ĐẠI HỌC BÁCH KHOA HÀ NỘI
VIỆN CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

IT4409: Web Technologies and e-Services

Lec 11: AJAX

Objectives

- …

Outline

1. ...
   - ...
2. ...

Characteristics of Conventional Web Application

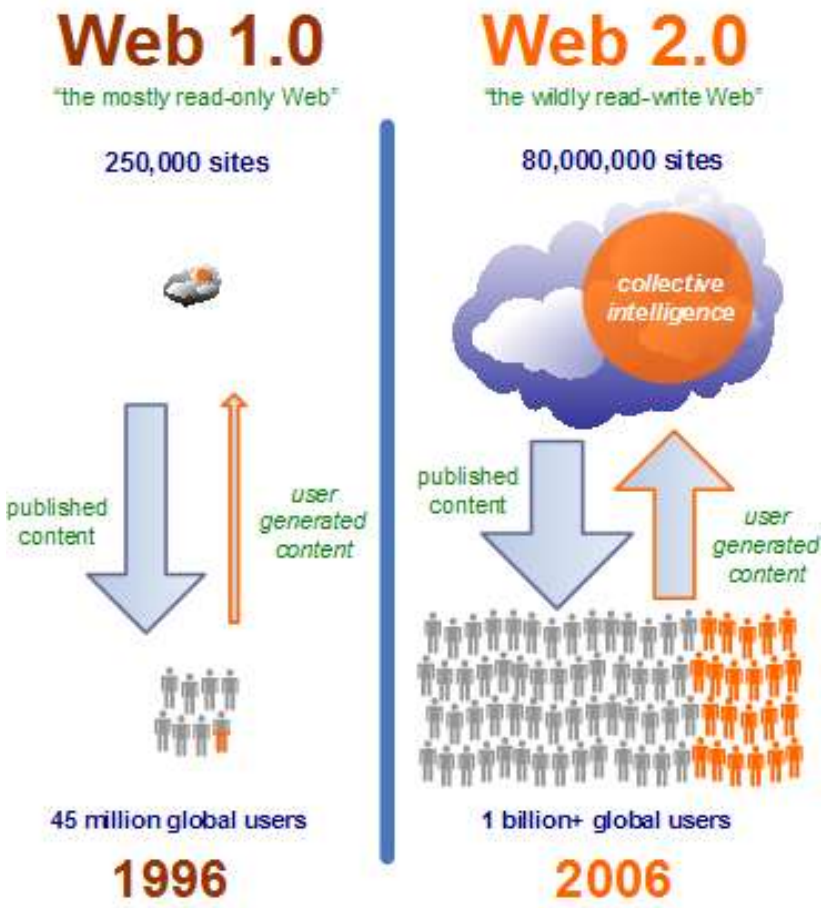
- "Click, wait, and refresh" user interaction
  - ➔ Page refreshes from the server needed for all events, data submissions, and navigation
  - ➔ The user must wait for the response
- Synchronous "request/response" communication model
- Browser always initiates the request

Issues of Conventional Web Application

- Slow response
- Loss of operation context during refresh
- Excessive server load and bandwidth consumption
- Lack of two-way, real-time communication capability for server-initiated updates

➔ These are the reasons why Rich Internet Application (RIA) technologies were born.

Web 2.0 Applications



Web 2.0 Definition

Web 2.0 is the **network as platform**, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a **continually-updated service** that gets better the more people use it, **consuming and remixing data** from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "**architecture of participation**," and going beyond the page metaphor of Web 1.0 to deliver **rich user experiences**.

