Ajax: Development and Debugging Tools

Originals of Slides and Source Code for Examples:
http://courses.coreservlets.com/Course-Materials/ajax.html

For live Ajax & GWT training, see training courses at http://courses.coreservlets.com/.

Taught by the author of *Core Servlets and JSP*, *More Servlets and JSP*, and this tutorial. Available at public venues, or customized versions can be held on-site at your organization.

- Courses developed and taught by Marty Hall
  - Java 5, Java 6, intermediate/beginning servlets/JSP, advanced servlets/JSP, Struts, JSF, Ajax, GWT, custom mix of topics
- Courses developed and taught by coreservlets.com experts (edited by Marty)
  - Spring, Hibernate, EJB3, Ruby/Rails

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Topics in This Section

- **Tools for debugging Ajax**
- **Tools for debugging JavaScript**
- **Tools for building Ajax-based Web apps**
- **Tools for developing xhtml**
- **Tools for building and previewing style sheets**
- **Tools for validating xhtml**

Debugging Ajax Pages: Firebug

- **Capabilities**
  - Debugs JavaScript
  - Shows DOM (including dynamic values)
  - Shows CSS
  - Much more. *Very* highly recommended.
- **Download site**
  - http://www.getfirebug.com/
- **Cost**
  - Free

Firebug Example

- **.innerHTML example: before button press**
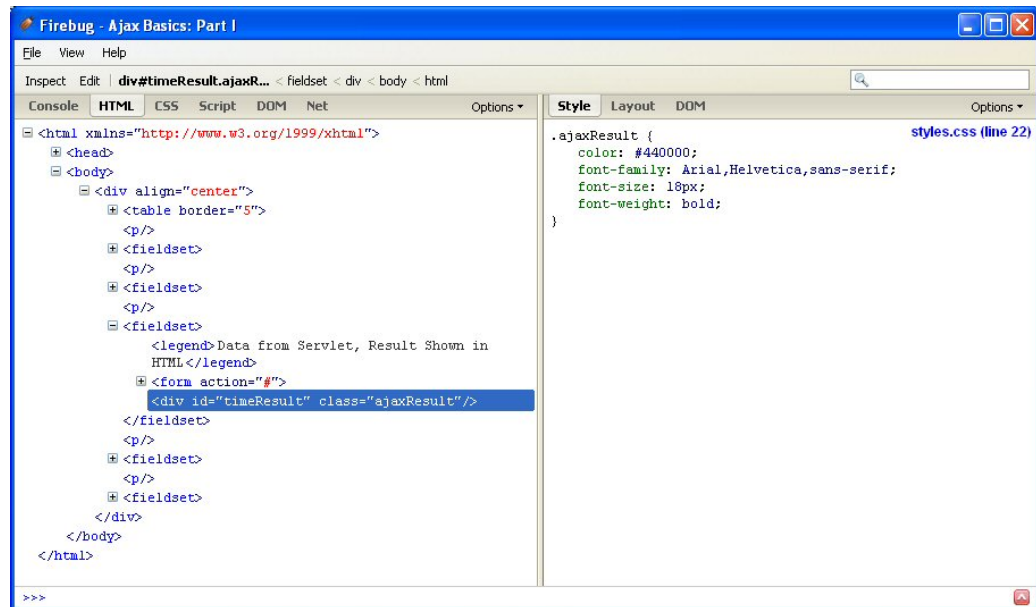
Firebug Example

