

Design and Development of Science and Technology Innovation Services System Based On Linux Server and SSH

Jinbao Song

Information Engineering School
Communication University of China, CUC
Beijing, China
songjinbao@cuc.edu.cn

Jinhong Song

Shandong Gold Mining Jiaojia Gold Mine (Laizhou) Co.,
Ltd
Shandong, China
453074798@qq.com

Jianping Chai

Information Engineering School
Communication University of China, CUC
Beijing, China
jp_chai@cuc.edu.cn

Xing Li

Information Engineering School
Communication University of China, CUC
Beijing, China
15570670@qq.com

Abstract—In the modern society, with the rapid development of Internet, the digitization of business will become inevitable. For the enterprise, it is a way to reduce future investment through transforming their business before others. The development of the innovation platform for Communication University of China is also in this background. The platform's purpose is not only to get rid of all the inconveniences before and human resource waste caused by duplication of overlapping, but also to allow college students to provide a full and independent innovation practice and promote school's research capacity. In order to achieve this goal, the detailed structure and flexibility of the platform is explained.

Keywords—*Ajax; Hibernate; Struts; Spring; Web*

I. INTRODUCTION

How to organize and manage effectively for the undergraduate scientific and technological innovation, how to give the undergraduate scientific and technological innovation some pointed guide and cultivation, how to form an organic quality training mechanism together with class education and social education are important problems which effect undergraduate scientific and technological innovation. And we must put forward the effective solution. The science and technology innovation services system construction is to solve these problems.

Digitalization is the most basic starting point of this paper. The current digital program is ongoing at the Communication University of China. But there are many missing in many factors. Human involvement in some systems is also too frequent, which results in a large amount of waste of resources. There are no implementation platform with management. This paper in combination with the current trend of the development

of network and the current situation of our school timely puts forward a series of network platform solution. Although it cannot achieve perfect state, but its advantage can be shown from the following several aspects.

- The B/S interactive network is as the foundation system, combined with the new media, virtualization and other modern means of science and technology [1]. It is for the technical integration and demonstration of information management and service, innovation training and guidance, coordination and mutual communication platform construction around undergraduate science and technology innovation activities. The Communication University of China undergraduate science and technology innovation activities comprehensive service demonstration system is established including organization, management, training, promotion, resources sharing, the information communication. And the employment and entrepreneurship comprehensive service demonstration system of Communication University of China science and technology park is also set up including entrepreneurship dynamic and hotspots tracking, employment guidance, business training, achievement presentation and investment hatch, project tracking and coordination and communication.
- The establishment of Communication University of China undergraduate science and technology innovation service system software and hardware test environment and operating system environment will be completed, including undergraduate science and technology innovation information service system internal network, central server, video server,

cooperation and sharing resources server, data information server, user authentication server and browser based client software and security plug-ins, etc [2].

- Based on the system, for the Communication University of China and its science and technology park, a group of outstanding entrepreneurs of college students are cultivated. A coaching professional team is formed. A group of college students' successful entrepreneurship models are set up. All kinds of relevant information of the enterprises and projects for college students are provided. The business consulting and training are organized in order to improve all kinds of the entrepreneurs' skills. And enterprise fast growth and independent business are promoted [3].
- Based on the system, the university science park industry chain is effectively extended. The new pattern of "complementary advantages and linkage development" is gradually formed with other industries inside and outside the park. The multiplication effect of entrepreneurship is realized in order to create more employment opportunities, ease Beijing and radiation regional employment pressure and promote the regional economic growth.

II. TECHNICAL SUPPORT

A. XML

XML is eXtensible Markup Language. XML is said to be a language, but I tend to think of it as a kind of data structure. By the authorities, it is a markup language. Markup refers to the information symbol that can be understood by computer. Through this tag, the articles containing all kinds of information can be processed between the computers. How to define these tags? It can choose the international general markup language, such as HTML. XML can also be used as markup language freely determined by the relevant personage. So it is the language of extensibility. XML is simplified from standard generalized markup language (SGML). It is mainly used in extensible markup language, extensible stylesheet language (XSL), XBRL and XPath.

We talk about XML, it will certainly play a role in our paper. We will put the XML as a data structure and information configuration file. Because of the development of the platform, we use the architecture type. The information configuration is inevitable. We consider is property to configure in the form of key-value pairs at the beginning. Some data is only read and written simply using .txt file to preserve. But after comparison with the advantages of XML, we use XML. The framework Officials also recommend us to use XML. XML in our system acts as a control configuration, data preservation, as well as the data structure of the object source.

