Research Article

An Efficient Design Method of Enterprise Attendance System Based on SSH2

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Abstract: On the basis of SSH2 open source framework, this paper designed and implemented a set of employee attendance management system. The system uses JSP, Ajax and JNDI technology to regulate the system standards. Meanwhile it implements the separation of presentation layer, business layer and database layer, which reduces the coupling of the module and improves the code reusability. The practice has proved that the system has the characteristics with strong expansibility, good maintainability and high efficiency, and has a good application effect.

Keywords: B/S, SSH2 framework, attendance system, Oracle database.

INTRODUCTION

Enterprise employee attendance system is an intelligent management system, which can get timely the working state of employee. The current attendance system has some common problems, such as lower scalability, poor portability and subsequent maintenance difficulty [1]. So it has been unable to meet the requirement of modern enterprise development. After consulting large number of relevant documents, this paper designed and implemented a set of employee attendance management system based on SSH2 architecture. The system is based on B/S structure, development platform is MyEclipse, three layer J2EE structure is combined with SSH framework, and background database is ORACLE 11g. It supports rights management of multi-user, multi application and multi module, has high scalability and portability, reduces maintenance cost, and improves the efficiency of software development.

THE INTRODUCTION OF SSH2 TECHNOLOGY

SSH2 open source framework is the most mainstream J2EE lightweight framework, including three frameworks, namely Struts2 framework, Spring3.x framework and Hibernate 2.5 [2].

Struts2

Struts2 is web application framework based on MVC (model, view and controller) structure. It takes WebWork as core, and adopts interceptor mechanism to deal with user's request, so that the business logic is completely divorced from the servlet API. It not only decreases the coupling degree of program but also improves the test efficiency [3]. Because it can test the Action without web container, and divides the program structure into business logic, control logic and display. So the coupling degree between the logic layers is greatly reduced, which improves the development efficiency of application, reusability and maintainability [4].

Spring

Spring is a business layer framework, it can well glue presentation layer and persistence layer. It provides a lightweight solution for enterprise program, including declarative transaction management, various configurations supportance of persistence layer, unified resource allocation management and so on [5]. Layered architecture is one of the advantages of Spring. It allows user to choose module according to their own needs, and manages the life cycle of business objects and invokeing relationships between them. The core of Spring is Aspect-Oriented Programming (AOP) and Inversion of Control (IOC), it provides a unified interface for the different data access technology.

Hibernate

Hibernate is a Object Relational Mapping (ORM) framework, it makes the lightweight object encapsulation for JDBC. It works in the persistence layer, its main work is automatic generating code of persistence layer. Moreove, it not only supports encapsulation and polymorphism of object-oriented, but also supports such as HQL query language, SQL query language and all mainstream relational database system, which can solve the mismatch between the oriented object technology and relational database technology [6-7]. So programmers can use object-oriented programming ideas to manipulate database and put more effort in the business layer.

SYSTEM STRUCTURE AND FUNCTION DESIGN
System architecture pattern

In this system, presentation layer uses Struts, it makes process control, business processing and presentation layer result separated; persistence layer uses Hibernate, it can directly generate the method of database persistence layer; business layer uses Spring, it integrates and assembles code by injection thought. Their integration improves the software expansibility, reduces maintenance cost, and greatly improves the efficiency of software development. System architecture is shown in Fig.1

(1) When user visit JSP page of the system and submit the request, the system will encapsulate the submitted data into the ActionForm class of Struts, and submit the request to the ActionServlet in the Struts.

(2) According to configuration file in Stmts-config.xml, ActionServlet will find the corresponding Action.

(3) ActionServlet will transfer the request to corresponding Action class for processing.

(4) The action will invoke the corresponding business Service in the Spring framework, and then invoke business Bean to deal with the request through the Service. The business Bean will invoke the corresponding objects of persistence layer, and dealt with them accordingly.

(5) Hibernate will manage the persistent layer object and save the changes of the persistence layer object to the database.

