
    - All Boolean variables must start with "bln".
    - All variables that store date must start with "dt".
    - All constants must be in upper case with different words separated by underscore ( \_ ).
    - All array variables must start with "arr".
    - Apart from these guidelines all variable name must be sensible enough, so that it's purpose can be identified from it's name.

Type	Example
String	strStringName
Boolean	blnPresent
Array	arrArrayName
Object	objObjectName
Date	dtDateName
Integer	intValueInteger
Float	fltValueFloat
Constants	STRING_CONSTANT ARRAY_CONSTANT NUMERIC_CONSTANT

- All HTML elements must be prefixed with appropriate types.
  - TextBox "txt"
  - Image "img"
  - Image map Area "img"
  - option button "opt"
  - CheckBox "chk"
  - DropDown List "lst"
  - Form Name "frm"
  - Buttons "btn"
  - All div tags "div"
  - All class names must start with "cls"
  - All user-defined objects must start with "u"
  - First letter of each variable/function name must be in upper case. Rest all letters must be in lowercase.
  - Use of underscore and digits for naming variables must be avoided.

Tag	Example
Div	divContent
Class	clsInterest
Form	frmContainer
Image	imgMapThis
Button	btnOk
TextBox	txtInterestRate
CheckBox	chkAllow
Option Button	rdbRate
DropDownList	lstState

It must be noted that this naming style does not apply to HTML elements. However, when these elements are accessed in the JavaScript functions, these naming conventions must be followed. This document describes coding convention only for JavaScript.

## 2. Commenting

- Comments related to a particular line of code should be on the same line after the statement gets over.

```
If (dtToday == "15/07/99") { // Is date birthdate?
 alert ("Happy Birthday"); // Give birthday message
} else {
 alert ("Happy Day"); // Give standard message
}
```

- Over all commenting should consist of two parts – Comment header and Comment footer. Comment header must precede the block of code and Comment footer must follow the block of code.

```

//Function Name: calculateInterest
//Description: This function calculates the interest. It accepts the initial investment and
// period for which the amount is invested. Rate of interest is fixed.
//
// Formula is
//
// fltInterest = fltAmount * fltPeriod *fltRATE/100
//
// Dhrumil Dalal
//
// 15/07/1999
//
//Author: fltAmount – indicated the amount invested
//Start Date: fltPeriod – Indicates the period of investment
//Input: Calculated interest
Parameters:
//
//Return Value:

Function calculateInterest(fltAmount,fltPeriod){
}

//End of function for calculating the rate of interest

```

### 3. Documentation

- All variables used in the function must be declared in brief.
- Only one variable declaration per line.
- Describe each variable on the same line and description should not be more than one line.
- All functions must be preceded by comments. Comments must describe the following:
  - Input parameters.
  - Return value.
  - Function logic in brief.

- Starting date.
- Name of the author.
- Revision history.
- After the end of function, there must be block of comment indicating the end of function.

```

//Function Name: calculateInterest
//Description: This function calculates the interest. It accepts the initial
// investment and period for which the amount is invested.
// Rate of interest is fixed. Formula is
// fltInterest = fltAmount * fltPeriod *fltRATE/100
//Author: Dhrumil Dalal
//Start Date: 15/07/1999
//Input Parameters: fltAmount – indicated the amount invested
// fltPeriod – Indicates the period of investment
// Calculated interest
//Return Value:
Function calculateInterest(fltAmount,fltPeriod){
 Var fltRATE = 12.5; // fixed rate of interest
 Var fltInterest; // The variable to store calculated interest
 fltInterest = fltAmount * fltPeriod * fltRATE/100 ;
 return fltInterest;
}

//End of function for calculating the rate of interest

```

#### 4. 4: Coding Styles

- For statements which may have block of code enclosed in {}, the opening brace "{" must immediately follow the statement and the closing brace "}" must be below the statement.

That is to say, the closing brace and first letter of the statement must be same in the column.

```
If (condition) {
 ...
} else {
 if (condition) {
 ...
 } else {
 ...
 }
}

for(intCounter=0; intCounter <= 5; intcounter++){
 //Perform calculation.
 //Display Result}
```

- All statements within corresponding opening and closing brace must be indented.  
Indentations must be in odd columns.

Column no

```
123456789.....
if (condition) {
 ...
} else {
 if (condition) {
 ...
 } else {
 ...
 }
}
```

- Also the code should not extend past the 80th column so that it is required to scroll to the right or left to edit a particular line. In the case of strings which do not fit on one line, it is recommended that temporary variables be used with the string concatenation operator (**+ =**) to construct strings of longer lengths. The following example illustrates this:

Column no	
123456789.....	80
strMessage = "Demonstrating the use of ... ";	
strMessage += "prepared on 15-07-1999";	

## Appendix B: Coding Best Practices

### JavaScript Best Practice

The following demonstrate the best practices that should be followed while writing JavaScript code.

#### 1. Inline JavaScript source code

Any JavaScript code that does not write out to the document should be placed within the head of the document.

```
<HTML>
<HEAD>
<SCRIPT>
<!--
function functionName() {
 alert(text);
}

var text = 'Hello World';
//-->
</SCRIPT>
</HEAD>
```

#### Example 10: Sample Code

This ensures that the browser has loaded the JavaScript function definitions before it is required. It also makes it slightly easier to maintain the JavaScript code if it can always be found in the head of the document.

#### 2. JavaScript Links

Avoid using the **javascript:** protocol as a default URL within a link.

If JavaScript is disabled, then the link will not work. Do not use the following:

```
<SCRIPT>
<!--
function functionName() {
 alert('Hello world');
}
//--></SCRIPT>
text link
```

**Example 11: Sample Code**

Instead, use JavaScript itself to override the **href** property of the link:

```
<SCRIPT>
<!--
function functionName() {
 alert('Hello world');
}
//-->
</SCRIPT>

text link
```

**Example 12: Sample Code**

### 3. Avoid Using Void

All browsers do not support the **void** function. Create your own **void** function.

