Evolving Ajax with JSON for Web Application Enrichment

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ABSTRACT
Today popularity of web application depends upon its content and its response time. Ease of access, increased availability of information, richness of web services elevated productivity and usefulness of web application. There are several rich internet applications are available which are highly interactive, but they also face common problems such high loading time, need to reload page time to time and lagged performance. Implementation of AJAX (Asynchronous Java Script and XML) can overcome these problems. Its implementation makes web application faster, highly interactive, and user friendly. This paper presents the implementation of AJAX in existing web application world. Traditional verses AJAX based web applications are studied and the results disused here.

General Terms
Web development, Rich Internet Application

Keywords
AJAX, RIA, AJAX-Framework

1. INTRODUCTION
In our day to day life everyone uses web application for information gathering, for updating knowledge and also for different web services. Many web applications provide useful information and also maintain its quality as well. The term Ajax i.e. Asynchronous Java Script and XML particularized the way to recognize the HTTP communication of web page in which java script program is ingrained.

For retrieving information or for use of different application user have to wait for page to page reloading in conventional websites. Even after reloading of page content remains for the most part unaltered until a client activity triggers event for a totally new page. Rather than this websites using Ajax can progressively stack new information from and transmit information to the originating web server. The JavaScript application running inside the program can upgrade content of the page without disturbing the entire page at each information transmission. Communication perform asynchronously in back ground, while web application stays fully functional in the interim. Figure 1 demonstrates the control-stream of an Ajax website contrasted with a conventional web application.

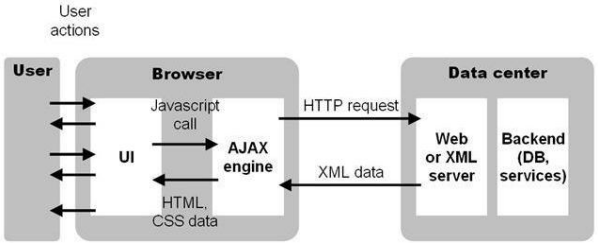

Fig 1: Generalize Architecture of Ajax

In Ajax application communication with web server is handled by XML HTTP request and retrieve information either synchronously or asynchronously. In the next case application is noticed by mean of callbacks when the recovered information is accessible. The scripting language like JavaScript is use for making XML HTTP request object more accessible. By utilizing the available components some highly interactive web applications can be acknowledged, as e.g. Google Maps (http://maps.google.com) where clients can consistently explore through maps or Gmail where inbox gets updated or mail transfers within folders without any page reloading.

So web application based on Ajax appear to offer tremendous advantages in usability compared to conventional web applications. But according to studies it is analyzing that use of Ajax in web application is very rare. So the aim is to produce some convincing results that demonstrate usability of Ajax.

2. LITERATURE REVIEW
In this section we make study of some previous research in web application. Here we discuss some closely related work. Some of the techniques which relates to our proposed work are being studied.

[9] introduces users view regarding to use of World Wide Web. many users have the complaint that they have to wait far too long for information to download. At present there is no sufficient speedy services are present therefore the problem of delay is occurring. How many time actually passes is not a delay but how many time users have to wait is actual delay.

To minimize this delay authors decided to implement the idea of feedback from users. This feedback is about how long user willing to wait, awareness about page delay, length of page, etc. by getting feedback authors developed four interfaces with browser style which used to evaluate user satisfaction with system.

A study of tolerable waiting time is done in [10]. Here how long user willing to wait is analyze more deeply. They describe about Tolerable computer response time, Tolerable waiting time for Web page download, Effect of feedback on

TWT which gives knowledge about the different factors related to the page loading time and user's satisfaction.