System function structure and analysis

The user of the system has three categories: ordinary users, department manager and administrator user. After the users login in the system, ordinary users can only view and maintain their own relevant; Department manager has the authorities of message management and audit management, the audit management includes travel leave audit and sign audit; Administrator user has all authorities, he can modify the authorities of user department manager, audit application which department manager has audited, and decide whether to pass. The system function structure is shown in Fig.2.
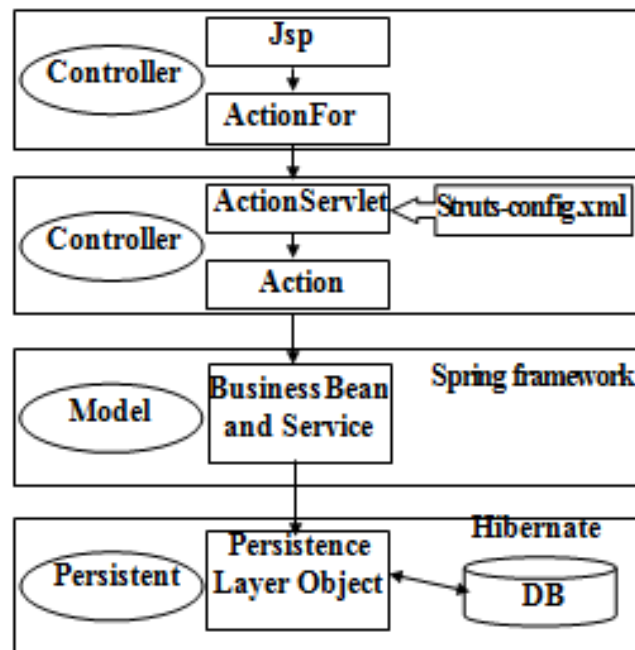

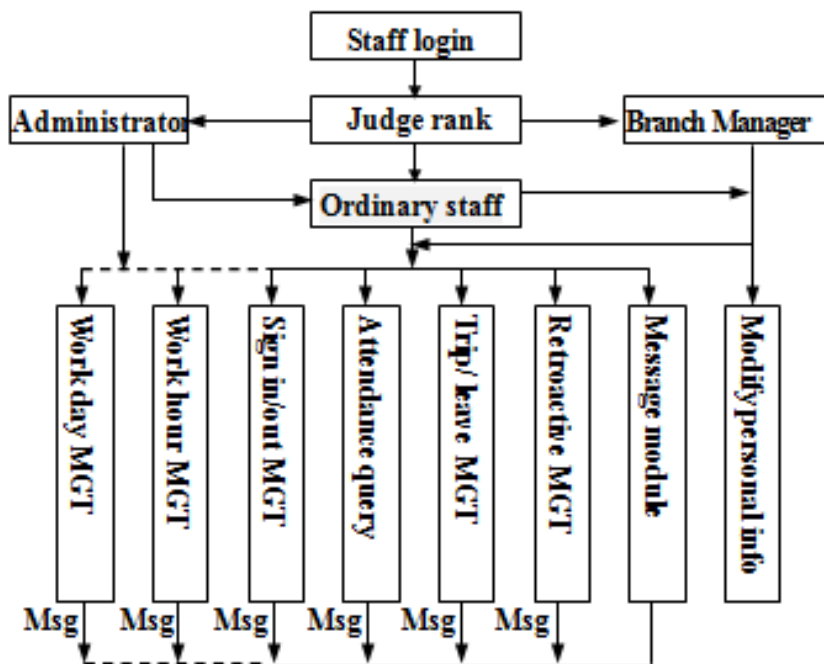**Fig. 1: System architecture chart**

Fig. 2: Function architecture chart

System function module

Taking into full account the needs of employee attendance management, system function mainly includes sign in/out management, attendance history management, working day/time management, travel/leave management, retroactive management and other modules.

(1) User management module: user can modify own information. If user is administrator, he can also set permission for other users.

(2) Sign in/out module: record sign in and sign out time, and judge whether is late or leave early. If there is no operation in the day, should check whether the employee is absent, sick leave or travel.

(3) Attendance history module: query user's authority, and according to the relevant authority to query by conditions.

(4) travel/leave management module: first, a employee sent a corresponding application to his department manager, then the application was sent to manager for final approval if it has get the agreement of department manager.

(5) Message management module: take charge of communication between different authority users, and can modify the news with CRUD operations.

(6) Retroactive management module: if employee forgot to sign in/out, they can submit retroactive applications. The applications were sent to department manager for approving.

(7) working days/time management module: set working days, rest days and working time periods. The function is only set by the administrator (Manager).

(8) Database management module: the administrator can backup, empty and restore the system attendance database.

THE DESIGN AND IMPLEMENTATION OF KEY TECHNOLOGY
The flexibility connection of database

Take Oracle as an example, when a programmer accesses Oracle database application, he needs to encode for the reference of Oracle JDBC driver class, and connect to the database by appropriate JDBC URL. If the database is changed, it will results the JDBC URL or JDBC driver package needs to be modified. Furthermore, with the increase of actual use terminal, the connection pool parameters of original configuration are also should be constantly adjusted.

This system uses JNDI technology. JNDI (Java Naming and Directory Interface) is one of important J2EE specification. Using JNDI, programmers do not need to care about the specific background database, JDBC driver, user name and password of database. These questions were left to the J2EE container to configure and manage. The programmer needs only to reference the configuration and management.

