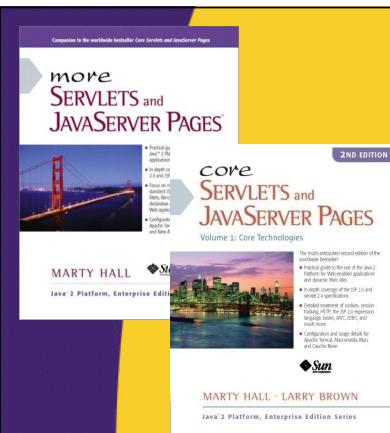




Ajax: Development and Debugging Tools

Originals of Slides and Source Code for Examples:
<http://coursescoreservlets.com/Course-Materials/ajax.html>

Customized Java EE Training: <http://coursescoreservlets.com/>
Servlets, JSP, JSF 1.x, JSF 2.0, Struts, Ajax, GWT 2.0, GXT, Spring, Hibernate/JPA, Java 5, Java 6.
Developed and taught by well-known author and developer. At public venues or onsite at *your* location.



For live Ajax & GWT training, see training courses at <http://coursescoreservlets.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 6, servlets/JSP (intermediate and advanced), Struts, JSF 1.x, JSF 2.0, Ajax, GWT 2.0 (with GXT), custom mix of topics
 - Ajax courses can concentrate on 1 library (jQuery, Prototype/Scriptaculous, Ext-JS, Dojo, Google Closure) or survey several
- Courses developed and taught by coreservlets.com experts (edited by Marty)
 - Spring, Hibernate/JPA, EJB3, Web Services, Ruby/Rails

Contact hall@coreservlets.com for details

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

4

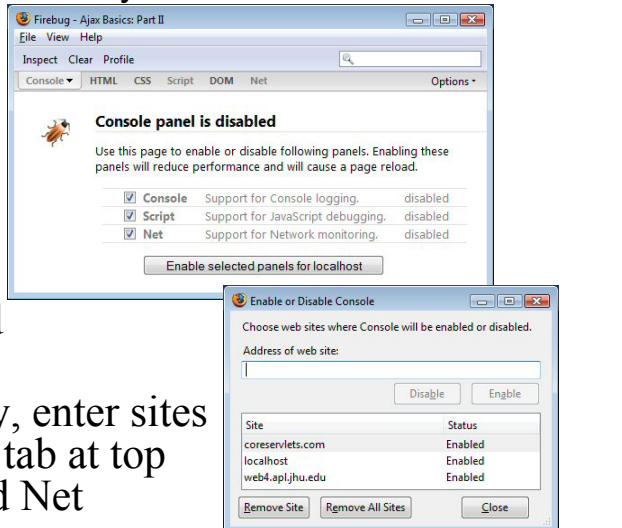
Debugging Ajax Pages: Firebug

- **Capabilities**
 - Debugs JavaScript
 - Shows DOM (including dynamic values)
 - Shows CSS
 - Much more. *Very* highly recommended.
- **Download site**
 - <http://getfirebug.com/>
 - Documentation: <http://getfirebug.com/docs.html>
- **Used with**
 - Firefox (*not* Internet Explorer)
 - But see later link on Firebug Lite
- **Cost**
 - Free

