IBM eServer iSeries

Building Web Sites: Introduction to JavaScript

Mel Anderson
IBM iSeries Technology Center
melander@us.ibm.com

why "i"? it's simple.

Agenda

- Overview of JavaScript
- How does JavaScript work?
- Basic JavaScript syntax
- Examples of JavaScript

What is JavaScript?

- A lightweight programming language that runs in a Web browser (client-side).
- Embedded in HTML files and can manipulate the HTML itself.
- Interpreted, not compiled.
- JavaScript is not Java.
  - Developed by Netscape, not Sun.
  - Only executed in a browser.
  - Is not a full-featured programming language.
  - However, the syntax is similar.

Why use JavaScript?

- To add dynamic function to your HTML.
  - JavaScript does things that HTML can't—like logic.
  - You can change HTML on the fly.
- To shoulder some of the form-processing burden.
  - JavaScript runs in the browser, not on the Web server.
    - Better performance
  - JavaScript can validate the data that users enter into the form, before it is sent to your Web application.

When not to use JavaScript

- When you need to access other resources.
  - Files
  - Programs
  - Databases
- When you are using sensitive or copyrighted data or algorithms.
  - Your JavaScript code is open to the public.

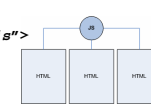
Add JavaScript to HTML

- In the HTML page itself:

```
<html>
<head>
<script language="javascript">
  // JavaScript code
</script>
</head>
```

- As a file, linked from the HTML page:

```
<head>
<script language="javascript" src="script.js">
</script>
</head>
```



Functions

- JavaScript instructions are usually grouped together in a ***function***:

```
<script language="javascript">
function myFunction(parameters) {
  // some logical grouping of code
}
</script>
```

- Like a method, procedure, or subroutine.
- Functions are called by ***events***.

Events

- JavaScript is **event-driven**.
  - Something has to happen before the JavaScript is executed.
- JavaScript defines various events:
  - onClick – link or image is clicked
  - onSubmit – a form is submitted
  - onMouseOver – the mouse cursor moves over it
  - onChange – a form control is changed
  - onLoad – something gets loaded in the browser
  - etc.
- Events are specified in the HTML code.

Event example

```
<html>
  <head>
    <script language="javascript">
    function funct() {
      // code
    }
    </script>
  </head>

  <body>
    <img src="pic.gif" onClick="funct();">
  </body>
</html>
```


Variables

- JavaScript has untyped variables.
- Variables are declared with the **var** keyword:

```
var num = "1";
var name = "Mel";
var phone = "123-456-7890";
```

The DOM

- Unlike other programming languages, JavaScript understands HTML and can directly access it.
- JavaScript uses the HTML Document Object Model to manipulate HTML.
- The DOM is a hierarchy of HTML things.
- Use the DOM to build an “address” to refer to HTML elements in a web page.
- Levels of the DOM are dot-separated in the syntax.

Part of the DOM

- **window** (browser window)
  - **location** (URL)
  - **document** (HTML page)
    - **anchors** <a>
    - **body** <body>
    - **images** <img>
    - **forms** <form>
      - **elements** <input>, <textarea>, <select>
    - **frames** <frame>
    - **tables** <table>
      - **rows** <tr>
        - **cells** <th>, <td>
    - **title** <title>

Referencing the DOM

- Levels of the DOM are dot-separated.
- By keyword and array number (0+)

```
window.document.images[0]
window.document.forms[1].elements[4]
```

- By names (the `name` attribute in HTML)

```
window.document.mygif
   (<img src="file.gif" name="mygif">)
window.document.catform.fname
   (<form name="catform" . . .>
        <input name="fname" . . .>)
```


JavaScript Examples

Alerts

- A JavaScript alert is a little window that contains some message:

```
alert("This is an alert!");
```

- Are generally used for warnings.
- Can get annoying—use sparingly.

Code

```
<html>
<head>
<script language="javascript">
function showAlert(text) {
  alert(text);
}
</script>
</head>
<body onload="showAlert('This alert displays when
 the page is loaded!');">
. . .
OR <body onload="alert('This alert…');">
```

Write to the browser

- JavaScript can dynamically generate a new HTML page. Use `document.writeln("text");`
  - Cannot add to the current page.
- When you're done, use `document.close();`
  - This flushes the buffer, and the generated document is then loaded into the browser.
- If the HTML code you're generating contains quotation marks, you must escape them with a backslash:

```
document.writeln("<a href=\"file.html\">");
```


Code (hyperlink example)

```
function writeHTML() {
  document.writeln("<html><body>");
  document.writeln("<h1>This page was " +
    "dynamically generated</h1>");
  document.writeln("</body></html>");
  document.close();
}
. . .

<a href="javascript:writeHTML();">Generate
 HTML</a>
```

