Web 2.0 at client side

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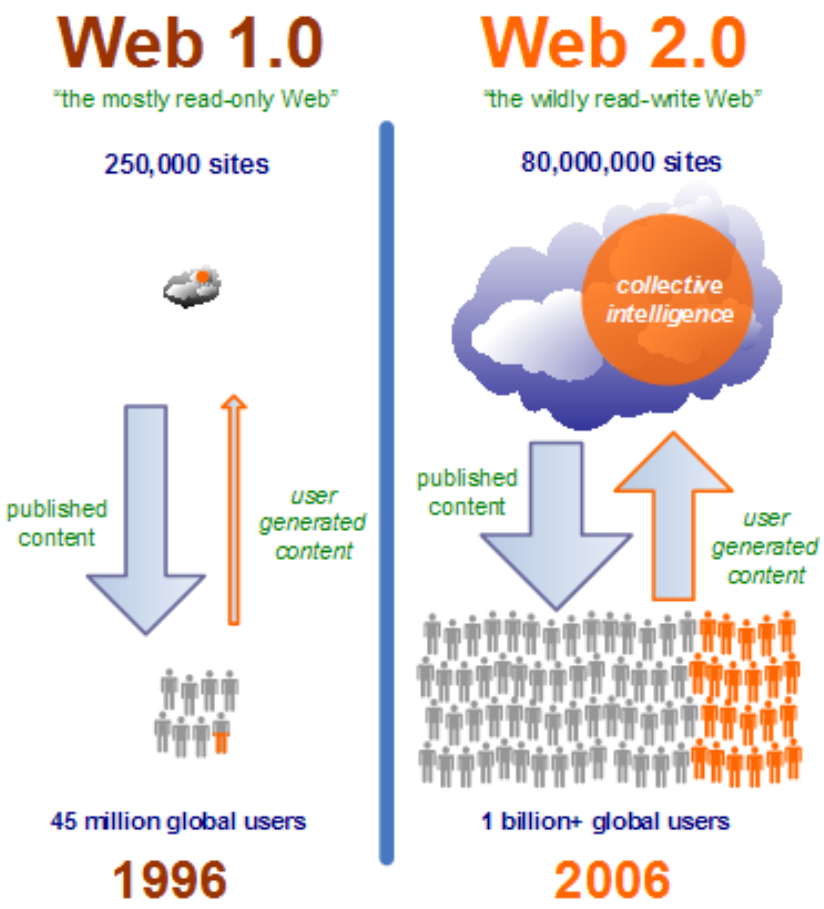
Web 2.0

- "**Web 2.0**" refers to the second generation of web development and web design that facilities
  - information sharing,
  - interoperability,
  - user-centered design
  - collaboration on web.
- Web 2.0 does not have any technical update specifications
- Web 2.0 refers to cumulative changes in the ways software developers and end-users utilize the Web
  - User create web contents
  - Users can own the data and exercise control over that data
- Ex: social-networking sites, video-sharing sites, wikis, blogs, google maps…


Web 1.0
"the mostly read-only Web"
250,000 sites
published content
user generated content
45 million global users
1996
Web 2.0
"the wildly read-write Web"
80,000,000 sites
collective intelligence
published content
user generated content
1 billion+ global users
2006

Web 2.0 vs. Web 1.0

Web 1.0	Web 2.0
collective	dispersed in many places
for individuals	for society, collective wisdom
provide content	provide services and APIs
readable	writable
communication between systems	synchronization between systems
the system includes structure, the content generated is pre-calculated	auto-generate and auto-suggest

Example of the move to Web 2.0

- **Web 1.0 --> Web 2.0**
  - Ofoto --> Flickr
  - Akamai --> BitTorrent
  - mp3.com --> Napster (users share file)
  - Britannica Online --> Wikipedia (users create content)
  - personal websites --> blogging
  - domain name speculation --> search engine optimization
  - publishing --> participation