5

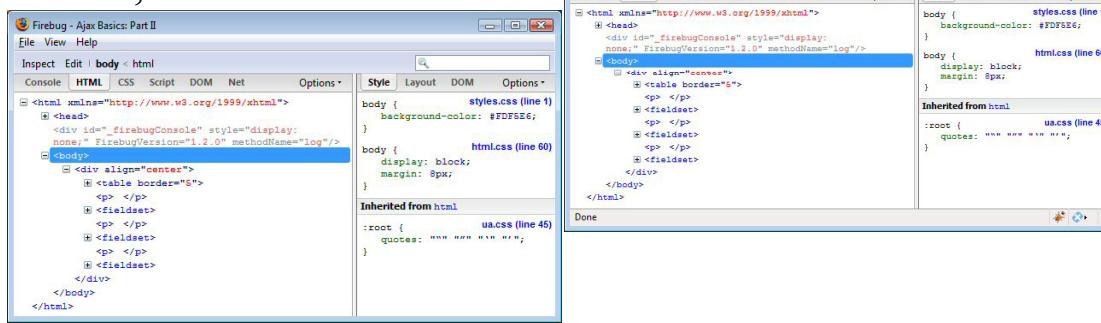
Enabling Firebug

- **Firebug and performance**
 - Monitoring network traffic slows down performance of Ajax-intensive sites like Yahoo Mail and Google Maps
 - So most features disabled by default
- **Enabling features**
 - Bring up page on site you want to monitor
 - E.g., on localhost
 - Hit Control-F12
 - Select all windows
 - Press “Enable selected panels for localhost”
 - To enable permanently, enter sites via “Sites” entry from tab at top of Console, Script, and Net



Bringing Up Firebug

- **Embedded in browser**
 - Click on Firebug logo at bottom right
 - Or, hit F12
- **In separate window**
 - Control-click on logo
 - Or, Control-F12



Firebug Example

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

The screenshot shows the Firebug interface with the 'HTML' tab selected. The left panel displays the DOM tree for a page with the URL <http://www.w3.org/1999/xhtml>. A specific element, a `<div id="timeResult" class="ajaxResult">`, is highlighted with a blue selection bar. The right panel shows the CSS styles defined in 'styles.css' at line 22, which applies a color of #440000, a font-family of Arial, Helvetica, sans-serif, a font-size of 16px, and a font-weight of bold to elements with the class 'ajaxResult'. The status bar at the bottom left indicates the number 8.

Firebug Example

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

The screenshot shows the Firebug interface with the 'HTML' tab selected. The left panel displays the same DOM tree as the previous screenshot, but the `<div id="timeResult" class="ajaxResult">` element now contains the text "It is now 11:52:17 AM on 02/02/08.", indicating that the innerHTML of the element has been updated. The right panel shows the same CSS definition from 'styles.css' at line 22. The status bar at the bottom left indicates the number 9.

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)
 - Details at <http://getfirebug.com/console.html>
- 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

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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 in 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() {} }; }
```

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Firebug Logging: Example

