Session 16

JavaScript
Part 1

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Reading

Reading
- Wikipedia
  en.wikipedia.org/wiki/Javascript
- W3C
  www.w3.org/TR/REC-html40/interact/scripts.html
- Web Developers Notes
  www.webdevelopersnotes.com/tutorials/javascript/

API
  krook.org/jsdom/

Video (a great tutorial video)
  http://video.yahoo.com/watch/630959/2974197

JQuery
  http://www.ibm.com/developerworks/xml/tutorials/x-
  processxmljquerytut/index.html

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Reference

- Reference
  - ECMAScript
    www.ecma-international.org/publications/files/ECMA-ST/Ecma-262.pdf
  - Mozilla Guide
    developer.mozilla.org/en/docs/Core_JavaScript_1.5_Guide
- IBM Developer Site
  www-128.ibm.com/developerworks/ajax?S_TACT=105AGX63&S_CMP=DWAJAX&DEVCOM=050270000005955
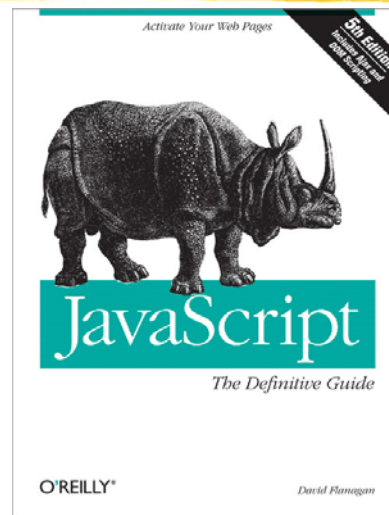
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Reference Book

- JavaScript: The Definitive Guide by David Flanagan, O'Reilly Press, 5th Edition (available through Safari Books On-Line and Google Books)

  the only complete JavaScript book I have seen that is written from a CS perspective

Activate Your Web Pages

JavaScript
The Definitive Guide

O'REILLY®   *David Flanagan*

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Background Reading

- **Available through CS Library using Safari Books On-line**
  - Learning JavaScript by Shelley Powers, O'Reilly Press
  - XML In a Nutshell, Chapter 19 (DOM)

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Learning Goals

- **Understand syntactic and semantic structure of JavaScript**
- **Understand use of events**

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What is JavaScript?

- JavaScript is a scripting language (a scripting language is a lightweight programming language) to use within a browser

- A JavaScript is usually embedded directly into HTML pages

- JavaScript is an interpreted language (means that scripts execute without preliminary compilation)

- The name often actually refers to ECMAScript

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Why Should You Learn JavaScript

- Useful for
  - Client side form processing (e.g., field validation)
  - More dynamic graphic UI
    www.scriptforest.com/javascript_cascading_menu.html
  - Dynamic update of html pages – AJax

  Warning: "achieving functionality through scripting is difficult for the author and restricts the type of user agent you can use to view the document " (W3C)

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Ajax

- JavaScript essential to the use of Ajax
- Ajax provides a new Web interaction style
- Examples:

  maps.google.com/maps

  nyc.bestparking.com/

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Important Concepts

- Low-level syntax of JavaScript is similar to Java, but the object model is very different
- A JavaScript can be set to respond to GUI events
- JavaScript treats functions as first class objects (you can use them in places where you would use other objects)
- JavaScript is a weakly typed language
- Browsers provide access to the document tree with JavaScript using the Document Object Model (DOM)
- JavaScript code can request data from the server – for update of the document tree (and browser update of the page)
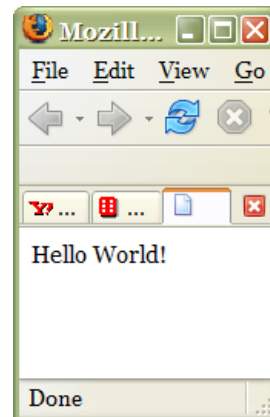- The Browser Object Model (BOM) forms a hierarchy of objects

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Hello JS

Script tag is used to insert JavaScript into a page

```
<html>
<body>
<h2>
<script type="text/javascript">
 document.write("Hello World!");
</script>
</h2>
</body>
</html>
```

Semicolon is optional (but mandatory for multiple statements on a line)

Code within a script element is executed immediately when the page is loaded (if it is not in a function)

Mozill...
File Edit View Go

Y?...   ...

Hello World!

Done

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JavaScript Development

▐ **Major browsers have JavaScript debuggers available**

  ▐ Firefox – Firebug (plugin)

  ▐ IE (Visual Studio)

▐ **Implementations of JavaScript vary, so it is helpful to test in all major browsers**

▐ **NetBeans has good syntax analysis features**

Be careful in debugging – sometimes a JavaScript function will just return if it encounters an error

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JavaScript Object Notation

Object name   Method invocation   String literal

```
document.write("Hello World!");
```

- Syntax similar to Java
- But what is the document object?

