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The Reconstruction Pattern of MVC

Guangyuan Song[1]

School of computer Science
Dezhou University,dezhou, shandong, 253023, China
398096840@qq.com

Abstract

Traditional MVC model is a monopoly-like patterns in response to the request, although there are a lot of advantages, but the performance of the layer is weak, and AJAX just make up for shortcomings in this regard.Ajax is the popular Web client technology, providing a asynchronous programming model by the adoption of Java Script and DHTML, so as to enhance the interactive web pages and the ability to respond so that the Web application offer the human-computer users a better experience. In this paper, it illustrates the development of Web applications by combination of both, and puts forward the reconstruction of the MVC pattern.

Keywords: *MVC Model; Ajax; Iterative MVC*

1. Introduction

The traditional development model of Java web is based on the development of the Java Web MVC Model12. Web-based applications to run logic of this mode are switched by a series of pages, and each page is the smallest indivisible unit. To update the data page must be a whole page refresh. Appearance of AJAX technology greatly change the traditional development model, a good web development has changed the traditional model to improve the user experience, it offers the users experience of continuous state, avoiding the traditional web application request - wait - response process, allowing users to multiple asynchronous requests sent continuously, without waiting for the server to respond.

With the development of technology, functionality and design presentation layer has become more complex. There is no longer the presentation layer only in HTML elements. In the new design, the performance level has become a leap Server and Client-side subsystem, including both the management of UI components, but also for AJAX communications package. The degree of its complexity has been even more than what was originally thought to be the absolute core of our business logic layer and persistence layer. Therefore, the further introduction of the MVC design pattern into the presentation layer has become a very real issue. The article describes the features of the traditional MVC pattern, analyzes Ajax communication mechanism of new technologies, and proposes reconstruction of the MVC pattern based on it.

2. Traditional Web Presentation Layer Technology

Traditional MVC design pattern redefines the development model of applications of the B / S model structure. MVC pattern prescribes B / S structure application should be divided into three parts: Model, View and Controller. Data access and data MVC pattern separation performance provides better decoupling of the system. The core idea of MVC framework is

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that the program is divided into relatively independent three parts while working together. The use of the MVC architecture can reduce the coupling between modules, providing application scalability. Each component of the MVC's only interests in logic of components and should not be mixed with other components.

Appearance of Java EE more standardizes the development of B / S structure application, Java EE recommends application be divided into the data persistence layer, business logic, and Web layer, the layers stopping from being together in a loosely coupled manner. As Figure 1 Schematic shows, about application pattern of B / S structure, the application state is saved on the server, so use the B / S structure of the application by client is a program based request / response. After the client sends a request and before the response from the server has not yet arrived the client, the user cannot do anything, only in a wait state, and what they see is a blank.

Request of traditional B / S structure is an exclusive type of request. If a task requires multiple steps to complete tasks or options, in HTML, a multi-step task, can be expressed. However, due to the limited interactivity of HTML, it may lead to a very long page, allowing users to feel confused, clumsy and difficult to use. Or the division of more steps into several pages was submitted, but the traditional exclusive request, if the former is not fully respond to a request, the next request will not be sent. During the wait for a server response to a user, the user's browser is blank. Such requests can be shown in exclusive Figure 2:

