Design and Implementation of ERP System Based on SSM Framework

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Abstract. With the continuous development of enterprise information technology, information resource sharing has become a major subject of scientific research projects. Traditional enterprises have complex business processes, low management efficiency and high operation cost, which leads to enterprises of low competitiveness. Therefore, it is the best choice for enterprises to regain their core competitiveness to use ERP management system to improve their operation process, simplify their operation and make their operation methods transparent. This paper designs an ERP system based on SSM framework. This paper introduces the basic principles of SSM framework, respectively realizes the business functions of Controller layer, Service layer and DAO layer in the framework, and designs Web pages for data collection and display. The main components of the system consist of six modules: purchase plan, purchase order, purchase contract, purchase document inquiry, purchase to order and purchase return, which can well realize the actual requirements of enterprises.

1. Introduction
Since the 1990s, the ERP control and management system has been developing rapidly because it is suitable for the management of modern enterprises. The current development direction is mainly the combination of ERP system with material management and information management technology \cite{1}. ERP has been regarded as the symbol of enterprise informatization internationally \cite{2}. Foreign research on ERP control and management system started earlier, which provided many application cases for China. During the development in China in recent 10 years, the success rate of the enterprise ERP management system is less than twenty percent. The fact mainly because the implementation of ERP system requires close coordination of each department and demands a high degree of integration, need a lot of software and hardware equipment have fully understanding of talent\cite{3}. The developments invest a lot of money and a long time of practice. For enterprises that use ERP system for the first time, they need to change their management mode and business process, which means that they have to take some risks for their future development, even if this is the last thing they want to face. China began using MRP systems in the early 1980s. Since MRP II, developed in the 1960s, is no longer suitable for the management of modern enterprises, all kinds of enterprises have started to change their business mode and management mode, upgrading the original system to ERP management system \cite{4-6}. The number of enterprises using ERP project is small and the time from start to produced results is long, the
application range is unbalanced. Using the ERP did not make good use of numerous functions, China's enterprises exist a big gap compared with abroad.

2. ERP system workflow and implementation process

2.1. System workflow
The implementation of procurement in ERP system can be realized. The working process is: establishing supplier resources, building materials business information, the selected vendors are screened, then create a form to specify the material details, finally confirm key points that the purchasing plan. Generate the purchasing plan, make it according to the inventory capacity and order demand in the warehouse, estimate the quantity of purchased materials in advance, and calculate the inventory space to be reserved. Then we can select the appropriate transportation method and work out the procurement plan, which can be modified as needed. Inquire and negotiate with suppliers to confirm purchasing plan. Through comparing the prices of the same materials in the market, the staff of the enterprise can negotiate with the suppliers to determine the quantity of goods to be purchased. Identify all types of suppliers according to material quality and technical requirements. To place orders, plan and generate purchase orders according to the quantity, purchase date, warehouse capacity, delivery plan and economic plan determined by the supplier, and then send the orders to the supplier for second confirmation. Generate the contract plan. After determining the purchase plan, the page will generate the contract order, confirm the contract with the supplier again, and track the purchase order. The completion time of the order is determined, and the order tracking plan will be written according to the order plan. For the acceptance of incoming materials, the raw materials transported by the business personnel of the enterprise according to the purchase order acceptance, and determine the previous contract. Or according to the system advantages of the ERP procurement management system and the acceptance process of the enterprise, the inspection personnel shall check and accept the orders. To settle accounts and to calculate expenses, the business personnel of the purchasing department cooperate with the financial department of the company after the acceptance of incoming materials, and then they can settle expenses, add up the purchasing cost and settle the purchase order according to the confirmed contract. After the delivery order is completed, the material is put into stock, the cost is settled with the supplier and the inspection is carried out. System basic data maintenance: the basic data of the procurement management system should be responsible for the purchase of the company's salesman data, raw material supplier data and material details. And the data should be updated in time.

2.2. Specific implementation process

![SSM framework schematic diagram](image)

**Figure 1. SSM framework schematic diagram**
SSM framework is used in this design, which can improve the coding efficiency and reduce the workload. The SSM framework is divided into three parts, spring, springMVC and mybatis. The principle is shown in figure 1.

Spring is responsible for the Service layer. It splits complex business into several fine-grained DAO operations, invokes daos to obtain data and then encapsulates them. Spring instantiates objects without recreating classes; it acts as a container that encapsulates objects and can be invoked directly by keyword when writing programs.

SpringMVC can respond to the user’s request to perform the corresponding operation, which can be likened to a controller. The controller accepts the user's request and generates the corresponding task request, and then calls the Service layer to perform the task. When the task is complete, the results are sent to the Web tier through the view dispenser.