B. JSON

JSON is consistent with XML data structure function. It is a kind of data structure for the javascript. That is to say, javascript is a very good content parsing to JSON format. JSON (JavaScript Object Notation) is a lightweight data-

interchange format. It is easy to read and write for man and easy to parse and generate for machine at the same time. It is a subset based on the JavaScript Programming Language, Standard ECMA - 262 3rd Edition - December 1999. JSON uses completely independent language text format, but also uses habits the similar to the C language family (including C, C++, C#, Java, JavaScript, Perl, Python, etc). These features make the JSON become an ideal data interchange language.

C. JQuery

JQuery, the write less, do more, JavaScript library. This is an official evaluation. JQuery is not a new language. It is just a javascript library. JQuery is just a framework designed by the open source team on the native javascript. It greatly simplifies the page designer operating DOM element method. It also don't lose the flexibility of native javascript. It encapsulates a lot of operation code. And if also simplifies the call on the effects. On the other hand, due to the development of the JQuery team effort, general web researchers also can get rid of the trouble of browser incompatibility.

D. AJAX

AJAX is called Asynchronous JavaScript and XML. AJAX is a kind of asynchronous javascript and XML technology. The biggest advantage of AJAX is able to interact with the server data without refreshing the entire page. Now the mainstream browsers all have an object called XMLHttpRequest. It is the core base of AJAX. The concept of AJAX is very simple, and is not so complicated to use. But AJAX together with javascript and CSS is a huge potential and rich contact experience.

III. STRUTS 2, SPRING, HIBERNATE

SSH is the abbreviation of Struts2, Spring, Hibernate. It is a very popular Java Web development framework in the current Java world. Also it is a kind of the MVC. MVC is Model, View, Controller layered structure. The three parts should as far as possibly reduce coupling to improve application expansibility and maintainability as shown in Fig. 1.

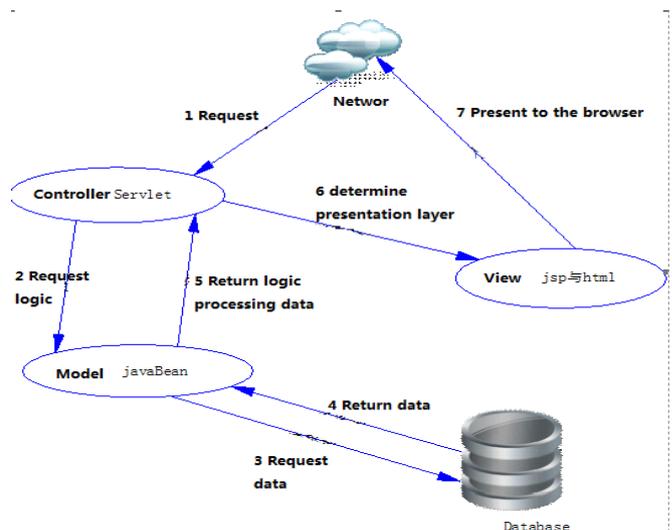


Fig. 1. MVC schematic framework.

A. Struts 2

Struts 2 is a framework which acts as the role of the Action. Struts 2 is mainly responsible for the collection of data, processes the data by calling the method of the corresponding model layer and returns data, and specifies the presentation layer. The data flow is as shown in Fig. 2.

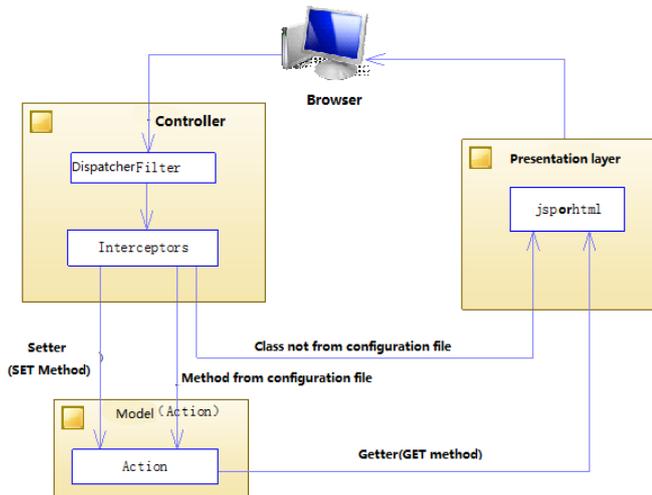


Fig. 2. Struts 2 data flow diagram.