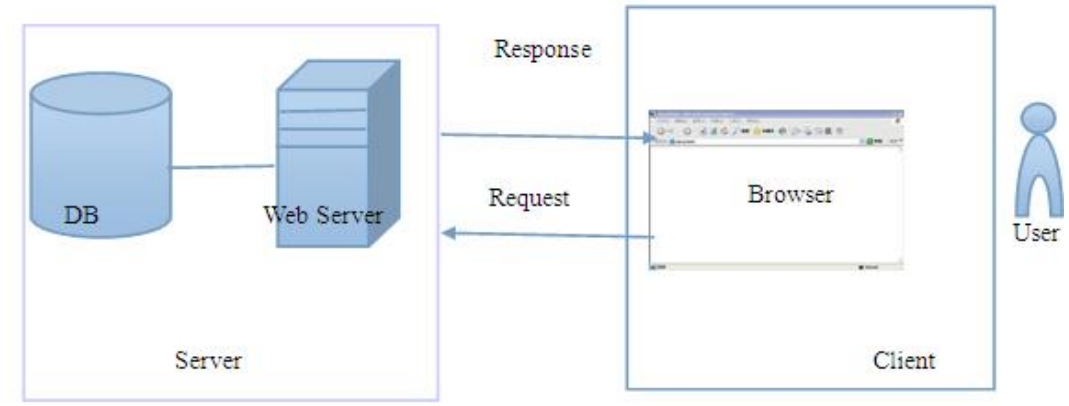

Figure 1. Schematic Diagram of Traditional B/S Structure

Most traditional Web applications use this exclusive request, and each request corresponding to a page, so that when the server response arrives at the client, the browser will be re-reproduced the response, resulting in frequent page refresh. Because of the use of the traditional time for each page B / S structure of the application is very short, so the page can not be made into rich pages. Currently web framework emerging based on MVC pattern, although they have its own advantages, they request server resources in the exclusive manner and customers still need to wait.

Appearance of Ajax technology perfects the shortcomings of traditional Web applications. Ajax technology uses asynchronous send user request: When a user while browsing a page send a request, when the server responds at the first request is not yet completely finished, the browser can send the request again, the page status does not stop, even if the server response is not achieved. Visitors can also browse the page. When a response arrives at the client browser, the browser needn't reload the entire page, but only updates some of the data page, thus improving the utilization time of the page, so you can make the presentation layer pages

into very rich pages with greet performance. The key point of Ajax technology is to send asynchronous requests. Because of the need to allow the browser to dynamically load the server response, it requires to update the dynamically HTML in advance by the use of traditional knowledge of DHTML. In addition to the asynchronous features of Ajax technology to send the request, there is a corresponding server dynamically load data. Applications of Ajax techniques can avoid frequent refresh the page, and the server response is the data, not the entire page content. Ajax is responsible of gaining the server data, and then loads the server data dynamically into the browser.

3. Introduction of Ajax Technology

Ajax (Asynchronous JavaScript And XML),Asynchronous JavaScript and XML, Ajax technology improves the traditional Web technology, using asynchronous communication mechanism between the viewer and the server, thus avoiding the surfers wait and bringing viewers a continuous experience. Ajax technology, a technology completely from the user perspective, improves excellent browsing experience architecture for users with support of Ajax and base of B / S (Browser / Server) architecture, gives the user a similar experience of C / S (client / Server mode) Framework applications. Ajax is not a new technology. JavaScript used by Ajax, CSS and DOM objects, haven't already exists. Through these traditional objects, Ajax improves the user's interactive experience, allowing users to send asynchronous requests: while browsing the page, sends a request to the server. Ajax joined the XMLHttpRequest object, which provides the ability to communicate with the server to send asynchronous request, providing asynchronous communication with server capacity. And users needn't perform actions on this page exclusively. Thus, Ajax gives users a new experience.

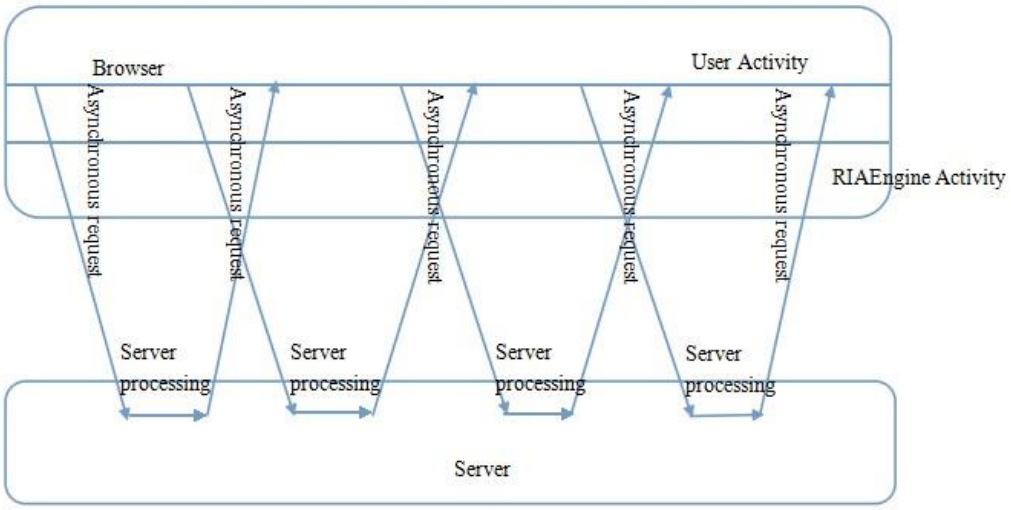

Figure 2. Schematic Diagram of Sending Request Asynchronously

The emergence of Ajax technology, changed the traditional Web application model, and it is not only improvement of the traditional Web applications, but also the traditional Web application revolution. Ajax technology uses an asynchronous send request instead of a form submission to update the Web page, which opened a prelude to the page without refresh

dynamic update time. Ajax can become a milepost in the history of Web application development.

