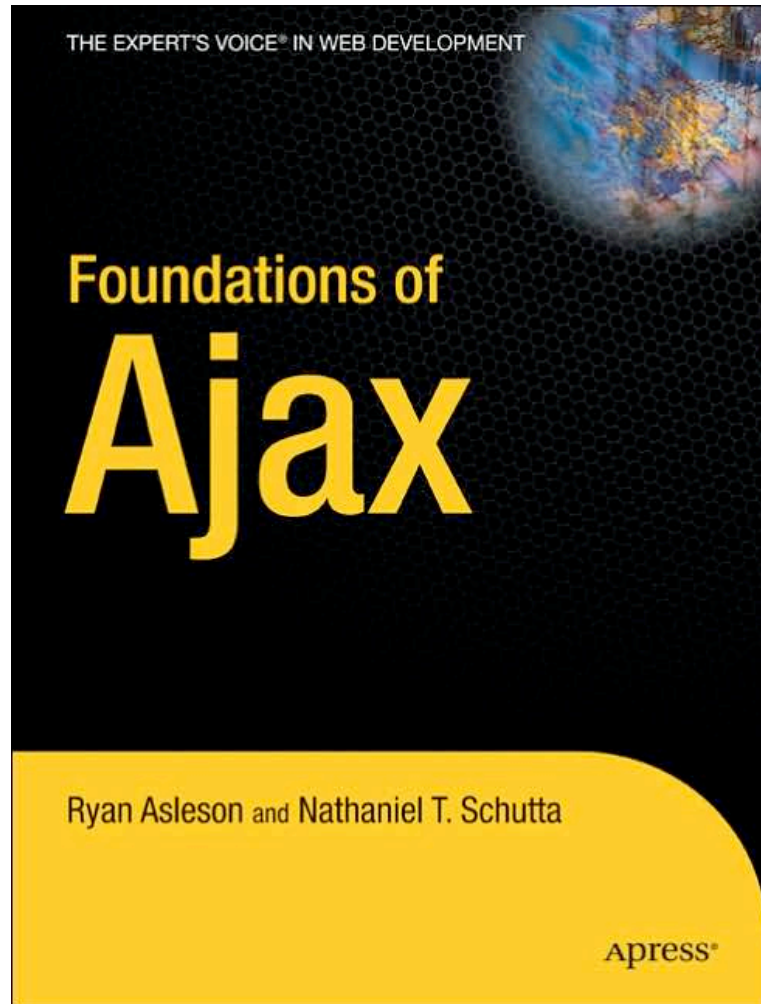


Foundations of Ajax

Ryan Asleson and Nathaniel T. Schutta

Who Are We?



- Ryan Asleson
- Nathaniel T. Schutta
www.ntschutta.com/jat/
- First Ajax book!

The Plan

- Where have we been?
- Where are we now?
- Where are we going?

How'd we get here?

- It's all about the desktop
 - Very rich applications
 - Upgrades a pain (new hardware anyone?)
- The Web takes center stage
 - Simplified maintenance, low barrier of entry
 - Less functional apps, browser issues
- All about trade offs

Sorry, that's not how it works

- We conditioned users with thick apps
- Then we took that all away
- Convinced our users to accept thin apps
- The browser pushed us towards plain vanilla
- Applets, Flash, XUL/XAML/XAMJ
- Fundamental Issue - Web is based on a synchronous request/response paradigm

What is Ajax?



<http://movies.yahoo.com/shop?d=hv&id=1808444810&cf=pg&photoid=521827&intl=us>



A cleaner? A Greek hero?
A soccer club?