Code (textbox example)

```
<script language="javascript">
function dynamicName() {
  var who = window.document.myform.name.value;
  document.writeln("<html><body>");
  document.writeln("<h1>Hello, " + who + "!</h1>");
  document.writeln("</body></html>");
  document.close();
}
</script>
</head>
<body>
. . .

<form name="myform" onSubmit="dynamicName();">
  Enter your name: <input type="text" name="name">
  <input type="submit" value="Submit">
</form>
```


Page navigation

- Use the `location` API to change the HTML file that is loaded in the window.
- Just set `location` to another value:

```
location = "page.html";
```

Code

```
<script language="javascript">
function goPage() {
 var pg = document.theForm.aPage.value;
 location = "page" + pg + ".html";
}
</script>
. . .
<form name="theForm">
  <select name="aPage" onChange="goPage();">
    <option selected>Choose a page</option>
    <option value="1">Page 1</option>
    <option value="2">Page 2</option>
    <option value="3">Page 3</option>
    <option value="4">Page 4</option></select>
  <input type="reset">
</form>
. . .
```


Image swap

- The image swap is really a sleight-of-hand trick.
- There are two images, each slightly different than the other one.
- Use the `src` API in JavaScript to replace one image with the other.

Code

```
<script language="javascript">
function swap(file) {
  document.globe.src=file;
}
</script>
. . .
<img name="globe" src="globe.jpg"
 onMouseOver="swap('globe2.jpg');"
 onMouseOut="swap('globe.jpg');">
```

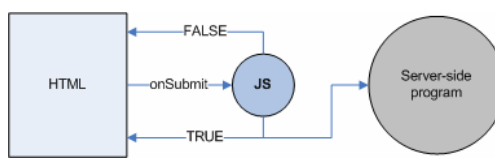

Form validation

- Have JavaScript validate data for the server-side program—more efficient.
  - Processing done on the client.
  - Data sent to server only once.
  - JavaScript can update the original HTML if errors occur—server-side program would have to regenerate the HTML page.
  - Server-side program gets the data in the format it needs.

Form validation

1. Add an **onSubmit** event for the form.
2. Use the `return` keyword to get an answer back from JavaScript about whether the data is valid or not.
   - **return false**: server-side program is not called, and the user must fix the field(s).
   - **return true**: the valid data is sent to the server-side program.

Form validation



All fields: HTML code

```
. . .
<form method="post" name="fields" action="/cgi-bin/pgm"
 onsubmit="javascript: return checkAll();">
       <p>Field 1: <input type="text" name="f1">
      <br>Field 2: <input type="text" name="f2">
      <br>Field 3: <input type="text" name="f3">
      <br>Field 4: <input type="text" name="f4"></p>

      <input type="reset">
      <input type="submit" value="Submit">
</form>
. . .
```


All fields: JavaScript code

```
<script language="javascript">
function checkAll() {
  for (i = 0; i < document.fields.elements.length; i++) {
    var f = document.fields.elements[i];
    if (f.value == "") {
      alert("Please enter a value for Field " + (i + 1));
      f.style.borderColor="#FF0000";
      f.focus();
      return false;
    }
  }
  return true;
}
</script>
```

Phone number: HTML code

```
. . .
<form onsubmit="javascript: return validPhone();"
 action="/cgi-bin/getphone" method="post" name="phone">

<p>Please enter your phone number:
(<input type="text" name="area" size="3" maxlength="3">)
 <input type="text" name="pre" size="3" maxlength="3"> -
 <input type="text" name="last" size="4" maxlength="4">
</p>

<input type="reset">
<input type="submit" value="Submit">

</form>
. . .
```


Phone number: JavaScript code

```
function validPhone() {
var phNum = document.phone.area.value +
 document.phone.pre.value + document.phone.last.value;

  // Check for numbers only
  for (i = 0; i < phNum.length; i++) {
    if (phNum.charAt(i) < "0" || phNum.charAt(i) > "9") {
      alert("Please enter only numbers.");
      return false;
    }
  }
  // Check for 10 digits
  if (phNum.length < 10) {
    alert("Please enter your 10-digit phone number.");
    return false;
  }
  return true;
}
```

Cookies

- JavaScript provides some limited, persistent storage, called ***cookies***:
  - Data is stored in a text file on the client
  - *name=value*
  - Multiple values are delimited by a semicolon
- Use sparingly. There are limits (generally):
  - Up to 300 cookies per browser, 20 cookies per web server, and 4 KB of data per cookie
- Don't depend on cookies—users can block or delete them.