3.1. Ajax Core Technology

The core of Ajax technology is the XMLHttpRequest object. The object was first introduced in Internet Explorer5 with the help of XMLHttpRequest object.T the application program can asynchronously send requests to users, handle their responses and avoid blocking users' actions. After adaption of Ajax asynchronous mode, the browser will not wait users to operate. Without re-downloading the entire page, you can display the corresponding data server. Ajax programming scripts using JavaScript, XMLHttpRequest is the core of Ajax, JavaScript is the adhesive to Ajax technologies. The whole work process of Ajax application are as follows:

·JavaScript script sends a request to the server using the XMLHttpRequest object. When sending a request, either send a GET request, you can also send a POST request.

·JavaScript script uses the XMLHttpRequest object and parses server response data.

·JavaScript script dynamically update HTML pages through DOM. You can also increase CSS style sheet for the server response data , which is displayed in a section of the current page.

·Ajax is not a new technology, it is a combination of several traditional techniques. These several techniques are described below:

·The core of Ajax: XMLHttpRequest is the soul of the whole Ajax technologies. It can be said without XMLHttpRequest, there is no Ajax. The core of Ajax is sending asynchronously request, and XMLHttpRequest is the object of Ajax to send the request asynchronously, if the request sent asynchronously is put aside, other technologies of Ajax will completely lose its original meaning. Microsoft is the first to use XMLHTTP. IE allows direct transmission of data to the server and allows access to data directly from the server. This feature is very important because it reduces the pain-free status of the connection, and also avoid downloading the honored HTML code, thus improving the speed of the process.

·Ajax programming script: JavaScript JavaScript is a cross-platform scripting language. Although in many places, it is also known as the language physiognomy JavaScript object, but not the language of a JavaScript object's surface. But the JavaScript language is simple, easy to use, but can run well in most browsers. JavaScript script is another important part of the Ajax technology. JavaScript is a scripting Ajax programming techniques. JavaScript is mainly to complete the following things:

Create XMLHttpRequest object.

Send a request to the server via XMLHttpRequest.

Create a callback function, monitor server response status, after server response is finished, start the callback function.

The callback function dynamically update HTML page via DOM.

·DOM model

DOM(Document Object Model) is a group of API operating HTML and XML documents, which provides a structured representation of the file. By using the DOM, you can manipulate the document structure in a changing style, you can change the content of the document. By using the DOM, nodes, web application developer can increase nodes, attributes and events to the file , thus providing dynamic updates to the HTML page, such as : document is on behalf of the "HTML file itself ", table object represents the HTML form objects. The DOM essentially is a way of operation of JavaScript of page content by JavaScript on programming language. In addition , Ajax techniques can also use XML files as data exchange format , but Ajax does not necessarily need to use XML as a data interchange format , we can either use

plain text files as data exchange format , you can use JSON (JavaScript Object Notation) as the format for data exchange . In order to generate more extensive performance results on the page, Ajax technology is inseparable from the CSS (Cascading Style Sheets) , controlled by CSS, you can make a similar program effect of C/S structure on the Web page, Ajax technology will make full use of advantages of B / S structure application and the C / S structure application to form a new Web development model.

·Ajax data format XML, JSON

XML is used to mark electronic document with a structured markup language that can be used to tag data, define data types, so it is a source language that allows users to define their own markup language. It is ideal for Web traffic, providing a unified approach to describe and exchange vendor-independent or structured data.

JSON (Java Script Object Notation) is a lightweight data interchange format that is easy to read and write, but also easy for machines to parse and generate. JSON is to use text format completely independent of the use of language, but also uses a C-like language family habits. These properties make JSON an ideal data-interchange language. In addition, as JavaScript and JSON is a subset of Python, so JSON can be used directly in JavaScript and Python. In JavaScript, you can go directly to the data in this format assigned to a variable, and get the value by key name.

