JavaScript

DHTML (Dynamic HTML)

- DHTML is a term used to describe the combination of the three web technologies HTML, style sheets (CSS) and Web Scripts to create dynamic and interactive web pages.

- Using DHTML you can interact with the user and alter the content of a page at any time.

JavaScript

- JavaScript is a scripting language used to create dynamic web pages. As a scripting language JavaScript is therefore, interpreted and not compiled.
- JavaScript cannot run outside the browser - it is a client-side scripting language.

- JavaScript is case-sensitive.
- It is an object-based scripting language.

Integrating JavaScript with HTML

- There are two ways to embed a JavaScript in an HTML document:
  i. Using the HTML **<script></script>** tag.
  ii. Placing the JavaScript in an HTML tag.

Using HTML <script> tag

Syntax:

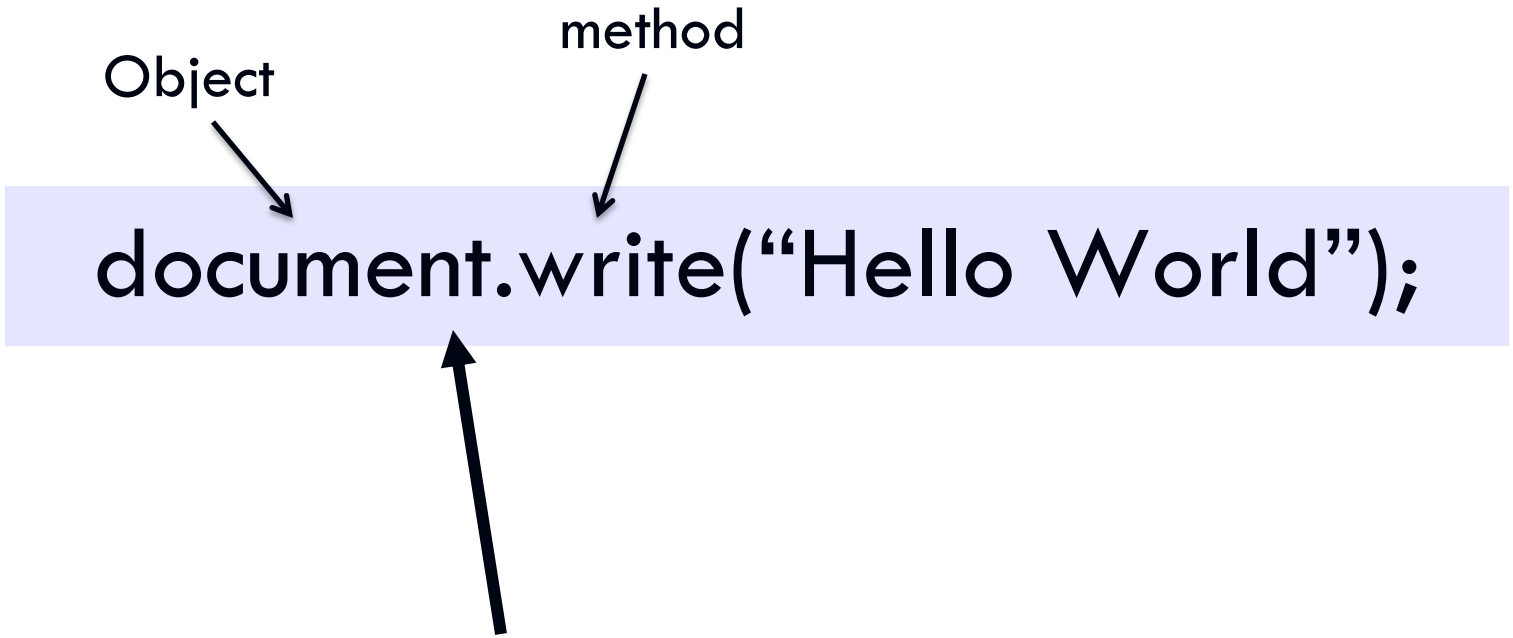
```
<script language="JavaScript"
   type="text/javascript" src="url">

...........

</script>
```

- The script can be placed:
  - Within the head or body section of an HTML document or
  - As an external file with a **.js** extension. The src attribute of the <script> tag specifies the location of the external JavaScript file.