<http://www.v-bal.nl/logos/ajax.jpg>

<http://www.cleansweepsupply.com/pages/skugroup1068.html>

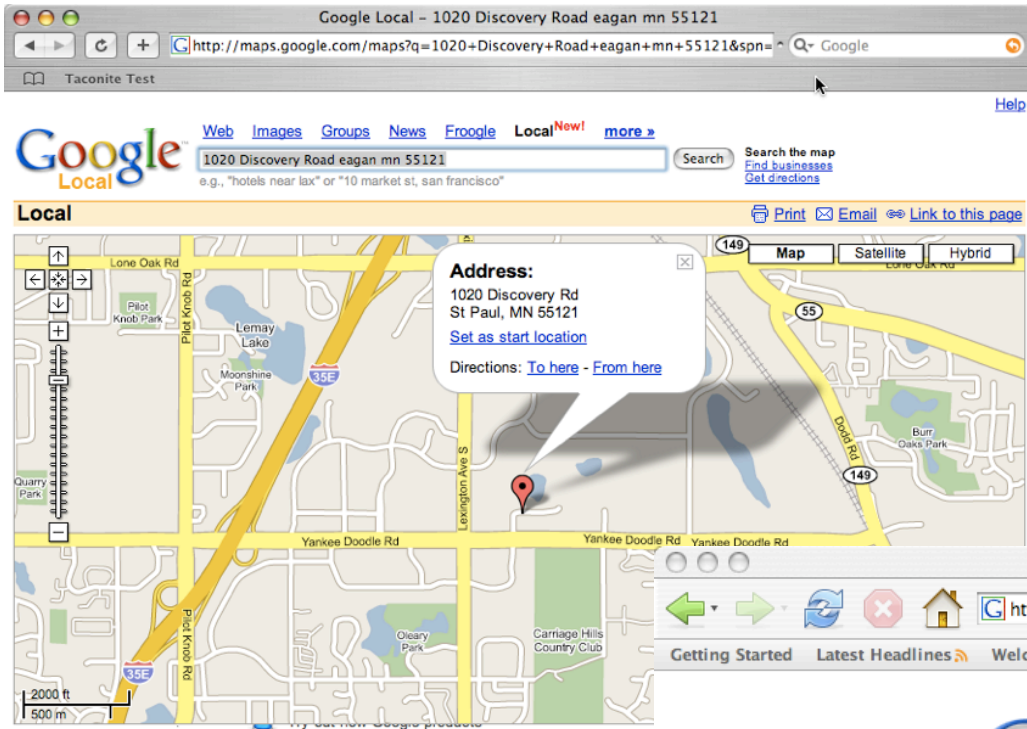
Give me an 'A'

- Ajax is a catch-phrase - several technologies
- Asynchronous, JavaScript, XML, XHTML, CSS, DOM, **XMLHttpRequest** object
- More of a technique than a specific “thing”
- Communicate with XHR, manipulate the Document Object Model on the browser
- Don't repaint the entire page!
- We gain flexibility

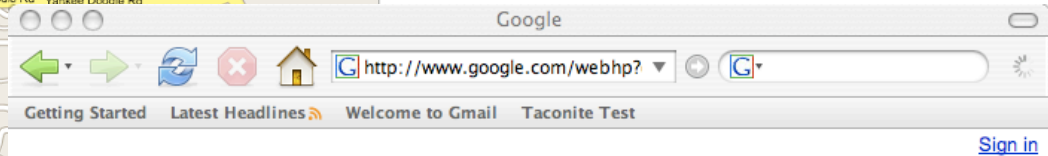
<http://www.adaptivepath.com/publications/essays/archives/000385.php>

What's old is new again

- XHR was created by Microsoft in IE5
- Of course it only worked in IE
- Early use of JavaScript resulted in pain
- Many developers shunned the language
- XHR was recently adopted by Mozilla 1.0 and Safari 1.2
- And a new generation of web apps was born



Google Suggest



Google Maps



Web [Images](#) [Groups](#) [News](#) [Froogle](#) [Local](#) [more »](#)

As you type

xmlhttprequest		Advanced Search
xmlhttprequest	84,400 results	Preferences
xmlhttp	95,400 results	Language Tools
xmlhttp javascript	30,800 results	
xmlhttp post	35,300 results	Learn more
xmlhttp.open	5,460 results	
xmlhttp object	28,300 results	
xmlhttprequest post	25,700 results	
xmlhttprequest javascript	40,300 results	
xmlhttprequest example	15,700 results	
xmlhttprequest tutorial	20,300 results	

