

Research and Design of Applications for Sports Information Management Platform based on B/S Architecture

Yue Jun^{*}, Liang Ying^{*}, Ye Yuyi^{*} and Long Jifeng^{*}

HeZhou University, Hezhou 542899, China

Abstract: In this paper, we conduct research on the design of applications for sports information management platform based on B/S architecture. Resource management is mainly to digitize all kinds of information about the sports events, scientific analysis by computer, and further to generate statistical reports and statistical charts. In the resource management module can also use the Internet to record all kinds of sport resource attribute information. We combine the design pattern of browser server and client server in the research. The result illustrates that the B/S model earns better result. In the future, we will optimize the current code structure to maintain the performance.

Keywords: Browser/server (B/S) pattern, sports information management, structure optimization.

1. INTRODUCTION

Java is an interpreted language that uses Virtual Machine, and has the strength of being able to run in various platforms. Along with the rapid development of Internet and computer technology and the expansion of business information and the rapid expansion of the market which makes enterprises must go beyond the traditional application system limitation. Will their internal system with the others on the Internet service system integration and in order to improve the information level of management. J2EE is a technical framework of application system can be simplified and specification and it is more advanced than previous technical architecture which is being used is Java2 platform and enterprise edition including the various components, technical level, *etc.* In the information release module, the user can use the Internet to release about sports events and e-commerce and advertising such as all kinds of information and at the same time also can real-time business communication with the outside world *via* the Internet including position is released to the world sports venues, facilities and venues cultural introduction. Resource management is mainly to digitize all kinds of information about the sports events, scientific analysis by computer, and further to generate statistical reports and statistical charts. In the resource management module can also use the Internet to record all kinds of sport resource attribute information, and a day for system maintenance personnel to collect the data information analysis and finishing, for later use. Event management module is mainly responsible for the sports event schedule, personnel and equipment and other resources for unified planning and management, the statistical function of event management can also be of a sports player's game in a certain period of time of system analysis, to solve the sports events and conflicts to provide the reference information on time.

Office automation management module is mainly to deal with sports daily affairs, help managers to improve the efficiency of management, the module is installed with advanced password authentication technology, strictly regulate the user identity, and hierarchical decentralized management, and to keep some important documents of corrections, to carry out the job responsibility, to ensure that the sports management of confidential information is confidential. In the past, a lot of research into improving J2EE application performance has focused on tuning the configuration of EJBs and of the EJB operating environment consisting of J2EE application servers, databases, Web servers, and hardware. In this pattern, the coding feature enhances the performance of the browser/server (B/S) application pattern [1, 2].

Therefore, to deal with the issues mentioned above, we conduct research on the design of applications for sports information management platform based on B/S architecture. In sports management information systems, business logic layer occupies the core position which is an important part of the system. Various business components and business logic layer itself in the application server, using the server such as sphere, to deal with related business request. The data layer is used to store data, it is especially important for sports management system. Under the influence of database, general system design is reasonable, only needs a program development can adapt to a variety of platforms. In the system, the data layer through JDBC implements database storage, the data for permanent storage [3]. In the business logic layer, there will be a lot of business needs and in the process of business process need to efficient storage of data, this needs through a database management system to complete the data related to storage tasks to ensure the integrity of the data, make the sports management system can be safe and effective operation. The business logic layer provides users with reliable system platform, the application server in the task processing, using the Session Bean to complete in the multiple EJB container. In business logic layer, data access using the entity bean is complete, it uses the component

