Browser As The New OS

- Application can be used from anywhere
- Easy application distribution and deployment
- Greatly simplifies system administration
  - No software to download, install, and update
  - Centralized data management

So why didn’t happen??

Disadvantages of Web Applications

- Usually requires high bandwidth
- Storing data remotely
  - Privacy
  - Reliability
- Limited number of GUI components
  - Compared to, e.g. http://java.sun.com/docs/books/tutorial/ui/feature
s/compWin.html
- Interactivity issues

Interactivity Issues

- 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

Example: Event Handling

- j1.html
  - Uses X Library from http://cross-
browser.com/
  - Handles events
  - Modifies the HTML document

HTML Event Models

- HTML 4 Event Model
  - HTML 4.01 Specification - http://www.w3.org/TR/REC-
    html40/interact/scripts.html#h-18.2.3
  - Limited but widely supported
- Standard Event Model
  - DOM Level 2 HTML Specification - http://www.w3.org/TR/DOM-Level-2-
    Events/events.html
  - Browser 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
  - <script>
    
    
    
    
    wtype="text/javascript"
    wlanguage="JavaScript"
    wrsrc="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.

An HTML Document

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

Nodes

Manipulate a Document

Find Elements

Modify Elements ...

... Modify Elements
Create Elements

- `document`
  - `createElement()`
  - `createTextNode()`

Example: Document Manipulation

- `j2.html`
  - Read and display the text input
  - Display "Hello <name>"??
  - Add text input to table??

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 - Properties

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

XMLHttpRequest - Methods

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

An XMLHttpRequest Example

- `a1.html`
  - A client scripts sends an XMLHttpRequest
  - A servlet responses with an XML message
  - When the message arrives on the client, a *callback function* is invoked to update the document
About the Example
- `clickHandler()`
- `newXMLHttpRequest()`
- `updateDocument()`
- `getReadyStateHandler()`

So What is Ajax?
- **Asynchronous JavaScript and XML**
  - JavaScript + XMLHttpRequest
- **Characteristics of Ajax**
  - Non-blocking – the server response is handled asynchronously with a callback function
  - Partial page update using JavaScript

More About AJAX
- XMLHttpRequest used to be an IE specific feature that received little attention
- It's all started by Google Maps
  - Vs. Yahoo Maps (The Old Version)
- The beginning of “Web 2.0” (or 3.0)

AJAX Frameworks and Libraries
- [http://ajaxpatterns.org/Ajax_Frameworks](http://ajaxpatterns.org/Ajax_Frameworks)

More Widgets, Less JavaScript
- Simplifies XMLHttpRequest creation and response handling
  - E.g. X Library, Taconite
- AJAX widgets libraries
  - E.g. Ajax JSP Tag Library, YUI
- Full-fledged web development frameworks
  - E.g. ZK, GWT
- AJAX widgets for existing web development frameworks
  - E.g. ASP, JSF

More Ajax Examples
- `a2.html` - a Taconite example
  - Simplifies request creation
  - Response generated by JSP
  - No JavaScript required to update page
- CSNS
  - Toggle file public
  - Add section
Readings

◆ AJAX: Getting Started -  
◆ Taconite Documentation -  
  http://taconite.sourceforge.net/