Done

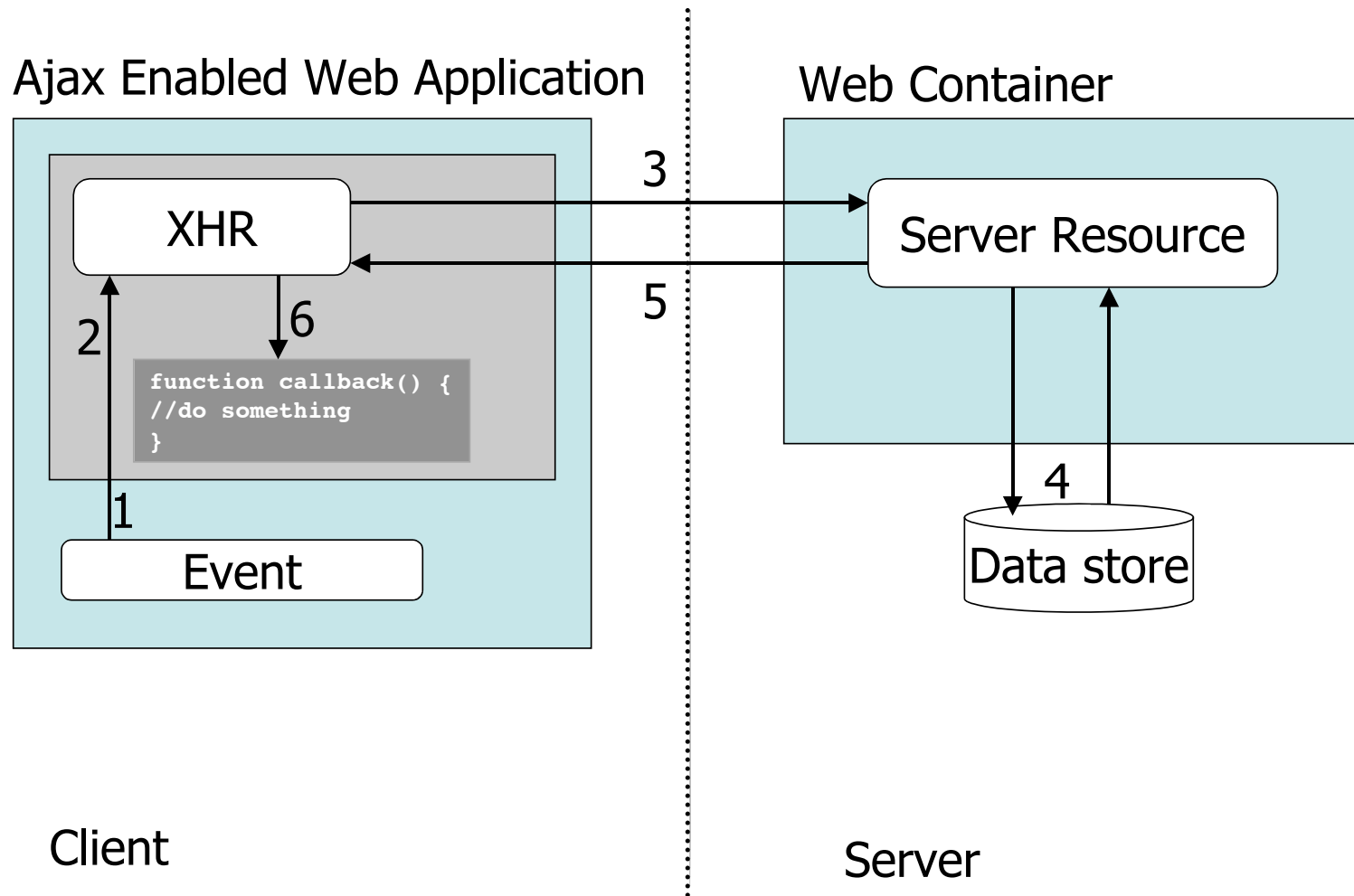
XHR Methods

Method	Description
<code>open("method", "url" [, async [, "username" [, "password"]]])</code>	Sets the stage for the call - note async flag.
<code>send(content)</code>	Sends the request to the server.
<code>abort()</code>	Stops the request.
<code>getAllResponseHeaders()</code>	Returns all the response headers for the HTTP request as key/value pairs.
<code>getResponseHeader("header")</code>	Returns the string value of the specified header.
<code>setRequestHeader("header", "value")</code>	Sets the specified header to the supplied value.

XHR Properties

Property	Description
<code>onreadystatechange</code>	The event handler that fires at every state change.
<code>readyState</code>	The state of the request: 0 = uninitialized, 1 = loading, 2 = loaded, 3 = interactive, 4 = complete
<code>responseText</code>	The response from the server as a string.
<code>responseXML</code>	The response from the server as XML.
<code>status</code>	The HTTP status code from the server.
<code>statusText</code>	The text version of the HTTP status code.

Typical Interaction



How's this work?

- Start a request in the background
- Callback invokes a JavaScript function - yes prepare yourself for JavaScript
- Can return: a) XML - responseXML, b) HTML - innerHTML c) JavaScript - eval
- Typically results in modifying the DOM
- We are no longer captive to the request/response paradigm!
- But I've done this before...
- IFRAME can accomplish the same concept

Sample Code

Unfortunately - some browser checking

```
function createXMLHttpRequest() {
    if (window.ActiveXObject) {
        xmlHttp = new ActiveXObject("Microsoft.XMLHTTP");
    }
    elseif(window.XMLHttpRequest) {
        xmlHttp = new XMLHttpRequest();
    }
}
function startRequest() {
    createXMLHttpRequest();
    xmlHttp.onreadystatechange = handleStateChange;
    xmlHttp.open("GET", "simpleResponse.xml");
    xmlHttp.send(null);
}
function handleStateChange() {
    if(xmlHttp.readyState == 4) {
        if(xmlHttp.status == 200) {
            alert("The server replied with: " + xmlHttp.responseText);
        }
    }
}
```