Struts 2 has the following characteristics. (1) highly decoupled: page and logic are no longer tightly together. (2) High reusability and maintainability: we just change a few places, a new form of expression can be achieved [4]. Struts 2 system diagram is as shown in Fig. 3.

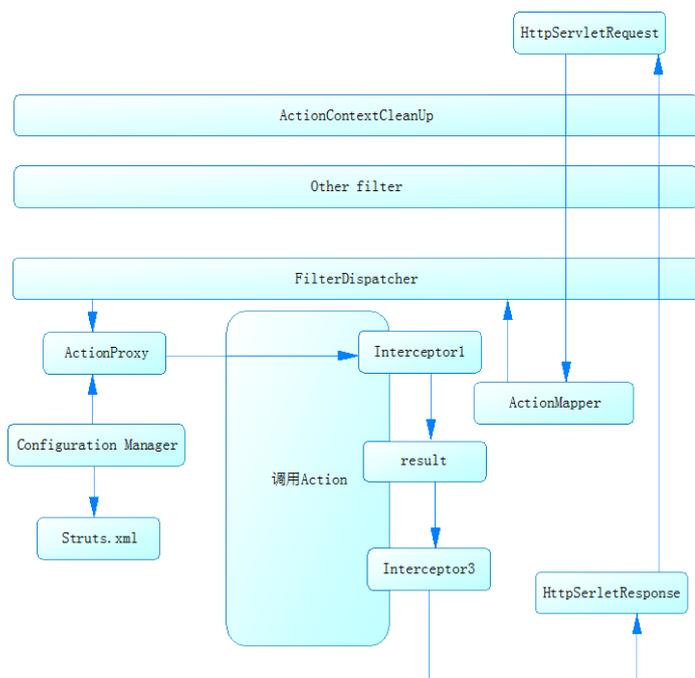


Fig. 3. Struts 2 system diagram.

B. Spring

Spring's biggest feature is as a kind of container providing class. Spring is one of the factory pattern evolution version. The core in Spring is the BeanFactory. The object instantiation of the programmer is concentrated in the Spring configuration file. On the suggestion of adopting programming to an interface, the highly coupling between the programs is realized by Spring. Two key technologies of Spring are inverse of control (IOC) and aspect oriented programming (AOP) [5].

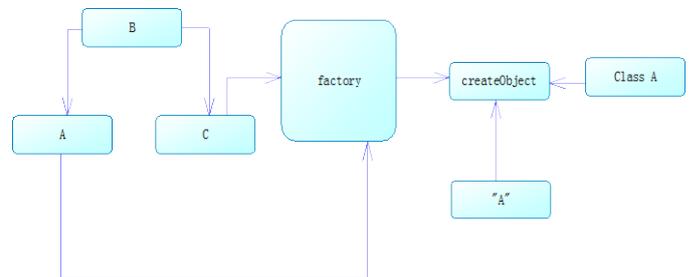


Fig. 4. Spring factory pattern.

C. Hibernate

Hibernate is an ORM, object map. It is designed as a data persistence. The configuration file is corresponding with the actual entity data table. With the support of the underlying JDBC, the data is processed by the programmer directly using thinking of object [6].

Hibernate object state is the fundamental starting point of the Spring configuration transaction consideration. Hibernate object is divided into three states including free state, transient state and persistent state. Objects taken out of the hibernate state are persistent state. But persistent state is effective only in a Session. Whereas a transaction can have a lot of Sessions. Of course, after the transaction is closed, there will be persistent state change [7].

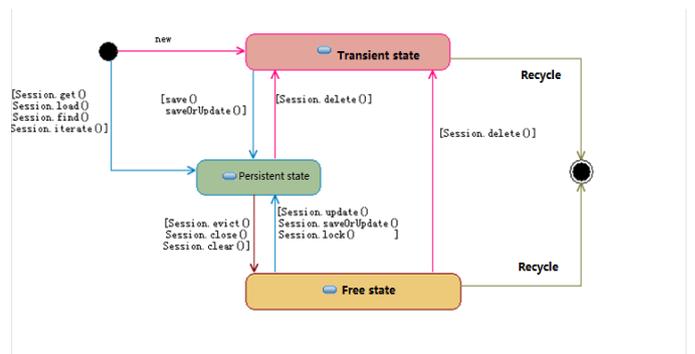


Fig. 5. Hibernate object state conversion.

D. Struts 2 + Spring + Hibernate construct MVC

Our science and technology innovation services system is built on the SSH framework, shown as Fig. 6.