Placing a JavaScript in the **Body Section**

- Scripts placed in the body section are executed as part of the HTML document when the page loads.

```
<body>
<h1>My First javaScript</h1>
<script language="javascript" type="text/ javascript">
        document.write("Hello World");
</script>
</body>
```



Note:

Each HTML document loaded into a browser window becomes a **Document object.**

Example 1:

Write a JavaScript to display the following:

- "Hello World" as a center aligned H2 heading. Underline the text.
- "How are you?" as a paragraph.

```
<html>
<body>
<script language="javascript"
type="text/javascript">
document.write("<h1 align=center><u>Hello
World</u></h1>");
document.write("<p>How are you?</p>");
</script>
</body>
</html>
```

```
<html>
<body>
<script language="javascript" type="text/javascript">
document.write("<h1 align=center><u>Hello
 World</u></h1><p>How are you?</p>");
</script>
</body>
</html>
```

Example 2:

Write a JavaScript to display the following:

- National School of Business Management as an H1 heading in italic and center aligned with font color red.
- BSc in Computing as a center aligned H2 heading.

```
<html>
<body>
<script language="javascript" type="text/javascript">
document.write("<h1 align=center><font
   color=red><i>National Institute  of Business
   Management</i></font></h1>");
document.write("<h2 align=center>DCSD 12.1</h2>");
</script>
</body>
</html>
```

Placing a JavaScript in the **Head Section**

- Scripts placed in the head section are not automatically executed when the page loads but can be executed when called by other scripts in the page.

```
<head>
<title> Javascript Example </title>
<script language="javascript" type="text/javascript">
..............
</script>
</head>
```

Placing a JavaScript in in an external file

- The src attribute of the <script> tag must be used to specify the external JavaScript file. The tag can appear in the head or the body section of the HTML document.
- Save the external JavaScript file with a .js file extension.

```
<script language="javascript" type="text/ javascript"
   src="filename.js">
</script>
```

- Note:

  The external script should not contain the <script></script> tags.

Example 1:

Use an external JavaScript to display the following:

- "Internet Technology" as a center aligned H1 heading.
- "Learn JavaScript in a day" as a paragraph with font color blue.

```
<html><body>
<script language="javascript" type="text/javascript"
   src="ext.js">
</script>
</body></html>
```

Ext.js

```
document.write("<h1 align=center>Internet
Technology</h1><p><font color=blue>Learn
JavaScript in a day</font></p>");
```

Comments

- Comments are written between the **<! - -** and **- - >** symbols.

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

JavaScript Popup Boxes

- JavaScript has three types of popup boxes:
  - Alert box
  - Confirm box
  - Prompt box

Alert Box

- A JavaScript alert is a dialog box that contains a message. When an alert box pops up, the user has to click "OK" to proceed.
- **Syntax:** alert(“text message”)

```
<script language=“javascript” type=“text/javascript”>
   alert(“This is an alert box”);
</script>
```


Microsoft Internet Explorer
This is an Alert box
OK

Confirm Box

- A confirm box pops up with both an OK button to accept and a Cancel button to reject.

- If the user clicks "OK", the box returns true. If the user clicks "Cancel", the box returns false.

Syntax:

- confirm(“text message")

```
<script language=javascript type="text/javascript">
        confirm("Do you want to log out?");
</script>
```

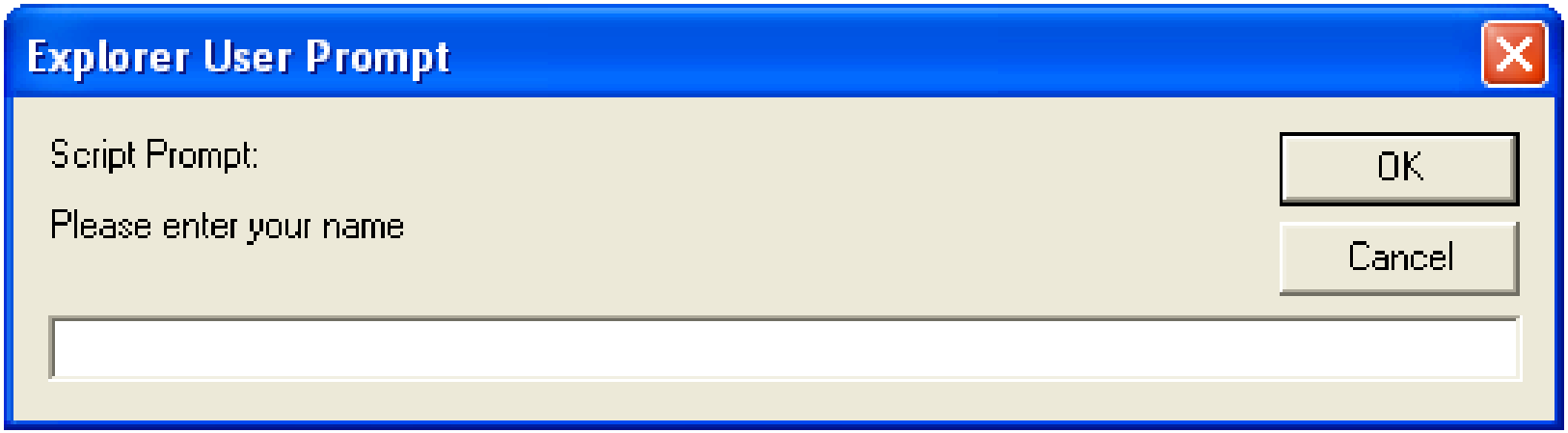
Prompt Box

- A prompt box is used if a user's input value is desired before entering a page.
- When a prompt box pops up, the user has to click either "OK" or "Cancel" to proceed after entering an input value.
- If the user clicks "OK" the box returns the input value. If the user clicks "Cancel" the box returns null.