Spare me the pain

- Yes, JavaScript can hurt
- Tools are coming, for now check out these
- JSDoc (<http://jsdoc.sourceforge.net/>)
- Greasemonkey (<http://greasemonkey.mozdev.org/>)
- Firefox JavaScript Debugger
- Microsoft Script Debugger
- Venkman JavaScript Debugger
(<http://www.mozilla.org/projects/venkman/>)
- Firefox Extensions
 - Web Developer Extension
(<http://chrispederick.com/work/webdeveloper/>)

HTML Validator

The screenshot shows a Mozilla Firefox browser window displaying HTML source code. The code includes several tags, some of which are highlighted in blue. A 'Tools' menu is open, showing 'HTML Validator' checked. Below the code, a panel titled 'HTML errors and warnings' lists several errors and warnings. The selected error is '<...> is not approved by W3C'. A 'Help' panel on the right provides details about this error, including the cause and solution.

```
abc
</td>
</table>

<br>-----<br>
<h3 id="test_15">TEST - 15 - inserting implicit ...</h3>
<a href="#test_6">See here</a><br>

<br>-----<br>
<h3 id="test_21">TEST - 21 - ... is not approved by W3C </h3>
BAD:<br>
<noabr>there is no wrapping here</noabr>
<br>

GOOD:<br>
<table><tr><td nowrap>there is no wrapping here</td></tr></table>

GOOD 2:<br>
<span style="white-space: nowrap;">there is no wrapping here</span>
<br>
```

HTML errors and warnings

- line 23 column 11 - Warning: discarding unexpect...
- line 31 column 3 - Warning: missing <tr>
- line 43 column 1 - Warning: <noabr> is not approv...
- line 57 column 1 - Error: <abc> is not recognized!
- line 57 column 1 - Warning: discarding unexpecte...
- line 81 column 2 - Warning: missing <td>
- line 82 column 4 - Warning: discarding unexpecte...
- line 81 column 2 - Warning: missing </form>
- line 83 column 2 - Error: discarding unexpected </...>
- line 106 column 39 - Warning: '<' + ' ' + letter not...

Help

<...> is not approved by W3C

Cause:

The following tag is not a standard HTML tag. For most tags, the reason is that there is other ways to achieve the same result with standard tags or with cascaded style sheet.

Solution:

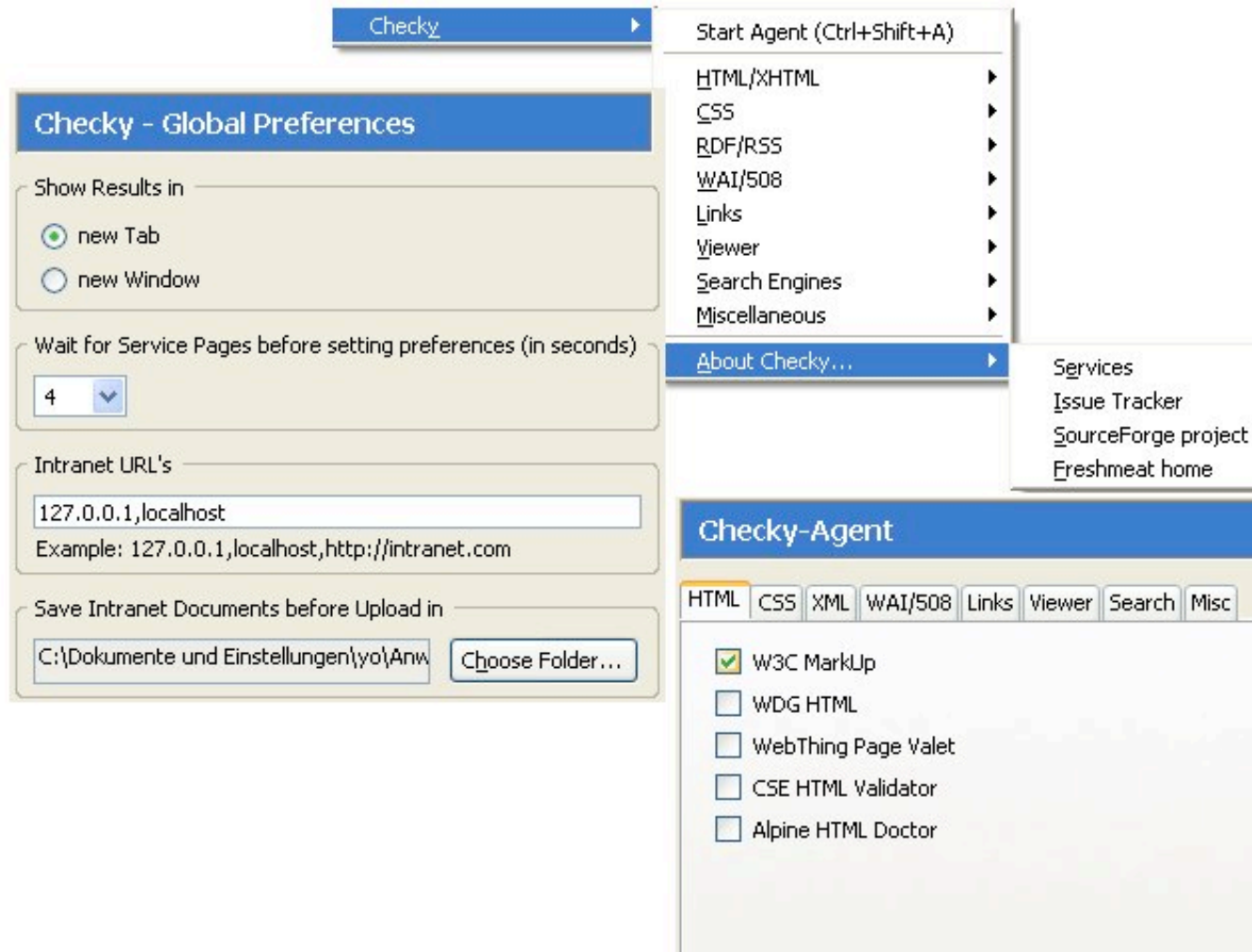
Replace the tag with the equivalent in standard HTML.