First, we configure the corresponding Oracle.xml file in web server, then write code on the program to reference the file. The core code is as follows:

```
Context ctx=new InitialContext();
Object datasourceRef=ctx.lookup("java:Oracle");
// The Reference of data source
DataSource ds=(Datasource)datasourceRef;
conn=ds.getConnection();
```

Now, the program does not need to care about specific JDBC parameters. If relevant parameters of database changed, we just need to modify the JDBC parameters in Oracle.xml.

The high efficiency scalability of system

Employee attendance system is based on SSH2 framework, it ensures the consistency of hierarchical design through the framework integration of Struts, Spring and Hibernate. To ensure that each hierarchy does not rely on another hierarchy, it realize the decoupling between these hierarchies. Therefore, when any of the frameworks was replaced, other hierarchical components of the system can not be affected.

Taking attendance module as an example: when employees login the system, they will enter the sign page. Their sign request will be stopped by Struts interceptor which is set in the web.xml. The system will according to the parameters passed by page to find the corresponding action in Struts.xml to deal with the request.

The code in struts.xml parts is as follows:
```
<package name="model1" extends="default">
    <action name="emp_signed"
class="SignedAction" method="signed">
        <result
name="signedSuccess">/employee/signed_in_out.jsp</result>
    </action>
</package>
```

It is observed that the class we find from XML configuration file is SignedAction, then we find Signed method according to the method attribute in Action. Because this program has no contact with the Servlet API, so the later expansion can be modified without changing the other program code.

Spring container is used to manage the objects of Struts2 and Hibernate framework. It can easily do unified control to object life cycle, and facilitate the future modifications and extensions. Spring is through the applicationContext.xml configuration to initialize actions and services. The specific code is as follows:
```
<bean id="EmployeeAction"
class="com.hrm.action.EmployeeAction"
  scope="prototype">
        <property name="employeeService"><ref
bean="employeeService" /></property>
        <property name="dataService"><ref
bean="dataService"/></property>
    </bean>
```

By the Spring configuration, EmployeeAction can successfully invoke the underlying Service, Service can successfully invoke the DAO layer to complete the increase of employee information.

The transaction flexibility of system

In the past, we used JDBC to operate data. Due to data source connection is not thread safe, so each request is getting a new connection from the data source. This will result code amount is larger and some try/catch are neglected. In order to avoid these questions, this system adopts declarative transaction of Spring. The configuration diagram of Spring is shown in Fig.3.
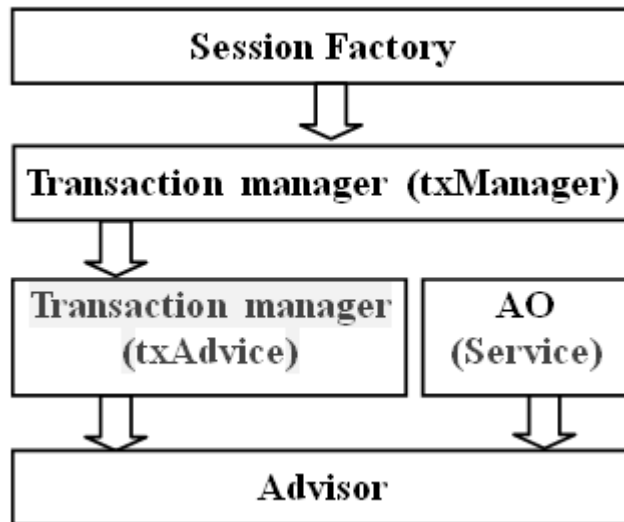
Fig. 3: Configuration diagram of declarative transaction in Spring

Its core configuration code is as follows:
```
<tx:advice id="transactionAdvice"
transaction-manager="transactionManager">
    <tx:attributes>
        <tx:method name="save*"
propagation="REQUIRED"
rollback-for="java.lang.Exception"/>
        ……   // Other transaction methods
    </tx:attributes>
    </tx:advice>
    <aop:config>
```

```
        <aop:advisor pointcut="execution(*
com.hrm.service..*.*(..))"
            advice-ref="transactionAdvice"/>
    </aop:config>
```

The biggest advantage of using Spring to declare transaction is that it does not require to manage transaction by programming approach. We only make the related transaction rule statement in the configuration file, then the transaction rules are applied to the business logic.

CONCLUSION

This paper introduces the design and implementation of enterprise employee attendance system based on SSH2 framework. It deeply analyzed the integration of hierarchical structure and framework technology, realized the separation of presentation layer and business logic layer, and described the key technologies in detail. The practice has proved that the system has high development efficiency, strong expansibility and good maintainability, and has a good application effect.

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