Syntax:

- prompt("text message","defaultvalue")

```
<script language=javascript  type="text/javascript">
            prompt("Please enter your name", " ");
</script>
```



JavaScript Values

- JavaScript recognizes the following types of values:
  - Numbers – real and integers (eg: 45.786, 100).
  - Strings (eg: Hello World).
  - Logical (Boolean) values - True or False.
  - Null - a special keyword to denote a null value

JavaScript Variables

- Variable names are case sensitive.
- A variable name must begin with a letter or an underscore. The remaining characters can be numbers (0-9), letters (a-z or A-Z) or the underscore.

- Variable names cannot contain spaces.
- Reserved words cannot be used as variable names.

Examples: maxval, First_Name, _name, a100

Declaring Variables

```
var  myval = 100;
```

```
var  maxval = 100.2;
```

```
var  name = “Saman”;
```

Manipulating Variables

Example 1

Write a JavaScript to define two variables num1 and num2, initialize them to 10 and 20 respectively and display the addition of the two numbers.

```
<html><body>
<script language="javascript" type="text/javascript">
   var num1=10;
   var num2=20;
   var num3=num1+num2;
   document.write("The Addition of numbers =" + num3);
</script>
</body></html>
```

```
document.write("The Addition of numbers =", num3);
```

Example 2:

Write a JavaScript to enter a user's name through a prompt box. If the user enters a name and clicks the OK button display the message "Good day <user name>!" else if the user clicks the cancel button display the message "Good bye". Use an alert dialogue box to display the relevant messages.

```
<html><body>
<script language="javascript" type="text/javascript">
var reply=prompt("What is your name?","");
if(reply!==null)
{alert("Good Day " +reply +"!"); }
else
{alert("Good Bye");}
</script>
</body></html>
```

JavaScript Functions

- A JavaScript function is a code-block that can be executed by an event (eg: button press, mouse click etc), or when the function is called.

- You may call a function from anywhere within the page or even from other pages (if the function is embedded in an external .js file).

- Functions can be defined both in the <head> and in the <body> section of a document. But, to ensure that a function is loaded by the browser before it is called, it is better to define the functions in the <head> section.

Defining a Function in a JavaScript

```
function functionname(var1,var2,...,varX)
{
some code
return
}
```

functions that return a value must use the return statement

Example 1:

Write a JavaScript to display the message “Hello world” as a function. Use an alert dialog box to display the message.

```
<html>
<head>
<script language="javascript" type="text/javascript">
function message()
{
        alert("Hello World");
}
</script>
</head>
<body>
<script language="javascript" type="text/javascript">
        message();
</script>
</body></html>
```

Example 2:

Write a JavaScript to input the name of a user through a prompt box and using a function display the alert “Hello and welcome <user name>”.

```
<html><head>
<script language="javascript" type="text/javascript">
function message(uname)
{
        alert("Hello and welcome " +uname);
}
</script></head>
<body>
<script language="javascript" type="text/javascript">
        var name=prompt("Please enter your name","");
        message(name);
</script></body>
</html>
```

Example 3:

- Modify the JavaScript written in example 2 as follows:
  - Write a function to accept the user name through a prompt box and return the value to the calling program.
  - Display the alert “Hello and welcome <user name>”.

```
<html><head>
<script language="javascript" type="text/javascript">
function message()
{
        var name=prompt("Please enter your name","");
        return name;
}
</script></head>
<body>
<script language="javascript" type="text/javascript">
        alert("Hello and Welcome " +message());
</script></body></html>
```

Example 4:

Write a JavaScript to input two numbers and display the product of the two numbers. Use a JavaScript function for the calculation.

```
<html><head>
<script language="javascript" type="text/javascript">
function prod(a,b)
        {var result=a*b;
        return result;}
</script></head>
<body>
<script language="javascript" type="text/javascript">
var x=prompt("Please enter First number","");
var y=prompt("Please enter second number","");
document.write("The product of the numbers= " +prod(x,y));
</script></body></html>
```

JavaScript Objects

- JavaScript is an object based programming language.
- Object

  An object is a construct such as a browser window or form button that manages its own attributes, or properties and also provides methods that can be used to manipulate the object and its data.