Options... Clean up the page...

<http://users.skynet.be/mgueury/mozilla/screenshot.html>

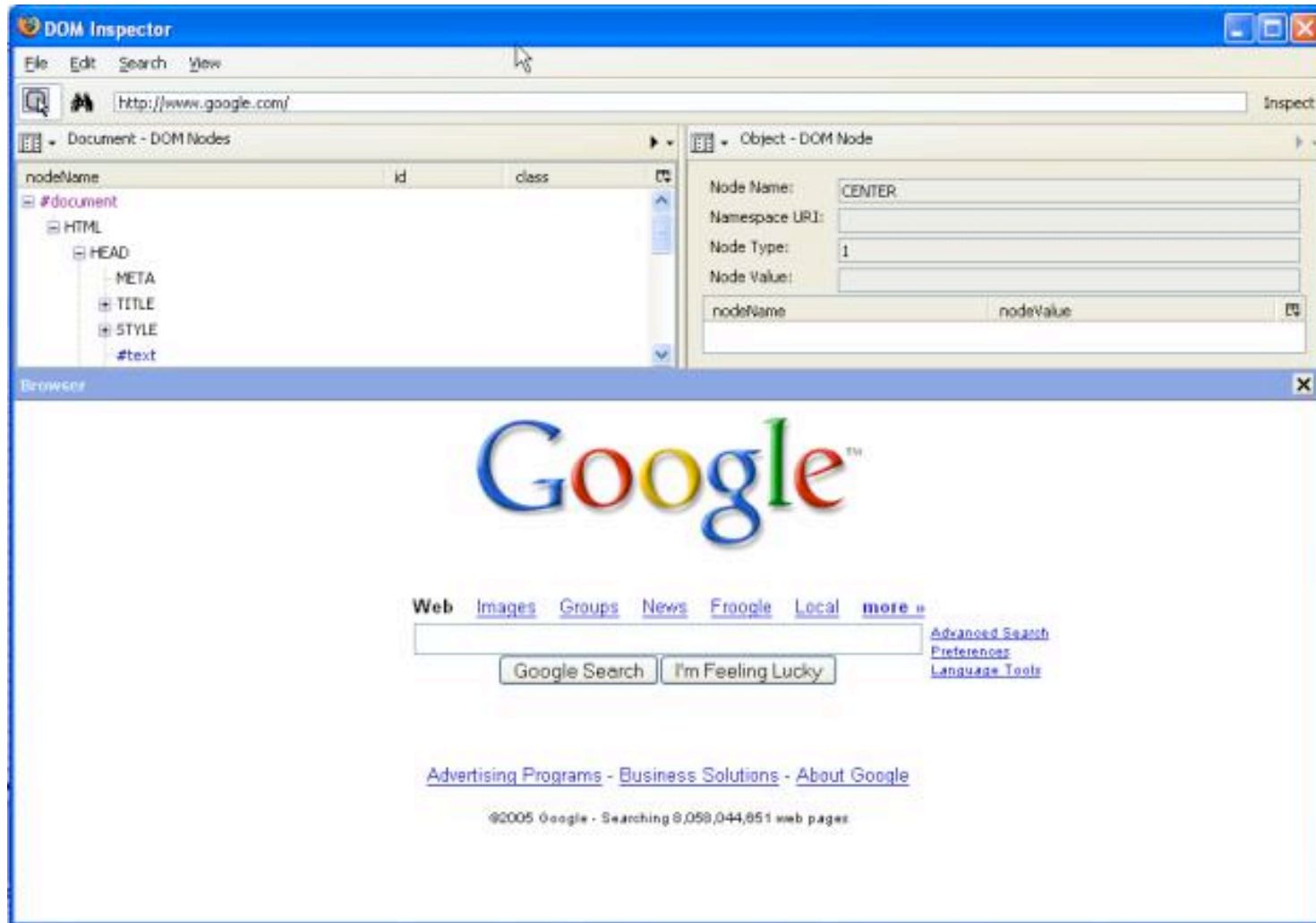
<http://users.skynet.be/mgueury/mozilla/>