The basic system introduction by adopting Ajax is given in [3]. Wrapping up of HTTP Request object creation codes inside a functions is performing in this structure. Which can viably diminish the excess code in Ajax usage. This paper gives the system construct exclusively with respect to the JavaScript, thus it is helpful for new developers. The technologies which are already established such as jQuery, JavaScript were used in this structure, they provide efficient wrappers for Ajax with different features. As learning curve of this structure is not too high this structure is not considerably useful for richness of web application. [4]

Propose another architecture for Ajax based RIA's. The architecture is named as SPIAR. It obtains couple of parts from Google's GWT, Backbase and Echo2; Alternate part structures is carried out by this engineering style. For single page improvement SPIAR is useful but it is not beneficial for improvement of overall application.

3. PROPOSED METHODOLOGY

3.1 Usability Aspects

While using Ajax in a part of website pages, it empowers new communication modes with pages, which infer on usability of these. In this segment we will examine that the proper use of Ajax can beneficial for web applications. In the next section we will talk about the downsides of its utilization.

3.1.1 Application Speed

Web applications make a use of Ajax for loading information needed by the user. User already open web page in browser. Sequential load can truncate to the changes. For unchanged parts like menus or page layout server cannot send code again and only transmit updated content. This leads to minimization of loading time of web page which is important for application speed.

3.1.2 User Interface Smoothness and Interactivity

For each new request from user, page should not be disturbing because user can work within a page. If the page gets change or reload for any kind of new request, affect the work process of the client. While transmission of information by mean of Ajax the client interface remains consistently obvious and unaltered with new contents elements also. A good user interface is that which cooperates with the user and responds spontaneously to his action. According to Lowry et al.'s study the higher interactivity of web application can give more satisfaction to user. With respect to interactivity, web applications were continuously in a substandard position contrasted with desktop application. Traditional web application only interacts with user; it sends new contents to the user by loading new page. When there is large data is needed by user, it becomes complex to fetch such a big data from server. If the web application is Ajax based, then it will continuously interact with server and take updates from server for each possible request and only updated part has to be loaded.

3.1.3 Data Transfer Transparency

According to Culwin and Faulkner's study an interface which keep informed with respect to whole loading process over an interface is preferable by users. The web application using Ajax are able to show the custom loading indicator. By which user can informed by application about when data starts loading, progress of loading, which content gets load, etc. while in traditional application unpleasant estimation of the loading progress is perform.

3.1.4 New Interactions

Instated of just supplanting general loading content and accelerating applications, Ajax provide new way of interaction with web page. For an instance it is difficult to acknowledged completion suggestions for the typed characters in an input field. For a web page neither reloading of complete page for small changes nor preloading of requested data, both in combination would be really useful.

3.2 Problems

As we have seen, the utilization of Ajax can enhance site ease of use in a few modes. But by modifying the way of web application work, issues also emerge. In this segment we will talk about the disadvantages of Ajax in terms of accessibility and the disturbance of navigation tools of web browser.

3.2.1 Accessibility

Users having the browsers which does not support JavaScript are not able to access Ajax applications as Ajax applications depend totally on JavaScript. The browsers like Lynx and some of the browsers for mobile devices are included in this group. Execution of JavaScript support is different for different browsers. Sometimes such a problem may occur that Ajax application do not give expected results with some versions of browser. There is required extreme efforts to get high compatibility. The conveyance of normal HTML pages consisting of Ajax functionality is the conceivable solution to the problem of accessibility. For recognizing Ajax support a non-Ajax-based version of the page is loaded and subsequently altered by a JavaScript program.

3.2.2 Browser Navigation and Bookmarks

In ordinary web application clients explore between pages and can utilize browser's "back" and "forward" buttons to reuse the recently visited pages. For revisiting the pages, they can be bookmark generally. Apart from this in Ajax web application only contents of page get changes or loaded so browser is not able to go "back" any more. Clicking on navigation button may give undesirable results. Ajax renders bookmark function of web browser, as in the application using Ajax content of page changes but URL cannot change. If we use bookmark function, then also only initial screen is loaded.

Some workarounds for these issues are known. For handling of the "back" and "forward" buttons, which get support from the current releases of Mozilla Firefox and Microsoft Internet Explorer browsers, custom function is implemented which is a promising approach.