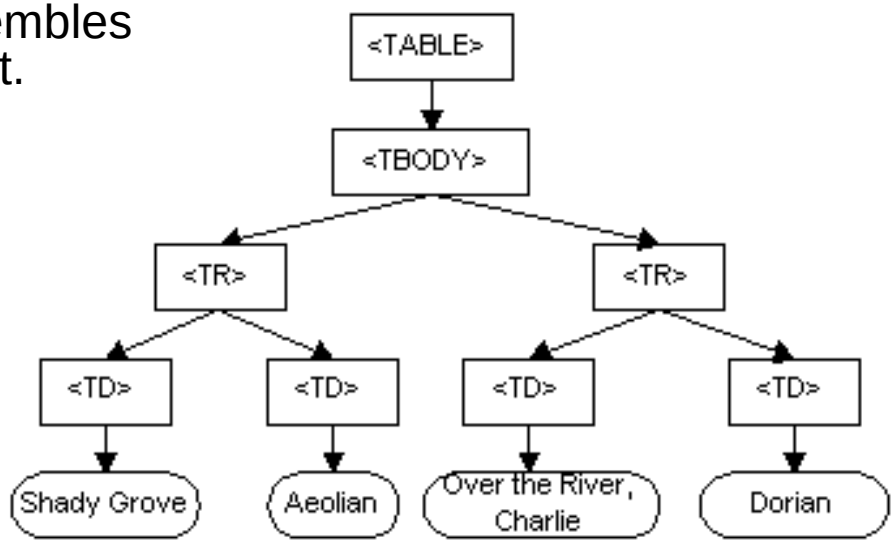
DOM

- The **Document Object Model** (**DOM**)
  - platform- and language-independent
  - standard object model for representing HTML or XML documents
- DOM provides an API for querying, traversing and manipulating such documents
- It defines the logical structure of documents and the way a document is accessed and manipulated.
  - programmers can build documents, navigate their structure, and add, modify, or delete elements and content of HTML and XML
  - DOM uses objects to model elements of documents.
- XML presents data as documents, and the DOM may be used to manage this data.
- DOM is a model and is implemented in different language: Javascript, VBscript, Java…

DOM

- The DOM model of a document resembles closely the structure of the document.
- Ex:

```
<TABLE>
 <TBODY>
    <TR>
          <TD>Shady Grove</TD>
          <TD>Aeolian</TD>
    </TR>
    <TR>
          <TD>Over the River, Charlie</TD>
          <TD>Dorian</TD>
    </TR>
</TBODY>
</TABLE>
```



DOM representation

DOM

- DOM currently consists of two parts
  - DOM Core
    - represents the functionality used for XML documents
    - serves as the basis for DOM HTML
    - A compliant implementation of the DOM must implement entirely the Core and implement at least one of the HTML DOM and the extended (XML) interfaces
  - DOM HTML.
    - Model for HTML document
      - Document, form, button, etc…
- Example of programming with DOM
  - See the textbook

Ajax

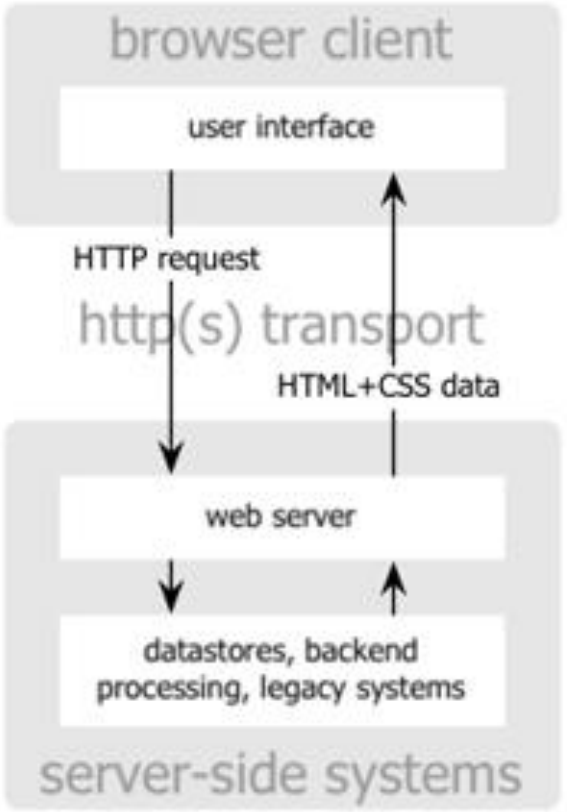
- **Ajax = A**synchronous JavaScript and XML,
- A group of interrelated web development techniques used on the client-side to create interactive web applications or rich Internet applications.
- With Ajax, web applications can retrieve data from the server asynchronously in the background without interfering with the display and behavior of the existing page.
  - reduce bandwidth usage and load time
  - increase interactivity and dynamicity on web pages