- **.innerHTML example: after button press**
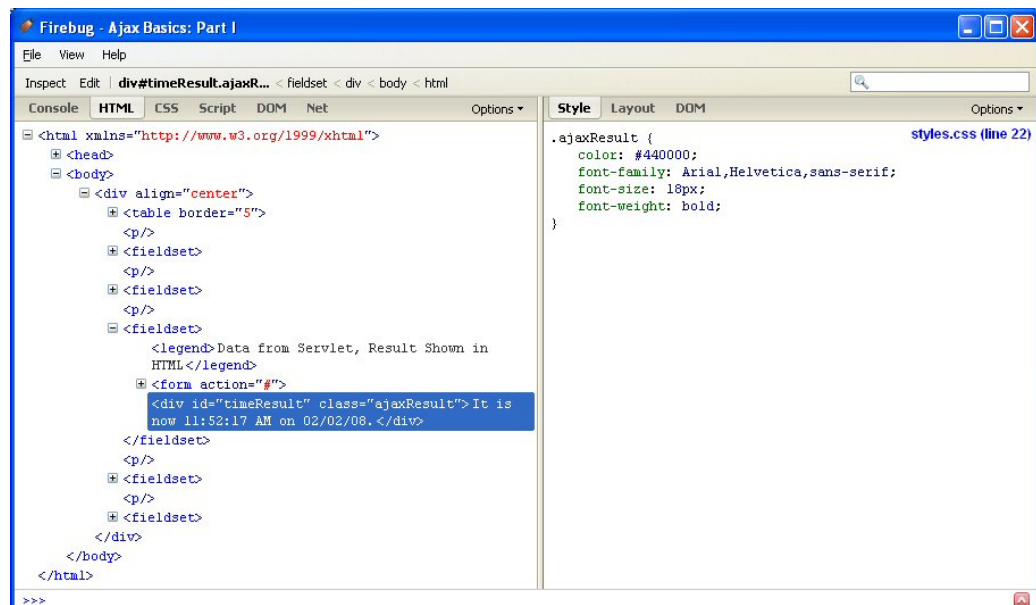
Firebug Logging

- **Firebug has a method called console.log that lets you use printf-like formatting to trace execution**
  - Also console.debug, console.info, console.warn, and console.error (same except for icon/color of printout)
- **Problem**
  - It crashes in IE, so you cannot leave in debugging statements when testing on multiple browsers
- **Solution**
  - Put in dummy console.log function for IE
    - See next page, but note that this code is already in my ajax-basics.js file
      - Download from link on first page of this tutorial

Firebug Logging: Trick for IE

```
// Trick so that the Firebug console.log function will
// be ignored (instead of crashing) in Internet Explorer.
// Also see Firebug Lite and Faux Console if you want
// logging to actually do something on IE.
// Firebug Lite: http://www.getfirebug.com/lite.html
// Faux Console: http://icant.co.uk/sandbox/fauxconsole/

try { console.log("Loading script");
} catch(e) { console = { log: function() {} }; }
```

```
function showResponseText(resultRegion) {
  if ((request.readyState == 4) &&
      (request.status == 200)) {
    console.log("Response text is '%s'.",
                request.responseText);
    document.getElementById(resultRegion).innerHTML =
      request.responseText;
  }
}

function showTimeInCity(resultRegion) {
  var address = "show-time-in-city";
  console.log("Selected city is '%s'.", getValue("city"));
  var data = "city=" + getValue("city") + "&useHTML=true";
  address = address + "?" + data;
  ajaxResult(address, resultRegion);
}
```

Firebug Logging: Example

These two lines are from console.log.

Firebug - Ajax Basics: Part I

File   View   Help

Inspect   Clear   Profile

Console   HTML   CSS   Script   DOM   Net   Options ▾

Selected city is 'New%20rleans'.

⊟ GET http://localhost/ajax-basics-1/show-time-in-city?city=New%20Orleans&useHTML=true *(16ms)*   ajax-basics.js (line 44)

　　Params Headers Response

　　city New Orleans
useHTML true

Response text is '<hr/><h2>In New Orleans, it is now 09:16:49 AM on 02/04/08.</h2><hr/>'.

Firebug automatically monitors the outgoing URL, the parameters,
the result text, and the HTTP response headers (including cookies).

Click here to jump to the line of code that initiated this request.

Firebug and Performance

- **Firebug monitors and records all Ajax traffic**
  - So, it can slow down Ajax-intensive sites like gmail and Google Maps.
- **Disable Firebug on most sites by default**
  - Right click on green Firebug arrow at bottom right
  - Choose "Disable Firebug"
  - Right click on Firebug icon again
  - Choose "Allowed Sites"
  - Enter localhost plus your main deployment sites
  - On any site, you can still hit F12 and enable Firebug on that site (temporarily or permanently)

Debugging JavaScript: Venkman Environment

- **Capabilities**
  - More powerful (arguably) JavaScript debugging environment than Firebug
  - Long-time tool from Mozilla foundation
  - Lacks the DOM and HTML and network tracing tools of Firebug, but still widely used
- **Download sites**
  - http://www.mozilla.org/projects/venkman/
 - https://addons.mozilla.org/firefox/216/
- **Cost**
  - Free