Checky



<http://checky.sourceforge.net/extension.html>

DOM Inspector



<http://www.mozilla.org/projects/inspector/>

JSLint

JSLint

```
function RemoteRequest() {
  this.xhr = createXMLHttpRequest();
  this.queryString = "";
  this.requestURL = "";
  this.addNamedFormElements = _addNamedFormElements;
  this.addFormElements = _addFormElements;
  this.accumulateQueryString = _accumulateQueryString;
  this.sendRequest = _sendRequest;
  this.setUsePOST = _setUsePOST;
  this.setUseGET = _setUseGET;

  /** Default method to GET for Opera */
  this.method = RemoteRequest.GET;

  /* Pre and Post request function hooks */
  this.preRequest = "";
  this.postRequest = "";
}
```

JSLint The JavaScript Verifier (documentation) 2005-05-01 clear

(40) : error at character 25: Use '=' to compare with ''

Options

- Strict line ending
- ++ and -- considered harmful
- Tolerate HTML case
- Tolerate JavaScript deviations

clear Copyright 2002 Douglas Crockford. All Rights Reserved Worldwide

<http://www.crockford.com/jslint/lint.html>

JsUnit

The screenshot shows a browser window titled "JsUnit" with the address bar containing "file:///Users/nate/Desktop/jsunit/testRunner.html". The page header includes the JsUnit logo, the title "JsUnit 2.1 TestRunner", and the text "Running on Mozilla/5.0 (Macintosh; U; PPC Mac OS X; en) AppleWebKit/412.6 (KHTML, like Gecko) Safari/412.2". A link for "JsUnit Home" and the email "edward@jsunit.net" is also present.

The main interface prompts the user to "Enter the filename of the Test Page to be run:". Below this is a text input field containing "file:/// Choose File jsUnitDeclSetUpTearDownTests.html" and a "Run" button.

Configuration options include a "Trace level" dropdown set to "no tracing", a checked checkbox for "Close old trace window on new run", a "Page load timeout" input set to "20", and a "Setup page timeout" input set to "60".

The status section shows "Status: Done (0.212 seconds)", a "Progress:" bar that is fully filled with green, and summary statistics: "Runs: 2", "Errors: 0", and "Failures: 0".

At the bottom, there is a section for "Errors and failures:" with a vertical scrollbar and two buttons: "Show selected" and "Show all".

<http://www.edwardh.com/jsunit/>

What about libraries?

- There are dozens
- Maturing space
- Most are very new - proceed with caution
- DWR, Dojo, Rico, Microsoft's Atlas, Ruby on Rails, Prototype, etc.
- Taconite

What's next?

- Better tool support - just a matter of time
- Sun's Creator 2
- Library/toolkit space will consolidate
- User expectation will increase
- More sites will implement