```
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);  
}
```

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Firebug Logging: Example



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.

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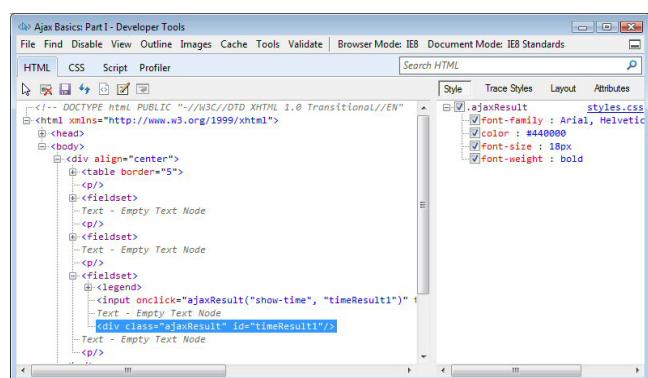
Debugging JavaScript in Internet Explorer

- **Firebug Lite**
 - <http://getfirebug.com/lite.html>
 - See especially the “bookmarklet” link
- **DebugBar**
 - <http://www.debugbar.com/>
 - Free for personal, non-commercial use
- **IE Web Developer**
 - <http://www.ieinspector.com/dominspector/>
 - Not free
- **Internet Explorer 8**
 - IE 8 (available as of 4/2009) has an integrated Ajax debugging environment. Not yet as good as Firebug.

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Debugging in IE 8 (Tools → Developer Tools)

- **JavaScript console, debugger, CSS**
 - Very good. Based on my limited testing, capabilities appear comparable to Firebug
- **Network tracing**
 - None
- **HTML display**
 - Major flaw: shows HTML as in original page (ala “View Source”), not the HTML as modified by JavaScript



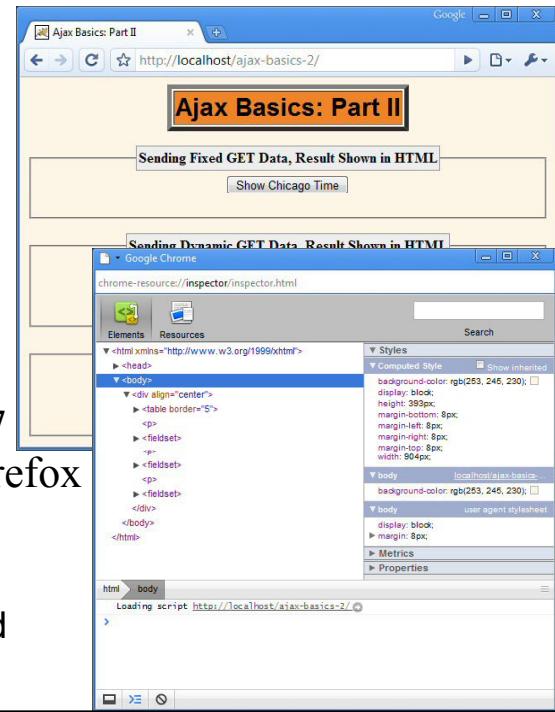
Example from Ajax Basics I lecture, after result has been inserted in page. IE 8 does not show update, even if you restart tool.

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Debugging JavaScript: Google Chrome Debugger

- **Chrome browser**

