Real World Ajax
Learning the magic behind Google, Yahoo!, and other Ajax-driven websites

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Introduction

- My name is Scott Davis
  - JBoss At Work (O’Reilly)
  - Google Maps API (Pragmatic Bookshelf)
  - Pragmatic GIS (Pragmatic Bookshelf)
The release of Google Maps (Feb 7, 2005) was a “Wizard of Oz / Technicolor” moment

➢ Not just for web mapping, but for web development in general
➢ It put Ajax on the map (no pun intended)
   • Jesse James Garrett’s seminal article coining the phrase (and mentioning GM) was published on Feb 18, 2005

What made it special was that it didn’t require a proprietary plug-in
➢ It used standard technologies (JavaScript, CSS) in new and interesting ways
Welcome to Web 2.0

- Ajax
- Web Services

In this talk, we’ll look at “next generation” website features and show you how to incorporate them into your own website.
Examples

- Google Maps
  - “Slippy Maps”
- Yahoo! Mail
  - Tabbed interfaces
- Apple
  - Live subtotals
Ajaxian Techniques

- It all boils down to:
  - CSS
  - Divs
  - Events
CSS

- Cascading Style Sheets

- More than just pretty colors and fonts
  - CSS Positioning is key to many ajaxian features
No Style

BLUEROBOT.COM

Left Menu

This is a simple two column layout with a left menu box. By modifying the stylesheet, this layout can serve as the basis for many standard two column layouts. As is the case with most layouts in the Reservoir, the order of elements (header, content, menu) in the HTML source is friendly and accessible to mobile computers, text-based browsers, and alternative/accessible devices.

Much effort has been made to ensure that the layouts in the BlueRobot Layout Reservoir appear as intended in CSS2 compliant browsers. The content should be viewable, though unstyled, in other web browsers. If you encounter a problem that is not listed as a known issue, I am most likely not aware of it. Please email me a heads-up. Your help will benefit the other five or six people who visit this site.

< Return to the Layout Reservoir :: View the CSS

A List Apart
Greasy Skillet
Roy Rosenzweig
SwankyAI
Fake Link One
Nothing Here
Links Nowhere
Fake Link Four
Fifth Fake Link

Done
Style #1

9  <head>
10  <title>Two Columns - Left Menu</title>
11  <link rel="stylesheet" type="text/css" href="layout1.css">
12  </head>

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< Return to the Layout Reservoir :: View the CSS
Style #2

9 <head>
10 <title>Two Columns - Left Menu</title>
11 <link rel="stylesheet" type="text/css" href="layout2.css">
12 </head>

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Left Menu

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< Return to the Layout Reservoir :: View the CSS
cssZenGarden.com

- For more examples of the power of CSS, see:
Divs

- Divs are semantically-named *divisions* of HTML

```html
14 <body>
15
16 <div id="Header">
17     <a href="http://bluerobot.com/" title="BlueRobot Home">BLUEROBOT.COM</a>
18 </div>
19
20 <div id="Content">
21     <h1>Left Menu</h1>
22     <p>This is a simple two column layout with a left menu box. By modifying the stylesheet, this layout can serve as the basis for many standard two column layouts. As is the
```
- CSS can be used to style regular old HTML tags...

```css
body {
  margin:0px;
  padding:0px;
  font-family:verdana, arial, helvetica, sans-serif;
  color:#333;
  background-color:white;
}
```
... or it can be used to style Divs

```plaintext
66  #Menu  {
67   position:absolute;
68   top:100px;
69   left:20px;
70   width:172px;
71   padding:10px;
72   background-color:#eee;
73   border:1px dashed #999;
```
Events

