Research and Design on Library Management System Based on Struts and Hibernate Framework

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***Abstract*—If some small libraries use traditional library management system, they maybe waste resources. In order to this problem, a library management system based on struts and hibernate frame is put forward. This system has MVC architecture. It is a mutil-tier system including presentation layer, business layer, data persistence layer and database layer, which can separate codes, and improve maintainability and reuse of the system.**

Keywords-Hibernate; Library management system; MVC; Struts

I. INTRODUCTION

Computer software has played a vital role in book management of library now. Computer software can retrieve books quickly and it also has high effective, long operating life, low costs advantage. It is the informatization and scientific trend of book management. However, existing large-scale library management system used in some small and medium-sized library directly will lead to resources wasting. So, developers adopt a popular software development technology and propose the library management solution based on framework. System which is designed on struts and hibernate frame structure can be divided into presentation layer, business logic layer and data processing layer. This technology can realize code separation and enhance system maintainability and reusability.

II. STRUTS FRAMEWORK BASE ON MVC DESIGN PATTERN

Wherever Times is specified, Times Roman or Times New Roman may be used. If neither is available on your word processor, please use the font closest in appearance to Times. Avoid using bit-mapped fonts if possible. True-Type 1 or Open Type fonts are preferred. Please embed symbol fonts, as well, for math, etc.

MVC is a widely used design pattern of smalltalk-80 Proposed by XerorPA PC in the 1980s. MVC forms Model/View/Controller structure through clearly separating business logic, data presentation and applied behavior. The model which represents business data and business logic is main part of the application program. View is the interface through which users can access and query the state of business. But it can't be changed by users. View also can accept model requirements to update data and renew user interface synchronously. Because a model can be reused by more than one view, this improves the reusability of application. The role of controller includes accepting the request from client, choosing appropriate business logic to implement and then sending the response results back to client.

Struts are an open source project in Apache Jakarta group. It is a Web application frame based on MVC architecture. Struts project is modular components .It is flexibility, reusability and simplifying the development of Web application. Struts separate business logic, data presentation and applied behavior reasonably. It makes software development clearly and concisely and improves software maintainability and reusability.

Model, view and controller are respectively mapped to components in web application by Struts architecture. View is established by JSP which contains a set of scalable custom tag library (Tag Lib). Model is represented by ActionFormBean. Business logic usually established by JavaBean or EJB. Controller is represented by ActionServlet which is the core of Struts. Control parameters of ActionServlet are in config.xml profile. The architecture of struts is shown in Figure 1 .

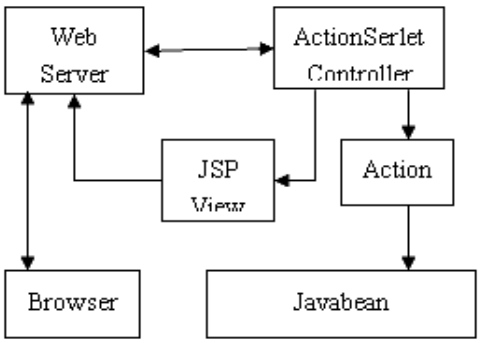

Figure 1. Struts architecture

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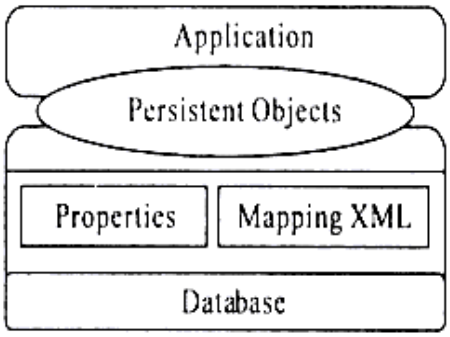

Figure 2. Hibernate architecture

III. HIBERNATE FRAMEWORK

Hibernate is an open source Object-Relational Mapping Framework in Apache Software Foundation. It is a java-objected mapping tool with object-relational database. Its architecture is shown in figure 2[6]. Object-relational mapping framework is used to map objects which are presented by object model into relational model structure base on SQL. Hibernate not only manages the mapping from java class to Table in Database, but also provides data query and data acquisition. Hibernate package JDBC lightly to reduce the time of SQL and JDBC processing data. So Java programmer can control database in object-oriented method easily.

Hibernate has five core interface, they are Session, Session Factory, Transaction, Query and Configuration. Programmers can access persistent object and also can control transaction with these interface. System built by hibernate can avoid manual developing the method of access Data Persistence Layer. Programmers can dedicate in the development of business logic. It will simplify the developing difficulty and accelerate developing speed [4].

IV. DESIGN AND IMPLEMENTATION OF LIBRARY MANAGEMENT SYSTEM BASED ON STRUTS AND HIBERNATE FRAMEWORK

A. System Model

Small Library Management System is a information system built with transaction demand, which includes system management, book borrow and return management, reader database management and book database management[2]. System management includes system parameters maintenance and reader access authority setting. Books borrow and return management processes routine business, such as books lend, return and query. Reader database management handles reader information maintenance, such as library card registration, loss registration. Book database management maintains literature and information such as query, modify, add and delete or print report. System function model is shown in Figure 3.