The in built **void()** function is supported since JavaScript 1.1. Therefore it is best to create your own void function rather than rely on JavaScript 1.1 being available.

```
<SCRIPT>
<!--
function myVoid() { } // create a void function
//-->
</SCRIPT>

non functional text link
```

**Example 13: Sample Code**

#### 4. JavaScript Performance

Avoid writing output multiple times to the document, concatenate the data, and then write all in one go.

With the introduction of Netscape Navigator 4, the rendering of JavaScript generated HTML slowed down considerably.

The following writes the HTML output to the document in one go:

```
<SCRIPT>
<!--
var output = '<P>';
output += 'Last modified: ';
output += document.lastModified;
output += '<\V>';
document.write(output);
//-->
</SCRIPT>
```

**Example 14: Sample Code**

#### 5. Select Form Fields

Use the Netscape method to correctly navigate select field properties.

The following technique works in Microsoft Internet Explorer. However it should be avoided.

```
<SCRIPT>
<!--
var property = document.formName.selectName.propertyName
//-->
</SCRIPT>
```

**Example 15: Sample Code**

Whereas the following will work correctly in all browsers:

```
<SCRIPT>
<!--
var property =
document.formName.selectName.options[document.formName.selectName.options.selectedIndex]
.propertyName
//-->
</SCRIPT>
```

**Example 16: Sample Code**

## 6. Changing Location

Do not use the following:

```
<SCRIPT>
<!--
location = 'page.htm';
//-->
</SCRIPT>
```

**Example 178: Sample Code**

The later approach is confusing as it is not clear whether you are changing the location property of the “window” or the “document object”.

Changing the location using the document is deprecated and causes problems on later browsers.

Use the following:

```
<SCRIPT>
<!--
window.location.href = 'page.htm';
//-->
</SCRIPT>
```

**Example 19: Sample Code**

## 7. Opening Windows

While opening a new popup window using JavaScript, there are several points to bear in mind.

To be able to control the popup window from the **opener** window, always retain the returned reference from the window's open method:

```
<SCRIPT>
<!--
var windowHandle = window.open('page.htm','windowName','width=600,height=320');
//-->
</SCRIPT>
```

**Example 18: Sample Code**

To avoid errors while referring to the **opener** window from the **popup** window, always check for the in-built browser support for the **opener** property. If necessary, provide your own:

```
<SCRIPT>
<!--
var windowHandle = window.open('page.htm','windowName','width=600,height=320');
if (!windowHandle.opener)
 windowHandle.opener = self;
//-->
</SCRIPT>
```

**Example 19: Sample Code**

While updating the contents of a newly opened window, give the browser time to open the window and to load the initial contents:

```
<SCRIPT>
<!--
function update() {
 windowHandle.document.open();
 windowHandle.document.write('<H1>Hello World</H1>');
 windowHandle.document.close();
}

var windowHandle = window.open('page.htm','windowName','width=600,height=320');
if (!windowHandle.opener)
 windowHandle.opener = self;
setTimeout('update()',2000);
//-->
</SCRIPT>
```

**Example 20: Sample Code**

## 8. JavaScript Entities

JavaScript Entities are only supported by Netscape Navigator. Avoid their use.

The following will cause errors in other browsers:

```
<HR WIDTH="{barWidth}%">
```

**Example 21: Sample Code**

Instead the following can be used.

```
<SCRIPT>
<!--
document.write('<HR WIDTH=' + barWidth + '%>');
//-->
</script>
```

**Example 22: Sample Code**

**Appendix C: Table of Figures**

Figure 1: Welcome to JavaScript.....	7
Figure 2: Formatting Text in JavaScript .....	8
Figure 3: Using external JavaScript File.....	9
Figure 4: Lab 1: Prob4.html .....	10
Figure 5: Embedding Script tags in HTML document.....	10
Figure 6: Using Variable in many Script tags .....	13
Figure 7: For loop in JavaScript.....	14
Figure 8: Operators and Arithmetic Expression .....	15
Figure 9: Displaying Date using Date Object .....	16
Figure 10: Using indexOf method of String object.....	17
Figure 11: Using various String methods .....	18
Figure 12: Using Array to display values .....	19
Figure 13: Interface to accept window coordinates .....	20
Figure 14: Opening a window .....	21
Figure 15: Location Object Properties .....	23
Figure 16: Displaying Products.....	24
Figure 17: Validating Products .....	25
Figure 18: Displaying Invoice details in a new window .....	25
Figure 19: Validating Form elements.....	27

**Appendix D: Table of Examples**

Example 1: Lab 1: Prob1.html .....	6
Example 2: Lab 1: Prob2.html .....	8
Example 3: Lab 1: Prob3.html .....	8
Example 4: Lab 1: HelloWorld.js .....	9
Example 5: Lab 1: Hello.js.....	10
Example 6: Lab 1: Prob5.html .....	12
Example 7: Lab 1: common.js .....	12
Example 8: Lab 5: Prob1.html .....	22
Example 9: Lab 8: Prob1.html .....	28
Example 11: Sample Code.....	37
Example 12: Sample Code.....	38
Example 13: Sample Code.....	38
Example 14: Sample Code.....	38
Example 15: Sample Code.....	39
Example 16: Sample Code.....	39
Example 17: Sample Code.....	40
Example 188: Sample Code.....	40
Example 19: Sample Code.....	41
Example 20: Sample Code.....	41
Example 21: Sample Code.....	42
Example 22: Sample Code.....	42
Example 23: Sample Code.....	42