Debugging JavaScript:
The Firefox JavaScript Console

- **Capabilities**
  - Simple JavaScript debugging built in with Firefox
  - Shows error messages and lets you interactively evaluate JavaScript variables and expressions
  - Nowhere nearly as good as Firebug or Venkman, but better than just "Script Error"
    - Best approach is to use Firebug on your development machine, but fall back on this when on a third-party PC
- **Open via**
  Tools → Error Console
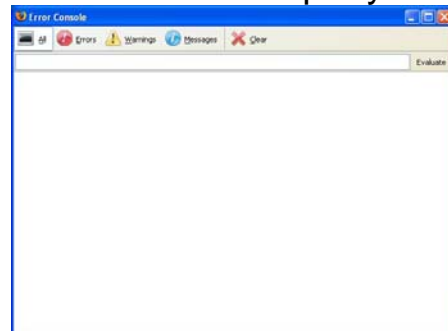
Debugging JavaScript:
Internet Explorer Script Debugger

- **Available in recent Windows versions**
  - Nowhere nearly as good as Firebug or Venkman, but again better than just "Script Error"
- **Enable debugging**
  - Tools → Internet Options → Advanced → Disable Script Debugging (Internet Explorer). *Uncheck this.*
- **Start debugging**
  - View → Script Debugger

Building Ajax-Enabled Web Apps: MyEclipse

- **Capabilities**
  - Support for Java, servlets, JSP, xhtml, xml, JavaScript, JSF, Struts, and lots more
  - Based on the free Eclipse Europa platform
    - Better support for xhtml/JavaScript than Eclipse on its own
      - But it erroneously flags builtin JavaScript properties (e.g., innerHTML) as errors. I reported it to MyEclipse for later versions.
- **Download site**
  - http://www.myeclipseide.com/
- **Cost**
  - $31.75 (standard edition)
  - $63.55 (professional edition)
  - Students in my JHU classes and short courses get free longer-term license
    - But I personally think the small cost is well worth it anyhow

Installing MyEclipse or Eclipse

- **Overview**
  - Eclipse is a free open-source development environment with support for Java and many other languages
  - MyEclipse is an inexpensive package built on top of Eclipse that adds tools and has a good user forum
- **Downloading MyEclipse**
  - Go to http://www.myeclipseide.com/
  - Download "All in One" Installer
- **Downloading regular Eclipse**
  - Go to http://www.eclipse.org/downloads/
  - Download the package entitled "Eclipse IDE for Java EE Developers" (also called "Europa")
- **Downloading Tomcat**
  - Go to http://www.coreservlets.com/Apache-Tomcat-Tutorial/, click "Preconfigured Tomcat version", download, unzip

Setting up MyEclipse

- **Make sure MyEclipse knows about Tomcat**
  - Select Window → Preferences → MyEclipse → Application Servers → Tomcat 6
  - Click "Enable"
  - Hit "Browse"
  - Navigate to the Tomcat installation directory
  - Click Apply & OK
- **Suppress bogus warning**
  - Window → Preferences → Java → Compiler → Errors/Warnings
    - Change "Serializable class without ..." to "Ignore"
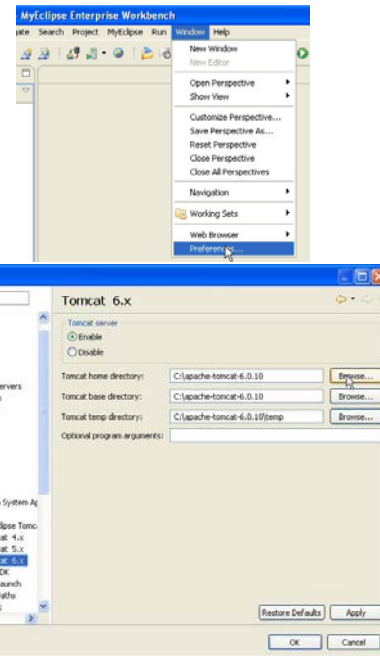
Making Web Apps in MyEclipse

