UNOBTRUSIVE JAVASCRIPT

Keeping JavaScript out of HTML

Announcements

- Demo Tuesday, March 25
  - Design
    - Sketch of pages to be implemented
    - Notes on what the pages do
  - Backlog
    - 5 * number of team member stories
    - E.g.
      - Four member team needs 20 stories
      - Five member team needs 25 stories
      - Six member team needs 30 stories

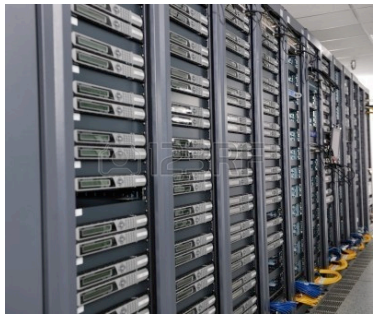
Announcements

- I left out Databases
  - Will introduce them today
  - Slides added to subsequent lessons

Why Unobtrusive JavaScript

- To keep files of different languages separate
- HTML: Describes the content to be presented
- CSS: Describes the content format
- PHP: Describes how to create a web page
- JavaScript: Describes response to user input
- SQL: Describe elements of the data

Web Languages



- Local hardware
  - HTML
  - CSS
- Responsiveness
  - JavaScript
- Data
  - PHP
  - SQL

HTTP Origin (1990's)

1. Designed to share scientific papers (Memex)
   - Request a paper and it is returned.
2. Extended to support multimedia (Mime)
   - Request any media and it is returned.
3. Extended to support interactivity (CGI, JavaScript)
   - Add more details to your request.

Client-Server Programming (1990s)

- Client is a program that requests information from the server and displays it to the user
- Server provides the information when requested.
- Both the client and the server were large programs
  - The client needed to deal with all of the problems of displaying information and sending information back to the server.
  - The server needed to store all of the information and provide the business logic

HTTP Today

- A full featured client-server system with a division of concerns
  - Browser (client) knows the local hardware.
    - HTML describes the content
    - CSS provide information of formatting intent
    - JavaScript provides interactivity within the content
  - Web Server provides the content when requested
    - PHP prepares the content from Data on the Server
    - Captures the business logic of the site.

Keeping the languages separate

- Important for clarity of expression: you are expressing different things with the different languages.
- HTML, CSS and JavaScript live in different files
  - HTML must provides classes and IDs for elements that are manipulated by CSS.
  - HTML must provide IDs for element that have events for JavaScript.
- PHP is difficult to separate out
  - Use functions to name activities

Keeping the languages separate 2

- PHP is difficult to separate out
  - Use functions to name activities
  - Use include to break up files
  - Keep HTML restricted to certain files

Database Basics

- **13.1: Database Basics**
- 13.2: SQL
- 13.3: Multi-table Queries
- 13.4: Databases and PHP

Relational Databases

- relational database: A method of structuring data as tables associated to each other by shared attributes.
- a table row is a unit of data called a record; a column is an attribute of that record
- A Database Management System (DBMS) is a program that manages databases.
- DBMS's often use Structured Query Language (SQL) to define, manage, and search relational data

Why use a database

- Powerful: search, filter, combine data
- fast: search, filter faster than from a file
- big: scale well up to very large data sizes
- safe: mechanisms for failure recovery (e.g. transactions)
- multi-user: many users view/edit data at same time
- layer of abstraction between data and app(s)
  - many database programs understand the same SQL commands

Standup

Discuss questions with your Scrum Team

Quiz

1. What information does the window object contain?
2. Why do you need to attach event handlers to events using the window.onload event?
3. What is an anonymous function?
4. What does the keyword “this” refer to?

And the answer is …

Quiz Answers

1. What information does the window object contain?
    1. The default information about windows such as the height, width …
2. Why do you need to attach event handlers to events using the window.onload event?
    1. So that the window will load before the handlers are attached to the events. Otherwise, the events may not be there.
3. What is an anonymous function?
    1. A function without a name e.g. function () { }
4. What does the keyword “this” refer to?
    1. The current object.

Unobtrusive JavaScript

Chapter 9.1

The six global DOM objects

name	description
document	current HTML page and its content
history	list of pages the user has visited
location	URL of the current HTML page
navigator	info about the web browser you are using
screen	info about the screen area occupied by the browser
window	the browser window

The window object

- *the entire browser window; the top-level object in DOM hierarchy*
- technically, all global code and variables become part of the window object properties:
  - document, history, location, name
- methods:
  - alert, confirm, prompt (popup boxes)
  - `setInterval, setTimeout clearInterval, clearTimeout` (timers)
  - `open, close` (popping up new browser windows)
  - `blur, focus, moveBy, moveTo, print, resizeBy, resizeTo, scrollBy, scrollTo`

The document object

- *the current web page and the elements inside it*
- properties:
  - `anchors, body, cookie, domain, forms, images, links, referrer, title, URL`
- methods:
  - `getElementById`
  - `getElementsByName`
  - `getElementsByTagName`
  - `close, open, write, writeln`

The location object

- *the URL of the current web page*
- properties:
  - `host, hostname, href, pathname, port, protocol, search`
- methods:
  - `assign, reload, replace`

The navigator object

- *information about the web browser application*
- properties:
  - `appName, appVersion, browserLanguage, cookieEnabled, platform, userAgent`
- Some web programmers examine the navigator object to see what browser is being used, and write browser-specific scripts and hacks:

```
if (navigator.appName === "Microsoft Internet Explorer")
{ ...
```
JS

The screen object

- *information about the client's display screen*
- properties:
  - `availHeight, availWidth, colorDepth, height, pixelDepth, width`

The history object

- the list of sites the browser has visited in this window
- properties:
  - `length`
- methods:
  - `back, forward, go`
- sometimes the browser won't let scripts view `history` properties, for security

Unobtrusive JavaScript

- JavaScript event code seen previously was *obtrusive*, in the HTML; this is bad style
- now we'll see how to write unobtrusive JavaScript code
  - HTML with minimal JavaScript inside
  - uses the DOM to attach and execute all JavaScript functions

Unobtrusive JavaScript

- allows separation of web site into 3 major categories:
  - content (HTML) - what is it?
  - presentation (CSS) - how does it look?
  - behavior (JavaScript) - how does it respond to user interaction?