Object Properties

- Properties are attributes of an object that contains some value. These values represent some quality of the object.
- To access the object's property:

  object.property

- Eg: string.length

Object Methods

- A method is an action that can be performed on objects.
- To execute the object's method:

  Object.method(p1,p2, ….,pn)
- Eg: document.write( )

  write( ) is the method of the document object.

JavaScript Built-in Objects

- String Object

  The ***string object*** allows a user to work with strings as objects.

Example 1:

- Write a JavaScript to enter a string and display the length of the string.
  - Hint: Use the length property

```
<html><body>
<script language="javascript" type="text/javascript">
var txt=prompt(“Please enter a string”,””);
document.write(“The length of the string =“ +txt.length);
</script>
</body>
</html>
```

Example 2:

Functions are case sensitive

Write a JavaScript for the following:

- Assign the text “welcome” to a variable
- Using that variable display the text:
  - In bold letters → **bold( )**
  - In upper case → **toUpperCase( )**
  - With the characters “come” → **substring(n ,m)**

Starting Index (End index+1)

```
<html><body>
<script language="javascript" type="text/javascript">
var test="welcome";
document.write(test.bold() +"<br>");
document.write(test.toUpperCase() +"<br>");
document.write(test.substring(3,7));
</script>
</body></html>
```

Example 3:

Write a JavaScript for the following:

- Assign the text “HAVE A NICE DAY” to a variable
- Using that variable display the message:
  - In lower case ⟶ **toLowerCase( )**
  - With the characters “NICE”

```
<script language="javascript" type="text/javascript">
var test="HAVE A NICE DAY";
document.write(test.toLowerCase() +"<br>");
document.write(test.substring(7,11));
</script>
```

- Math Object

  The ***Math object*** allows the user to perform mathematical tasks.

Example 4:

- Write a JavaScript to input the radius of a circle through a prompt box and display the perimeter of the circle.
  - Hint: Use the PI property of the Math object.

```
<html><body>
<script language="javascript" type="text/javascript">
var r=prompt("Please enter the size of the radius","");
var p=Math.PI;
var peri=2*p*r;
document.write("The perimeter of the circle =" +peri);
</script>
</body></html>
```

case sensitive

Example 5:

- Write a JavaScript to input two numbers through two prompt boxes and display the maximum number.
  - Hint: Use the max method of the Math object.

```
<html>
<body>
<script language="javascript" type="text/javascript">
var a=prompt("Enter a number","");
var b=prompt("Enter another number","");
document.write("The largest number is : " +Math.max(a,b));
</script>
</body>
</html>
```

JavaScript Browser-Based Objects

- When an HTML page loads in a browser, the browser automatically builds a collection of objects.
- Eg: document object , window object

document Object

- Each web page contains a single document object.
- The document object contains properties based on the contents of the document.

Some of the methods/properties of the document object

- write( )→write output to the screen
- bgColor→ Specifies the document background color.
- fgColor →Specifies the color of the document text.

window object

- The window object represents an open window in a browser.
- If a document contain frames , the browser creates one window object for the HTML document, and one additional window object for each frame.
- Some of the methods of the window object

window.alert( )

window.prompt( )

window.confirm( )

window.open()

window.close()

window.resizeTo(x,y)

JavaScript Events

- Events are actions that can be detected by JavaScript.
- Events include actions such as mouse clicks, pressing keyboard keys opening/closing of windows etc.
- The browser recognizes these events and perform some default action when these events occur.

Event Handler

- It is a JavaScript code that is not added inside the <script> tags, but, inside the html tags.
- When an event occurs for a given object, its event handler gets executed.
- The syntax of an event handler is:

  name_of_handler="JavaScript code"

- Eg:

Event	Event handler
Load	onLoad
Click	onClick

- The names of event handlers are based on the events that trigger them. Placing the word "on" in front of the event name creates the event handler's name.
- Eg: the event handler for the click event is onClick.
- The event handlers are placed within HTML tags that define the object.

Mouse Event Handlers

- OnClick- user clicks the element with the left mouse button
- onDblClick-user double clicks the element with the left mouse button
- onMouseover- user moves the mouse pointer into boundaries of the element
- onMouseOut-user moves the mouse pointer out of the boundaries of the element

Window and Frame Event Handlers

- onLoad
- onResize
- onUnload
- onMove

Note:

These event handlers are placed inside the <BODY> tag

Keyboard Event Handlers

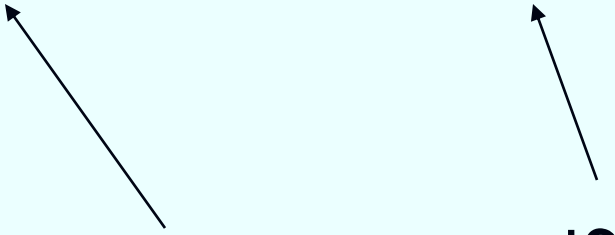
- There are three keyboard events:
  - onKeyDown
  - onKeyUp
  - onKeyPress

Placing a JavaScript in an HTML tag

<body **onLoad='window.alert("Hello World");'**>

.....