- The “Chrome” browser from Google includes an integrated Ajax debugging environment similar to Firebug
- JavaScript performance in Chrome is order of magnitude better than IE 7 and slightly better than Firefox
- Chrome still has very low market penetration
 - As of 9/2009, well behind 3rd place Safari by most measures



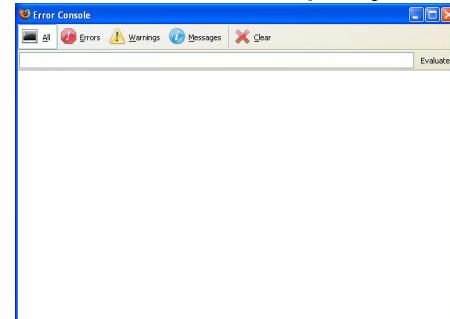
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Debugging JavaScript: The Firefox JavaScript Console

- **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

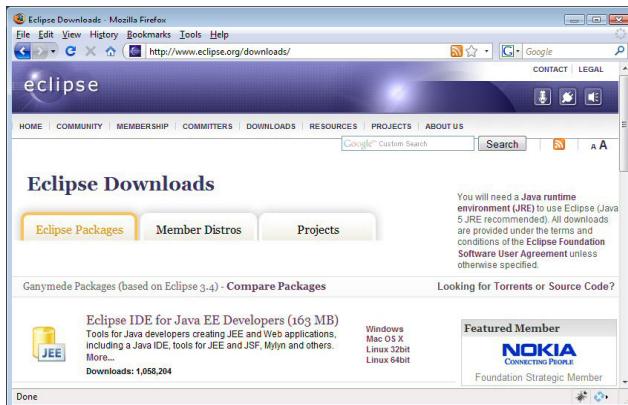
- **Open via
Tools → Error Console**



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Building Ajax-Enabled Web Apps: Eclipse

- **Eclipse is the main development tool**
 - Organizes entire project
 - Deploys to local server
 - Always used for
 - Editing Java
 - Editing JavaScript
 - Sometimes used for
 - HTML
 - XML
 - CSS
 - sftp
- **Alternatives**
 - MyEclipse
 - NetBeans
 - IntelliJ IDEA



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Installing Eclipse

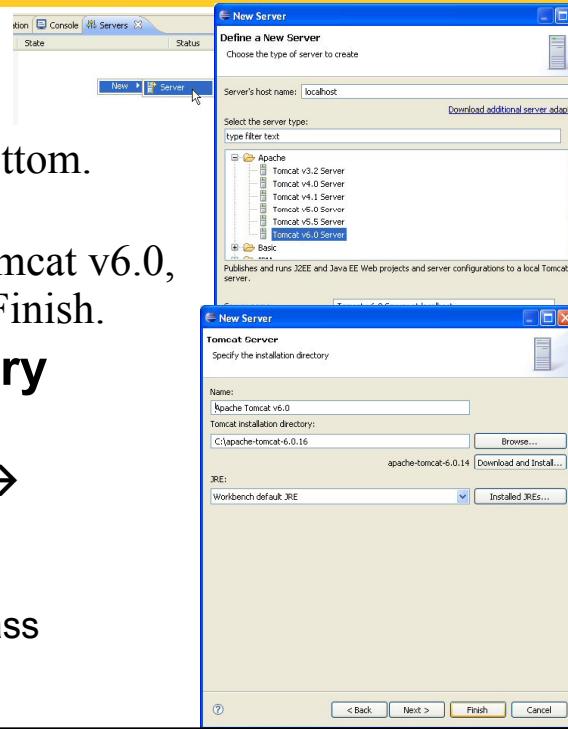
- **Overview**
 - Eclipse is a free open-source development environment with support for Java and many other languages
- **Downloading**
 - <http://www.eclipse.org/downloads/>
 - Choose “Eclipse IDE for Java EE Developers”
 - As of 9/2009, version 3.5, called Eclipse Galileo
- **Installing**
 - Unzip into directory of your choice
 - Put shortcut to eclipse.exe on your desktop
- **Integrating Tomcat in Eclipse**