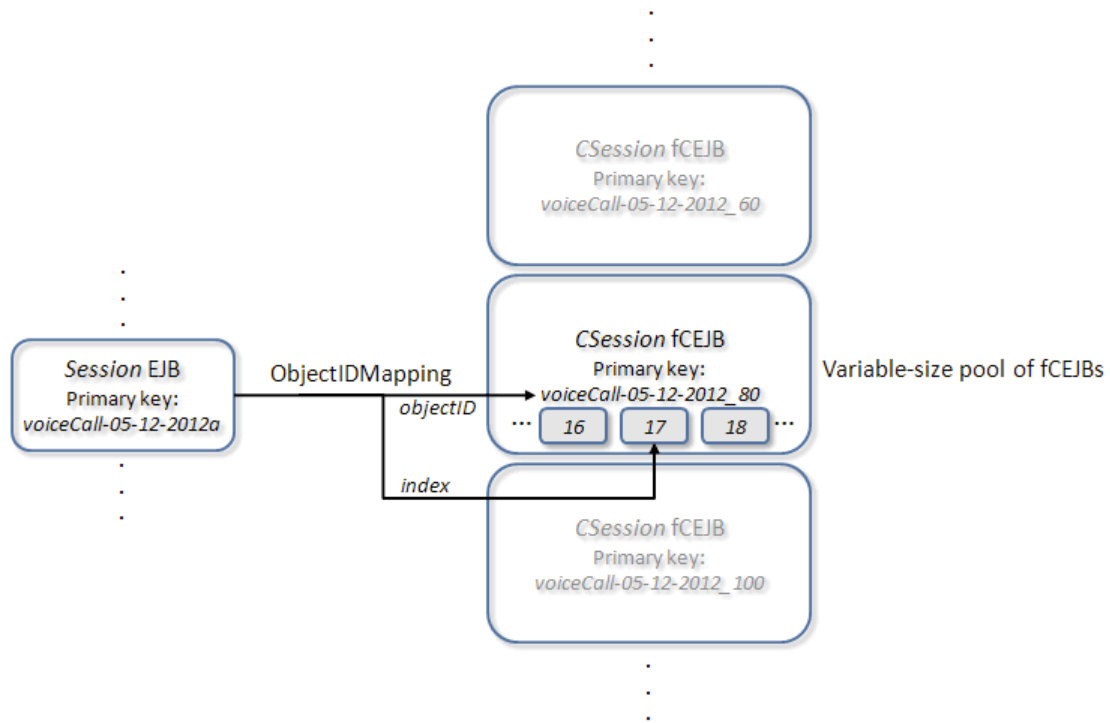


Fig. (1). The basic aArchitecture of B/S pattern in the paper.

technology and encapsulates the business logic which will cover some of the details and effectively improve the scalability of the system. In the following Fig. (1), we show the basic architecture of B/S pattern [4].

2. THE PROPOSED PLATFORM DESIGN AND IMPLEMENTATION

The Principles of Java and B/S Architecture. C/S mode of development and maintenance cost is higher. For different clients to develop different applications it will suffer from programming larger workload. If the application for installation, modification, and upgrade, all need to be done on the client, complicated and trouble. B/S (client just install general browser and does not need to install a dedicated client software, data query, processing and presentation are performed by the server, system version upgrade and maintenance is performed on the server side [5]. Database design is the sports management information system is an important link in the design and development. But in sports field at present, comprehensive large database application is still an important problem, a lot of valuable data resources have not been fully used, and the matching database system is lacking. To some extent hindered the improvement of sports information in China [6]. Structured analysis method is the demand analysis and design of software engineering classic method which is to use the concept of abstract model, in accordance with the system internal information flow, and the relationship between the parts, since the item can decompose step by step down, the system overall function is decomposed into different functional modules and makes system implementation module set of functions and procedures. This process oriented analysis and design method of decomposition of the complexity of the problem, improved the control in the process of problem solving. The server is responsible

for data analysis and acquisition repeatedly. The Struts framework is a structure of the MVC framework, the basis of the framework for system control, display, data transmission on the definition of architecture, and provides the corresponding interface management function. In this framework, the Controller receives the user's request events from the show end which use Action Servlet to specific user behavior event capture, according to the Action mapping for specific events, according to the corresponding processing logic of the definition of the model for processing. The Struts framework provides many extensions, convenient for the user to control various parts of the MVC structure. It can be divided into view specific end and control end and model. On side view framework to the JSP page as the carrier of data to demonstrate, and provides a tag library, show the development of users to provide a rich library [7]; In the model, the main system business logic processing, in the Struts framework which uses a variety of control used to deal with the business class and component; In the controller, the framework provides the Action Servlet class and class Action, the foreground of data capture and forward. Finally, the framework provides the configuration file, can carry on the business personalized request configuration. Its working principle is: first, the user data is presented by the client application to maple customers request, but our data of client user request submitted to the server, the server database management system of data processing tasks, after processing, the user needs on the part of the data transmission to the client, the client required to complete the processing of data. By using this method separates the business logic and at the same time able to control the relationship between life cycle and the object, is directly controlled object creation and destruction, developers don't need to know the specific creation process of things but only to the framework and at the re-

```

1 public class ObjectIDMapping {
2     private int N,
3         index;
4     private String objectID;
5
6     public ObjectIDMapping(int N) {
7         this.N = N;
8         index = -1;
9         objectID = null;
10    }
11
12    public void setObjectID(String objectIDArg) {
13        int lastElementIndex = objectIDArg.length() - 1,
14            c = objectIDArg.charAt(lastElementIndex);
15        index = c % N;
16        objectID = objectIDArg.substring(0, lastElementIndex) + "_" + (c - index);
17    }
18
19    public int getIndex() {
20        return index;
21    }
22
23    public String getObjectID() {
24        return objectID;
25    }
26 }