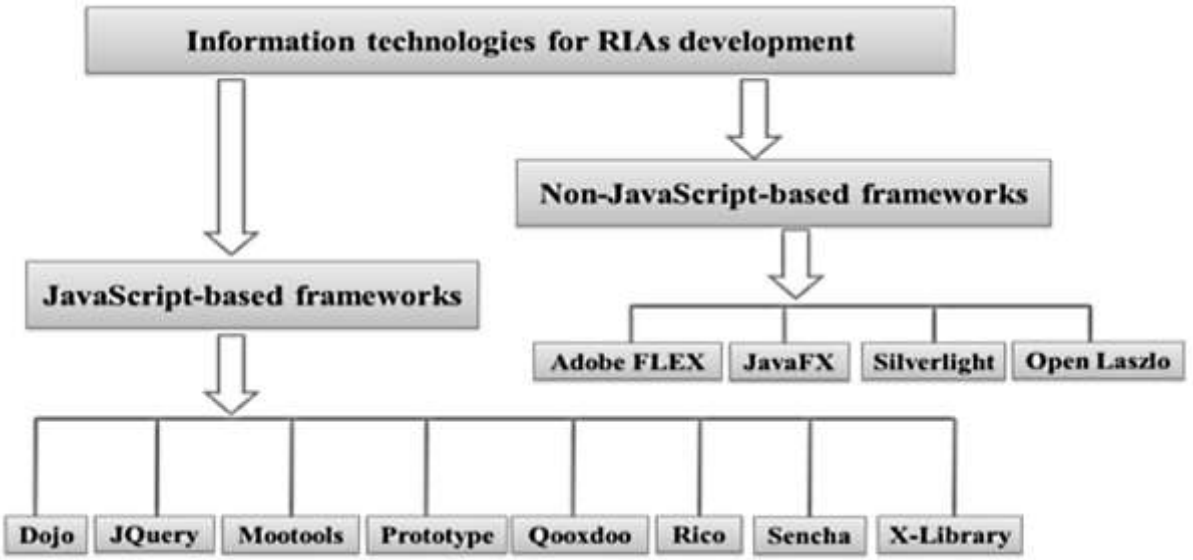
Tim O'Reilly, "Web 2.0: Compact Definition?"

What Makes the Web 2.0 Different?

- Personalized
- User oriented
- Easy to Use
- Get you to the information you want
- Useful
- You can add more...

Rich Internet Application (RIA) Technologies

- Macromedia Flash
- Java Web Start
- Dynamic HTML (JavaScript + DOM + CSS)
- DHTML: No asynchronous communication
  ➔ full page refresh still required
- AJAX