  → better quality of Web services
- Data is usually retrieved using the *XMLHttpRequest* object.
- Despite the name, the use of JavaScript and XML is not actually required, nor do the requests need to be asynchronous.

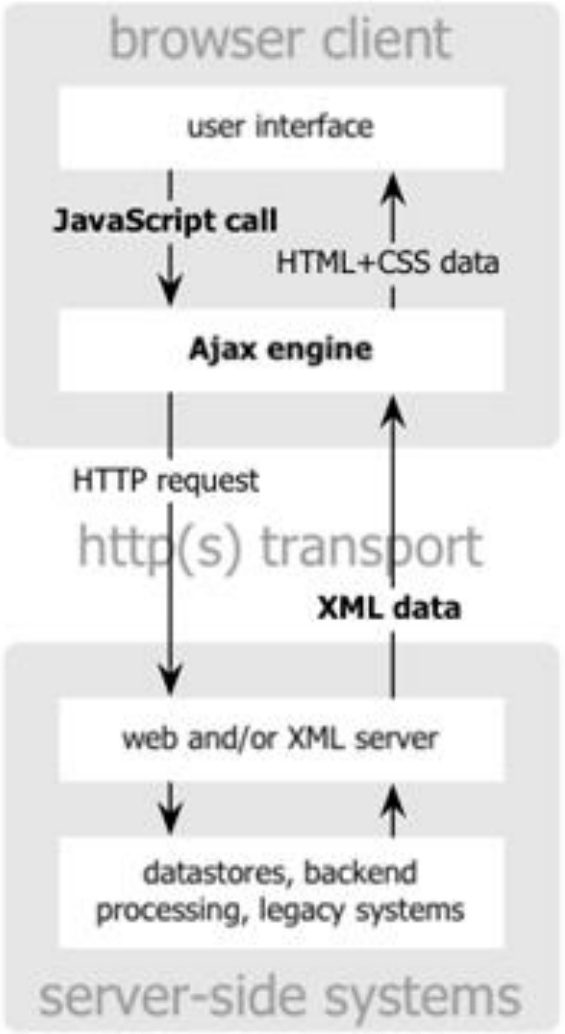
History of Ajax

- 199x: Techniques for the asynchronous loading of content is introduced with Java applets
- 1996, Internet Explorer introduced the IFrame element to HTML, which also enables this to be achieved.
- 1999, Microsoft created the XMLHTTP ActiveX control in Internet Explorer 5 using the native XMLHttpRequest object.
- However, this feature only became widely known after being used by Gmail (2004) and Google Maps (2005).
- The term "Ajax" itself was coined in 2005