```

Fig. (2). The sample code block of the B/S pattern.

quest of the operating system automatically will get things. In the process of building sports information management platform, mainly adopted structure oriented system analysis method. In the following Fig. (2), we show the sample code block of the B/S pattern.

Our Current Sport Situation Introduction. Because the management information system has a wide scope of inclusion, the study of the management information system in our country are mostly combined with the specific application and sports management information system theory and the definition of the concept is not unified, with "information management system" the same view. Sports management information system application focused on in the school sports teaching, administration, performance and management, sports training process control, statistic, games of organization and management to speed up the information of the sports plays a role in promoting. Because of the social sports has a wide range, management, complex numbers and the management system of multiple redundant, with less in the field of management information system of social sports. With the advancement of the national fitness program outline, the rapid development of social sports, the information management work will be urgently required in the process of social sports. Sports management is an applied discipline and it is a branch of modern management. Sports management is to achieve the goal of physical culture or sports work, improve the effect of sports work and the development of undertakings of physical culture and sports to plan, organize, command, coordinate and control the process. Among them, the information is always throughout the course of management work, is the core of the management. Information work of the task is to collect, sort out useful information, processing, storage and transmission, for sports management services. The development of campus information construction is constantly, perfect, and J2EE which make the development of sports management information system has a stronger ability to adapt to change. Because good coding structure,

J2EE standard sports management information system can, over time, by changing the underlying middleware, operating system or hardware to zoom in but not significantly change the application, it is important to protect the future IT investment. To a large extent, the sports management is the process of the process of the sports information. With the progress of society and sports denotation of constantly expanding, college sports information in between management system and its external environment has been a series of growth and multifarious sports information processing work takes up a lot of manpower and material resources in order to change the backward situation, colleges and universities sports information processing mode must be changed much, breadth and depth of information in the universities sports management applications are subject to further development.

3. TECHNICAL ARCHITECTURE OF THE SPORTS INFORMATION MANAGEMENT PLATFORM

Management information system whether can accord with the requirement of the user, to a large extent depends on the selection of a system's architecture. In the process of development, the needs of users, there are two major categories, namely architecture requirements and business functional requirements. Among them, the architectural requirements is the selection of system architecture and the overall solution, and the business functional requirements is system to solve business problems. Especially for sports management information system, the architectural requirements more and more become the core of the system development and implementation, system structure as shown in Fig. (3).

Client layer is mainly related to the processing of the page, which is used to provide user friendly access to the system. On this layer, sports management information platform for users to use the browser to input the data and the authorized business processing.



Fig. (3). The structure and flowchart of the proposed system.

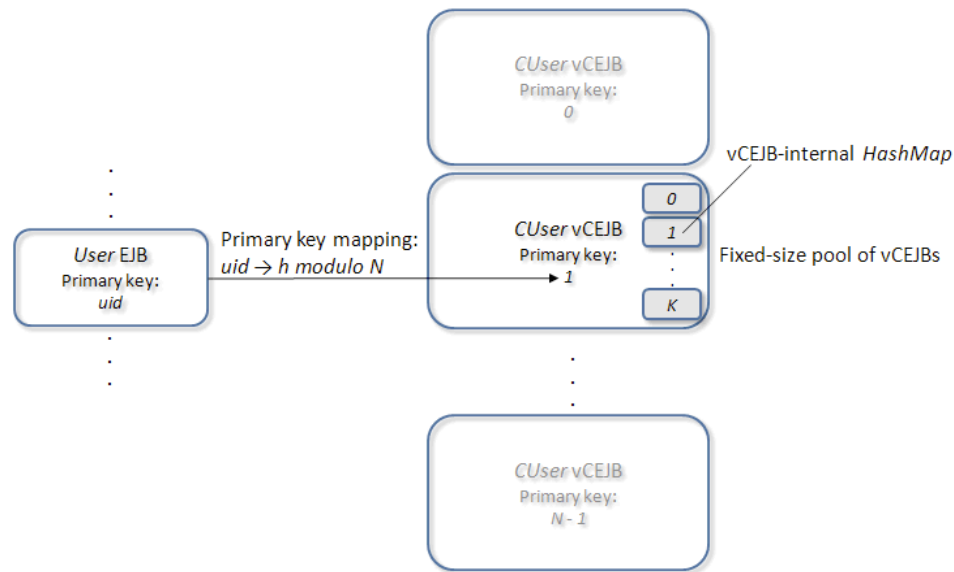


Fig. (4). The structure and flowchart of the proposed system.