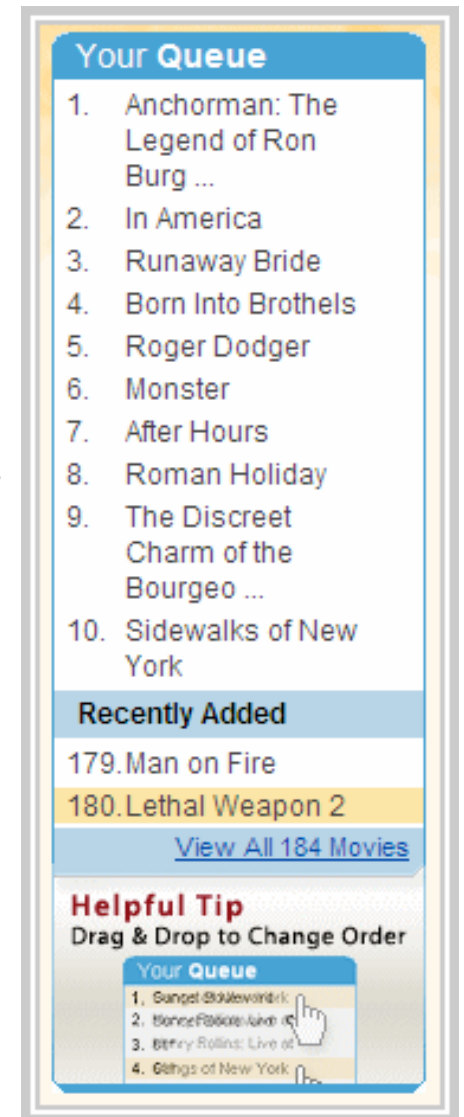
Now what?

- Start small
- Validation is a good first step
- Auto complete
- More dynamic tool tips
- Partial page updates
- Recalculate
- **It's all about the user!**

Proceed with caution

- Unlinkable pages - “Link to this page” option
- Broken back button
- Code bloat
- Graceful fallback - older browsers, screen readers
- Breaking established UI conventions
- Lack of visual clues - “Loading” cues

gmail.com | [Settings](#) | [Help](#) Loading...



The image shows a screenshot of a movie queue interface. The main queue is titled "Your Queue" and lists 10 movies. Below it is a "Recently Added" section with two items. A "Helpful Tip" overlay is present, showing a smaller version of the queue and a hand icon indicating that items can be dragged to change their order.

Your Queue

1. Anchorman: The Legend of Ron Burg ...
2. In America
3. Runaway Bride
4. Born Into Brothels
5. Roger Dodger
6. Monster
7. After Hours
8. Roman Holiday
9. The Discreet Charm of the Bourgeo ...
10. Sidewalks of New York

Recently Added

179. Man on Fire
180. Lethal Weapon 2

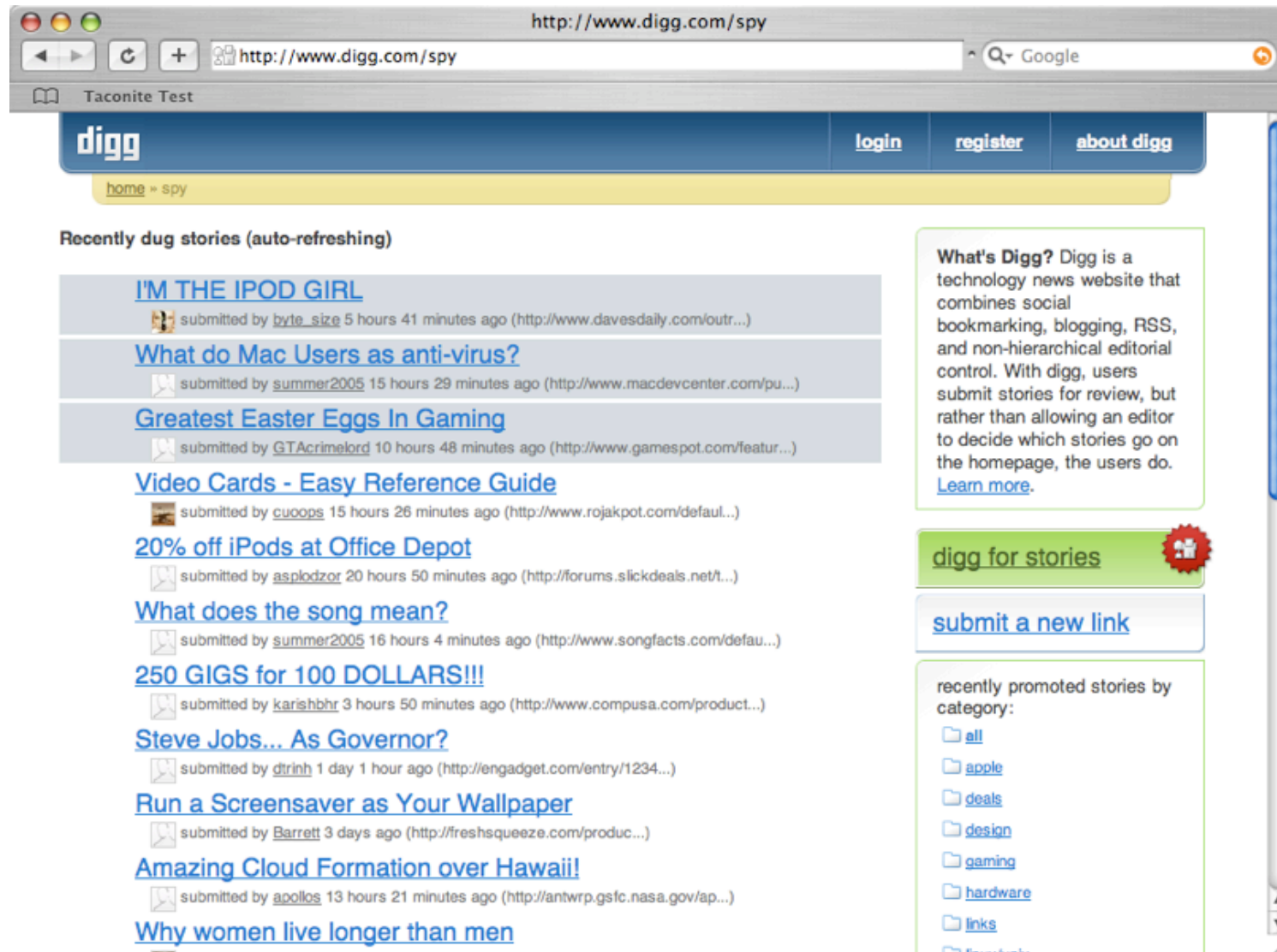
[View All 184 Movies](#)