Classic Web & AJAX Communication Model

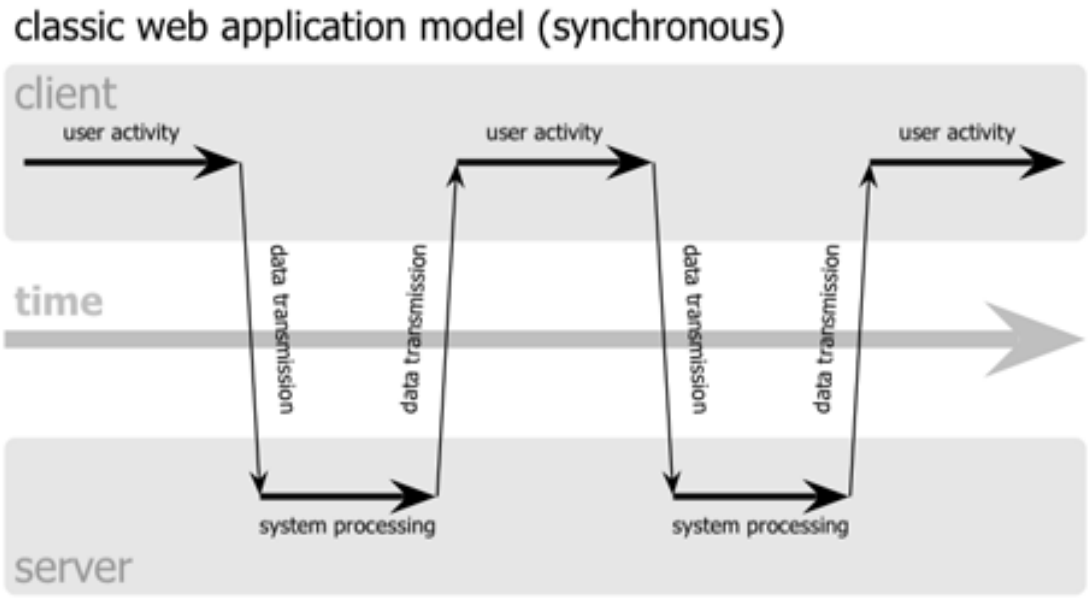


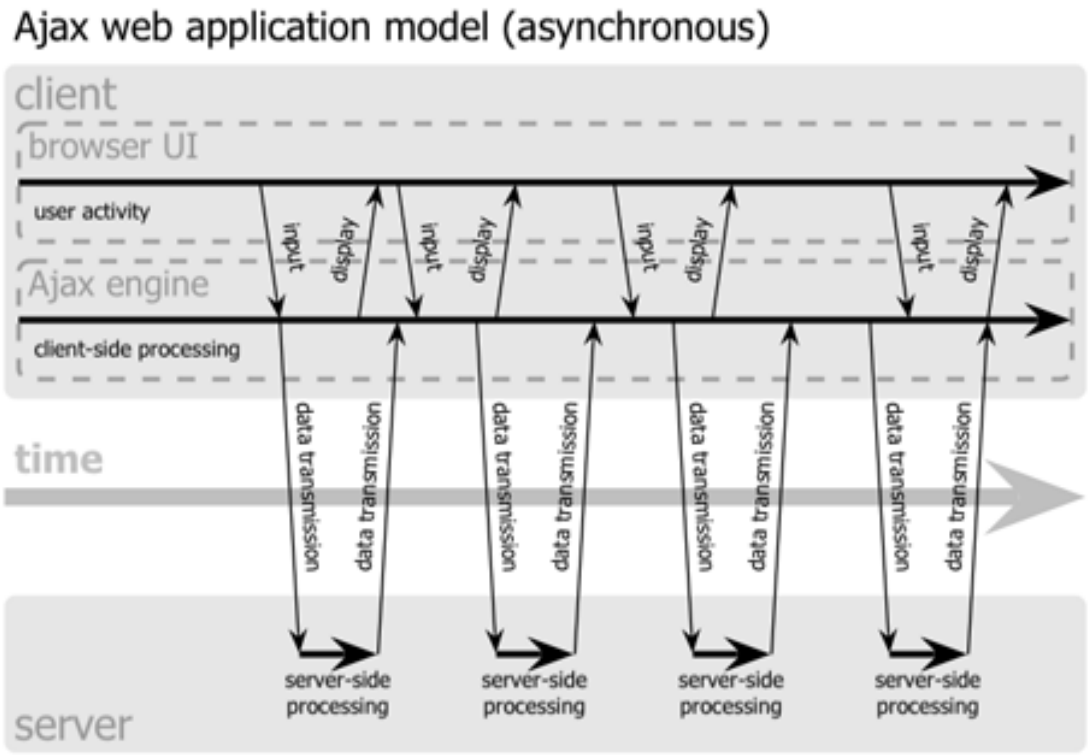
classic
web application model



Ajax
web application model

Asynchronous Communication





Ajax technology

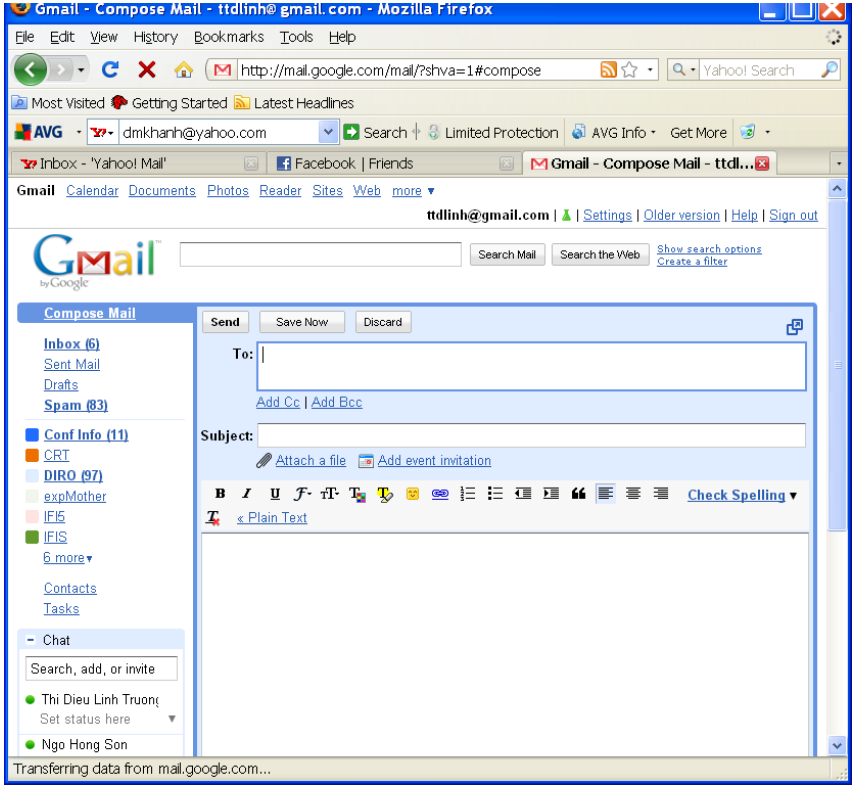
- Uses XHTML and CSS for presentation
- Uses DOM for dynamic display of and interaction with data
- Uses XML and XSLT for the interchange, and manipulation and display, of data, respectively
- Uses XMLHttpRequest object for asynchronous communication
- Uses JavaScript to bring these technologies together
- However
  - Other languages such as VBScript can also replace JavaScript in Ajax
  - XML, XSLT are not required for data interchange and manipulation. JavaScript Object Notation (JSON) is often used as an alternative format for data interchange. Other formats such as preformatted HTML or plain text can also be used

Drawbacks of Ajax

- Pages dynamically created using Ajax requests do not automatically be registered to the browser's history engine
  - "back" button may not return the user to an earlier state of the Ajax-enabled page
- Dynamic web page updates also make it difficult for a user to bookmark a particular state of the application.
- Most web crawlers do not execute JavaScript code → it is impossible for search engine to index page that content is retrieved with Ajax,
- Browsers, devices such as mobile phones, PDAs, and screen readers that do not support Ajax or JavaScript will not be able to use its functionality.
- Ajax opens up another attack vector for malicious code that web developers might not fully test for

Example of Ajax

- Pages using Ajax
  - Gmail:
    - Read or writing an reply email does not require to reload the page
  - News site
    - Play video without reload page



RIA

- Term RIA was introduced in March 2002 by vendors like Macromedia
- **Rich Internet applications** (**RIA**s)
  - Web applications with most of the characteristics of desktop app.
  - Run by using web browser plug-ins, sandboxes or virtual machines.
    - **sandbox** is a security mechanism for separating running programs. Often used to execute untested code, or untrusted programs.
- RIA platform:
  - Adobe Flash/Adobe Flex/AIR: 99%
  - Java/JavaFX: 80%
  - Microsoft Silverlight: 54%
- Example of RIA:
  - Using plug-in : flash : YouTube
  - offline usage : Adobe AIR, Google gears : ?

RIA

- Rich internet applications use a distributed-function model rather than the simple thin-client–server mode
- Flash, Silverlight and Java enrich user experiences in part due to their reduced reliance on network/server communications
  - --> reduce response time
- Challenge for search engines because RIA content is difficult to be indexed