

Design and Development of a Storage Management System Based on Java

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Date of Submission: 11-23-2022

Date of Acceptance: xx-xx-2022

ABSTRACT: With the rapid development of Internet e-commerce, the low efficiency of express warehousing is an urgent problem to be solved. The traditional handwritten record storage management system is far from satisfying the registration speed of the current goods, and the traditional handwritten recording mode is more likely to cause omissions. Therefore, a modern digital information management system can effectively solve the above-mentioned problems. The system adopts B/S architecture, uses @Bean annotation Spring framework to manage objects, uses a series of Spring provided methods such as @Autowired annotation to automatically assemble to simplify Java development, calls MySQL database to display the information of each goods and uses HTML+CSS+JAVASCRIPT technology to achieve the web page display of storage management system. Users can simply click the mouse to implement the ex-warehouse/in-warehouse operations of goods, It makes the user's operation more convenient and realistic.

KEYWORDS: Storage management system, B/S architecture, Spring framework

I. INTRODUCTION

[1].Today, with the continuous economic growth, people's desire for shopping continues to expand. The following problem is that the repository's warehouse management is chaotic, so the repository administrator hopes to upgrade the way of warehouse management.[2].At present, some large enterprises are using the storage management system to provide a good enterprise warehousing management environment of collaborative management and sorting management for the warehouse to realize the most basic and simple service, that is, goods ex-warehouse/in-warehouse operations. The original simple handwritten storage mode is optimized into a digital management system, which improves the storage location of the original storage mode and improves the utilization

rate of ex-warehouse/in-warehouse of goods. [3].However, as far as the current storage system market in China is concerned, most small enterprises are still using the traditional manual recording mode to save costs. This mode is not only inefficient but also prone to the problem of wrong delivery and warehousing records. In addition, it takes a lot of time to ex-warehouse/in-warehouse of goods, which makes it difficult to keep up with the shopping speed of users. Therefore, an efficient and cheap digital storage management system is needed to help repository management solve the problem of low efficiency of handwriting recording and reduce the cost of use.

The storage management system implemented by Java usually uses the B/S architecture, which is the software architecture, which refers to the browser server model. It uses a three-tier architecture, from bottom to top, which is the data access layer, the business logic layer, and the presentation layer. [4].The data access layer uses the MyBatis framework to perform user-defined SQL statements, stored procedures, and advanced mapping, and finally updates, queries, deletes, and adds the database. The business logic layer is mainly used to make corresponding operations for specific problems, which can also be understood as processing the data business logic. Specifically, in the storage management system, it is used to implement a series of operations such as ex-warehouse/in-warehouse operations of goods, query the location of each goods in the repository, and registration of the administrator. [3].The presentation layer is the nearest layer to the user, which is used to display data and accept the data input by the user, providing a human-computer interaction interface for the user.

II. SYSTEM ARCHITECTURE AND FUNCTIONAL MODULE DESIGN

2.1. Requirement Analysis

The traditional handwritten recording mode mainly uses the repository administrator to manually put the express goods in and out of the warehouse according to the business needs. It requires a large number of workers to execute the express goods in and out of the warehouse. It is inevitable that there will be mistakes by handwriting, which makes it difficult to efficiently carry out the express goods in and out of the warehouse. But the storage management system based on Java can enable the repository administrator to effectively manage the repository, avoiding mistakes as much as possible, and also make the storage management more intelligent and visual.

The system is divided into inventory management module, in-warehouse/ex-warehouse management, personnel management module, basic data module, and system maintenance module.

2.2. Function Module Analysis

According to the analysis of requirements, a system needs other functional modules to enrich the system and improve the comfort of user operation in addition to its core functions. Specific modules are as follows:

(1) Login verification module: under this module, the administrator or user needs to input the

correct ID and password to enter the system, to prevent malicious people from damaging the system and ensure the security of the system.

(2) Main interface module: under this module, there are five modules: "inventory management", "in-warehouse/ex-warehouse management", "personnel management", "basic data" and "system maintenance". The management can click each sub-function under each module to achieve the desired operation.

(3) Exception interface module: under this module, the system will enter the module when the administrator makes an operation error or the system has an exception. If the administrator assigns a negative number to the number of goods under the "Goods in-warehouse" function, the system will report an error and enter the current module.

III. SYSTEM DESIGN

3.1. System structure

According to the system architecture and functional module design, the system structure diagram of the storage management system based on Java can be obtained, as shown in Figure 1.



Figure 1 System Function Module Diagram

3.2. Database design

MySQL in this system is used as a data storage tool. According to the requirements of functions such as goods in-warehouse and delivery, as well as efficient management of various information, multiple tables should be established to manage data, as follows: goods table (goods ID,

goods name, goods type, goods size, goods price), warehouse table (warehouse ID, warehouse address, warehouse status, warehouse area), the administrator table (administrator ID, administrator name, administrator phone number, and administrator's management warehouse ID). Details are shown in Figure 2.

