

## AJAX Overview

MSIS 531 – Spring 2006

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## AJAX Overview

- AJAX: “Aynchronous JavaScript and XML”
- New technique for creating interactive web applications
  - Not a new *Technology* but more of a *Pattern*
- Motivation:
  - HTTP never intended to dynamically serve content
  - Pages always reload, but never get updated
  - Users wait for the entire page to load even if a single piece of data is needed
  - Single request/response restrictions: no middle ground between “this page” and “next page”

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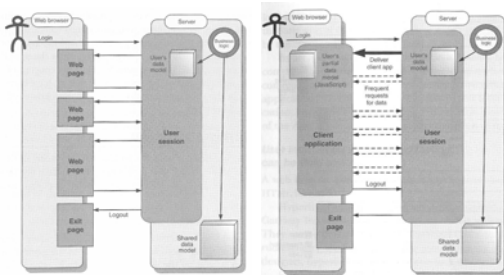
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## Web Applications and AJAX



Standard web app—many web pages, each refreshing the screen. Conversational state on server

AJAX app – client code delivered at login, requests processed on client or server without interrupting workflow

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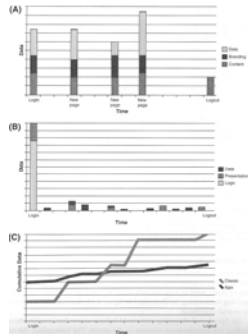
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## Content Delivery

- Classic webapp – everything delivered for each page
  - Browser caching reduces, but does not remove, this overhead
- AJAX webapp – initial large delivery, subsequent activity low
  - Front-loaded client load less expensive than you might think
- Cumulative data delivered
  - Higher at first, but cumulative data cost lower
  - Clear benefit if WAN involved



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## AJAX Design Principles

1. The browser hosts an application, not content
  - Application code delivered to browser, mostly as JavaScript code
2. The server delivers data, not content
  - Data may be plain text, JavaScript fragments, or XML documents
3. User/application interaction is continuous and fluid
  - UI metaphors like drag-and-drop become possible
4. This is real coding and requires discipline
  - Significant developer responsibility to manage conversational state over entire web transaction

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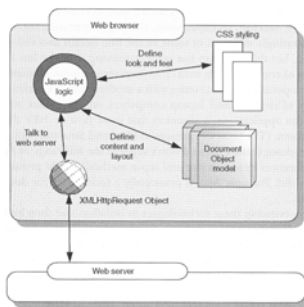
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## AJAX Components

- HTML and CSS
  - Presentation, with standardized style information
- Document Object Model (DOM)
  - Dynamic display of and interaction with the HTML page
- XMLHttpRequest object
  - Asynchronously retrieves data from web server
- Javascript
  - Client-side code controls actions (controller pattern)



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## Cascading Style Sheets (CSS)

- Well-established design technique for classic and Ajax web applications
- Goal: standardize formatting (“styles”) of web content
  - In classic web applications, promotes resuability
  - In Ajax, allow predefined looks, applied w/minimum code
- CSS selectors are applied to HTML tags
  - Example: make this heading red

```
.redhead { color: red; }
<h1 id="head1" class="redhead">A red headline</h1>
```
- Many other options available to CSS designers

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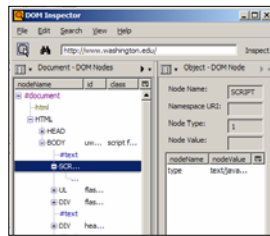
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## Document Object Model (DOM)

- The DOM exposes a web page to the JavaScript engine
- Tree-structured format
  - DOM structure well defined by World-Wide Web Consortium (W3C)
  - Each DOM element is a node
- DOM can be read, and also updated (change, insert)
- Programming recommendations:
  - Use of “id” attribute to make finding elements easy
  - CSS styles applied using node’s className attribute:

```
head1.className = 'redhead';
```
  - Use of XHTML



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## JavaScript

- Solid browser-based programming language with a very bad reputation
  - Source of pop-up windows, back button hacks, image rollovers
- Not Java, but from the same family
  - Java-like syntax
  - Loosely-typed variables, dynamically interpreted
  - Functions are objects
    - Can be involved from outside a class
- Can use OOP-like style, but not required

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## Asynchronous Data Loading

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- Two techniques: IFrames, XMLHttpRequest
- IFrames (Inline Frames) are an old technique given new life with Ajax
  - Invisible frame, in line with other HTML
  - IFrame owns the processing
- XMLHttpRequest: DOM extensions allowing asynchronous calls
- Issue with both: browser compatibility
  - Developer owns implementation, testing burden...
  - Or we implement using a toolkit and make it someone else's problem

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## AJAX Downsides

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- Note these are not all specific to AJAX:
  - Browser "back" button may not work
    - Browsers record static page visits
  - Bookmarking state becomes difficult
    - Javascript generates the page
  - Increase browser code size
    - Response time affected
  - Difficult to debug
    - Processing logic both in client and server
  - Viewable Source
    - Open to hackers or plagiarism
  - Server Load
    - Asynchronous request may be an expensive operation

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## AJAX Toolkits

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- Lots of frameworks out there
  - Commercial, open source
  - Java/.NET/PHP
  - Server-side or client-side bias
- We'll look at one framework, dojo, which fits nicely into the Java/Netbeans environment
  - Nice examples of what's possible in AJAX
  - No requirement (though straightforward implementation) for Java (or .NET, or PHP)

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