 - <http://www.coreservlets.com/Apache-Tomcat-Tutorial/eclipse.html>

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Configuring Eclipse

- **Make sure Eclipse knows about Tomcat**

- Click on Servers tab at bottom.
R-click in window.
 - New, Server, Apache, Tomcat v6.0,
Next, navigate to folder, Finish.



- **Suppress unnecessary compiler warnings**

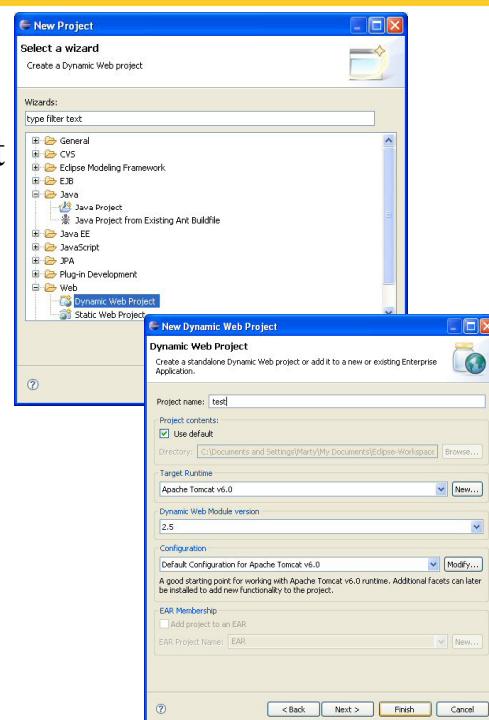
- Window → Preferences → Java → Compiler → Errors/Warnings
 - Change “Serializable class without ...” to “Ignore”

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Making Web Apps in Eclipse

- **Make empty project**

- File → New → Project → Web → Dynamic Web Project
 - Give it a name (e.g., “test”)
 - Accept all other defaults



- **Shortcut**

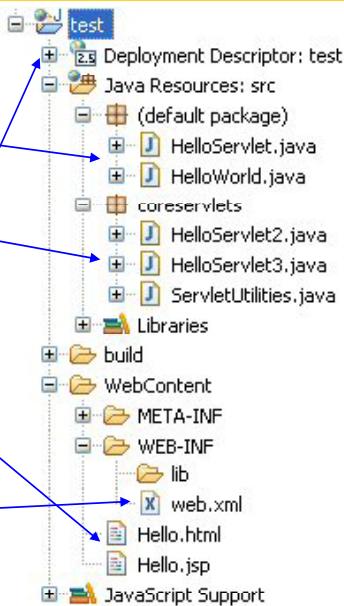
- If you have made Dynamic Web Project recently in workspace, you can just do File → New → Dynamic Web Project

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Adding Code to Eclipse Projects

- **Locations**

- src
 - Unpackaged Java code
 - Packages strongly recommended
- src/somePackage
 - Java code in somePackage package
- WebContent
 - Web files (HTML, JavaScript, CSS, JSP, images, etc.)
- WebContent/some-subdirectory
 - Web content in subdirectory
- WebContent/WEB-INF
 - web.xml (will be discussed later)
 - Can also click on “Deployment Descriptor”



- **Note**

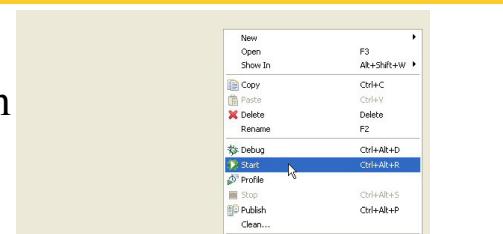
- Can cut/paste or drag/drop files into appropriate locations