</body>



Example 1:

- Write a JavaScript to change the background color of an HTML document from red to yellow according to the mouse over and mouse out events of a hyperlink.

```
<html>
<body>
<a href="http://www.nsbm.lk"
   onMouseover='document.bgColor="red"; '
   OnMouseout='document.bgColor="yellow"; '>NIBM</a>
</body></html>
```

Example 2:

- Modify the JavaScript written for example 1 by using JavaScript functions.

```
<html><head>
<script language="javascript" type="text/javascript">
function mouseoverfn()
{document.bgColor="red";
}
function mouseoutfn()
{document.bgColor="yellow";
}
</script></head>
<body>
<a href="http://www.nsbm.html"
   onMouseover="mouseoverfn();"
   OnMouseout="mouseoutfn();">NSBM</a>
</body></html>
```

Example 3:

- Write a JavaScript to display the alert message "Welcome to NSBM" and change the background color to yellow for a button click event of a button. Use JavaScript functions.

```
<html><head>
<script language="javascript" type="text/javascript">
function message()
{
document.bgColor=“yellow”;
window.alert("Welcome to NSBM");
}
</script></head>
<body><form>
<input type="button" value="click me"
   onClick="message();"></form>
</body></html>
```

Example 4:

- Write a JavaScript to display the alert message “You are resizing the window” for a page resizing event.

```
<html>
<body onResize=‘alert(“You are resizing the
   window”);’>
<h1>hello world</h1>
</body>
</html>
```

Example 5:

- Write a JavaScript to display a suitable alert message for a keydown event of a text box. Use JavaScript functions.

```
<html><head>
<script language="javascript" type="text/javascript">
function keyfn()
{
alert("You pressed a key");
}
</script></head>
<body>
<form>
Enter Name: <input type="text" onKeyDown="keyfn();">
</form>
</body></html>
```

Example 6:

- Write a JavaScript for the following:
  - Create two buttons button1 and button2.
  - Close the browser window when button1 is clicked.
  - Resize the browser window when button2 is clicked.

```
<html><body>
<form>
<input type="button" value="Button1"
   onclick="window.close();">
<input type="button" value="Button2"
   onclick="window.resizeTo(500,500);">
</form>
</body></html>
```

Example 7:

- Write a JavaScript for the following:
  - Display an H1 heading “Hello World” as the web page contents.
  - Create a button.
  - Change the background color of the document to yellow and the text color to red when the button is clicked.

```
<html>
<body>
<h1>Hello World</h1>
<form>
<input type="button" value=“Button1"
   onclick='document.bgColor=“yellow”;
   document.fgColor=“red”;’>
</form>
</body>
</html>
```

Form Validations Using JavaScript

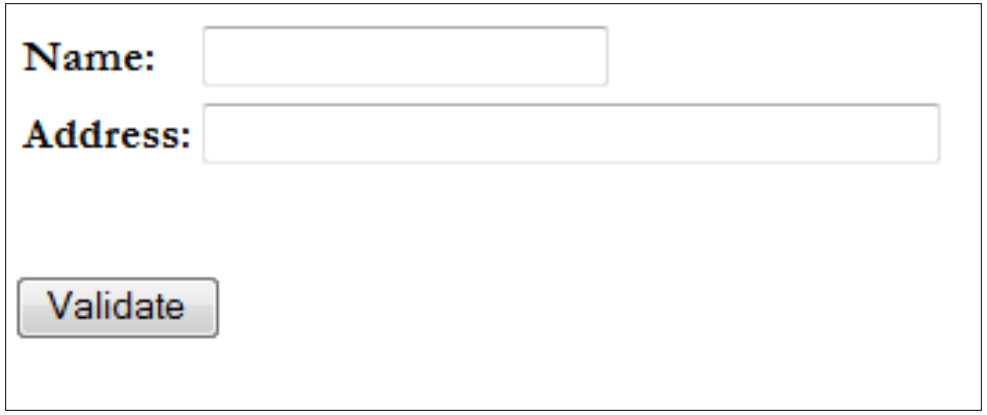
- Validation allows you to ensure that the user has filled in all required fields of a form and that valid data has been entered into those fields.