·Advantage of Ajax

Ajax is especially suitable for interactive Ajax applications, more frequently read data , data classification good Web applications. In general, the use of Ajax technology has the following advantages:

Reduce the client's memory consumption. Fundamental philosophy of Ajax is "demand data" , so possibly reducing redundant requests in the maximum and avoiding loading client data to redundant memory. This model reduces the amount of data actually read in the traditional Web applications; the server is a full page each response, while in Web applications based on Ajax technology, the response from the server only has to update data.

Update without refreshing the page. By sending requests asynchronously, it avoids frequent refresh the page, thus reducing waiting time for users. Meanwhile, if the server response data is too large, then reloading the traditional black and white of Web application will appear; Because Ajax sends a request in asynchronous way and updating the page is completed by the JavaScript DOM operation, therefore, in the process of reading the data, the browser it will not appear in black and white, but the original page state, which provides users continuous experience.

Ajax technology can pass the work from the traditional server to the client, thereby reducing the burden on the server and bandwidth, saving space and leasing costs of bandwidth.

To give users a better experience, Ajax asynchronously update page, allowing users to process a request when other requests can be processed simultaneously, making the B / S structure of the system sufficient to achieve the C / S system display. Because web can handle advantages of all tasks with a web browser, experience and availability of Ajax applications is naturally self-evident.

Ajax uses a "demand data" model. Companies can enhance the functionality by using Ajax site, and improve the user experience. Users can browse a lot of information by scrolling the screen, and drag items more easily into online shopping cart or online configuration of products, which are not required to refresh the page. In fact, a considerable number of companies are considering improving the user experience by the use of Ajax technology.

Other technical support for Ajax

DWR

DWR (Direct Web Remoting), writen with JavaScript in the browser, focusing on allowing developer to achieve remote call from client side JavaScripts to ordinary Java objects in Java EE Web container. Its biggest feature is the Java method in which the background is called in JavaScript inside to separate business logic and presentation code. It offers a range of good scalability which can integrate with any Java Web frameworks, such struts2.0 and Spring. And it has the advantage of invading performance style of pages.

RICO

Rico is the Ajax framework developed on the basis of Prototype, focusing on drag and drop, data grid and movie effects (moving parts, fade into the light, etc.) and design. Rico enhances some common features of JavaScript, DOM provides some enhancement to operations and Ajax Widget. Rico's file is relatively small, and simple structure, it is suitable for introduction of Ajax application in a small project.

In addition to these components, Prototype, Sarissa, Dojo, JSON-RPC and other components provide cross-browser Ajax library access, UI components, which make Ajax easy to use, and can be relatively simple to achieve some complex functions, providing excellent user interface.

4. AJAX Impact on Web Development Model

Development model of MVC based on model2, assumes that there is a logical operation - Web applications is constituted by a series of switching the pages, where each page is not particularly complicated in general, tend to have very specific functions and purpose. At the same time, page is the smallest indivisible unit in terms of the browser. To update the data page must be a whole page refresh.

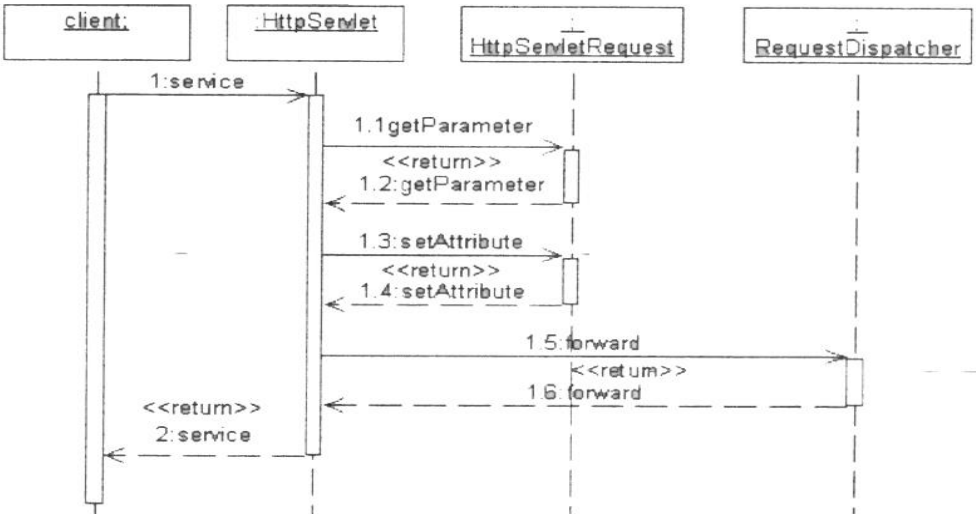

Figure 3. Processing Requests Under the Traditional Model

In this mode, the processing of the request (take servlet for example)is shown in the picture, the request from the browser is processed, first by the controller servlet's service. Servlet can retrieve any desired value (in the form of parameters or in the form of property) from HttpRequest. Once the controller processing is complete, the result is sent back to the HttpRequest (or Httpsession) and Requestnispateher put forward control (or contain) back to the page.