- The key to an interactive web site is tapping into the JavaScript event model

<table>
<thead>
<tr>
<th>Attribute</th>
<th>The event occurs when...</th>
</tr>
</thead>
<tbody>
<tr>
<td>onabort</td>
<td>Loading of an image is interrupted</td>
</tr>
<tr>
<td>onblur</td>
<td>An element loses focus</td>
</tr>
<tr>
<td>onchange</td>
<td>The content of a field changes</td>
</tr>
<tr>
<td>onclick</td>
<td>Mouse clicks an object</td>
</tr>
<tr>
<td>ondblclick</td>
<td>Mouse double-clicks an object</td>
</tr>
<tr>
<td>onerror</td>
<td>An error occurs when loading a document or an image</td>
</tr>
<tr>
<td>onfocus</td>
<td>An element gets focus</td>
</tr>
<tr>
<td>onkeydown</td>
<td>A keyboard key is pressed</td>
</tr>
<tr>
<td>onkeypress</td>
<td>A keyboard key is pressed or held down</td>
</tr>
<tr>
<td>onkeyup</td>
<td>A keyboard key is released</td>
</tr>
<tr>
<td>onload</td>
<td>A page or an image is finished loading</td>
</tr>
<tr>
<td>onmousedown</td>
<td>A mouse button is pressed</td>
</tr>
<tr>
<td>onmousemove</td>
<td>The mouse is moved</td>
</tr>
<tr>
<td>onmouseout</td>
<td>The mouse is moved off an element</td>
</tr>
<tr>
<td>onmouseover</td>
<td>The mouse is moved over an element</td>
</tr>
<tr>
<td>onmouseup</td>
<td>A mouse button is released</td>
</tr>
<tr>
<td>onreset</td>
<td>The reset button is clicked</td>
</tr>
<tr>
<td>onresize</td>
<td>A window or frame is resized</td>
</tr>
<tr>
<td>onselect</td>
<td>Text is selected</td>
</tr>
<tr>
<td>onsubmit</td>
<td>The submit button is clicked</td>
</tr>
<tr>
<td>onunload</td>
<td>The user exits the page</td>
</tr>
</tbody>
</table>

Courtesy: http://www.w3schools.com/jsref/jsref_events.asp
Ajax Frameworks

- Working with CSS, Divs, and Events is considerably easier when “helper” frameworks come along for the ride:
  - Prototype
    - [http://prototype.conio.net/](http://prototype.conio.net/)
  - Script.aculo.us
    - [http://script.aculo.us/](http://script.aculo.us/)
Google Maps

“Slippy Maps” -- how’d they do that?
Solution:

- Rolling Your Own Google Maps
- [http://www.mapmap.org/ryogm](http://www.mapmap.org/ryogm)
  - ~200 lines of JavaScript
  - 12 step-by-step pages take you from static HTML to a fully functional “slippy map”, including zooming and multiple map types
RYOGM-1

next...

00, 00 01, 00 02, 00 03, 00 04, 00

00, 01 01, 01 02, 01 03, 01 04, 01

00, 02 01, 02 02, 02 03, 02 04, 02
RYOGM-1: Basic HTML

```html
<html>
<head>
<title>RYOGM - 1</title>
<!-- lay out the table -->
<!-- Don't freak out -- we'll dynamically build this in just a moment. -->
</head>
<body>
<h1>RYOGM - 1</h1>
<a href="2.html">next...</a>
<table border="0" cellpadding="0" cellspacing="0">
  <tr>
    <td><img src="images/test/00-00.png"></td>
    <td><img src="images/test/01-00.png"></td>
    <td><img src="images/test/02-00.png"></td>
    <td><img src="images/test/03-00.png"></td>
    <td><img src="images/test/04-00.png"></td>
  </tr>
  <tr>
    <td><img src="images/test/00-01.png"></td>
    <td><img src="images/test/01-01.png"></td>
    <td><img src="images/test/02-01.png"></td>
    <td><img src="images/test/03-01.png"></td>
    <td><img src="images/test/04-01.png"></td>
  </tr>
  <tr>
    <td><img src="images/test/00-02.png"></td>
    <td><img src="images/test/01-02.png"></td>
    <td><img src="images/test/02-02.png"></td>
    <td><img src="images/test/03-02.png"></td>
    <td><img src="images/test/04-02.png"></td>
  </tr>
</table>
</body>
</html>
```
RYOGM-2: Basic CSS

```html
<html>
<head>
  <title>RYOGM - 2</title>
  <!-- create viewableMap and wholeMap -->
  <!-- notice that viewableMap clips the display of wholeMap -->

  <style type="text/css">
    #viewableMap {
      height: 300px;
      width: 500px;
      border: 1px solid black;
      position: relative;
      overflow: hidden;
    }

    #wholeMap {
      position: relative;
      left: 0px;
      top: 0px;
    }

  </style>

  </head>

  <body>
    <h1>RYOGM - 2</h1>
    <a href="3.html">next...</a>

    <div id="viewableMap">
      <div id="wholeMap">
        <table border="0" cellpadding="0" cellspacing="0">
          <tr>
            <td><img src="images/test/00-00.png" /></td>
          </tr>
        </table>
      </div>
    </div>

  </body>
</html>
```
RYOGM - 5

