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The Design and Realization of Vehicle Rent Information System Based on Java

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Abstract

In recent years, with the "Internet+" action plan put forward by the state, "Internet + industry" has been widely used in various industries, especially in the country. With the encouragement of the "Internet + traffic" innovative form, the Internet rental car industry is developing rapidly. Therefore, the establishment of a network-based car rental management system is conducive to improving the operational capacity of enterprises to meet the needs of industry development. The system is mainly based on j2EE, mainly using struts 2 + Spring + hibernate and other frameworks, using MyEclipse as a development tool, MYSQL as a database, Macromedia Dreamweaver as a tool for interface beautification, and using JAVA language development. The page adopts JSP dynamic page development technology. The system has simple interface, easy operation and easy maintenance.

Subject Areas

Mechanical Engineering

Keywords

Car Rental System, Java, JSP, j2EE

1. Introduction

Today, with the improvement of people's living standards, the development of the automobile industry and the popularization of automobiles, computers have been widely used in business management, but many car rental companies are still at the level of manual management, obviously not suited to the development of the times. Managers need a set of convenient, computerized [1] management information system to replace their tedious, inefficient traditional manual management, and ultimately realize the full automation of car rental management.

The use of car rental management system can standardize the management and operation of enterprises, and reduce operating costs and improve efficiency. Car rental management system is a simple and easy-to-use system for car rental companies. With the development of science and technology and the modernization of equipment and management, how to improve work efficiency has become a very important issue in practical work.

2. Idea and Technology of System Development

2.1. JSP Technology and MVC Mode, and the Basic Framework of the System

This system uses JSP technology, based on MVC mode development, using SSH framework (Struts 2, spring, hibernate) to increase the speed of system development. The so-called MVC mode is the abbreviation of "Model-View-Controller", and Chinese is translated as "mode view controller" [1]. The program is to use Struts 2 and hibernate to implement the model layer and controller layer, and JSP to implement the view layer. Generally speaking, the program acts as a bridge between the database and the page. JSP page requests to go to action first, then to to Dao aspects, then to action, and then back to JSP page. Action mainly deals with requests from the page. Dao mainly interacts with the database. Struts 2 is mainly used for action. It handles requests from the page. After processing, jump back to the page. Hibernate is mainly used in Dao aspects, including database add, delete, modify, check operation, spring control procedures [2].

2.2. Advantages of the S.S.H. framework

2.2.1. Struts 2 Frame

Struts2 is an open source project of Apache organization. Struts 2 is a good MVC framework, which provides the underlying support for developing MVC systems. The main technologies it uses are Servlet, JSP and Custom tag library. Its basic composition is shown in **Figure 1**.

2.2.2. Spring Frame

Spring's core is a Lightweight Container, which is a framework for implementing IoC (Inversion of Control) containers, non-intrusive, and provides the implementation of AOP (Aspect-oriented programming) concepts, providing persistence and transaction. Support, implementation of the MVC Web framework, and consistent model encapsulation of some commonly used enterprise service APIs (Application Interfaces) is an all-round application framework, in addition to existing frameworks (Struts, JSF, Hibernate, etc.), Spring also mentions The scheme is integrated with them [3].

2.2.3. Hibernate Frame

Hibernate is an open source ORM persistence layer framework. As an excellent persistence layer framework implementation, the Hibernate framework provides powerful, high-performance Object-to-Relational database persistence services,

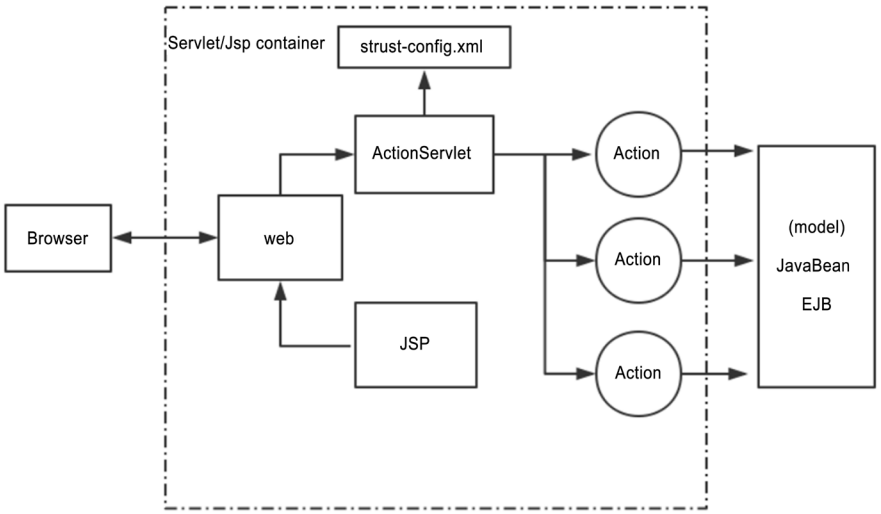

Figure 1. Struts Framework workflow.

and developers can use object-oriented design for persistence layer development. Simply put, Hibernate is just a tool for mapping persistent classes to database tables, each of which corresponds to a row in the database table. Users can insert, delete, modify and read database table data only by operating the persistent class instance directly with object-oriented method.

