

A Study on Ajax in Web Applications to improve Usability of Online Systems

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ABSTRACT

In olden days the web technology was using HTML (Hyper Text Markup Language) for creating web pages. The AJAX has changed the traditional paradigm of Web development by giving partial page update facility. Ajax is short-form of Asynchronous JavaScript and XML. It is a bundle of technologies that combined together to create new, dynamic, responsive and powerful web applications. Most of the giant internet-based companies such as Google, Yahoo, Microsoft and Amazon etc. are developing web applications based on Ajax. Even though major internet based companies working with Ajax, there is still ignorance about this technology among many developers. Many developers find it difficult to handle those bundle of technologies to build Ajax application.

Keywords : Web Application, Asynchronous communication, XML, AJAX

I. INTRODUCTION

AJAX

Today's rich Web applications use a mix of JavaScript and asynchronous communication with the application server. This mechanism is also known as Ajax: Asynchronous JavaScript and XML. The intent of Ajax is to exchange small pieces of data between the browser and the application server by using partial page refresh instead of reloading the entire Web page. AJAX (Asynchronous JavaScript and XML) is a powerful Web development model for browser-based Web applications. Technologies that form the AJAX model are XML, JavaScript, HTTP, and XHTML. These are individually widely used and well known. AJAX combines these technologies to let Web pages retrieve small amounts of data from the server without having to reload the entire page. This capability makes Web pages more interactive and lets them behave like local applications. Web 2.0 enabled

by the Ajax architecture has given rise to a new level of user interactivity through web browsers. Many new and extremely popular Web applications have been introduced such as Google Maps, Google Docs, Flickr, and so on. Ajax Toolkits such as Dojo allow web developers to build Web 2.0 applications quickly and with little effort.

II. COMMUNICATION TECHNIQUES

2.1 Synchronous Communication

Classic web applications uses synchronous communication in most of applications. Synchronous communication is good for the static web applications. Websites giving read-only information is a good example of static web page. But for more interactive, dynamic and responsive web applications, synchronous communication is not suitable.

In classic web application, generally user needs to send a request to server through some link or form using synchronous communication system. In such systems, user has to wait till the server side processing is completed. In some scenario, as a result of user query to server, a dynamic creation of content in web page is necessary. In such cases, a full page refresh is done to update the user-desired results. In this process, user has to suffer from very unpleasant experience of broken connection till page is updating. This make-and-break of connection continues whenever user asks for any new piece of information in synchronous communication.

This request-wait-response pattern in classic web applications is extremely troublesome. It also lowers overall productivity. The classic web application model has many drawbacks such as large response time that makes it sluggish, loss of states, usage of excessive bandwidth, less interactive nature of application and redundant data in transmission code which makes code heavy unnecessarily.

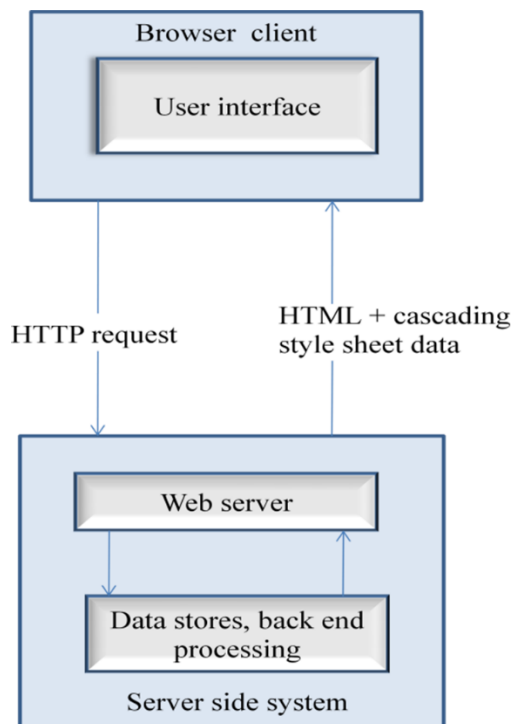


Figure 2 : AJAX Web Application Model

Ajax engine adds asynchronous communication to the web application, by sending and receiving data from server side asynchronously. Due to this behavior of Ajax engine, an undisrupted and fast responding web applications can be experienced. Even if, Ajax model adds extra level in web application module, it makes overall application more responsive and interactive, instead of slowing it down.

In classic web applications, whole web page needs to reloaded, on every user triggered event. Ajax eliminates this need-to-reload. Ajax also increases overall efficiency of web application, by providing updates of specific content that user asked for, rather than updating entire page. This process saves lots of data transmission, leading to saving of bandwidth usage. Due to this, overall process becomes much faster and user experiences more responsive and richer interaction with web application.

III. AJAX ARCHITECTURE

The AJAX is benefit for those who are already involved in implementing MVC architecture like user registrations for organizations, validations (like name(s), email, Date of Birth (DOB), exception handling, etc.), shopping cart applications and so on. With this technology they can experience how to download such information on to client system in an asynchronous mode without keeping client in a wait state for a longer time.