Application layer, or layer functions or business logic layer, each management subsystem and the specific function of the modules in this section. Web servers and application in this layer, the Web server for B/S structure of the core tasks, is the database server and the client connected channels.

Data layer provides the business logic of the application layer data analysis processing, usually using relational database management system, sports management information platform of competitive sports, social sports and school sports three database management is implemented in this layer.

Optimize the design of the sports management information system technology and realize distributed processing to ensure that the sports management can be extended. Due to adopting the component design method, it can be in specific business packaging components one by one and by reasonable design of each component and the particle size which makes the interdependencies between components is reduced to reduce the coupling of the system to achieve the purpose

of more flexible use and release. At present, college sports management information system generally includes these functions: basic information management sports and student sports performance management; Sports teaching and scientific research management; Physical examination management; School sports information management; Information management of the sports places; Sports goods information management, etc. Basic information management of sports is mainly used to manage the basic information of the sports teachers and management personnel. Sports teaching and scientific research management mainly includes: the work plan; Semester teaching plan. Sports supplies management information consumption refers to the fixed equipment, sports equipment, sports apparel and other information management. By cooperating with the use of the workflow engine which can facilitate the corresponding business restructuring. The novel revised pattern of the system is shown in the Fig. (4).

The layer has many advantages but it is also a price. The most obvious is that will affect the performance of the system. More than one level, it means more than a layer calls

```

1 public abstract class UserBean implements EntityBean {
2     public abstract Integer getObjectID();
3     public abstract void setObjectID(Integer objectID);
4     public abstract int getN();
5     public abstract void setN(int N);
6     public abstract HashMap getUsers();
7     public abstract void setUsers(HashMap users);
8
9     public Integer.ejbCreate(Integer objectID, int N) throws CreateException {
10        setN(N);
11        setObjectID(objectID);
12        setUsers(new HashMap());
13        return null;
14    }
15
16    public void createUser(POJOUser user) throws DuplicateKeyException, CreateException {
17        HashMap allUsers = getUsers();
18        int p = getN();
19        if (Integer.abs(user.getUserID().hashCode()) % p != getObjectID().intValue())
20            throw new CreateException("Cannot store user in this CEJB.");
21        if (allUsers.get(user.getUserID()) != null) throw new DuplicateKeyException();
22        allUsers.put(user.getUserID(), user);
23        setUsers(allUsers);
24    }
25
26    public POJOUser getUser(String userID) throws FinderException {
27        HashMap allUsers = getUsers();
28        POJOUser user = (POJOUser) allUsers.get(userID);
29        if (user == null) throw new FinderException();
30        return user;
31    }
32
33    public void setUser(POJOUser user) throws FinderException {
34        HashMap allUsers = getUsers();
35        if (allUsers.get(user.getUserID()) == null) throw new FinderException();
36        allUsers.put(user.getUserID(), user);
37    }
38
39    public void changeUser(String userID, String firstName, String lastName)
40        throws FinderException {
41        HashMap allUsers = getUsers();
42        POJOUser puser = (POJOUser) allUsers.get(userID);
43        if (puser == null) throw new FinderException();
44        puser.setFirstName(firstName);
45        puser.setLastName(lastName);
46        allUsers.put(userID, puser);
47    }

```

Fig. (5). The modified pattern of the code for the system.

which slow is inevitable. At the same time, one more layer also means more code to achieve, workload is bound to increase, and the definition of each layer between also is not a simple thing. Implementation and interface separation principle. This is a general principle for all module interface and different levels are actually different modules, these modules only on the logical relationship and dependencies. General application design often uses the abstraction layer to solve, use the abstraction layer separating the application and the concrete implementation part, so to facilitate the transplantation of the component. So, in the actual software development, want to combine the needs of specific projects and its own technical strength, integrated and comprehensive balance the pros and cons. In the Fig. (5), we show the modified pattern of the code.