3. System Business Description

The system divides managers, staff, technicians, and customers into 4 user roles. The main functions of the manager include personnel management, vehicle management, daily income statistics, monthly income statistics, vehicle income statistics. The main functions of the staff are vehicle rental management, car rental record management, technical confirmation query, confirmation return management, reservation record management, reservation record query, customer information query, message management. The main function of the technician is to confirm the vehicle information and my confirmation list. The main functions of the customers are scheduled car rental management, reservation record management and message board.

The use case diagram is as follows (Figure 2).

System Privilege Design

According to the relevant laws and regulations of our country, the automobile rental management system can operate and manage the automobile rental management system according to the user's real authority, so as to ensure the safe and effective operation of the whole management system [4]. Therefore, in the management system design process, it is necessary to carefully understand the different user rights. Its settings should include Fax external network, function module management, login, transfer and other permissions. In the process of car rental, users can handle the related content and interface browsing according to the permission allocation of system management.

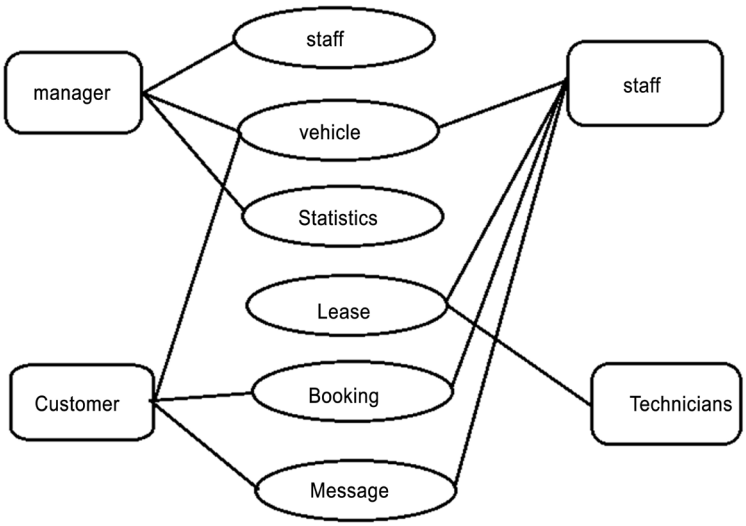

Figure 2. Role and function diagram.

To avoid overbrowsing, for example, rational rose permission design method is a very good way of permission management, in the use of the process can be a detailed division of permissions, and do a good job in the layout and design work to ensure that different permission tasks and traffic are clear, and through the group of sages to define different user permissions, and dynamic. The operation menu and interface conditions are displayed dynamically to ensure that the whole system achieves the original predetermined design effect [5].

4. Program Flow Chart

First, the login process, login process is the most critical process in the system, and is closely related to the security of the entire system, no matter what type of administrator login system need to verify the login information, when the verification is correct before logging in. Secondly, the vehicle reservation process, when the visitor logs in as administrator of the main interface, can use two forms of vehicle reservation, but the predetermined premise is that there must be customer information in the interface, if not, the relevant personnel need to be added in a timely manner, and then the selected vehicle for reservation. Another way is to book the vehicle directly. In the process of booking, the user needs to know the license plate number of the vehicle in advance. Finally, the order and return process, the order information mainly exists in the order management category. When the user used up the vehicle, but also need to return the vehicle, at this time can click on the return management, the system will display the user's use, to confirm the vehicle's intact return.

User login flow chart is in **Figure 3**.

5. Detailed Design and Implementation of the System

The system is designed according to the general B/S (browser and server) mode (**Figure 4**).

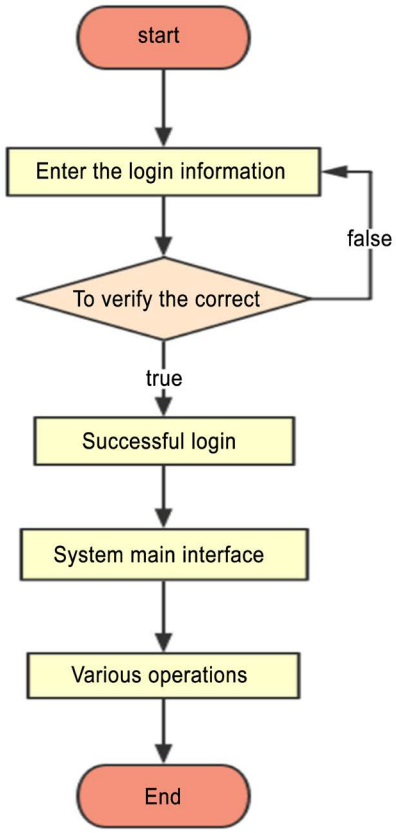

Figure 3. Login flow chart.