Example 1:

Write a JavaScript to include the following validations for the data entered through the form given below:

- The 'Name' field should not be empty
- The 'Address' field should not be empty

Display suitable messages to the user based on the result of each validation.



```
<html><head>
<script language="javascript" type="text/javascript">
function validateform()
{
if(document.form1.uname.value.length==0)
    {
        alert("Missing Name");
        return;
    }
if(document.form1.address.value.length==0)
    {
        alert("Missing Address");
        return;
    }
}</script></head>
```

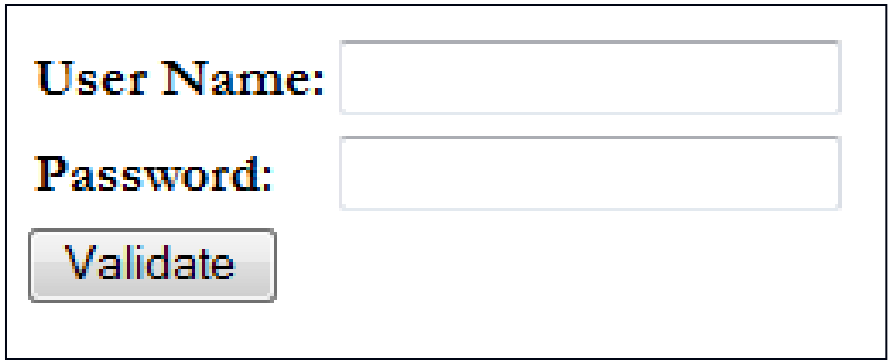
```
<body>

<form name="form1”>

Name:<input type="text" name="uname">

Address:<input type="text" name="address" size="40”>

<input type="button" value="Validate" onClick="validateform();">

</form>

</body>

</html>
```

Example 2:

Write a JavaScript to include the following validations for the data entered through the form given below:

- The 'User Name' field should not be empty.
- The 'password' should be more than 6 characters

Display suitable messages to the user based on the result of each validation.



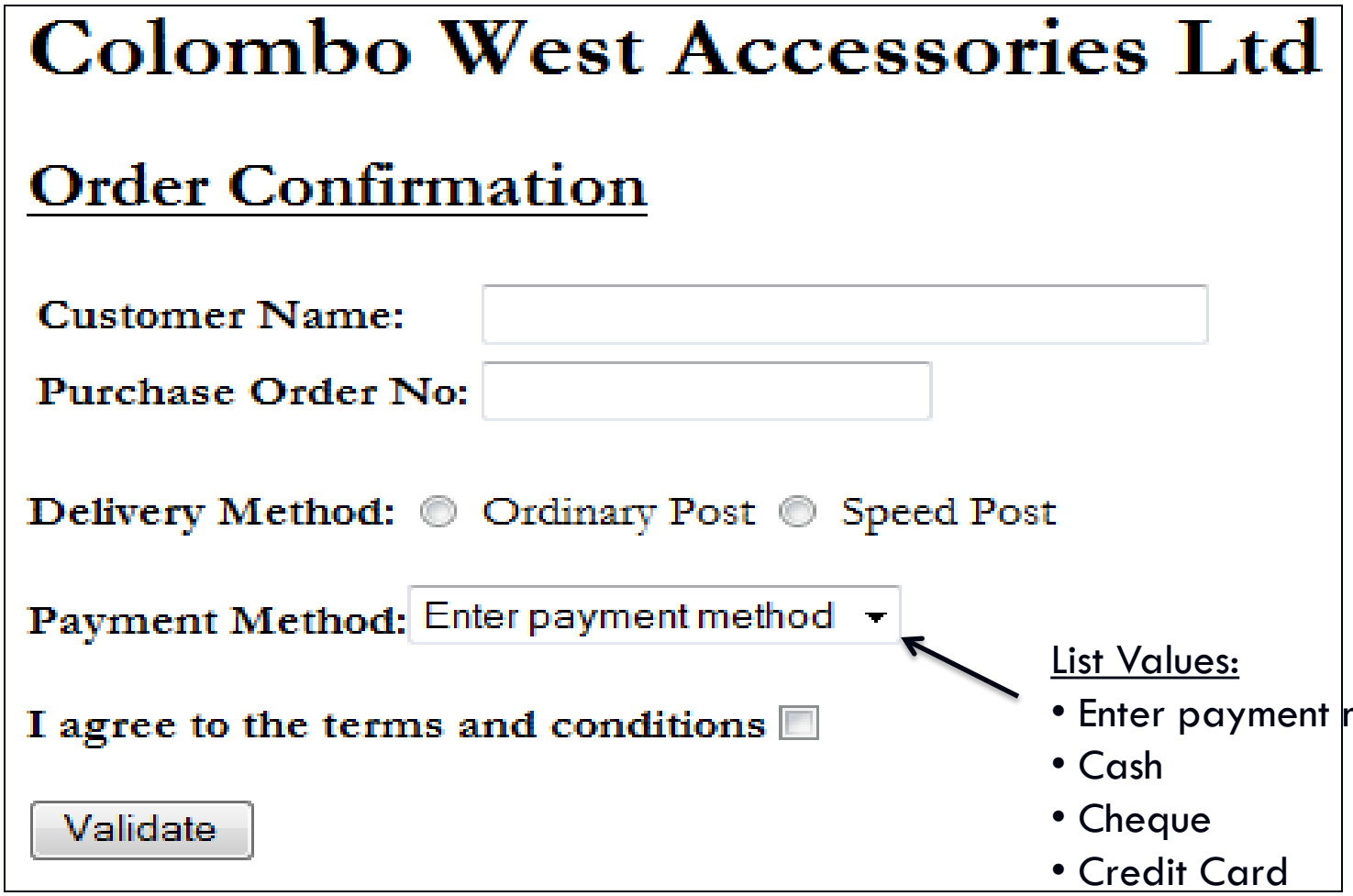
```
<html>
<head>
<script language="javascript" type="text/javascript">
function validateform()
{
    if(document.form1.uname.value.length == 0)
    {
        alert("Please enter the user Name");
        return;
    }
    if(document.form1.password.value.length < 6)
    {
        alert("Password should be more than 6 characters");
        return;
    }
}
</script></head>
```

```
<body>
<form name="form1“>
User Name:<input type="text" name="uname“>
Password:<input type="password" name="password”>
<input type="button" value="Validate"
   onClick="validateform();">
</form>
</body>
</html>
```