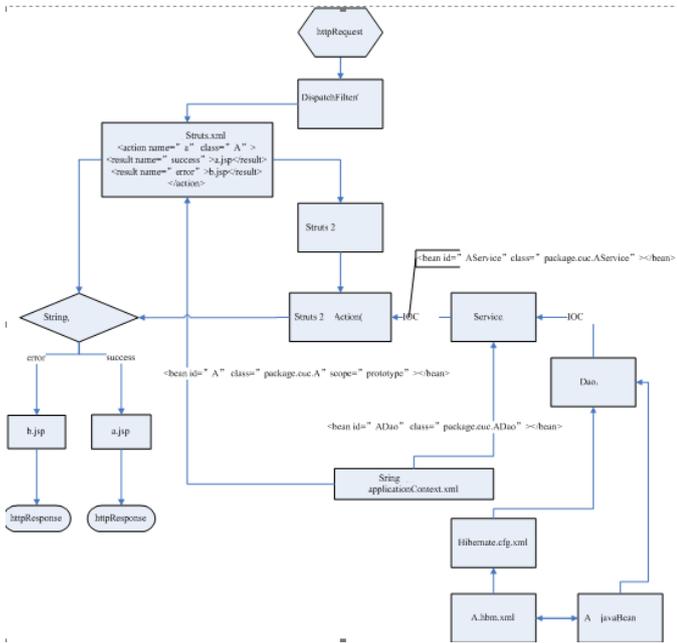


Fig. 6. SSH schematic framework.

IV. SCIENCE AND TECHNOLOGY INNOVATION SERVICE SYSTEM

The software system frame of science and technology innovation service system is shown as Figure 1. This system is mainly divided into six big modules including user login module, the project application and management module, the innovation achievements exhibit module, online training and technical guidance module, equipment and the experiment environment module and team communication BBS module. The modules specific functions are shown below.

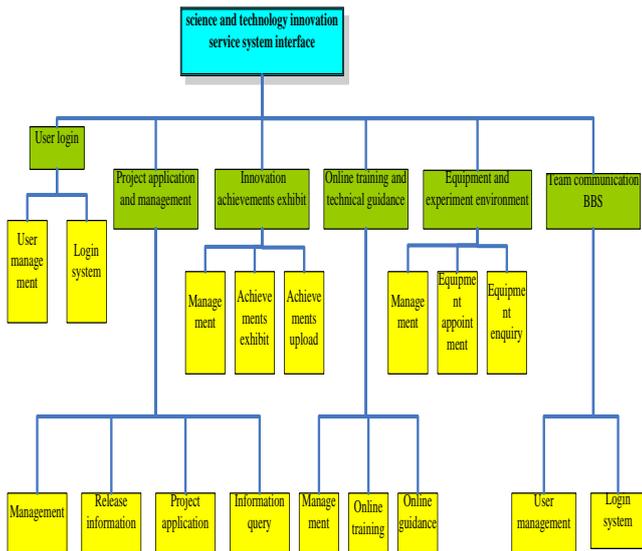


Fig. 7. Science and technology innovation service system diagram.

V. SUMMARY

In the modern society, with the rapid development of Internet, the digitization of business will become inevitable. For the enterprise, it is a way to reduce future investment through transforming their business before others. The development of the innovation platform for Communication University of China is also in this background. The platform's purpose is not only to get rid of all the inconveniences before and human resource waste caused by duplication of overlapping, but also to allow college students to provide a full and independent innovation practice and promote school's research capacity. In order to achieve this goal, the detailed structure and flexibility of the platform is explained. According to validation and evaluating the effect of the system, we have adjusted and optimized system solutions and perfected the system.

REFERENCES

- [1] Z. B. Liu, Java WEB core framework. Beijing: Posts & Telecom Press, 2013, pp. 123–135.
- [2] W. Q. Sun, Proficient Hibernate JAVA object persistent mass media technology, Beijing: Posts & Telecom Press, 2012, pp. 212–236.
- [3] R. Johnson, J. Hoeller, Expert one-on-one J2EE Development without EJB, 2014.
- [4] R. Johnson, J. Hoeller, Expert one-on-one J2EE Development without EJB, 2011.
- [5] Ji Wenke, Spring Technology Insider Insights Spring architecture and design principles, 2010.
- [6] C. Bauer, G. King, JAVA Persistence with hibernate, 2015.
- [7] Sun Weiqin, Proficient Hibernate JAVA object persistence technology explain, 2009.