- **Make empty project**
  - File → New → Project → MyEclipse → Java Enterprise Project → Web Project
  - Give it a name (e.g., "test")
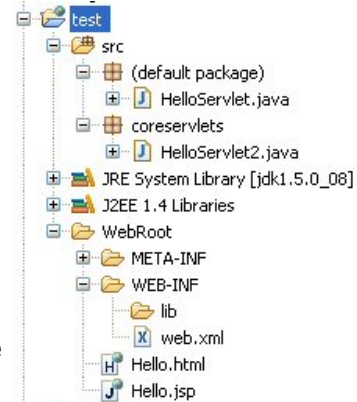 - Accept all other defaults
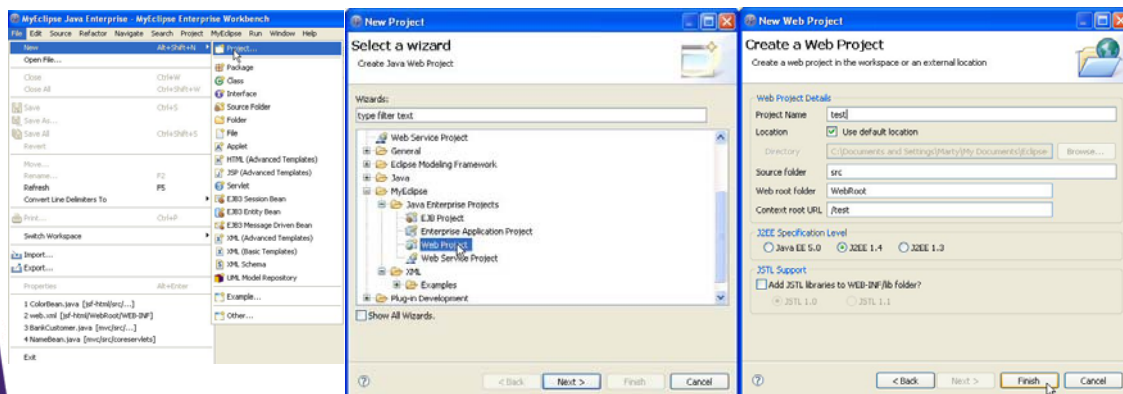
Making Web Apps in MyEclipse (Continued)

- **Add code**
  - WebRoot (commonly renamed to WebContent)
    - Web content (HTML, JavaScript, CSS, JSP, images, etc.)
    - Most people delete the auto-created index.html file
  - WebRoot/some-subdirectory
    - Web content in subdirectory
  - WebRoot/WEB-INF
    - web.xml
  - src
    - Unpackaged Java code
  - src/somePackage
    - Java code in somePackage package
- **Note**
  - You can cut/paste or drag/drop existing files into appropriate locations
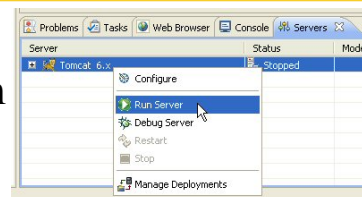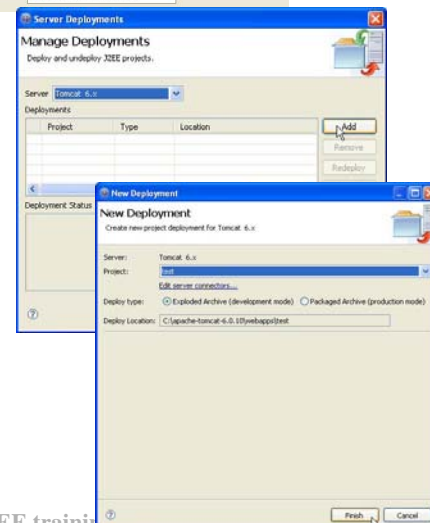

Deploying Web Apps in MyEclipse

- **Start Tomcat**
  - Select "Server" tab at bottom
  - R-click on Tomcat
  - Choose "Run Server"
- **Deploy project**
  - Select "Server" tab at bottom
  - R-click on Tomcat
  - Choose "Manage Deployments"
    - There is also a deployment button on toolbar at top
  - Keep Tomcat as server
  - Press Add
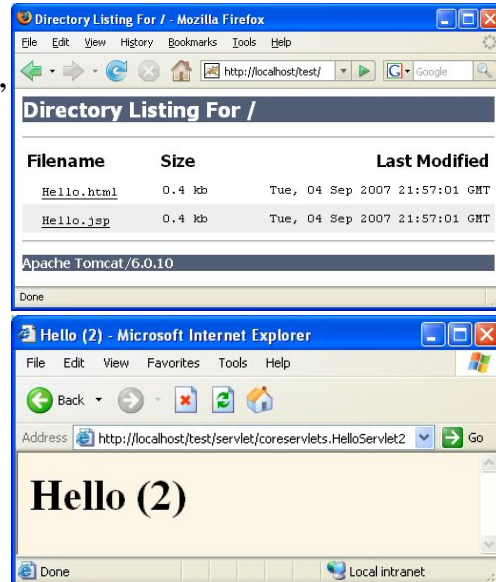 - Choose project
  - Click "Finish"

