RAPID APPLICATION DEVELOPMENT TOOLS FOR AJAX BASED RICH INTERNET APPLICATION ENGINEERING

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Abstract

Despite the complexities in realization, Script-based AJAX has become a popular and powerful technique in Rich Internet Applications development in the era of WEB2; and there is a growing number of tools and technologies available for AJAX based Rich Internet Application engineering. Understanding and selecting the suitable tool set carefully, is important to enable the Rapid Application Development methodology in AJAX based Rich Internet Applications engineering. In this paper we discuss about some established tools and some research solutions we came across in our on going research of designing a general architecture for AJAX based Rich Internet Applications. The general architecture we propose is supposed to increase the realization of the Rich Internet Application structure and AJAX adoption. Combining this general architecture with the tools and best practices, we expect to provide an adequate support for Rapid Application Development of AJAX based Rich Internet Applications.

Introduction

WEB2 is the era of Rich Internet Applications (RIAs), which have rich User Interfaces (UIs), and interactive than the traditional Web Applications in WEB1 (Piero, et al., 2010) (Paulson, 2005). Unlike the page sequential mechanism of the classical Web Apps, RIAs are capable of updating a section of the web page when needed, rather than reloading the complete page or loading a complete new page. This partial rendering ability make the RIAs faster and responsive (Lawton, 2008). As the users nowadays are experiencing the power of the RIAs via popular Web Apps like Facebook, Flicker or Google Apps, the demand for RIAs has gone up increasing the attention of the web engineers (Zepeda & Chapa, 2007).There are several differenttechnologies for developing

the RIAs. 1.) Proprietary Plugin-based approach like in Adobe's Flash/Flex, Microsoft's Silverlight or JAVA Applets; 2.)Script-based techniques like Asynchronous JavaScript And XML (AJAX); 3.) and least known browser-based approach like Mozilla's XUL (Piero, et al., 2010).

The script-based AJAX has become a popular technique for developing RIAs (Li & Peng, 2012). The combination of established technologies – like HTML, CSS, XML, JavaScript and http request-response model –has made AJAX unique and powerful (Mesbah & Deursen, 2007). Despite the popularity and the power of AJAX, it suffer from complexities, which make the AJAX based RIA engineering is a difficult process (Zepeda & Chapa, 2007) - (Mesbah & Deursen, 2007). Engineers need to think different to design and develop AJAX based RIAs (Zepeda & Chapa, 2007), hence the realization of the RIA structure and the AJAX adoption is really important.

Rapid Application Development (RAD) is an approach to build quality systems faster using a combination of Computer Aided Software (CASE) tools and prototypes with people and process factors (Inc, 2002)

We used a prototype-based incremental and iterative methodology in our research. We conducted a literature survey to gain the knowledge about the RIAs, AJAX, RAD and some other related areas and conducted a cross-sectional survey to get an understanding of the up-to-date nature

(McConnell, 1996). Since all the stakeholders like to see a quality output rapidly, the understanding and selection of the correct tools and technologies is important in AJAX engineering (Kao-ming & Geng-guo, 2010), when using the RAD; as the success of RAD is mainly depend the tools used (Inc, 2002).

There is a heap of tools, techniques and technologies available to support the RAD of the AJAX based RIAs. In this paper we discuss a popular, well established and essential set of tools we identified, while conducting our ongoing research.This knowledge will be useful for beginners in the area of AJAX engineering as well as for the professionals in decision making, aligning to the business constraints. And we hope the content in this paper will provide a good analysis for the researches as a starting point of researching in AJAX based RIA engineering. Methodology

Our ongoing research is based on designing a general architecture for AJAX based RIAs, to raise the realization of the RIA structure and the AJAX adoption, hence minimize the difficulties and support the usage of RAD adequate.
of the AJAX based RIA engineering. The population was the individuals of Designers and Developers of AJAX RIAs and we used the random sampling techniques to gather data using structured questionnaire with close end questions. The gathered data were analyzed using the statistic methods.

Parallel to the surveys we conducted a series of experiments, to design and test solutions/techniques to address the difficulties in AJAX adoption.The main difference between different platforms in RIAs is the client-side language and related technologies. In our experiments, we used PHP as the client-side language and Apache web server in Microsoft Windows platform. We used and tested various CASE tools, technologies and techniques throughout this series of experiments.A selected set of popular and stable tools are presented in the discussion.

DISCUSSION

Various CASE tools are engaged throughout the engineering process of software, to enable the RAD. We focus on CASE tools for designing, development and testing of AJAX based RIAs, in this section.

1.1. Designing tools

System design provides the abstract understanding of the requirements, and clear visualization of the system. Understanding the proper design patterns and designing a strong architecture will increase the realization of the system, and provide the foundation for the system designing. There are various architectural design patterns, languages and tools for system designing. We discuss about two strong designing languages, which can be useful in AJAX based RIA designing.

1.1.1. UML

Unified Modeling Language (UML) (Group, n.d.)is a popular graphical software system designing language, which has a set of diagrams to design the different aspects of systems and set of symbols and rules to design these diagrams. The power of the UML can be utilized effectively in desktop application engineering, and it is not strong enough assisting in web application designing.The extension mechanism of the UML can be useful in designing web applications. But when it comes to RIAs and AJAX, the complexity level goes up and still there are not well defined standards, so that the application of the UML can raise a new level of difficulty.

