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/](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, ondblclick,
    onmousedown, onmouseup,
    onmousemove, onmouseover ...
- Specify event handler
  - `<element event="code">`
  - For example:
    `<button onclick="clickHandler();">click</button>`
**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
  ```html
  <script>
  // type="text/javascript"
  // language="JavaScript"
  // src="path_to_script_file"
  </script>
  ```
- 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.

**Window**

```
self, window, parent, top
frames
location
history
document
screen
```

```
forms[]
navigator
anchors[]
location
link[]
history
images[]
document
applets[]
screen
```
DOM HTML Representation - DOM

Nodes

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

Modify Element
- `HTMLDocument` properites 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
XMLHttpRequest - Properties

- onreadystatechange
- readyState
  - 0 – uninitialized
  - 1 – loading
  - 2 – loaded
  - 3 – interactive
  - 4 – complete
- status
- statusText

XMLHttpRequest - Methods

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

About the Example

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

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)

More Ajax Examples

- CSNS
  - Toggle file public
- Evelyn
  - Show item details
  - Flip through bibtex edit history

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