Use of good Ajax UI components from a combination of communication mechanisms, we can put all these operations of the above into a single interface. If the information is not complicated, we can use an editable Grid component that allows users to maintain product information directly in the Grid. If the information is more complex, we can maintain the form of a product and then place the information on the screen, and the user can select the product you want to edit directly in the Grid. The results are temporary cache all these editing operations on the client until the user has completed the steps above one-time use of AJAX technology to submit to the background. In this way, during the whole operation users needn't leave the interface.

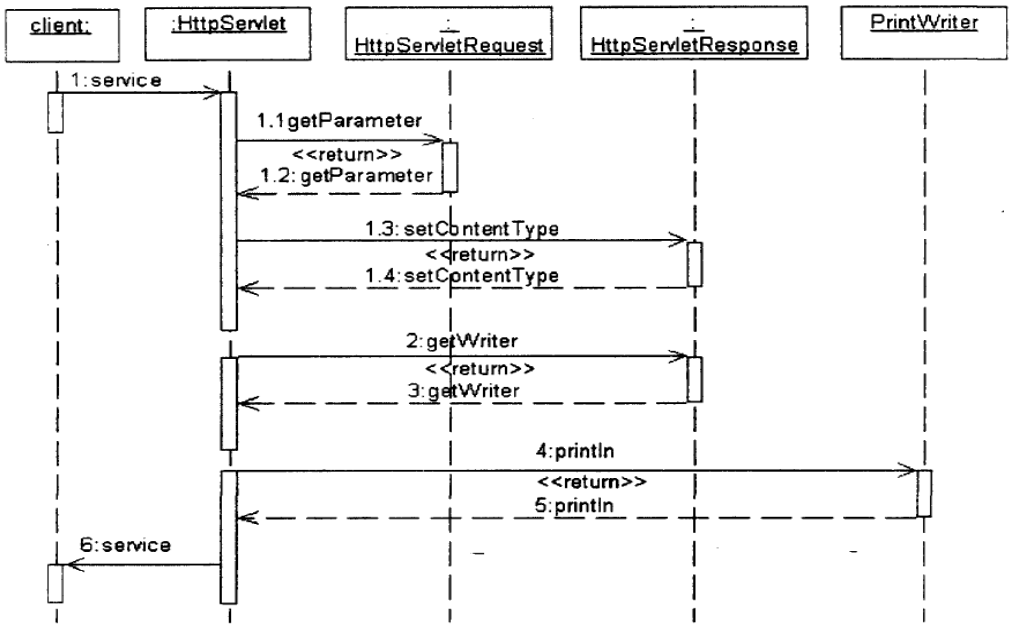

Figure 4. Processing Requests under the Servlet Model

In dealing with such a mode request procedure, process requests (in servlet for example) is shown, The request from the browser is first processed by the controller servlet's service. Servlet can retrieve any desired value from HttpRequest. (in the form of parameters or in the form of attribute). Once the controller processing is complete, HttPservletResPonse content type must be set to XML. Moreover, the logical result of the controller will be written by printwriter. At this time, use of requestDispateher is crossed.

As is shown from the above analysis, AJAX played it overturned a basic assumption Model2, the user is no longer operating range of replacement and refresh the page. Therefore, upgrading of the development of the presentation layer technology will inevitably lead to rethinking and positioning of the MVC design pattern.