Example 3:

Write a JavaScript to include the following validations for the data entered through the form given below:

- ✓The 'Customer Name' field should not be empty.
- ✓The 'PO number' should be numeric.
- ✓One of the delivery methods and payment methods should be selected.
- ✓"Terms and conditions" checkbox should be checked.


Colombo West Accessories Ltd
Order Confirmation
Customer Name:
Purchase Order No:
Delivery Method: Ordinary Post Speed Post
Payment Method: Enter payment method
I agree to the terms and conditions
Validate
List Values:
• Enter payment method
• Cash
• Cheque
• Credit Card

- isNaN( )- Checks to see if a value is a number. This function returns true if the value is not a number, and false if not.

- selectedIndex - The selectedIndex property sets or returns the index of the selected option in a dropdown list. The index starts at 0.

```
function validateform()
{
   if(document.form1.cname.value.length==0)
   {    window.alert("Please enter your name");
        return;}
   if(isNaN(document.form1.po.value))
   {alert("Purchase order number should be numeric");
     return;    }
   if ((!document.form1.method[0].checked) &&
   (!document.form1.method[1].checked))
   {    alert("Please enter the delivery method");
        return;}
```

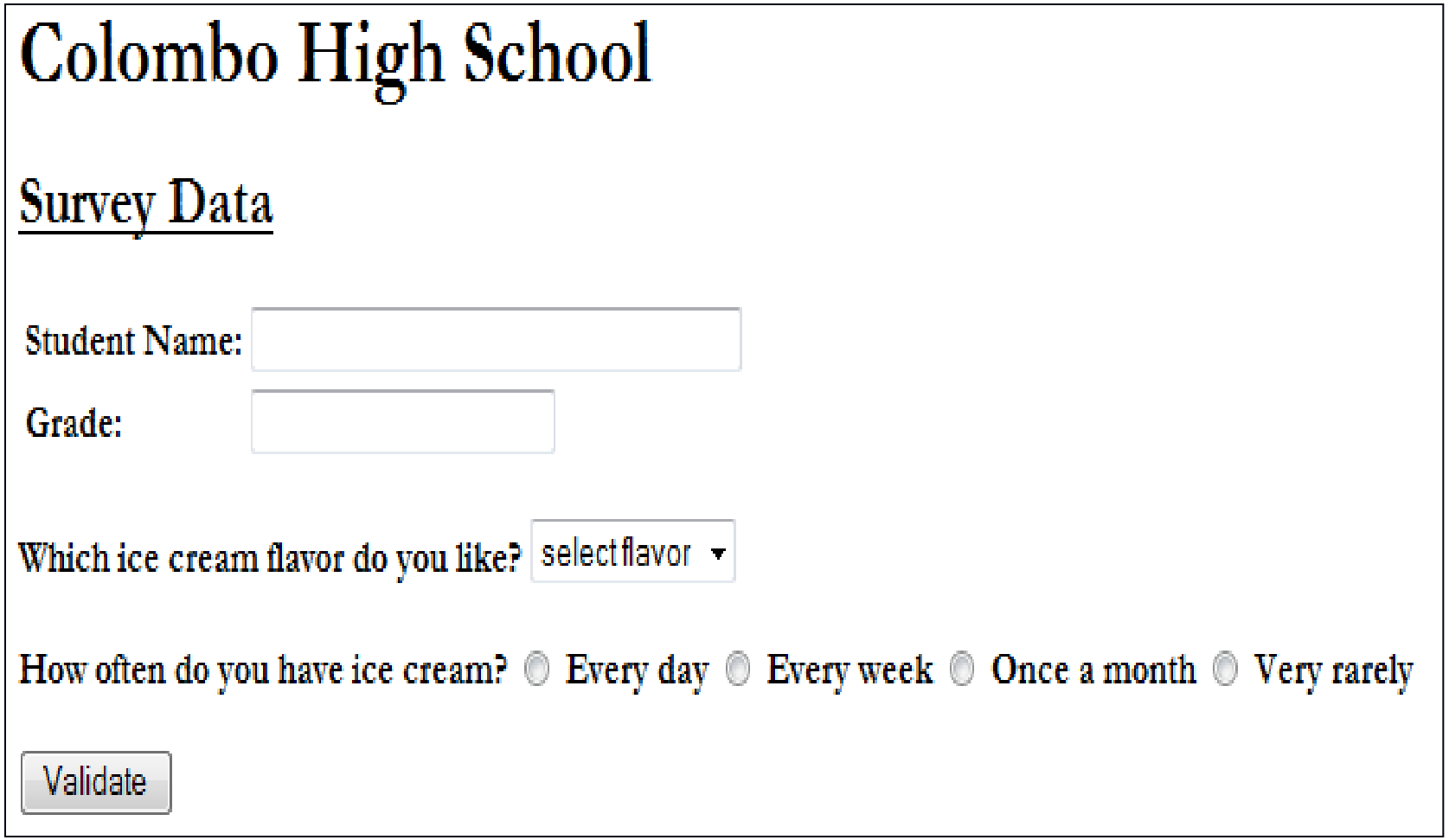
```
    if(document.form1.pay.selectedIndex==0)
    {alert("Please select a payment method");
    return;}
    if(!document.form1.cond.checked)
    {alert("Do you agree to the terms and conditions?");
    return;
    }
    alert("Thank you for your confirmation!");
}
```