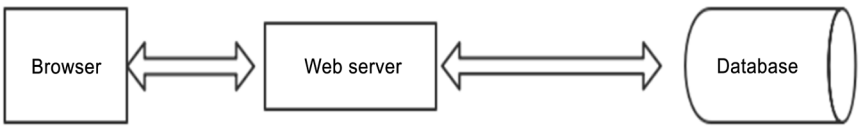

Figure 4. B/S Structure.

Database plays a very important role in an information management system. The quality of database structure design will directly affect the efficiency of the application system and the effect of implementation. Reasonable database structure design can improve the efficiency of data storage and ensure the integrity and consistency of data.

6. Database Logic Model

Vehicle Information Sheet (primary key, remarks, vehicle price, frame number, status indicating deletion, brand, addition time, vehicle rent total, vehicle pictures, total maintenance fee, model, pass, color, status, rent);

Message Form (primary key, state indicating whether to delete, reply content, message content, message time, reply time, message title, reply status, message customer, reply staff);

Daily Statistics (primary key, status, amount, date, maintenance fee);

User Table (primary key, add time, status indicating whether deletion, phone,

password, type, username, name);

Reservation Form (primary key, remarks, status indicating deletion, contact phone, copy of driving license, id card number, copy of id card, reservation time, processing time, customer name, status, vehicle information, reserved customer, staff);

Monthly Statistics (primary key, status, amount, date, maintenance fee);

Rental Records (primary key, remarks, status indicating deletion, contact phone, copy of driving license, id card number, copy of identity card, rental time, return time, number of leased days).

7. Design and Implementation of Server-Side Public Class

Designing common classes and interfaces of the platform can improve the utilization rate of the program and achieve rapid development to reduce maintenance costs. The platform web client writes a common class for database operations and data return class examples: the database operations of the public class Base Dao is mainly used for encapsulation of general add-delete checks [4]. For example, in order to increase the number of users, the user Add method is firstly defined to increase the number of users. In the user Add method, the user is added by calling the method of adding the Dao layer whose parent class is Base Dao aspects. The server requests to return JSON data, and the JSONUtils class mainly converts the acquired data into JSON data: the converted JSON data is sent to the foreground through the controller, and then the foreground receives JSON data, completes automatic parsing, and finally displays the parsed JSON data on the client side. The key code to transform the object into JSON data in the controller is as follows:

```
public static String obj2str(Object obj){
Object Mapper mapper=new Object Mapper();
String retStr="";
try {
retStr=mapper.write Value As String(obj);
} catch (Json Processing Exception e) {
e.print Stack Trace()
}
returnretStr;
```

8. Conclusions

This paper discusses the automobile rental management system based on SSH framework. The system has four main functions: rental information management, automobile release and recovery management, and bill revenue management. Among them, the rental information management function module is divided into eight sub-function modules, such as rental issue, rental record management, confirmation of car return management, scheduled record management. The automobile release and recovery function includes three sub-function

modules: car rental, car renewal, and car return settlement. The bill revenue management function is divided into daily income and monthly income. The system has the following advantages:

1) The function of leasing information management is realized. Through the lease information management, it manages the lease information management of the automobile leasing management system based on SSH framework. The lease management personnel respectively manage the registration of the lease announcement and formulate the lease system. In the whole management process, through the management of different operations of the information management of kindergarten lease, lease managers can make detailed management of the lease information of the lease management system.

2) The lease management function is realized. This function includes car rental, car rental renewal, and car rental settlement function, which is based on the SSH framework of car rental management system in the process of lease management operation to ensure the stability and security of car rental management system for the lease management to provide the basis for normal operation.

3) Realize the function of vehicle management. This function is a very important function of the system, including the basic information of the car, car maintenance information, car release, and car recycling; four sub-functions. The automobile management function first publishes the automobile basic information, carries on the inquiry work, and completes the system automobile management work.

4) Realize the function of bill management. This function realizes the bill management of the car rental management system based on SSH framework. This function module has three sub-function modules: rental registration form information, payment information and checkout information. Car rental management system based on SSH framework involves detailed collection of billing information. First of all, the lease management personnel can manage and operate the information of the lease registration form. At the same time, the lease management personnel can also manage the payment information.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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