next...
9,207

00 01, 00 02, 00 0
RYOGM-5: Events

```javascript
<!-- global vars -->
var wholeMapTop = 0
var wholeMapLeft = 0

function pageInit() {
    setWholeMapSize('1000px', '600px')
    Event.observe('viewableMap', 'mousedown', startDrag, false)
    Event.observe('viewableMap', 'mousemove', dragging, false)
    Event.observe('viewableMap', 'mouseup', stopDrag, false)
    Event.observe('viewableMap', 'dragstart', function() { return false })
}
```
function dragging(event) {
  if(iAmDragging) {
    var wholeMap = $('wholeMap')
    wholeMap.style.left = wholeMapLeft + (Event.pointerX(event) - dragStartX)
    wholeMap.style.top = wholeMapTop + (Event.pointerY(event) - dragStartY)
    
    var debug = $('debug')
    debug.innerHTML = "dragStartX: " + dragStartX +
    " currentX: " + Event.pointerX(event) +
    " delta: " + (Event.pointerY(event) - dragStartY) +
    " wholeMapTop: " + wholeMapTop
  } else {
    var debug = $('debug')
    debug.innerHTML = Event.pointerX(event) + "," + Event.pointerY(event)
  } Event.stop(event)
}

function stripPx(value) {
  if(value == "") {
    return 0
  } else {
    return parseFloat(value.substring(0, value.length - 2))
  }
}
CSS

- Whole map / viewable map
  - `<div id='viewableMap'>`
  - `#viewableMap { width: '500px'; ... }`
Divs

- **Getting a `<div>` using `$(())`**
  - Without Prototype:
    - `document.getElementById('foo')`
  - With Prototype:
    - `$('foo')`
Events

- Click, drag events
  - Without Prototype:
    - `<div id='wholeMap' onMouseDown='startDrag()'>`
  - With Prototype:
    - `Event.observe('wholeMap', 'mousedown', startDrag)`
Yahoo! Mail

- Tabbed interface – how’d they do that?
• Solution:
  ➢ DynamicDrive’s Ajax Tabs
  ➢ http://www.dynamicdrive.com/dynamicindex17/ajaxtabscontent/
    • Single zip file containing all required code, including a simple example
Tabs, Unstyled

- **Intro**
- **Bird**
- **Dog**
- **Cat**
- **Sea Otter**

This is some default tab content, embedded directly inside this space and not via Ajax. It can be shown when no tabs are automatically selected, or associated with a certain tab, in this case, the first tab.
```html
27 <ul id="maintab" class="shadetabs">
28     <li class="selected">
29         <a href="#default" rel="ajaxcontentarea">Intro</a>
30     </li>
31     <li><a href="external.htm" rel="ajaxcontentarea">Bird</a></li>
32     <li><a href="external2.htm" rel="ajaxcontentarea">Dog</a></li>
33     <li><a href="external3.htm" rel="ajaxcontentarea">Cat</a></li>
34     <li><a href="external4.htm" rel="ajaxcontentarea">Sea Otter</a></li>
35 </ul>
36
37 <div id="ajaxcontentarea" class="contentstyle">
38     <p>This is some default tab content, embedded directly inside this space and not via Ajax. It can be shown when no tabs are automatically selected, or associated with a certain tab, in this case, the first tab.</p>
39 </div>
```
Tabs, Styled

This is some default tab content, embedded directly inside this space and not via Ajax. It can be shown when no tabs are automatically selected, or associated with a certain tab, in this case, the first tab.
This removes the bullet

This makes the list horizontal instead of vertical

```css
.shadetabs{
  padding: 3px 0;
  margin-left: 0;
  margin-top: 1px;
  margin-bottom: 0;
  font: bold 12px Verdana;
  list-style-type: none;
  text-align: left; /*set to left, center, or right to align the menu as desired*/
}

.shadetabs li{
  display: inline;
  margin: 0;
}
```
CSS Links “Rollover”