Mybatis makes the underlying database operations transparent. All database-related operations go through the persistence layer of the database, through which the user, if performing database-related operations, is forwarded by the controller to the view dispenser. Mybatis is associated with the Mapper file of each entity class through the configuration file, in which each class is configured with the SQL statement mapping required for the database. In each interaction with the database, sqlSessionFactory to get a sqlSession, and then execute the SQL command.

The Web layer is used to receive user input data and instructions, which are sent to the Controller layer through the network, receive SSM data processing results and present them to the user.

2.3. Change configuration files

First create a Java WEB engineering project and change the configuration files applicationcontext.xml, web.xml, and springmvc.xml used by the framework. Create an empty database using the database management tool Navicat. Change the database name and project address to the configuration file. Web.xml is used to connect the SSM framework to the tomcat server, which is the entry file of the server. The files are composed of a body file and a mapping file. The applicationcontext.xml file, spring in the SSM framework, concatenates component-scan in it, where you define the used keywords for later invocation. Add an annotation driver to the springmvc.xml file to set all the fonts in the project to utf-8 to avoid gargoyles on the page where the front end returns json strings.

3. Design login page

3.1. Front-end page code writing

Create the index.jsp file in the web-inf folder, and in the file create "response.sendredirect (" ");" Method, used to direct the front page, control page jump. Next, create four file packages under the SRC folder: controller file package, dao file package, entity file package and service file package. The Controller file is the Controller in springMVC, it provides the definition of a very simple method of the Controller without inherits a specific class or implement a specific interface, simply use the @Controller mark that it is a kind of Controller, and then use some annotations like @RequestMapping and @RequestParam to define URL request and to define mapping between the methods of the Controllers. This controller can be accessed by the outside world. You can write multiple request handling methods. The controller is used to receive requests from the user and to write a logical method for the user to log in. If the correct user name and password are filled in, the user can log in to the main page. The Dao file package is the database operations layer used to interact with the database, where you write and define database-related SQL statement methods. Entity file package is used to store the data of the database form. The classes defined in this file package must correspond to one by one in the database table. The Service file package defines an interface that allows users to add, delete, and change operations on the web server, i.e. on the web page. The method written in the Service file package must be the same as that in the dao layer, and the technology applied is servlet connection technology. Under the service file package, create a Java file with the same suffix "impl" as the service file name to implement the service interface and invoke the dao layer's methods. You also define the user's mapper file, where you write specific SQL statements.
Controller files, dao files, entity files, and service files must also correspond one to one. This is the process of writing the back-end code that implements the login function.

Next, write the front-end page, create login.jsp file in the web-inf folder, define the characters in <meta> tag, and define the front-end login method in <script> tag. Write a view of the main screen display inside the <body> tag.

Finally, the database form is created. Navicat is used to define the columns of id, user, password, etc. of the user form in the database. The columns of varchar type are uniformly set to utf-8 character format. Add username and password after creation.

After deploying the tomcat server in eclipse software, run the entire web project, open the page in the browser and enter your username and password to log in to the main screen.

3.2. Design of main interface and form module

GetSession() is used to connect the main interface after login with the login button, and the side list of the main interface is the list of forms. JSP files (or HTML files) of 5 forms are established respectively. Fill in the form style inside the <body> tag, and add the method inside the <script> tag. Use the database administration tool navicat to create the elements of each form separately. Writing of form back-end code: the controller mainly writes methods of adding, deleting, checking and modifying front-end page forms and methods of connecting with JSP files (writing methods by array traversal). The dao layer is used to define the interfaces that are the operations of the data layer.

![Figure 2. The Purchase Plan Order](image-url)
Figure 3. The Purchase Contract

Figure 4. The Inquiry of Purchase Documents

Figure 5. The Inquiry of Purchase Arrival
The Service layer is basically the same as the dao layer, which is used for logical judgment, and then the impl file is created to implement the Service interface. Finally, define the mapper file of the form, which writes SQL statements to add in, delete and change forms. The forms are listed in figure 2-5.

4. Summary
Through the analysis of ERP purchasing management system, this paper shows the basic principle of ERP system and realizes some functions of ERP purchasing management system. Eclipse software was used to write Java code, JDBC technology was used to connect mysql database and designed JSP page, and sevlet technology was used to enable technicians to add, delete, change and check the designed JSP page. This design uses Java programming language. The language is object-oriented language, easy to transplant, can enhance the vitality of the system. The use of Java programming system in the factory can make the management more structured and streamline, which can greatly improve the production efficiency of the factory.

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