

Class Title: JavaScript 1 Lecture #: 3

Chapter 9 Traditional JavaScript Object Models

Adapted from
JavaScript: The Complete Reference 2nd and 3rd Editions
by
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Two Object Models?

- An object model defines the interface to the various aspects of the browser and document that can be manipulated by JavaScript.
- In JavaScript, two primary object models are employed
 1. a browser object model (BOM)
 - The BOM provides access to the various characteristics of a browser such as the browser window itself, the screen characteristics, the browser history and so on.
 2. document object model (DOM).
 - The DOM on the other hand provides access to the contents of the browser window, namely the document including the various HTML elements ranging from anchors to images as well as any text that may be enclosed by such elements.

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The Ugly Truth

- Unfortunately, the division between the DOM and the BOM at times is somewhat fuzzy and the exact document manipulation capabilities of a particular browser's implementation of JavaScript vary significantly.

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The Big Picture

- Looking at the "big picture" of all various aspects of JavaScript including its object models. We see four primary pieces:
 - The core JavaScript language (e.g. data types, operators, statements, etc.)
 - The core objects primarily related to data types (e.g. Date, String, Math, etc.)
 - The browser objects (e.g. Window, Navigator, Location, etc.)
 - The document objects (e.g. Document, Form, Image, etc.)

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The diagram is divided into two main sections:

- JavaScript Language and Built-in Objects (standardized under ECMA 262):** This section contains two boxes: "Core Language Definition (statements, operators, expressions, etc.)" and "Math". Below these are boxes for "String", "Boolean", "Number", "Date", "Array", "Object", "Function", and "RegExp".
- Browser Object Model (unstandardized):** This section shows a hierarchical structure. A box labeled "window" is connected to a box labeled "Document". From "Document", lines connect to boxes for "frame()", "history", "location", and "navigator". To the right of this structure is a box labeled "Document Object Model: Traditional or DOM Flavor".

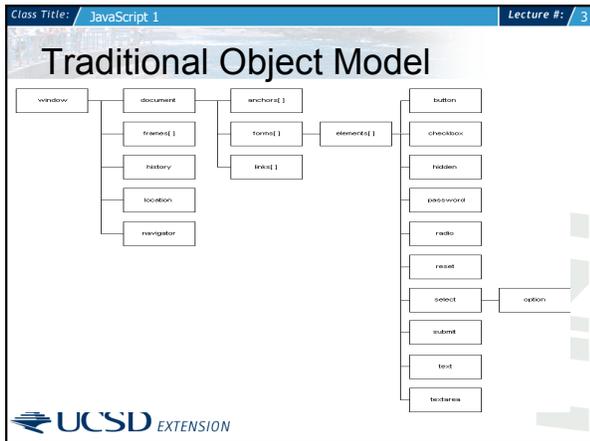
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Four Models

- By studying the history of JavaScript we can bring some order to the chaos of competing object models. There have been four distinct object models used in JavaScript including:
 - Traditional JavaScript Object Model (NS 2 & IE 3)
 - Extended Traditional JavaScript Object Model (NS 3)
 - Dynamic HTML Flavored Object Models
 - a. IE 4
 - b. NS 4
 - Traditional Browser Object Model + Standard DOM (NS6 & Explorer 5)
 - HTML5 model!

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Overview of Core Objects

Object	Description
Window	The object that relates to the current browser window.
Document	An object that contains the various HTML elements and text fragments that make up a document. In the traditional JavaScript object model, the Document object relates roughly the HTML <code><body></code> tag.
Frames[]	An array of the frames in the Window contains any. Each frame in turn references another Window object that may also contain more frames.
History	An object that contains the current window's history list, namely the collection of the various URLs visited by the user recently.
Location	Contains the current location of the document being viewed in the form of a URL and its constituent pieces.
Navigator	An object that describes the basic characteristics of the browser, notably its type and version.

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- ## Document Object
- The **Document** object provides access to page elements such as anchors, form fields, and links as well as page properties such as background and text color.
 - Consider
 - `document.alinkColor`, `document.bgColor`, `document.fgColor`, `document.URL`
 - `document.forms[]`, `document.links[]`, `document.anchors[]`
 - We have also used the methods of the **Document** object quite a bit
 - `document.write()`, `document.writeln()`, `document.open()`, `document.close()`
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Object Access by Document Position

- HTML elements exposed via JavaScript are often placed in arrays or collections. The order of insertion into the array is based upon the position in the document.
- For example, the first **<form>** tag would be in `document.forms[0]`, the second in `document.forms[1]` and so on.
- Within the form we find a collection of `elements[]` with the first **<input>**, **<select>** or other form field in `document.forms[0].elements[0]` and so on.
- As arrays we can use the `length` property to see how many items are in the page.
- The downside of access by position is that if the tag moves the script may break



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Object Access by Name

- When a tag is named via the **name** attribute (HTML 4.0 - **<a>**, ****, embedded objects, form elements, and frames) or by **id** attribute (pretty much every tag) it should be scriptable.
- Given


```
<form id="myform" name="myform">
  <input type="text" name="username"
id="username">
</form>
```

we can access the form at `window.document.myform`
and the first field as `window.document.myform.username`



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Object Access by Associative Array

- The collection of HTML objects are stored associatively in the arrays.
- Given the form named "myform" we might access it using `window.document.forms["myform"]`
- In Internet Explorer we can use the **item()** method like so `window.document.forms.item("myform")`



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Event Models

- JavaScript reacts to user actions through event handlers (code associated with a particular event or object and event in the page)
- Common events include Click, MouseOver, MouseOut, etc.
- Events can be registered through HTML event handlers like onclick or via JavaScript directly
 - `<input type="button" value="press" onclick="alert('hi')">`
 - `document.onload = new Function("alert('hi')");`
- We'll see events primarily with links, form items and mouse movement

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All Together

- Once document objects are accessed either by user event or script event we can then modify the various properties of the elements.
- The following examples on the next slides show reading and writing of form fields as a demonstration of this.

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```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<title>Meet and Greet</title>
<script language="JavaScript" type="text/javascript">
<!--
function sayHello()
{
var theiname=document.myform.username.value;
if (theiname != "")
alert("Hello "+theiname+"!");
else
alert("Don't be shy.");
}
// -->
</script></head><body>
<form name="myform" id="myform">
<p>What's your name?<br>
<input type="text" name="username" id="username" size="20"><br><br>
<input type="button" value="Greet" onclick="sayHello()>
</form>
</body>
</html>

```

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The Cross Browser Nightmare

- The problem we face with JavaScript is that each object model is different
- Somehow we either have to find a common ground (traditional model), use object detection, use browser detection, pick a particular object model like IE and stick with it or just hope the standards work out
- We'll see with the rise of the Document Object Model (DOM) that someday maybe only certain BOM features will be non-standard and all browsers will have the same ability to manipulate page content.

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Modern Access Solutions

- `document.getElementById()`
 - id is not a name replacement completely, think form fields (name-value pairs)
- `document.getElementsByClassName()`
- `document.querySelectorAll()`
- `$()` this is a wrapper function folks!
- Modern doesn't always equal better as we'll see...things are still a mess at times

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Summary

- This chapter introduces how to access browser and document objects in the traditional manner
 - By name and by document location
- All the various object models were presented from NS 2 to modern day browsers
- The problem of cross browser compatibility starts to become apparent when you compare the models

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