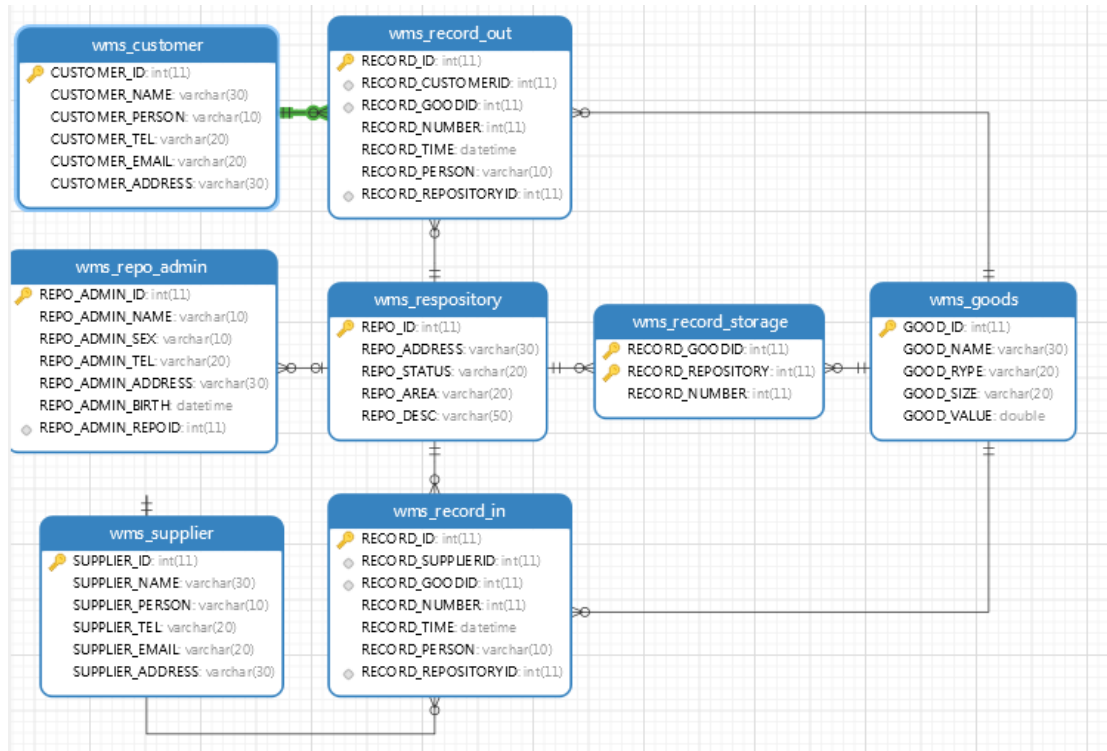


Figure 2 ER Diagram

IV. SYSTEM DEVELOPMENT

According to the previous demand analysis, the system must design five modules: "inventory management", "in-warehouse/ex-warehouse management", "personnel management", "basic data" and "system maintenance".

4.1. Inventory Management

In this module, there are two sub-functions: inventory query and in-warehouse/ex-warehouse record.

In inventory query, the administrator can query or view all goods through the keywords such as goods ID, goods name, and goods type information. You can also specify the repository to query or find goods from all repositories; After the goods are found, the user needs to display the information of goods such as goods ID, goods name, goods type, repository ID, and inventory quantity. As shown in Figure 3.

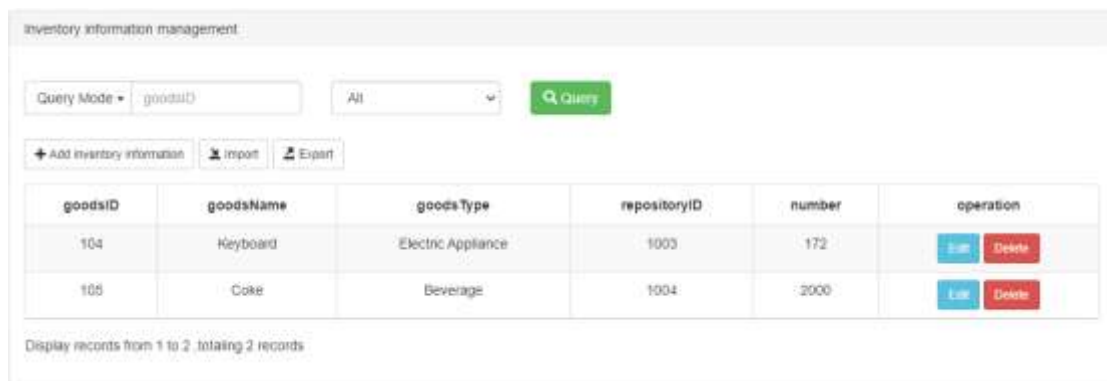


Figure 3 Inventory information management

Under the ex-warehouse/in-warehouse record function, the administrator can select the

warehouse number to view, specify whether to select in-warehouse record or ex-warehouse record

and finally select an appropriate date range to query. The queried goods records should present this information to users according to record ID,

supplier/customer name, commodity name, repository ID, quantity, date, handler, and record type. As shown in Figure 4.