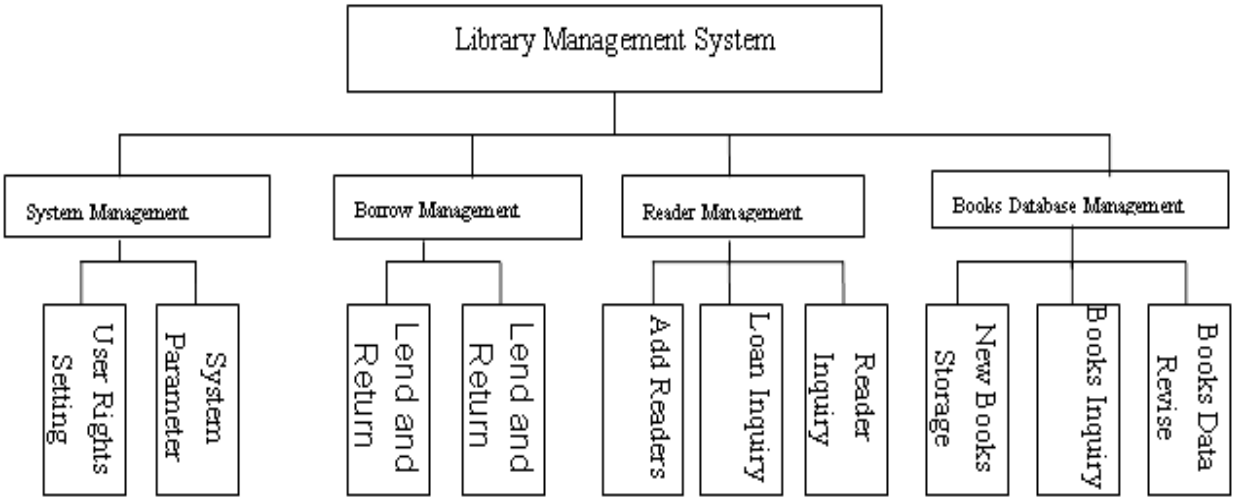

Figure 3. System function model diagram

B. System Architecture

Struts and Hibernate was used to develop the framework of library management System .Whole system can be divided into Presentation Layer, Business Processing Layer, Data Persistence Layer and Database Layer. Its architecture is shown in Figure 4. Presentation Layer realize with JSP technology and Tag Lib in Struts. The core component of Business Processing Layer is controller realized with ActionServlet and Action component in Struts. Business Processing Layer also

includes Business Logic Class which is realized with JavaBean. Business Processing Layer can exchange of information with database through model layer, which is done by Hibernate. Besides, relational database is at the bottom of the model.

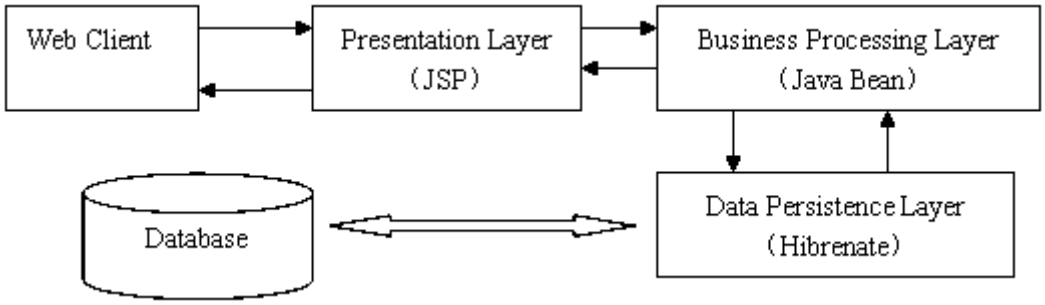

Figure 4. System architecture

C. System Implementation

1) Presentation Layer

Presentation Layer is realized with Struts framework, whose core is ActionServlet component. While each controller component is designed, struts-config,xml will be defined to allocate business Process and this configuration item will be declared in web.xml file. ActionServlet will realize the map of input、processing and output on client terminal based on struts-config.xml configuration file. While users run user registration page-register.jsp, registration information in the page will be sent to controller. According to the configuration file, the controller will create a JavaBean file-RegisterForm.java which is the business model in MVC. RegisterAction.java is used to handle business model. When registration is successful, system will call file Login.jsp to login, otherwise, users should register again.

2) Business Logic Layer

Business logic layer is responsible for all the business logic in library management system. It is the middle layer between Presentation Layer and Data Persistence Layer. Data handled in Business Logic Layer only comes from Presentation Layer and Data Persistence Layer. Business Logic Layer is responsible for packaging data object which is provided by Data Persistence Layer .It also provides function interface for Presentation Layer. Business Logic Layer is realized by Business component. Considering the length of article, related source code is not shown in the article.

3) Data Persistence Layer

Data persistence layer is realized on Hibernate. During the course of realization, programmers should create configure file, define persistence class, define the mapping of persistence object and realize persistence operation.

Configuration file hibernate-cfg.xml in Hibernate sets up driver, user name and password of the information database. UserIn.hm.xml is an object-relational mapping file; realize the map from userInformation.java object file to table UserIn in database.

Database operation such as query, modify, delete and add was packaged in UserInformationManager.java.

A part of the code in UserInformationManagerm.java is shown below.

```
public class UserInformationManager{
   public void save(UserIn userIn){}
   public void delete(UserIn userIn){}
   public UserInf findById(Integer id){}
   public void find(UsreIn userIn){}
}
```

This method will create Session object firstly in the course of realization, then it will implement a variety of database operations, and close Session object after the operation.

With the use of Hibernate, SQL sentences to access database will reduce significantly. It will facilitate user development and system maintenance.

V. CONCLUSION

This article describes the design and realization of a library management system with struts and hibernate technology. System takes fully advantage of struts and hibernates, shortens system development cycle effectively, realizes code separation and Enhances system maintainability and the reusability. System has already run with good results in an organization. System simplifies the work of library management and has good extensibility.

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