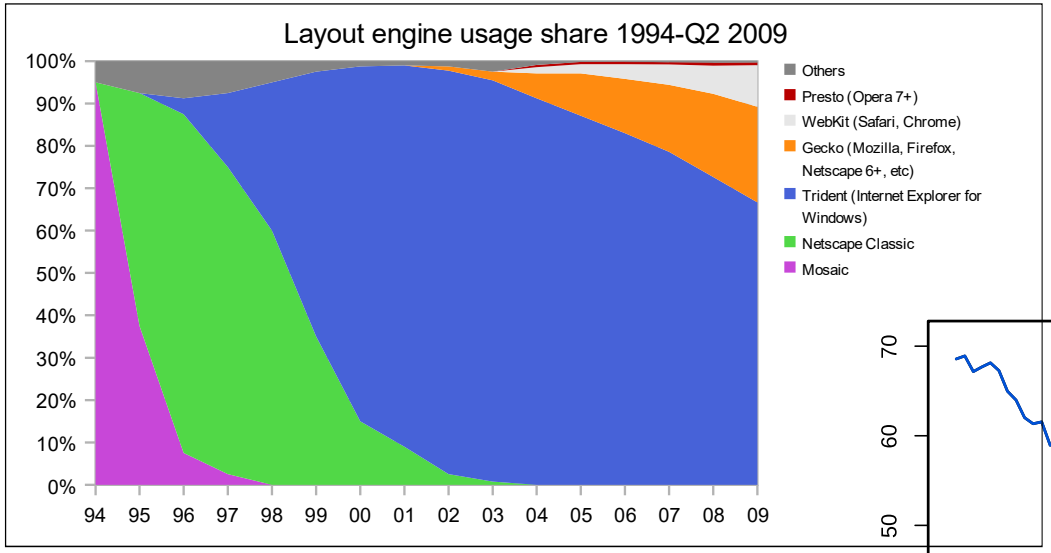


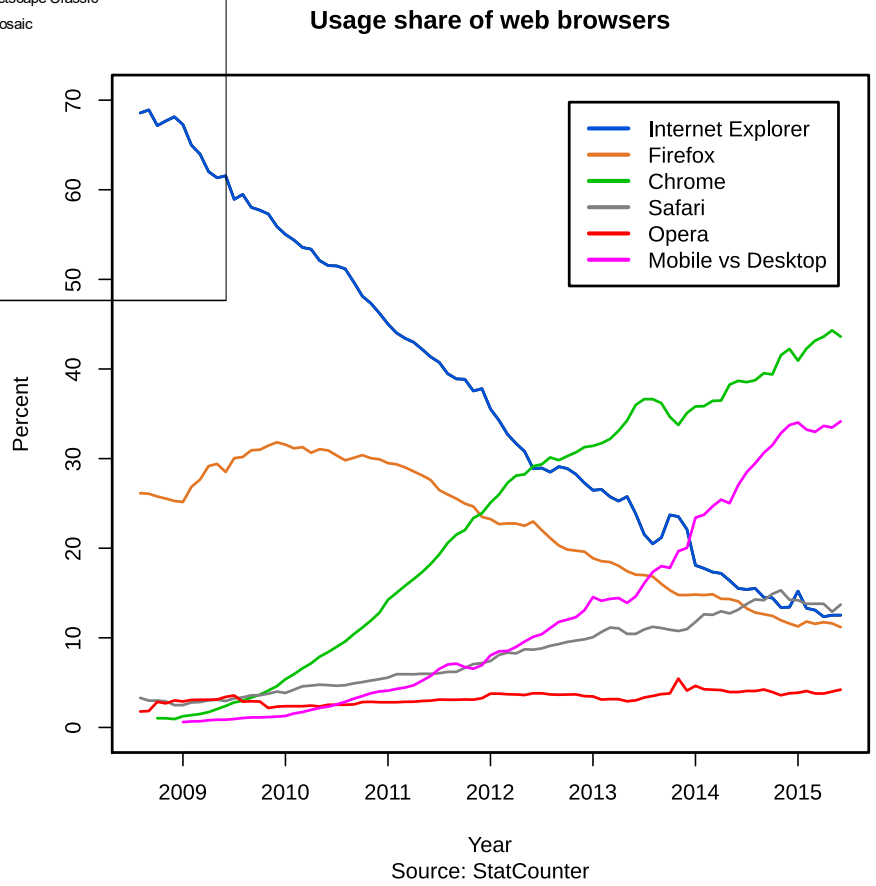
Browser wars

- https://en.wikipedia.org/wiki/Browser_wars
- competition for dominance in the usage share of web browsers.
- The “First Browser War” during the late 1990s pitted Microsoft's Internet Explorer against Netscape's Navigator.
- Browser wars continued with the decline of Internet Explorer's market share and the popularity of other browsers including Firefox, Google Chrome, Safari, and Opera.

➔ Diversity in Web application script languages

Browser wars: market data





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

AJAX Introduction

- **AJAX = Asynchronous JavaScript and XML**
- AJAX is not a new programming language, but a technique for creating better, faster, and more interactive web applications.
- With AJAX, your JavaScript can communicate directly with the server, using the JavaScript **XMLHttpRequest** object. With this object, your JavaScript can trade data with a web server, without reloading the page.
- AJAX uses asynchronous data transfer (HTTP requests) between the browser and the web server, allowing web pages to request small bits of information from the server instead of whole pages.
- The AJAX technique makes Web applications smaller, faster and more user-friendly.