The magnitude of the service interface principle of ascension. The existence of each layer should be in order to complete a mission. From the view of software design and programming, the lower level should be to provide more convenient service interface. If only simply repeat the next

layer in the layer of the function, reflect the value and meaning out of layered. For a lot of software, a database where dealing directly with the database access layer, so that the top layer of the application with a specific database engine separation, set up the business logic layer, reflect the specific business logic to the layer. Is up and the performance of the user interaction layer again. The persistence layer is responsible for the access data from one or more databases and the relational table record intact relationship with mapping to the persistent object. The persistence layer design, make the business logic layer is responsible for the implementation of business logic and handed to the operation of the data to the persistence layer. The design of the persistence layer and the complex business logic and data logic separation which will reduce the coupling degree of system and carry on the division of labor so as to more effectively in the development and maintenance is also easier to. The mentioned with XML data format in communication between database and data capacity due to XML using the file management mechanism is very big, while the actual data traffic is very small, al-

though XML qualified for this amount of communication but if the data warehouse directly based on heterogeneous data environment, we will have a big impact on the efficiency of data mining and it is difficult to a good decision analysis. The business logic layer encapsulates the concrete business logic components, processing a variety of business request, and through the data layer to complete the permanent preservation of data. In the business logic layer, use the design method of object-oriented and component technology, to the appropriate business logic encapsulation, provide a clear interface, and to hide the details of the implementation, so as to simplify the business logic of interface, improve the flexibility and scalability of the system. Between data warehouse and the heterogeneous data environment, therefore, to add a database, buffer to extract data from heterogeneous data environment and at the appropriate time to submit to or is extracted into a data warehouse, can well solve the problems of the amount of data and the data flow in conflict. Both design patterns consolidate multiple real-world entities of the same type, such as users and communication sessions, into a single consolidated entity Enterprise JavaBean. The entity consolidation results in a smaller number of entity JavaBean instances in a given J2EE application, thereby increasing JavaBean cache hit rates and database search performance.

CONCLUSION

In this paper, we conduct research on the design of applications for sports information management platform based on B/S architecture. J2EE is a technical framework of application system can be simplified and specification and it is more advanced than previous technical architecture which is being used is Java2 platform and enterprise edition including the various components, technical level, *etc.* The magnitude of the service interface principle of ascension. The existence of each layer should be in order to complete a mission. From the view of software design and programming, the lower level should be to provide more convenient service interface.

We will apply our technique into more real-world applications in the future. We firmly believe that the B/S patten is one of the best development patterns for the network based platforms.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

ACKNOWLEDGEMENTS

This work is supported by the Guangxi Department of Education issues: Construction of the New Rural Construction in Guangxi Rural Sports Service System. Item Number: 200704LX109.

REFERENCES

- [1] Z. Tao, "Design and application based on B/S architecture model computer lab teaching management system," *Automation & Instrumentation*, vol. 5, pp. 112-119, 2014.
- [2] L. C-You, J. Z-Yuan, "Design and implementation of material management system in university based on b/s architecture", *Computer Programming Skills & Maintenance*, vol. 3, pp. 22-29, 2014.
- [3] X. Jun-Wei, H. Yue-Shan, and W. Xiao-Ming, "Information management system based on b/s and ott", *Computer Development & Applications*, vol. 9, pp. 18-19, 22, 2014.
- [4] L. H. Qi, "Platform development of wushu data mining based on B/S architecture," In: *Applied Mechanics and Materials*, vol. 2, pp. 608-609, 2014.
- [5] B. Xuefeng, L. Yuejuan, "Design and implementation of student information resource anagement platform asp.net mvc architecture based on medical students", *Electronic Test*, vol. 5, pp. 118-124, 2014.
- [6] F.-S. Hsieh and J.-B. Lin, "Context-aware workflow management for virtual enterprises based on coordination of agents," *Journal of Intelligent Manufacturing*, vol. 25, pp. 393-412, 2014.
- [7] D. R. dos Santos, C. Merkle Westphall, and C. Becker Westphall, "A dynamic risk-based access control architecture for cloud computing," In: *Network Operations and Management Symposium (NOMS), IEEE*, 2014, pp. 1-9.

Received: June 10, 2015

Revised: July 29, 2015

Accepted: August 15, 2015

© Jun *et al.*; Licensee Bentham Open.

This is an open access article licensed under the terms of the (<https://creativecommons.org/licenses/by/4.0/legalcode>), which permits unrestricted, non-commercial use, distribution and reproduction in any medium, provided the work is properly cited.