Method 2

```
status="no";
for(i=0; i<document.form1.method.length; i++)
{if(document.form1.method[i].checked)
      { status="yes";
      }
}
if(status=="no")
{ alert("Please enter the delivery method");
   return;    }
```

Example 4:

Write a JavaScript to validate the data entered through the form given below:



```
function validateform()
{
    if(document.form1.sname.value.length==0)
    {
        alert("Please enter your name");
        return;
    }
    if(isNaN(document.form1.grade.value))
    {
        alert("Grade should be numeric");
        return; }
```

```
if(document.form1.flavor.selectedIndex==0)
    {     alert("Select your favorite ice cream flavor");
          return; }


    status="no"
    for(i=0;i<document.form1.freq.length;i++)
    {if(document.form1.freq[i].checked)
          {status="yes"; }
    }
    if(status=="no")
    {     alert("How often do you eat ice cream?");
          return; }
    alert("Thank you for participating in the survey!");
}
```

Example 5:

Write a JavaScript to validate the data entered through the form given below:

```
function validateform()
{    if(document.form1.cname.value.length==0)
     {       alert("Please enter your name");
             return;      }
     if(document.form1.address.value.length==0)
     {       alert("Please enter your address");
             return;      }
     if(isNaN(document.form1.tel.value))
     {       alert("telephone number should be numeric");
             return;      }
     if(document.form1.room.selectedIndex==0)
     {       alert("How many rooms do you want?");
             return;      }
     if((!document.form1.rtype[0].checked) && (!document.form1.rtype[1].checked))
     {       alert("Select a type of room");
             return;      }
     if((!document.form1.ex1.checked) && (!document.form1.ex2.checked) &&
     (!document.form1.ex3.checked))
     {       alert("Select any extras you want");
             return;      }
     alert("Thank you for reserving with us!");
}
```

Variable Scope

```
<html><head>
<script>
function sum()
{b=10;
sum=a+b;
return sum;
}
function prod()
{var c=5;
prod=b*c;
return prod;
}
</script></head>
```

Global variable

Local variable

```
<body>
<script>
a=20;
document.write(“Sum is " +sum());
document.write("Product is " +prod());
</script>
</body>
</html>
```

Web Scripting

- Two main scripting languages are in use.
  - JavaScript
  - VBScript

- The disadvantage of using VBScript is that it is only supported by Internet Explorer. Where as JavaScript is supported by several browsers.

Example 3:

Write a JavaScript for the following:

- Enter the price of an item and the quantity purchased through prompt boxes.
- Calculate the total amount (qty*price).
- If the amount is greater than Rs500/= add a 10% tax.
- Display the total amount payable as an alert.

```
<html><body>
<script language="javascript" type="text/javascript">
var x=prompt("Enter the price of an item","");
var y=prompt("Enter the quantity","");
var amount=x * y;
if(amount > 500)
   {var total= amount * 1.1 ;
   alert("The total value payable with tax= Rs " +total);}
else
   {alert("The value payable =  Rs " +amount);}
</script>
</body></html>
```