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Starting Server in Eclipse

- **Start Tomcat**

- Select “Servers” tab at bottom
- R-click on Tomcat
- Choose “Start”

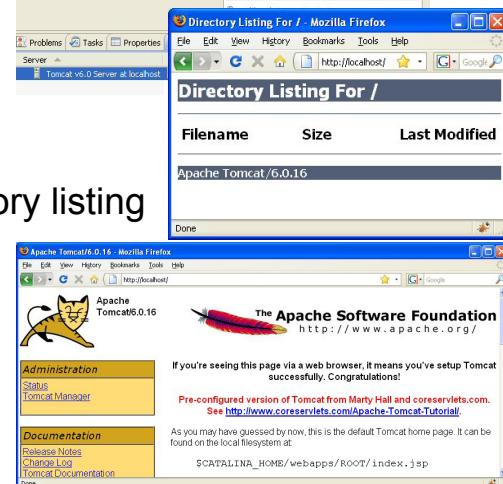


- **Verify server startup**

- Open browser
- Enter http://localhost/
 - You should see blank directory listing

- If you want pretty Tomcat welcome page, search for a folder called ROOT in your Eclipse workspace.

Copy files from
C:\tomcat-dir\webapps\ROOT
to that folder

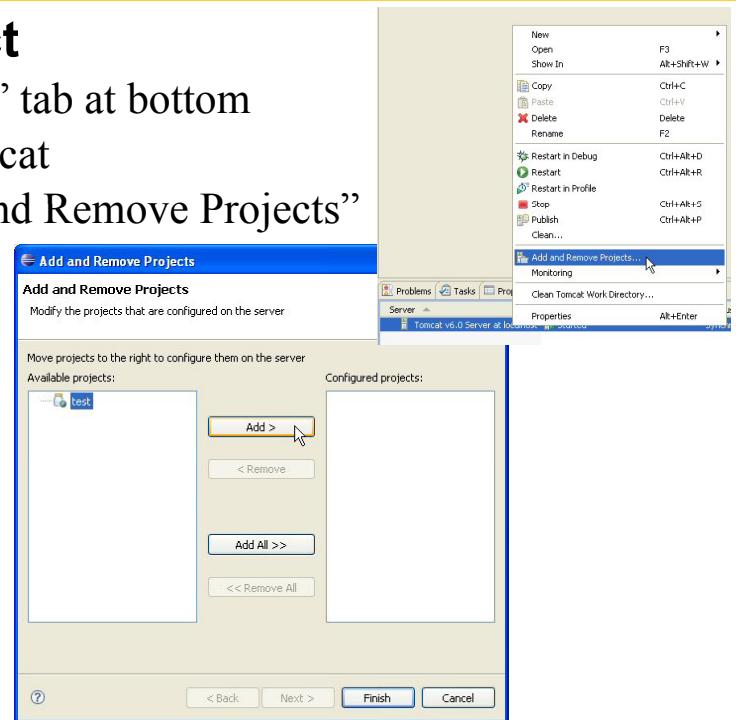


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Deploying App in Eclipse

- **Deploy project**
 - Select “Servers” tab at bottom
 - R-click on Tomcat
 - Choose “Add and Remove Projects”
 - Choose project
 - Press “Add”
 - Click “Finish”
- **Restart Server**
 - R-click Tomcat at bottom
 - Restart

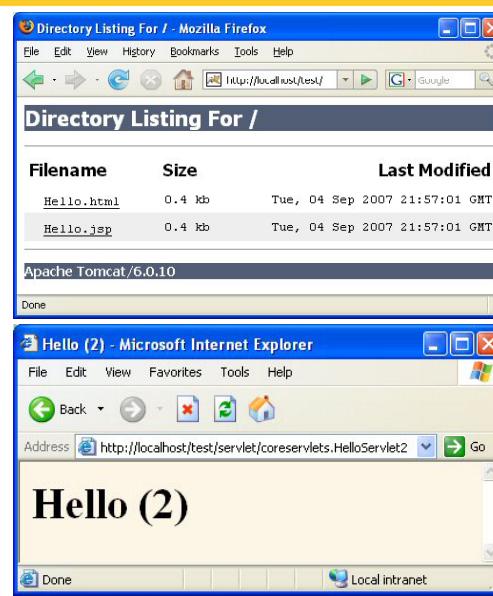
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Testing Deployed Apps in Eclipse

- **Start a browser**
 - Eclipse 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

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Building HTML: Dreamweaver

- **Capabilities**

- Very good support for HTML and xhtml
- Moderate support for CSS
- Moderate/weak support for JSP
- I personally develop in Eclipse, but pop the HTML files into Dreamweaver for any extensive editing

- **Download site**

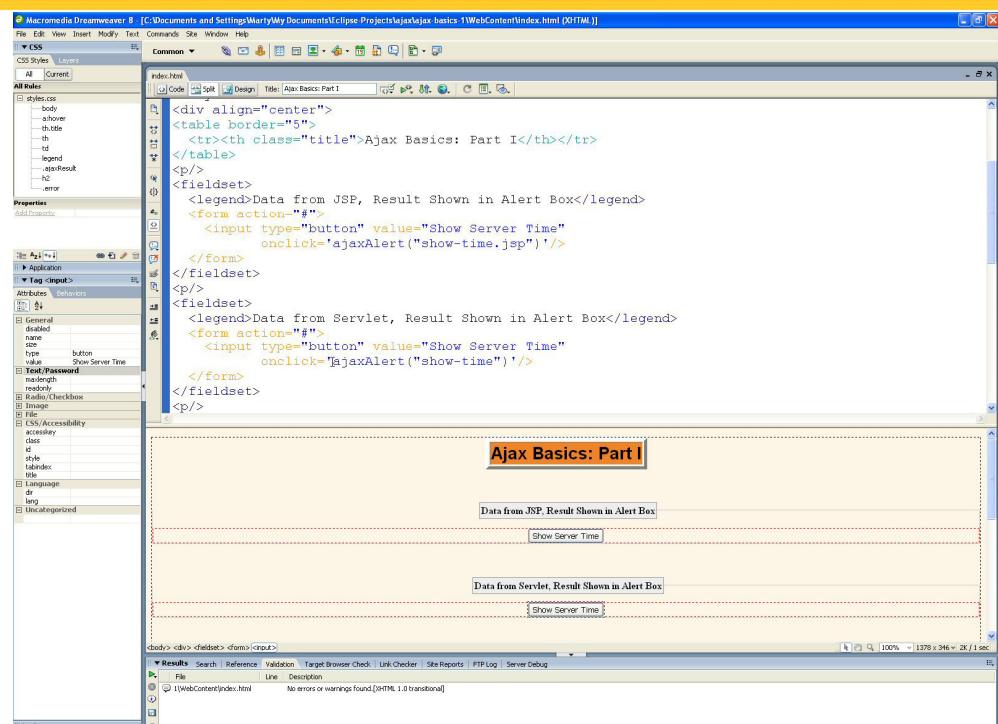
- <http://www.adobe.com/products/dreamweaver/>