About AJAX

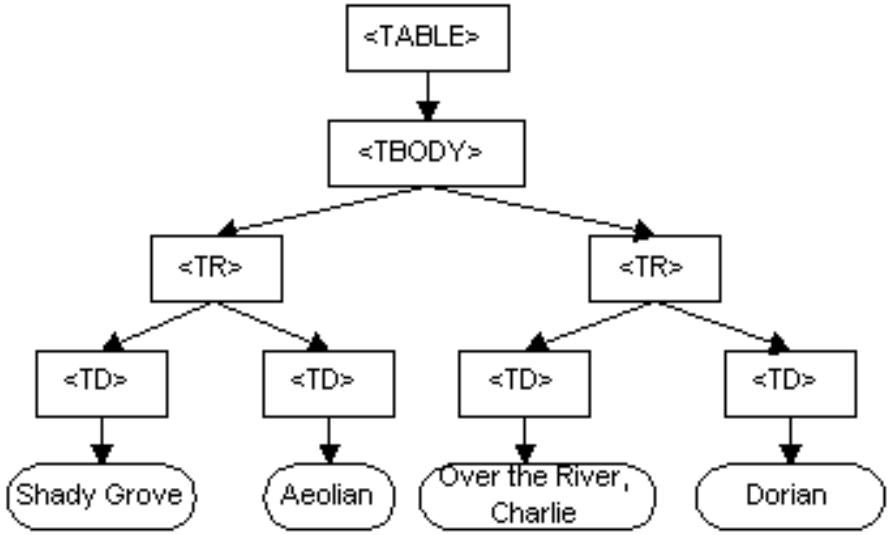
- AJAX is based on the following web standards:
  - JavaScript
  - XML
  - HTML
  - CSS
  - DOM
- The web standards used in AJAX are well defined now and supported by all major browsers. AJAX applications are browser and platform independent.

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 (cont.)

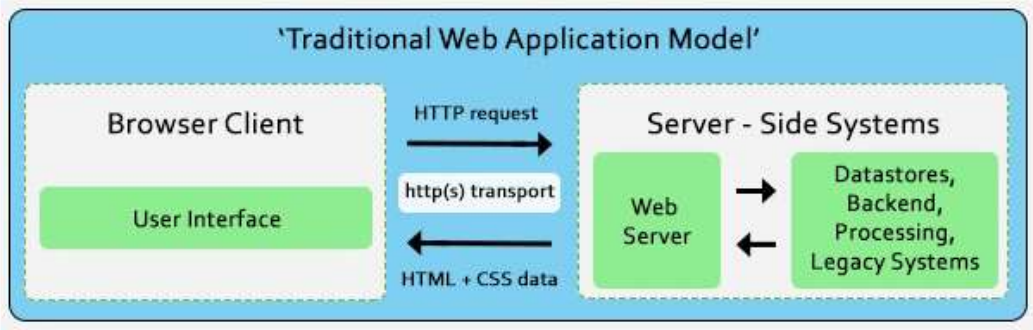
```
<TABLE>
 <TBODY>
     <TR>
          <TD>Shady Grove</TD>
          <TD>Aeolian</TD>
     </TR>
     <TR>
          <TD>Over the River, Charlie</TD>
          <TD>Dorian</TD>
     </TR>
</TBODY>
</TABLE>
```