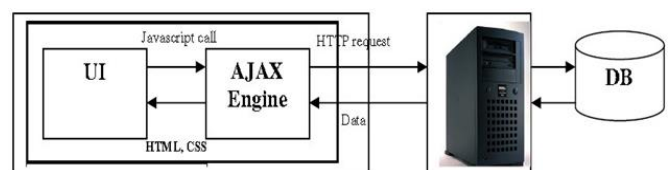


Figure 3: AJAX Architecture

This approach involves transmitting only a small amount of information to and from the server in order to give the user the most responsiveness experience possible. In traditional web application model browser is responsible for initiating client requests and processing requests from the web server. The AJAX model provides an intermediate layer without client's involvement.

IV. TECHNOLOGIES

The term Ajax has come to represent a broad group of web technologies that can be used to implement a web application that communicates with a server in the background, without interfering with the current state of the page.

- ✓ HTML (or XHTML) and CSS for presentation
- ✓ The Document Object Model (DOM) for dynamic display of and interaction with data
- ✓ XML for the interchange of data, and XSLT for its manipulation
- ✓ The XMLHttpRequest object for asynchronous communication
- ✓ JavaScript to bring these technologies together

Since then, however, there have been a number of developments in the technologies used in an Ajax application, and the definition of the term Ajax. JavaScript Object Notation (JSON) is often used as an alternative format for data interchange, although other formats such as preformatted HTML or plain text can also be used.

V. USE OF AJAX TO IMPROVE USABILITY

AJAX can help to improve usability in many situations while implementing an online information system. Some of them are discussed below

1. AJAX allows the partial page updates which improves the efficiency of the information system. The partial page update will reduce the time taken to complete the task and thus improve efficiency of online information system. The recently updated results can be highlighted also to let the user know about the changes that has taken place.

2. While filling a form with AJAX support in an online information system, the users will get to know the validation errors in the form before actually submitting the form. Although certain validations like mandatory field validation, range validation etc. could have been implemented with only Javascript but there may be cases where data is required to be posted to server to validate the data like ensuring availability/non-availability of UserID while filling a registration form. In such cases AJAX may help to post the data to server to ensure availability of UserID and coming up with possible suggestions in case of non-availability of filled UserID. Use of AJAX to perform validation at an earlier stage will help to improve efficiency and satisfaction level of users. In the above discussed example, without AJAX support, to ensure availability/non-availability of UserID, user may get frustrated if the filled UserID, tried differently multiple times, is unavailable. Moreover whenever there is a round trip from client to server and server to client, data filled in certain fields like password may get empty and user will have to fill the data every time.

3. AJAX can be used during CAPTCHA verification to allow partial page update instead of refreshing full page when the filled image characters are sent to server for verification.

4. Various AJAX Controls are available in different front ends to provide different functionalities like providing watermark on textboxes, determining password strength etc. These AJAX controls help to build a more usable and intuitive interface.

IMPACT OF AJAX

AJAX user interfaces are highly responsive and giving users the feeling that changes are instantaneous. AJAX moves web-based applications from a page model to a true application model, based on events and user actions. Here are major impact criteria are given for considering the impact of AJAX in the web applications which are highly interactive.

- ✓ User can use standard web browsers like I.E, Mozilla, Firefox, Netscape etc.
- ✓ User is not forced to wait till the whole page is loaded or refreshed.
- ✓ Even in case of an error in one segment other segments can stay usable.
- ✓ It normally avoids scrollbars and makes user experience flexible.
- ✓ Data is manipulated in XML format so it can be easy to interoperate with other languages like PHP, Perl, CGI, ASP.NET.

VI. FEATURES

Ajax changes the way of development in Web applications. Google maps presents huge interest by web developers, because it shows that Ajax is practical for real world applications.

7.1 Advantages:

- ✓ Open source: Ajax is a unique combination of existing open source technology.
- ✓ Minimize cost of development: Ajax application can be developed with just simple notepad.
- ✓ Optimization: Code can be easily separately optimized in small parts.
- ✓ Enriches user experience: Ajax applications provide more interactive, optimized, and dynamic web content.
- ✓ Fast: Ajax applications are faster than traditional web applications.

- ✓ Compatibility: Very compatible with existing technologies.

7.2 Disadvantages:

- ✓ Complexity: More complex than traditional web applications.
- ✓ JavaScript: More use of JavaScript for interaction.
- ✓ Old browsers: More bulky and separate code for old browsers.
- ✓ Internet explorer: Different code for internet explorer.
- ✓ Coding: Adding extra layer to existing web model needs more coding.

VII. CONCLUSION

"*Asynchronous JavaScript and XML*", is a web development technique for creating interactive web applications. The intent is to make web pages feel more responsive by exchanging small amounts of data with the server behind the scenes, so that the entire web page does not have to be reloaded each time the user requests a change. This is intended to increase the web page's interactivity, speed, and usability. AJAX has high impact on web applications compares to standard web applications and it also has several features which overpass the normal web applications. It also saves the round trip to the server. Adapting AJAX feature in communication of client and servers, decrease traffic and increase faster transmission.

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