In traditional Web applications, with a large number of pages flow, we should manage it under an effective mechanism. And because performance of the functional layer is relatively very weak, the controller often have to take on the work to prepare for the presentation of data. That is, after the user makes a request , the network send handled data to the server through certain protocol, the server responds, these represent new components dynamically generated HTML page, which substitute the page users are viewing and update the user interface. The data prepared in the controller (such as the Request Attributes) is sent to preparations layer by pushing in context, push mode (Push Mode). This push mode is always

a way to get an updated overall development approach by refreshing the page and does not appear any problems, everything running well. But after AJAX appears, there is a problem in this operation mechanism. What Ajax emphasizes is to reduce refreshing the overall page, instead of refreshing the local data. When a local data refresh request is initiated from the client, the performance of the active layer must have the ability to obtain the required data. That application of data received from the XMLHttpRequest object, JavaScript client code is responsible for updating the user interface, and the view becomes data representation of the server responds to client request. This operation is similar to pull data (pull mode) which the client pulls data from the back-end data through the presentation layer. The functional requirements conflict with the traditional Model2. Recalling the above analysis, we have found two conflicting points between traditional and AJAX Model2: first different basic hypothesis of two different page flow; second, contradiction push mode and pull mode.

5. Reconstruction of MVC Development Framework

There is a dissonance between Model2 and AJAX, this is an indisputable fact. But this is not to say that we must negate out traditional MVC architectural pattern. In fact, companies are in the process of transition to AJAX. Currently, main body of MVC development framework currently in the body can still be preserved, but we need to make some adjustments partially. We call this process reconstruction of the MVC development framework. In this reconstruction process, what should first be adjusted is the control layer. We need to define the control layer. If the control layer in traditional Web application development model is decoupling the data model and the role of the page , then after a new technology into the presentation layer , control layer should be the role of decoupling data model and data presentation layer. Server-side presentation layer will take full control of the communication with the Client -side. In terms of the Client -side, control layer is hidden behind the presentation layer which is responsible for docking between the presentation layer and the data model. Accordingly, the triangular relationship with the Client -side MVC framework will evolve into three-button model will evolve with the vertical distribution. Figure 4:

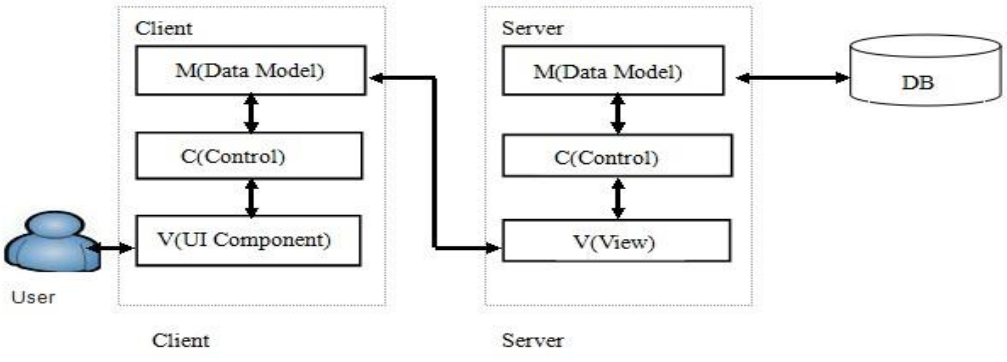

Figure 5. Iteration MVC Model Diagram

We see the various components in the MVC Server as a closed subsystem. Function of this subsystem is to extract data from the database through a series of treatment and send it to the client-side, while after processing the data submitted by some client-side, save it into the

database. Similarly, if we also put the components of the Client-MVC as a closed subsystem whose work is similar with that of server-side subsystem, except that the two interactive objects are user subsystems and the Server side. According to this idea, Web development model eventually formed will be an iterative MVC architecture. This iterative development approach slightly impact on the existing MVC, but can play a role in improving interactivity.

6. Application Results

Iterative reconstruction MVC mode with the use of AJAX technology retains the traditional MVC pattern and maintains a hierarchical structure and coupling procedures, bringing customers a new experience. The model has been applied in the 'online shopping platform' project.

7. Conclusion and Outlook

The traditional Web application is mainly composed of three layers. And Web application with the increase of Ajax technology will add an Ajax engine in traditional Web application, which transfers parts of function of the controller to the client page. Ajax technology is a kind of improvement and development not only to the traditional Web technology revolution, but also to the traditional Web technology of a kind of improvement and development. Ajax, a challenge to traditional MVC mode, with the use of iterative reconstruction of MVC mode effectively improves the efficiency of web application development and user experience effect without abandoning the traditional MVC pattern.

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Author

GuangYuan Song, received his Master's degree in Computer Science and Technology from South-West JiaoTong University of Technology in Chengdu, China and is currently teacher of dezhou university. His research interest is mainly in the area of theory of software and he has published several research papers in scholarly journals and international conferences in the above research areas.