4. METHOLOGY

As we discuss in previous sections Ajax based web applications are always give better performance than the conventional web applications. Therefore, to prove this statement we develop one sample web application based on Ajax. For creating this application, we choose domain as Medicare. Question may arise that why we focus on health? But if we take any general survey regarding to health we can find out that the (NRHM) was launched in April 2005 by the Government of India, still millions of people die due to insufficient knowledge about healthy living and medicines. There are total 2189 PHCs required in Maharashtra and only 1811 PHCs are in position. Whereas if we talk about mobile phones and internet they are available everywhere. That means doctor cannot reach to villages but mobile can reach. Therefore, we choose this subject for our web application.

At the initial stage we develop a single Ajax feature in our web application. And then analyze the result of application. At that time even if we use Ajax based feature then also it cannot give satisfied result. According to results it is clear that only Ajax based application cannot improve performance, to enrich the performance there is need of some framework. Therefore, in the next module we describe framework for Ajax. [5] Introduce the detail information about framework for Ajax. Following figure shows generalize architecture of Ajax.

If the model view controller technique is applied in RIA based on AJAX then it will be beneficial. In RIA different programming languages are used for development of different parts. In the MVC model designing and developing is perform in three parts where we can use various programming language for each part. It is really become realizable if we use RIA in MVC way for implementing Ajax technology. Following figure shows MVC modeling.

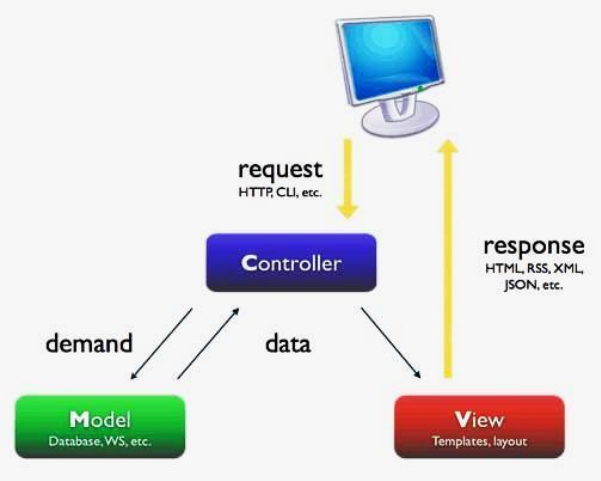

Fig 2: MVC Modeling

In this way by developing Ajax applications in RIA using MVC model we can overcome critics with Ajax. Another guideline define is use of JSON with Ajax. JSON stands for JavaScript Object Notation. Ajax has limitation of fetching data from the same domain (website) that the Ajax application came from if data is formatted as xml. But if data is formatted as JSON then Ajax can access data from anywhere. JSON is a lightweight data interchange format that's why it also reduces burden of excessive expression in coding.

5. RESULTS

To find out the performance of our web application we use some trustable tools via internet. Results show the improvement of application with different extends like page speed, number of request required to fetch page, loading time, size of page. This results are shown in following figure.