 - And many third-party sites

- **Cost**

- Expensive!
 - Often accused of being overpriced, but nevertheless Dreamweaver is *the* single most popular HTML tool

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Dreamweaver: Example



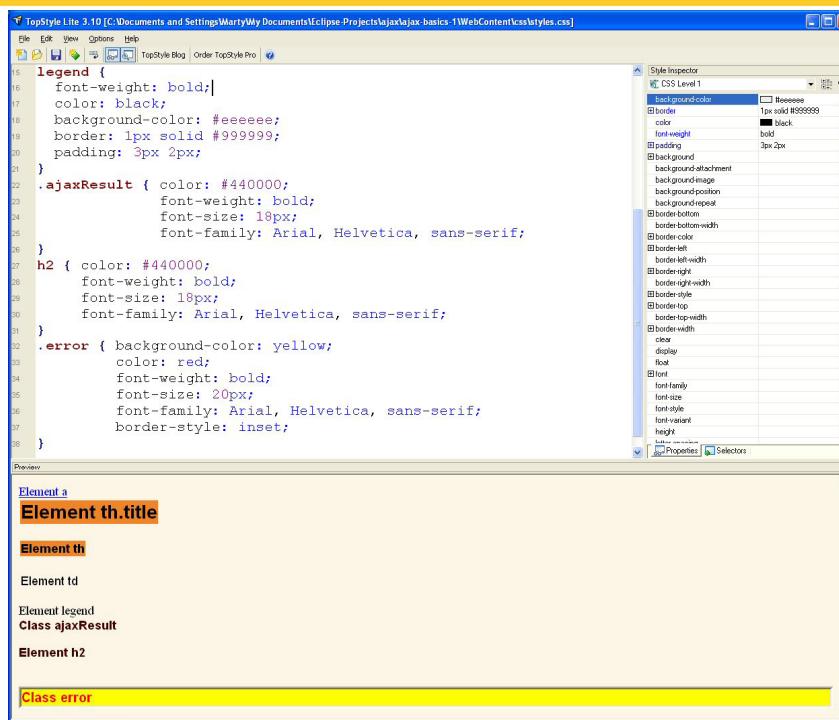
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Building CSS Pages: TopStyle Lite

- **Capabilities**
 - Building style sheets
 - Has a visual preview of styles
 - Even the free version is better than what Dreamweaver supports. Eclipse 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

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TopStyle Lite: Example



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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
 - Eclipse 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**

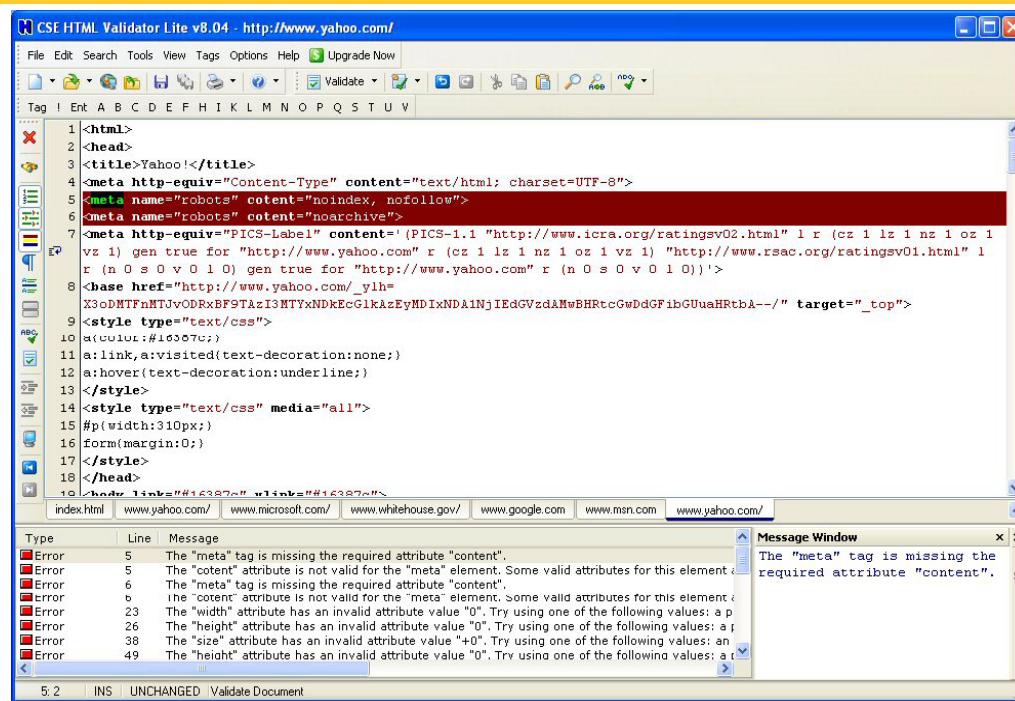
- Lite: <http://www.htmlvalidator.com/lite/>
 - Pro: <http://www.htmlvalidator.com/>

- Cost

- Lite version is free for personal/educational use

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CSE HTML Validator: Example



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Summary

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

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Questions?

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Developed and taught by well-known author and developer. At public venues or onsite at your location.