Obtrusive event handlers (bad)


```
<button id="ok" onclick="okayClick();">OK</button>
```

HTML

```
// called when OK button is clicked
function okayClick() {
        alert("booyah");
}
```

JS

- this is bad style (HTML is cluttered with JS code)
- goal: remove all JavaScript code from the HTML body

Attaching an event handler in JavaScript code


```
// where element is a DOM element object
element.event = function;
```
JS

```
$("ok").onclick = okayClick;
```
JS

- it is legal to attach event handlers to elements' DOM objects in your JavaScript code
  - notice that you do not put parentheses after the function's name
- this is better style than attaching them in the HTML
- Where should we put the above code?

When does my code run?


```
<head>
<script src="myfile.js" type="text/javascript"></script>
</head>
<body> ... </body>
```
HTML

```
// global code
var x = 3;
function f(n) { return n + 1; }
function g(n) { return n - 1; }
x = f(x);
```
JS

- your file's JS code runs the moment the browser loads the script tag
  - any variables are declared immediately
  - any functions are declared but not called, unless your global code explicitly calls them

When does my code run?


```
<head>
<script src="myfile.js" type="text/javascript"></script>
</head>
<body> ... </body>
```
HTML

```
// global code
var x = 3;
function f(n) { return n + 1; }
function g(n) { return n - 1; }
x = f(x);
```
JS

- at this point in time, the browser has not yet read your page's body
  - none of the DOM objects for tags on the page have been created

A failed attempt at being unobtrusive


```
<head>
<script src="myfile.js" type="text/javascript"></script>
</head>
<body>
<div><button id="ok">OK</button></div>
```
HTML

```
// global code
$("ok").onclick = okayClick; // error: $("ok") is null
```
JS

- problem: global JS code runs the moment the script is loaded
- script in head is processed before page's body has loaded
  - no elements are available yet or can be accessed yet via the DOM

The `window.onload` event


```
// this will run once the page has finished loading
function functionName() {
	element.event = functionName;
	element.event = functionName;
...
}
window.onload = functionName; // global code
```

JS

- we want to attach our event handlers right after the page is done loading
  - there is a global event called `window.onload` event that occurs at that moment
- in `window.onload` handler we attach all the other handlers to run when events occur

An unobtrusive event handler


```
<!-- look Ma, no JavaScript! -->
<button id="ok">OK</button>
```

HTML

```
// called when page loads; sets up event handlers
function pageLoad() {
	$("ok").onclick = okayClick;
}
function okayClick() {
	alert("booyah");
}
window.onload = pageLoad; // global code
```

JS

Common unobtrusive JS errors


```
window.onload = pageLoad();
window.onload = pageLoad;
okButton.onclick = okayClick();
okButton.onclick = okayClick;
```

JS

- event names are all lowercase, not capitalized like most variables

```
window.onLoad = pageLoad;
window.onload = pageLoad;
```

JS

Anonymous functions


```
function(parameters) {
        statements;
}
```
JS

- JavaScript allows you to declare anonymous functions
- quickly creates a function without giving it a name
- can be stored as a variable, attached as an event handler, etc.

Anonymous function example


```
window.onload = function() {
	var okButton = document.getElementById("ok");
	okButton.onclick = okayClick;
};
function okayClick() {
	alert("booyah");
}
```

JS

The keyword `this`


```
this.fieldName // access field
this.fieldName = value; // modify field
this.methodName(parameters); // call method
```

JS

- all JavaScript code actually runs inside of an object
- by default, code runs inside the global window object
  - all global variables and functions you declare become part of window
- the this keyword refers to the current object

The keyword `this`


```
function pageLoad() {
	$("ok").onclick = okayClick; // bound to okButton
here
}
function okayClick() { // okayClick knows what DOM object
	this.innerHTML = "booyah"; // it was called on
}
window.onload = pageLoad;
```

JS

- event handlers attached unobtrusively are **bound** to the element
- inside the handler, that element becomes this (rather than the window)

Fixing redundant code with `this`


```
<fieldset>
	<label><input type="radio" name="ducks"
value="Huey" /> Huey</label>
	<label><input type="radio" name="ducks"
value="Dewey" /> Dewey</label>
	<label><input type="radio" name="ducks"
value="Louie" /> Louie</label>
</fieldset>
```

HTML

```
function processDucks() {
	if ($("huey").checked) {
		alert("Huey is checked!");
	} else if ($("dewey").checked) {
		alert("Dewey is checked!");
	} else {
		alert("Louie is checked!");
	}
	alert(this.value + " is checked!");
}
```

JS

Example: Tip Calculator


```
<h1>Tip Calculator</h1>
<div>
        $<input id="subtotal" type="text" size= "5" /> subtotal
<br />
        <button id="tenpercent">10%</button>
        <button id="fifteenpercent"> 15%</button>
        <button id="eighteenpercent"> 18%</button>

        <span id="total"></span>
</div>
```

HTML

```
window.onload = function() {
        $("tenpercent").onclick = computeTip;
        }
function computeTip{
        var subtotal = parseFloat($("subtotal").value);
        var tipAmount = subtotal*0.1;//Add this code
        $("total").innerHTML = "Tip: $" + tipAmount;
}
```

JS