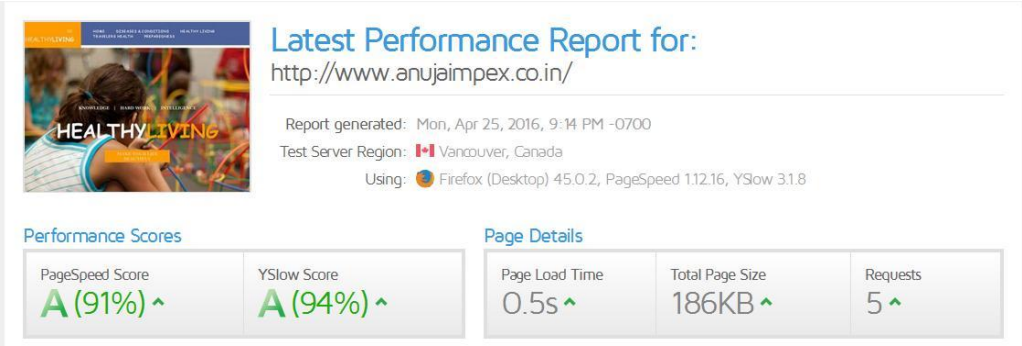

Fig 3: Performance Report

Comparative results are examining by using some non-Ajax based web applications. We compare our web application with three non-Ajax based applications and also with some Ajax based applications and calculate some results. As seen in following figure 4 and figure 5, it shows the loading speed required by each web application. The size of the page, internet speed of the user computer and loading time of the page on the user's computer is take in consideration while calculating the speed. How faster the webpage responds to user interaction and the loading time required for web pages is also calculated.

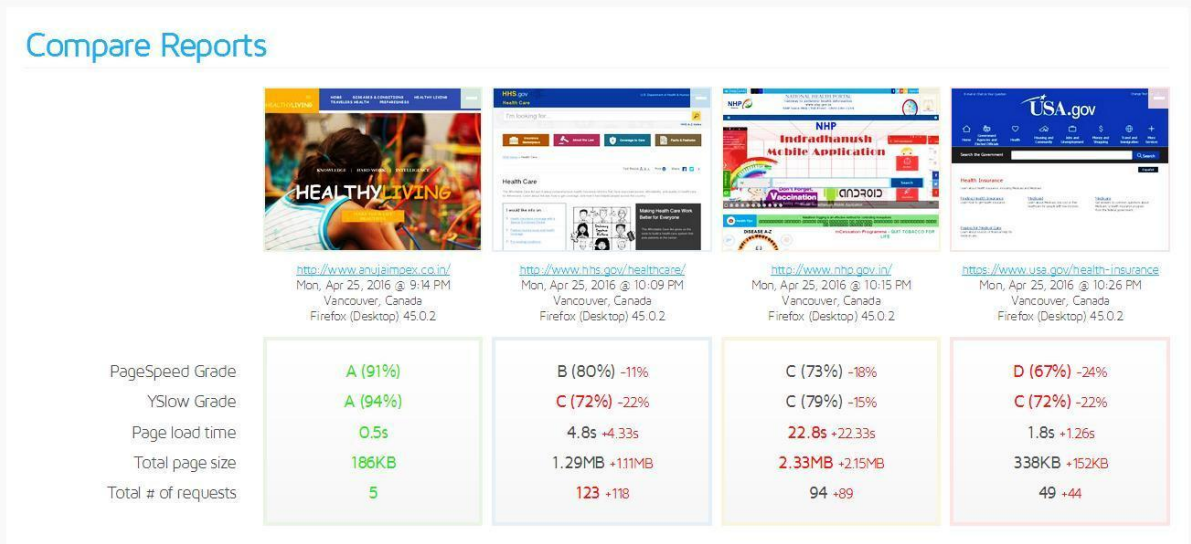

Fig 4: Comparison Report (AJAX Vs Traditional Web Applications)

Table 1: Comparison with government web application

Sr. No.	Web Application	Page speed grade (%)	Yslow grade (%)	Page Load Time (second)	Total Page Size (kb/mb)	Total No. of Request
1	Proposed system	91%	94%	0.5s	186kb	5
2	Site A	80%	72%	4.8s	1.29mb	123
3	Site B	73%	79%	22.8s	2.33mb	94
4	Site C	67%	72%	1.8s	338kb	49

Table 1 above shows, the numbers, that given in the figure 4, which are the first comparison results of the proposed system based web application with several other government web applications in the same area of healthy living. As seen from above table, proposed system is compared against other web applications, on five different parameters. The proposed system has fastest loading speed, hence least load time, its Yslow grade is 94%, which is best in the category and only 5 request has to be made to load a page which is also very much less that other web applications.