Testing Deployed Apps in MyEclipse

- **Start a browser**
  - MyEclipse also has builtin browser, but I prefer to use Firefox or Internet Explorer
- **Test base URL**
  - http://localhost/test/
- **Test Web content**
  - http://localhost/test/Hello.html (case sensitive!)
  - http://localhost/test/Hello.jsp
  - If you used subdirectories
    - http://localhost/test/ some-subdirectory/blah.html
- **Test servlets**
  - http://localhost/test/servlet/HelloServlet
  - http://localhost/test/servlet/coreservlets.HelloServlet2
    - Note: custom URLs discussed in next section

Directory Listing For /

Filename	Size	Last Modified
Hello.html	0.4 kb	Tue, 04 Sep 2007 21:57:01 GMT
Hello.jsp	0.4 kb	Tue, 04 Sep 2007 21:57:01 GMT

Apache Tomcat/6.0.10

Hello (2)

Defining Custom URLs

- **Java code**
  ```
  package myPackage;  ...
  public class MyServlet extends HttpServlet { ... }
  ```
- **web.xml entry (in <web-app...>...</web-app>)**
  - Give name to servlet
  ```
  <servlet>
    <servlet-name>MyName</servlet-name>
    <servlet-class>myPackage.MyServlet</servlet-class>
  </servlet>
  ```
  - Give address (URL mapping) to servlet
  ```
  <servlet-mapping>
    <servlet-name>MyName</servlet-name>
    <url-pattern>/MyAddress</url-pattern>
  </servlet-mapping>
  ```
- **Resultant URL**
  - http://*hostname*/*webappPrefix*/MyAddress

Defining Custom URLs: Example (Assume MyEclipse Project is "test")

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="2.4"
    xmlns="http://java.sun.com/xml/ns/j2ee"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://java.sun.com/xml/ns/j2ee
    http://java.sun.com/xml/ns/j2ee/web-app_2_4.xsd">

