Browser As The New OS

- Easy application distribution and deployment
- Greatly simplifies system administration
  - No software to download, install, and update
  - Centralized data management
- Application can be used from anywhere
- So why it didn't happen??

Interactivity Issue

- Conventional GUI application
  - Rich event model
  - Responsive
    - No network delay
    - Partial redraw
- Web application
  - Simple request-response model
  - Not so responsive
    - Send request, wait for response
    - Full page refresh

HTML Event Models

- HTML 4 Event Model
  - HTML 4.01 Specification - http://www.w3.org/TR/REC-html40/
  - Limited features but portable
- Standard Event Model
  - Fully featured but less portable
- Vendor specific event models

Events and Event Handler

- Events
  - onfocus, onblur, onkeypress, onkeydown, onkeyup, onclick, ondbclick, onmousedown, onmouseup, onmousemove, onmouseover ...
- Specify event handler
  - <element event="code">
  - For example:
    <button onclick="clickHandler();">click</button>

Example: Event Handling with JavaScript

- j1.html in jex
- Disclaimer: all my JavaScript code is only tested under Firefox 1.07
JavaScript

- Interpreted language
- Originally developed by Netscape
- Syntax is similar to Java

Core JavaScript

- Mainly covers language syntax, which is kind of similar to Java
- Global Object
  - Created by a JavaScript interpreter
  - Global variables and global methods are simply variables and methods of this object

Client-Side JavaScript

- Embed JavaScript in HTML
  - `<script`
    - type="text/javascript"
    - language="JavaScript"
    - src="path_to_script_file"
- Run inside a browser
- Window is the global object

Document Object Model (DOM)

- Representing documents as objects so they can be manipulated in a programming language.

DOM HTML Representation - HTML

```html
<html>
  <head>
    <title>JavaScript Example</title>
  </head>
  <body>
    <h1>JavaScript Example</h1>
    <p>Some content.</p>
  </body>
</html>
```
DOM HTML Representation - DOM

Nodes

Find Element
- `document.getElementsByTagName()`
- `document.getElementById()`

Modify Element
- `getElementsByTagName` propeties and methods:
  - IE
    - `innerHTML`
    - `innerText`
    - `insertAdjacentHTML()`
    - `insertAdjacentText()`
  - Netscape/Mozilla
    - `innerHTML`
  - Element-specific

Communicate with Server
- The request-response model is still a limiting factor in user interactivity
- Solution: XMLHttpRequest
  - A JavaScript object
  - Send HTTP request
  - Parse XML response
  - Response can be handled asynchronously

XMLHttpRequest Example
- `A1 in jex`
  - A client that sends XMLHttpRequest
  - A servlet that replies with XML response
- Non-blocking - the server response is handled asynchronously with a `callback` function
- Partial page update
About the Example

**getReadyStateHandler()**
- Function parameter
- Function return type

XMLHttpRequest - Methods

- **abort()**
- **getAllResponseHeaders()**
- **getResponseHeader( header )**
  - asyncFlag, username, password are optional
- **open( method, url, asyncFlag, username, password )**
- **send( messageBody )**
- **setRequestHeader( name, value )**

XMLHttpRequest - Properties

- **onreadystatechange**
- **readyState**
  - 0 – uninitialized
  - 1 – loading
  - 2 – loaded
  - 3 – interactive
  - 4 – complete
- **status**
- **statusText**
- **responseBody**
- **responseStream**
- **responseText**
- **responseXML**

AJAX

- **AJAX = JavaScript + XMLHttpRequest**
- **Asynchronous JavaScript and XML**
- The technologies have been around for several years
- The recent buzz seems to be started by Google Maps
  - Vs. Yahoo Maps
- Now it's "Web 2.0"!

AJAX Frameworks and Libraries

- [http://ajaxpatterns.org/Ajax_Frameworks](http://ajaxpatterns.org/Ajax_Frameworks)
- Some interesting ones (*)
  - OpenRico - [http://openrico.org](http://openrico.org)
  - Pragmatic Objects - [http://pragmaticobjects.com](http://pragmaticobjects.com)
  - Prototype - [http://prototype.conio.net](http://prototype.conio.net)
  - Scriptaculous - [http://script.aculo.us](http://script.aculo.us)
  - Taconite - [http://taconite.sourceforge.net](http://taconite.sourceforge.net)

(* I bias toward Java related ones and the ones with online demos.)

Using Google Maps API

- [http://www.google.com/apis/maps](http://www.google.com/apis/maps)
- A JavaScript API
- Host restriction
- Some missing functions
  - Geocoding
  - Routing
Google Maps in Evelyn

- Longitude-latitude lookup using http://geocoder.us
- Distance calculation and other spatial operations
  - PostGIS - http://postgis.refractions.net
- Mixing JSP and JavaScript