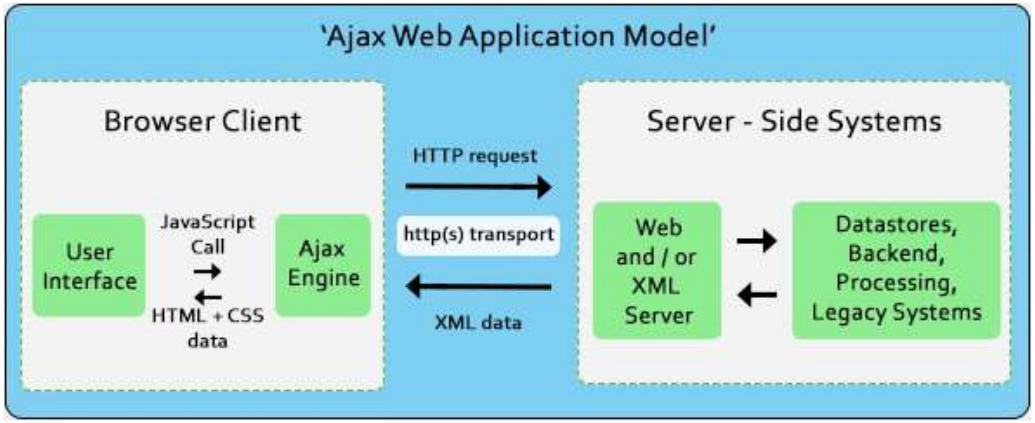


DOM representation

AJAX Architecture

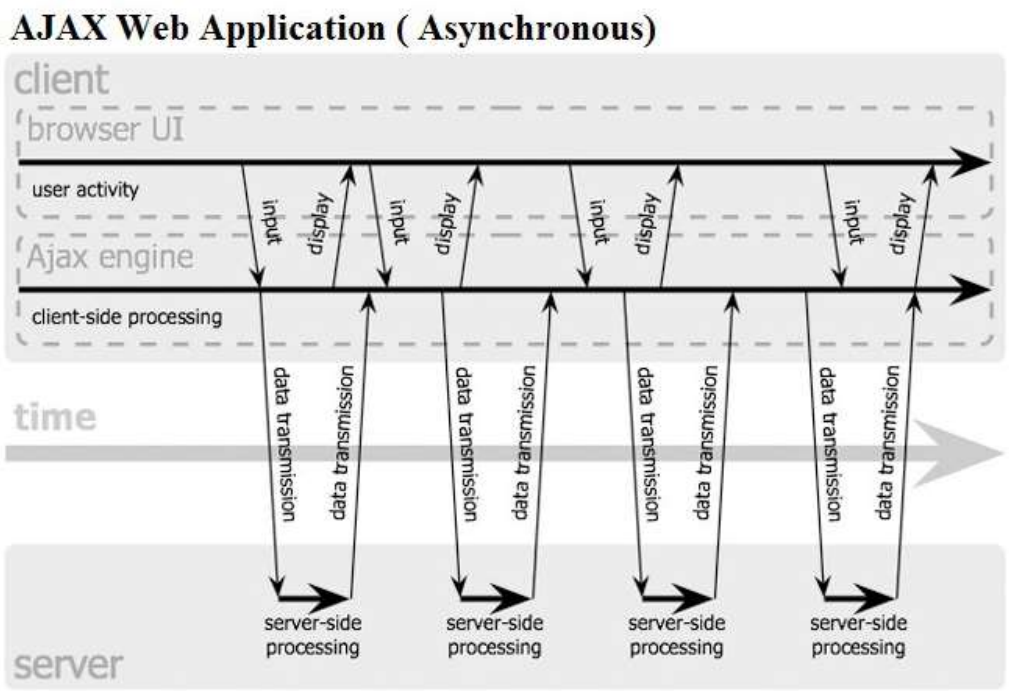
- Ajax application eliminates the start-stop-start-stop nature of interaction on the Web by introducing an intermediary - an Ajax engine - between the user and the server
- Instead of loading a webpage, at the start of the session, the browser loads an Ajax engine.
- AJAX engine is responsible for both rendering the interface the user sees and communicating with the server on the user's behalf.





AJAX Asynchronous Communication

- The Ajax engine allows the user's interaction with the application to happen asynchronously - independent of communication with the server.
- Every user action that normally would generate an HTTP request takes the form of a JavaScript call to the Ajax engine instead.
- If the engine needs something from the server in order to respond to the browser, the engine makes those requests asynchronously using java script XMLHttpRequest.



AJAX tutorial by samples