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Window as Global Execution Context

- The document object represents the html document
- The window object represents the browser window that displays the document
- The window object is the global object (think of it as the default object)
- The document object is a property of the window object

```
window.document.write(…)    ⟷    document.write(…)
```
     Is similar to
```
this.getServletContext(…)    ⟷    getServletContext(…)
```

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Script Tag – Type Attribute

▌ Possible values
- ▌ text/javascript
- ▌ text/ecmascript – A standard version of Javascript
- ▌ text/jscript – Microsoft's version of Javascript
- ▌ text/vbscript – Runs only in IE
- ▌ text/vbs
- ▌ text/xml

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JavaScript Functions

▌ Scripts that appear in the head element of the document are loaded first

▌ A function defined in the head element will be loaded before anyone uses it

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JavaScript Variables

- Syntax

  ```
  var strname = "x"
  ```
  or
  ```
  strname = "x"
  ```

- Variables declared within a function are local to the function

- Variables declared outside a function are properties of the window object (visible everywhere in the page)

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Operations

- Arithmetic
- Assignment
- Comparison
- Logical
- String
- Conditional

Syntax is very similar
to Java
(both are based on C)

All Java keywords
are reserved in
JavaScript

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Popup Boxes

� Alert box – user has to click OK to proceed

▪ Confirm box – user has to either click OK or cancel to proceed

▪ Prompt box – user enters a value, then clicks either OK or Cancel to proceed

Methods of the
Window object

```
alert("Email must be filled out");
confirm("sometext");
prompt("sometext", "defaultvalue");
```

Popup boxes are useful
mainly for debugging

[JavaScript Application]
⚠ Email must be filled out!

OK

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Conditional Statements

▪ If, else, switch
statements

End of statement semicolons can be
omitted if each statement is on a
separate line

```
<script type="text/javascript">
//If the time is less than 10,
//you will get a "Good morning" greeting.
//Otherwise you will get a "Good day" greeting.
var d = new Date()
var time = d.getHours()
if (time < 10) {
        document.write("Good morning!") }
else { document.write("Good day!")
}
</script>
```

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External JavaScripts

- Similar to style sheets
  - Script can either be embedded or referenced in an external file

```
<html>
<head>
<script src="xxx.js" />
</head>
<body>
</body>
</html>
```
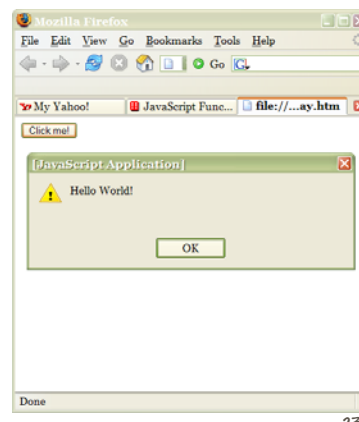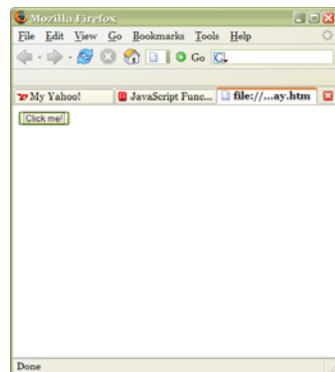
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Functions

- To keep the browser from executing a script as soon as the page is loaded, write your script as a function.
- A function contains some code that will be executed only by an event or by a call to that function.
- You may call a function from anywhere within the page
- Functions are defined at the beginning of a page, in the <head> section (so that they are available when your page begins to load)

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Function Example

```
<html> <head>
<script type="text/javascript"> function displaymessage() {
    alert("Hello World!") } </script> </head>
<body> <form>
<input type="button" value="Click me!" onclick="displaymessage()" >

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

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Events

▌ Events are actions that can be detected by JavaScript

▌ Elements on a Web page have events that can be used to execute JavaScript functions

▌ Examples

   ▌ Mouse click

   ▌ Image load

   ▌ Mouse over

   ▌ Form submittal

```
<input type="button"
   value="Click me!"
   onclick="displaymessage()"
>
```

Notice that these event attributes are not camel case

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Typical Event Handlers

- onclick – when the pointing device button is clicked over an element
- onmouseover – when the pointing device is moved onto an element
- onchange – when a control loses the input focus *and* its value has been modified since gaining focus
- onblur – when an element loses focus either by the pointing device or by tabbing navigation
- onfocus – when an element receives focus either by the pointing device or by tabbing navigation
- onsubmit –when the submit button of a form element is clicked

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Are We on Track

- Write an xhtml page that contains a form with a text box and a submit button

- When the text box loses focus (after you enter text and hit tab) display an alert box with the text "CSE336"

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Were We on Track?

```
…
<script language="javascript">
function f() { alert("text entered"); }
</script>
</head>

<body>
<h1>Track - JavaScript Example</h1>
<form
   action="http://localhost:8080/CodeCSE336/JSPs/FormTester
   3.jsp" method="post" >
<input type="text" name="JS-Input" value="Enter text"
   onblur="f();" />
<br /><input type="submit" />
</form></body></html>
```

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Guidelines

▌ White space is ignored

▌ Case sensitive

▌ Comments (// …)

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Objects

- Object properties are accessed with the dot (.) operator

  Object encapsulation practice is not like Java

- Object methods invoked with the dot (.) operator and a parameter list (())

- Built-in objects

  Objects are really maps, where the map value can be a function

  - String
  - Date
  - Array
  - Boolean

```
var myDate=new Date()
myDate.setFullYear(2010,0,14)

            var mycars=new Array()
            mycars[0]="Saab"
            mycars[1]="Volvo"
            mycars[2]="BMW"
```

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Have You Satisfied the Lecture Objectives?

- Understand syntactic and semantic structure of JavaScript

- Understand use of events

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