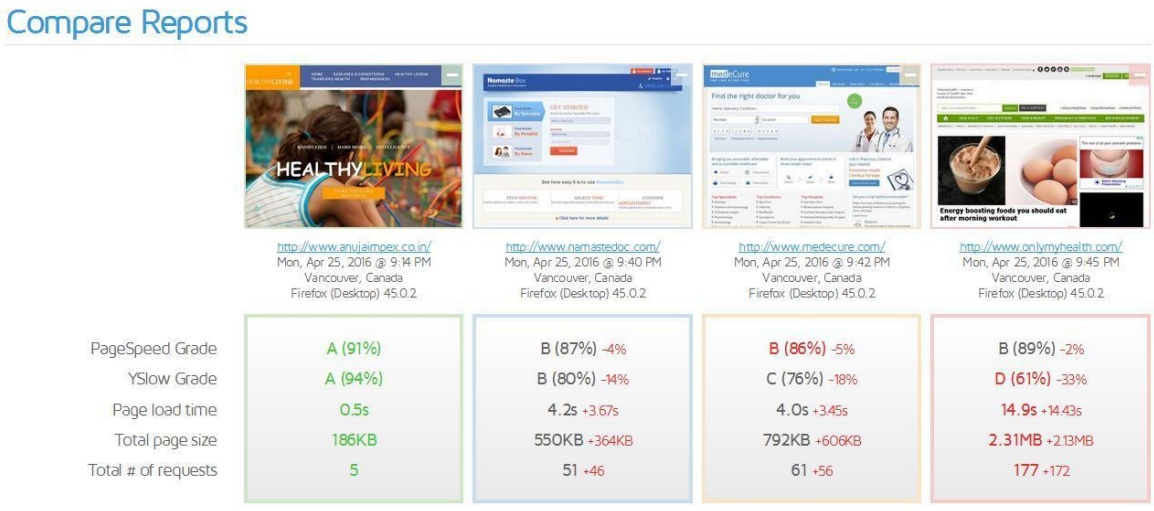

Fig 5: Comparison Report (AJAX Vs Traditional Web Applications)

Table 2: Comparison with Private Web Application

Sr. No.	Web Application	Page speed grade (%)	Yslow grade (%)	Page Load Time (second)	Total Page Size (kb/mb)	Total No. of Request
1	Proposed system	91%	94%	0.5s	186kb	5
2	Site B	87%	80%	4.2s	550kb	51
3	Site C	86%	76%	4.0s	792kb	61
4	Site D	89%	61%	14.9s	2.31mb	177

Table 2 above appears, the numbers, that given in the figure 5, which are the principal examination aftereffects of the proposed framework based web application with a few other privateweb applications in the same zone of solid living. As seen from above table, proposed framework is looked at against other web applications, on five distinct parameters. The proposed framework has quickest stacking speed, subsequently minimum burden time, its Yslow evaluation is 94%, which is best in the class and just 5 demand must be made to stack a page which is additionally particularly less that other web applications.

5.1 Interpretation of Results

As per the result it is clear that Ajax based web application n with some proper guidelines improve performance of web application and can give efficiency and satisfaction with use of such applications. While non-Ajax application and also simple Ajax based application cannot give efficient results. Comparison is done with respect to different aspects like loading speed, page fetching time, space required for page that depends upon size of page, etc. in every comparison web application which uses generalize framework for Ajax gives noticeable advantage. The simple Ajax based application and non-Ajax based web application face some common problem of large size of page, excessive loading time, etc.

6. ACKNOWLEDGMENTS

Our Developers facing Various complexities while building RIA based on Ajax. In this paper we discuss about user expectation regarding to the performance of web application, also presents advantages of using Ajax in web application, but drawbacks are considered. Usability and user satisfaction influence the efficiency of application. But if we use generalize framework for Ajax then it will solve the usage incompatibility with Ajax.

In future work we will try to find out and implement more efficient architecture using green Ajax. Which will give us more recognizable advantages in field of RIA's and make these application most likely as desktop application.

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