1.1.2. WebML/IFML

The Web Modeling Language (WebML) (WebML.org, n.d.)is an UML like designing language specially introduced for web application designing. It has a rich set of diagrams, which are really useful in web application designing. But when it comes to RIA designing, we think WebML still needs to be improved. Recently webML has gone through a significant changes and updated to its new release Interaction Flow Modeling Language (IFML) (Object Management Group, n.d.). IFML has generalized its designing capacity to expand from web applications to desktop applications; and since the features of the RIAs are similar to desktop applications; we think this new version will be a better designing language for RIAs. Its ability to assist well in AJAX based RIAs needs to be experimented. They have a dedicated

IDE to design the systems using IFML, called WebRatio(WebRatio, n.d.), which is powerful in designing web and mobile applications. On the downside both IFML and WebRatio has a significantly high learning curve and incorporating WebRatio with other tools may need time to be matured.

1.2. Development Tools – IDEs

IDEs provide great environment for system and UI designing, automatic code generation and manual coding, testing, and debugging. IDEs do not help in realizing the designing complexities. If the system is designed well, the usage of IDE can improve the quality and speed of the development phase.

1.2.1. Dreamviewer

Adobe Dreamviewer (Adobe, n.d.) is an excellent tool for HTML and CSS based web page designing, with a rich set of features like visual designing, automatic code completion, web page.

previewing and many more.Dreamviewer supports for a range of development languages and technologies like JavaScript, PHP, ASP, JSP, etc. It's a commercial tool and has a new version as a Cloud service too.

1.2.2. Expression Web

Among many free web UI designing IDEs we think the Microsoft Expression Web (Microsoft, n.d.)is a better tool. It has the split view which displays both the visual design and code as in Dreamviewer and the CSS management is really powerfull.

Expression web also supports multiple development envvronments for JavaScript, PHP, ASP, etc.

1.2.3. NetBeans

NetBeans (NetBeans, n.d.)is also a free IDE and supports development in HTML, PHP, JAVA, etc... not only for web applications but also for desktop and mobile applications as well. It comes with servers and good for JAVA based RIA development. We do not think the UI designers and developers will find it is a better tool, but its other features like visual designing, debugging, ect... make NetBeans a powerful tool.

1.3. Development Tools – Frameworks/Libraries

Libraries/frameworks wrap the complexities in the original environment within their features and allow the developers to code faster with less bugs.

1.3.1. jQuery

jQuery is a JavaScript library with CSS like selector. It is strong in Document Object Model (DOM) manipulation and provide a rich set of features for RIA UI development. jQuery has multiple AJAX wrappers to make the AJAX adoption easier.

1.3.2. Prototype

Prototype is also a JavaScript library which can be used for RIA development. It has a special feature – which is lack in JavaScript – of simulating Object Oriented Programming (OOP) using class implementations.

1.4. Related researches

1.4.1. AJAX-based Application Framework Research and Design

Authors of the paper "AJAX-based Applicable Framework Research and Design" (Kao-ming & Geng-guo, 2010) introduce a simple and basic pure JavaScript framework. The XMLHttpRequest object creation and the response of the asynchronous request handling codes are wrapped inside two functions. Developer can reuse the XMLHttpRequest object creation function and minimize the redundant code. This is a good start for a student who is a beginner in AJAX. When it comes to real world projects, if the developer is using pure JavaScript – not any other third party JavaScript libraries – this framework is a handy tool.

1.4.2. jQuery-based AJAX General Interactive Architecture

As the name implies, the authors of this paper (Li & Peng, 2012) propose a jQuery – which is an open source and free framework – based general architecture called JAGA as a solution for addressing the complexities in AJAX based RIAs. This architecture is composed of multiple modules and sub modules, and it does not inherited features from available architectural patterns, which makes the JAGA is a complete novel solution.

1.4.3. An Architectural Style for AJAX

The paper "An Architectural Style for AJAX" (Mesbah & Deursen, 2007), introduces a novel architectural style named SPIAR. It inherits some characteristics from existing frameworks Google's GWT, Backbase and Echo2. Authors have worked on providing an architectural formalism for AJAX base RIAs to minimize the complexities. SPIAR has its own set of components and uses a technique of maintaining a replica of UI components – from the browser – in the server. And SPIAR is specified for single page RIAs, therefore the components in the architecture are specifically designed for that purpose.

2. CONCLUSION AND FUTURE WORK

The usage of the CASE tools is an essential factor in application of RAD, and the success of RAD enabled project depends on the tools used. Therefore, understating the nature of the tools and selecting them carefully is needed. In AJAX based RIA engineering, CASE tools provide good support in reducing the complexities and speed up the development.

In future of our ongoing research we expect to design a general architecture for AJAX based RIAs, which is supposed to increase the realization of the RIA structure and AJAX adoption. We expect to introduce a RAD platform by combining our general architecture with CASE tools and some best practices.

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