No JavaScript required to create the “Rollover” effect

(These CSS styling rules are called ‘pseudoclasses’)

```css
.shadetabs li a{
  text-decoration: none;
  padding: 3px 7px;
  margin-right: 3px;
  border: 1px solid #778;
  color: #2d2b2b;
  background: white url(shade.gif) top left repeat-x;
}

.shadetabs li a:visited{
  color: #2d2b2b;
}

.shadetabs li a:hover{
  text-decoration: underline;
  color: #2d2b2b;
}

.shadetabs li.selected{
  position: relative;
  top: 1px;
}
```
JavaScript

```html
28  <ul id="maintab" class="shadetabs">
29    <li class="selected">
30      <a href="#default" rel="ajaxcontentarea">Intro</a>
31    </li>
32    <li><a href="external1.htm" rel="ajaxcontentarea">Bird</a></li>
33    <li><a href="external2.htm" rel="ajaxcontentarea">Dog</a></li>
34    <li><a href="external3.htm" rel="ajaxcontentarea">Cat</a></li>
35    <li><a href="external4.htm" rel="ajaxcontentarea">Sea Otter</a></li>
36  </ul>
38  <div id="ajaxcontentarea" class="contentstyle"/>
42  <script type="text/javascript">
43    startajaxtabs( "maintab" )
44  </script>
```
function startajaxtabs() {
    for(var i = 0; i < arguments.length; i++) { //loop through passed UL ids
        var ulobj = document.getElementById(arguments[i])
        var ulist = ulobj.getElementsByTagName("li") //array containing the LI elements
        for(var x = 0; x < ulist.length; x+++) { //loop through each LI element
            var listlink = ulist[x].getElementsByTagName("a")[0]
            if(listlink.getAttribute("rel")) {
                var modifiedurl = listlink.getAttribute("href").replace(/\^http:\/\/[\^\]/)
                listlink.setAttribute("href", modifiedurl) //replace URL's root domain w
                savedefaultcontent(listlink.getAttribute("rel")) //save default ajax tab
                listlink.onclick = function() {
                    ajaxpage(this.getAttribute("href"), this.getAttribute("rel"), this)
                    loadobjs(this.getAttribute("rev"))
                    return false
                }
                if(ulist[x].className == "selected") {
                    ajaxpage(listlink.getAttribute("href"), listlink.getAttribute("rel"))
                    loadobjs(listlink.getAttribute("rev")) //auto load any accompanying .
                }
            }
        }
    }
}
function ajaxpage(url, containerid, targetobj) {
    var page_request = false
    if (window.XMLHttpRequest) // if Mozilla, Safari etc
        page_request = new XMLHttpRequest();
    else if (window.ActiveXObject) { // if IE
        try {
            page_request = new ActiveXObject("Msxml2.XMLHTTP")
        }
        catch (e) {
            try {
                page_request = new ActiveXObject("Microsoft.XMLHTTP")
            }
            catch (e) {
            }
        }
    } else
        return false
```javascript
page_request.onreadystatechange = function () {
  loadpage(page_request, containerid)
}

/*...*/
page_request.open('GET', url, true)
page_request.send(null)

function loadpage(page_request, containerid) {
  if (page_request.readyState == 4 &&
      (page_request.status == 200 ||
       window.location.href.indexOf("http") == -1))
    document.getElementById(containerid).innerHTML =
    page_request.responseText
```
CSS

- UL, styled
- Links, hover style (no JavaScript needed)
- ID (singleton) vs. Class