Helpful Tip
Drag & Drop to Change Order

Your Queue

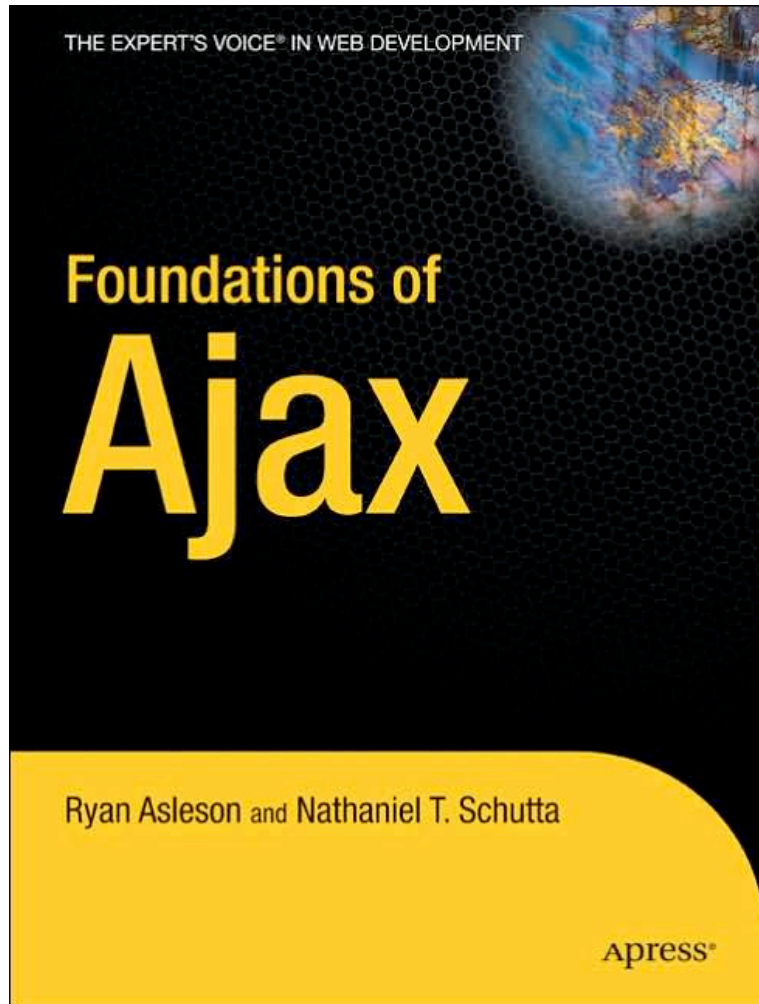
1. Gangster Squad
2. Bonefire
3. Bethany
4. Sidewalks of New York

Fade Anything



Asynchronous changes - Fade Anything Technique

Give me more!



- www.ajaxian.com
- www.ajaxpatterns.org
- www.ajaxmatters.com/r/welcome
- www.ajaxblog.com/
- <http://labs.google.com/>
- www.adaptivepath.com/

To sum up

- Ajax changes the request/response paradigm
- It's not rocket science, it's not a cure all
- Test it with your users
- Start slow
- Embrace change!

Questions?!?
Thanks!