  <!-- Use the URL http://hostname/intro/hi instead
       of http://hostname/intro/servlet/HelloServlet -->
  <servlet>
    <servlet-name>Second Hello Servlet</servlet-name>
    <servlet-class>coreservlets.HelloServlet2</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>Second Hello Servlet</servlet-name>
    <url-pattern>/hi2</url-pattern>
  </servlet-mapping>
</web-app>
```
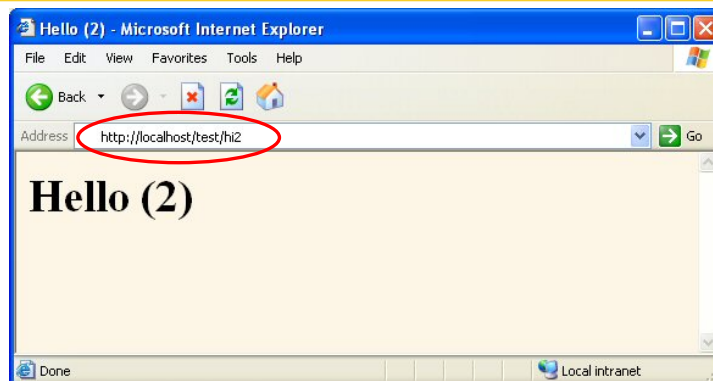
Don't edit this manually.
Should refer to version 2.4
or 2.5 (Tomcat 6 only).

Fully qualified classname.

Any arbitrary name.
But must be the same both times.

The part of the URL that comes after the app (project) name.
Should start with a slash.

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Defining Custom URLs: Result

(browser window showing)

Hello (2) - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

Back

Address   http://localhost/test/hi2   Go

Hello (2)

Done   Local intranet

- **MyEclipse details**
  – Name of MyEclipse project is "test"
  – Servlet is in src/coreservlets/HelloServlet2.java
  – Deployed by right-clicking on Tomcat, Run Server, right-clicking again, choosing Manage Deployments, Add, and choosing the test project

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Building HTML: Dreamweaver

- **Capabilities**
  - Very, very good support for HTML and xhtml
  - Moderate support for CSS
  - Moderate/weak support for JSP
  - I personally develop in MyEclipse, but pop the HTML files into Dreamweaver for any extensive editing
- **Download site**
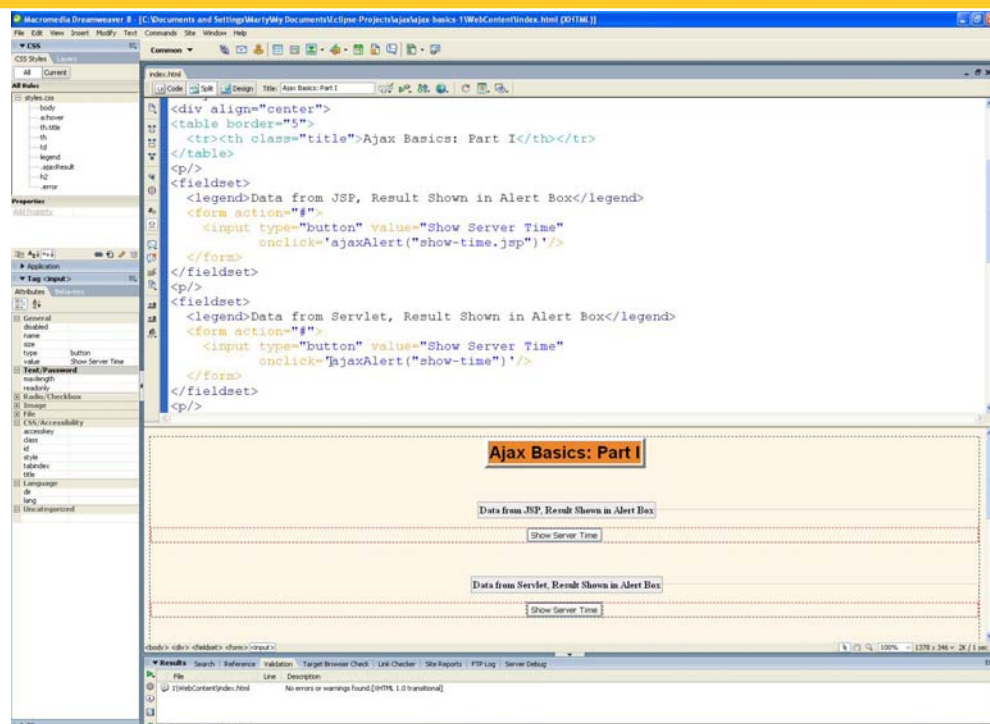 - http://www.adobe.com/products/dreamweaver/
    - And many third-party sites
- **Cost**
  - Expensive!
    - Often accused of being overpriced, but nevertheless Dreamweaver is the single most popular HTML tool

Dreamweaver: Example

Building CSS Pages: TopStyle Lite

- **Capabilities**
  - Building style sheets
  - Has a visual preview of styles
    - Even the free version is better than what Dreamweaver supports. MyEclipse has no real CSS support.
- **Download site**
  - http://www.newsgator.com/Individuals/TopStyle/ Default.aspx
    - Look for TopStyle Lite link near bottom
- **Cost**
  - Lite version is free

TopStyle Lite: Example

Validating HTML: CSE HTML Validator

- ## Capabilities
  - Powerful and helpful HTML/xhtml validator
    - Dreamweaver has moderately good validation built in, but not as good as the CSE tool
    - MyEclipse also has moderately good xhtml validation, but not as good as Dreamweaver
    - Also see these online validators
      - http://htmlhelp.com/tools/validator/
      - http://validator.w3.org/
- ## Download site
  - Lite: http://www.htmlvalidator.com/lite/
  - Pro: http://www.htmlvalidator.com/
- ## Cost
  - Lite version is free for personal/educational use

CSE HTML Validator: Example

Summary

- **Monitoring and debugging Ajax**
  - Firebug
- **Debugging JavaScript**
  - Venkman
  - Firefox JavaScript Console
- **Building Ajax-based Web apps**
  - MyEclipse
- **Developing xhtml**
  - Dreamweaver
- **Building and previewing style sheets**
  - TopStyle Lite
- **Validating xhtml**
  - CSE HTML Validator
  - Online validators

Questions?