Selectors

- .shadetabs li a { ... }

Pseudoclasses

- .shadetabs li a:hover { ... }
Divs

- Placed Ajax content in the div
  
  ```html
  <div id='ajaxContentArea'>
  ```
Events

- OnClick -> ajaxPage()
The Apple Store

“Live Subtotals” – how’d they do that?
Solution: Let’s view/source
Dojo

They’re using the Dojo Ajax library

```html
<script type="text/javascript"
src="http://store.apple.com/rs/js/dojo-0.2.2-ajax/dojo.js"></script>
```
They are building Divs on the fly

```javascript
var Defaults = new Array();

if(hasAJAX) {
    ShowDeltasFromBaseOnly = true;
    FadeInterval = 1000000;
    FadeColors = FadeColorsBlueAlt;

    Defaults["summary-MemoryYellowMid"] = document.createElement("div");
    Defaults["summary-MemoryYellowMid"].innerHTML = "1GB 667 DDR2 - 1 SO-DIMM";
}  
```
### Tabs

```html
<div id="tabs">
  <table width="100%" border="0" cellpadding="0" cellspacing="0"><tr><td
    valign="top" width="49%"
    background="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
  >
      <img border="0" alt="nbbkgd.gif" width="1"
  src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
  /></td>
  </tr><table border="0" width="2%" valign="TOP" align="CENTER">
    <tr><td width="725" cellpadding="0" cellspacing="0"><A href="http://www.apple.com"<img border="0" alt="Apple" width="118"
    src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
    onclick="s_objectID='EC571521';" href="/1-800-MY-APPLE/WebObjects/AppleStore.woa/wo/3.RSLID?nmnsnbstorelink"><img border="0" alt="The Apple Store"
    src="http://a248.e.akamai.net/7/248/204" href="http://www.apple.com/itunes/"><img height="32" border="0" alt="Music" width="9"
    src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
    href="http://www.apple.com/iTunes/index.html"><img height="32" border="0" alt="Mac" width="98"
    src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
    href="http://www.apple.com/QuickTime/"><img height="32" border="0" alt="Quick Time"
    width="98" src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
    href="http://www.apple.com/support/"><img height="32" border="0" alt="Apple Support"
    width="98" src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
    href="http://www.apple.com/macosx/"><img height="32" border="0" alt="Mac OS X"
    width="98" src="http://a248.e.akamai.net/7/248/2041/1106/store.apple.com/value2_4x.png"
  /></td></tr>
</div>
```
**Subtotal**

```
301  <tr>
302      <td align="left"><span class="L11"><b>Subtotal</b></td>
303      <td align="right"><span class="L11" style="font-weight: bold;">&amp;#36;2,499.00</span></td>
305  </tr>
```

```
388  <tr>
389      <td class="personalisation"><div id="productSummaryItems" class="productsSummary"><ul><li id="summary_ProcessorYellowMid">2.16GHz Intel Core Duo</li><li id="summary-MemoryYellowMid">1GB 667 DDR2 - 1 SO-DIMM</li><li id="summary-HardDriveYellowMid">100GB Serial ATA drive @ 5400 rpm</li><li id="summary-DisplayMacBookProYellowMid">MacBook Pro 15-inch Widescreen Display</li><li id="summary-OpticalDriveYellowMid">SuperDrive (DVD&plusmn;RW/CD-RW)</li><li id="summary-AccessoryKitYellowMid">AirPort Extreme Card & Bluetooth</li><li id="summary-KeyboardMacOSYellowMid">Backlit Keyboard/Mac OS - U.S. English</li><li>15.4-inch TFT Display</li></ul></div></td>
```

The Order Form

```html
<FORM name=configForm method=post
    action="http://store.apple.com/1-800-MY-APPLE/">

    <td>
        <table id="MemoryYellowMidTable" class="radiorow" border="0"
            cellspacing="2" cellspacing="0" width="100%">
            <tr id="MemoryYellowMidRow0"
                onmouseover="hoverRow('MemoryYellowMidRadio0', 'MemoryYellowMidRow0');" />
            <tr id="MemoryYellowMidRow0"
                onmouseout="clearRow('MemoryYellowMidRadio0', 'MemoryYellowMidRow0');" />
            <tr id="MemoryYellowMidRow0"
                onclick="selectRadio('MemoryYellowMidTable', 'MemoryYellowMidRadio0', '');">
                <td align="middle">
                    <INPUT id="MemoryYellowMidRadio0" type="radio"
                        onclick="selectRadio('MemoryYellowMidTable', 'MemoryYellowMidRadio0', 'value=0', 'name="MemoryYellowMid"');">
                </td>
            </tr>
        </table>
    </td>

    <td align="middle" width="100%">
        <span class="f10">
            <strong id="MemoryYellowMidRow0Title">
                1GB 667 DDR2 - 2x512 SO-DIMMs [Subtract &amp;#36;100]
            </strong></span>
    </td>

    <script language="JavaScript">
        uncheckRadio('MemoryYellowMidRadio0');
        clearRow('MemoryYellowMidRadio0', 'MemoryYellowMidRow0');
    </script>
</FORM>
```
Summary

- Google Maps
  - “Slippy Maps”
- Yahoo! Mail
  - Tabbed interfaces
- Apple
  - Live subtotals
Ajaxian Techniques

- It all boils down to:
  - CSS
  - Divs
  - Events
Conclusion

- Questions?
- Thanks for your time!

- Email: scottdavis99@yahoo.com
- Code examples: http://www.davisworld.org/presentations