Cookies

- By default, cookies are destroyed when the browser window is closed, unless you explicitly set the `expires` attribute.
  - To persist a cookie, set the `expires` attribute to a future date.
  - To delete a cookie, set the `expires` attribute to a past date.
- By default, cookies can only be read by the web page that wrote them unless you specify one or more of these attributes:
  - `path` – allows more than one page on your site to read a cookie.
  - `domain` – allows multiple servers to read a cookie.

HTML code

```
<body onload="readCookie();">

<form name="cookieForm" onsubmit="javascript: return
 setCookie();" action="/cgi-bin/login" method="post">

User ID: <input type="text" name="username"><br>
Password: <input type="password" name="pwd"><br>

<input type="checkbox" name="persist"> Remember user ID
<br>
<input type="submit" value="Submit">
</form>
...
```


JavaScript code (set the cookie)

```
function setCookie() {
 if (window.document.cookieForm.persist.checked) {
   // Get the date and set it to next year
   var expDate = new Date();
   expDate.setFullYear(expDate.getFullYear() + 1);

   var who = window.document.cookieForm.username.value;
   document.cookie = "username=" + who + ";" +
     "expires=" + expDate.toGMTString();
 } else {
   deleteCookie();
 }
 return true;
}
```

JavaScript code (read the cookie)

```
function readCookie() {
  if (document.cookie) {
    var theCookie = document.cookie;
    var pos = theCookie.indexOf("username=");
    if (pos != -1) {
      var cookie_array = theCookie.split("=");
      var value = cookie_array[1];

      // Load the stored username into the form
      window.document.cookieForm.username.value=value;
      window.document.cookieForm.persist.checked=true;
    }
  }
}
```


JavaScript code (delete the cookie)

```
function deleteCookie() {
  if (document.cookie) {
    // Get a date and set it to last year
    var expDate = new Date();
    expDate.setFullYear(expDate.getFullYear() - 1);

    document.cookie = "username=" + "" + ";" +
      "expires=" + expDate.toGMTString();
  }
}
```

JavaScript Graph Builder

- Can use JavaScript for dynamic content:
  - Put JavaScript code within the <body> tag.

1. Download the supporting code (images and graph.js):
   http://www-adele.imag.fr/~donsez/cours/exemplescourstechnoweb/js_graphimg/
2. Put them in the same directory as your HTML file.
3. Add the code to customize the graph in the body section of your HTML.

Code

```
<script language="javascript" src="graph.js"></script>
</head>

<body>
<script>
var g = new Graph(370, 200);
g.scale = 10000;
g.xLabel = "Month";
g.yLabel = "Number of Rants";
g.title = "Rants 2005";
g.setXScaleValues("Jan", "Feb", "Mar", "Apr", "May", "Jun",
 "Jul", "Aug", "Sep", "Oct", "Nov", "Dec");
g.addRow(90000, 80000, 60000, 20000, 10000, 30000, 28000,
 15000, 18000, 68000, 92000, 75000);
g.build();
</script>
```

Clock

- Another dynamic content example.

Tips for debugging JavaScript

- Difficult because the language is interpreted.
  - No compiler errors/warnings.
  - Browser will try to run the script, errors and all.
- Make each line as granular as possible (use variables).
- Use alerts to get values of variables and see which lines are not getting processed.
- When testing form validation, set the action attribute to a dummy HTML page—not the server-side form. If you get the page, the script works.

Tools for debugging JavaScript

- Use Netscape, Mozilla, or Firefox browsers.
  - Load the page in the browser.
  - Type `javascript:` in the URL window or select **Tools → Web Development → JavaScript Console** to bring up the console.
  - You can also view cookie content from the browser settings.
- Download a JavaScript debugger:
  http://www.mozilla.org/projects/venkman/
- The JavaScript debugger for Internet Explorer is avaliable in MS VisualStudio.

Tutorials

- WebMonkey JavaScript
  - http://webmonkey.wired.com/webmonkey/programming/javascript/
    - JavaScript Tutorial
    - Advanced JavaScript Tutorial
- W3 Schools JavaScript
  - http://www.w3schools.com/js/

Resources

- David Flanagan, JavaScript: The Definitive Guide. O'Reilly, 1998.
- Tom Negrino, Dori Smith. JavaScript for the World Wide Web: Visual QuickStart Guide. Peachpit Press, 2001.
- Mozilla Developer's Center: JavaScript
  http://developer.mozilla.org/en/docs/JavaScript

Steal this JavaScript!

- Webmonkey
  http://webmonkey.wired.com/webmonkey/reference/javascript_code_library/
- TamingTheBeast.net
  http://www.tamingthebeast.net/scripts/freejavascripts.htm
- Search Google for "JavaScript code library"

Any questions?

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