Figure 4 In-warehouse/ex-warehouse record

4.2. Ex-warehouse/in-warehouse Management Module

In the current module, there are two functions: warehousing and discharge from repository.

Under the warehousing function, you need to fill in the supplier information, in-warehouse

goods, in-warehouse warehouse, and in-warehouse quantity, and finally, submit the goods to the background database for records. As shown in Figure 5.

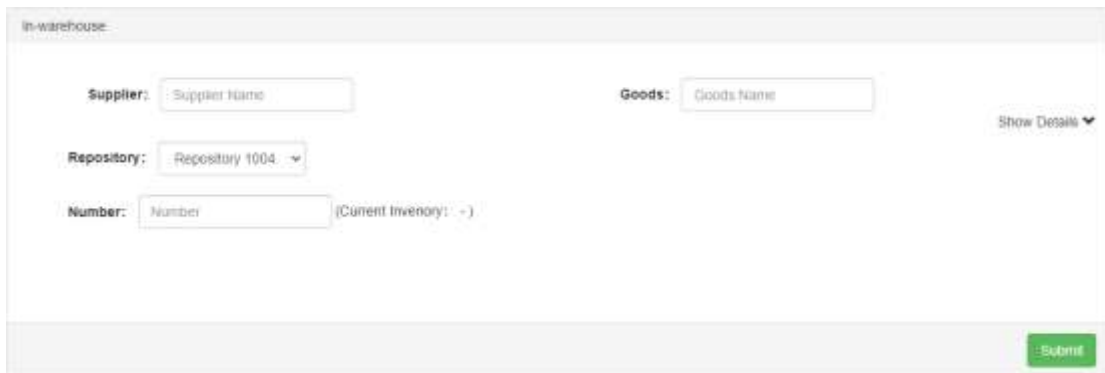


Figure 5 In-warehouse

Under the discharge from repository function, you need to fill in the customer name, goods ID, ex-warehouse warehouse and ex-

warehouse quantity. Finally, the system will automatically perform the ex-warehouse operation in the background database. As shown in Figure 6.

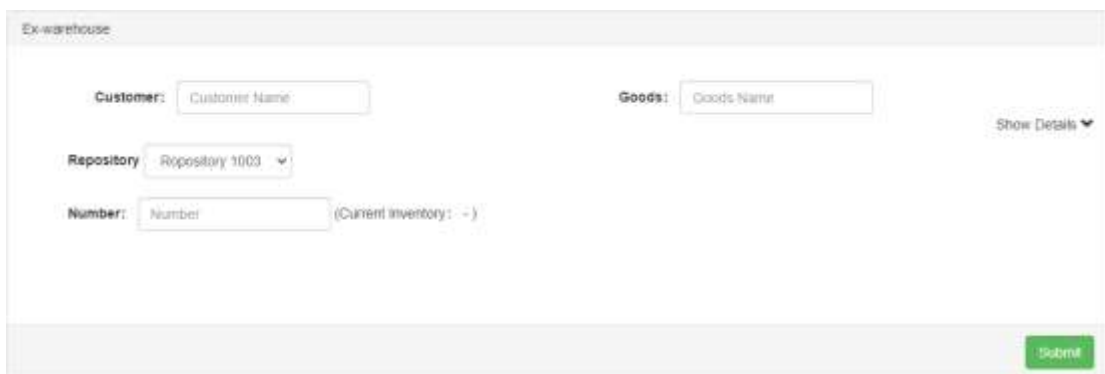


Figure 6 Ex-warehouse

4.3. Personnel Management Module

In this module, there is a warehouse personnel management sub-function. Under this function, you can query the repository personnel ID,

repository personnel name, and repository ID to find the corresponding repository personnel. As shown in Figure 7.



The screenshot shows a web interface for 'Administrator information management'. It includes a search bar with 'Administrator ID' and a 'Query' button. Below the search bar are buttons for 'Add administrator information', 'Import', and 'Export'. The main table displays administrator records with columns for administratorID, administrator name, gender, repositoryID, and operation. The operation column contains 'Edit' and 'Delete' buttons for each record.

administratorID	administrator name	gender	repositoryID	operation
1018	LiSuwei	male	1004	Edit Delete
1019	SuZhan	male	1003	Edit Delete
1020	LiYongle	male	1005	Edit Delete

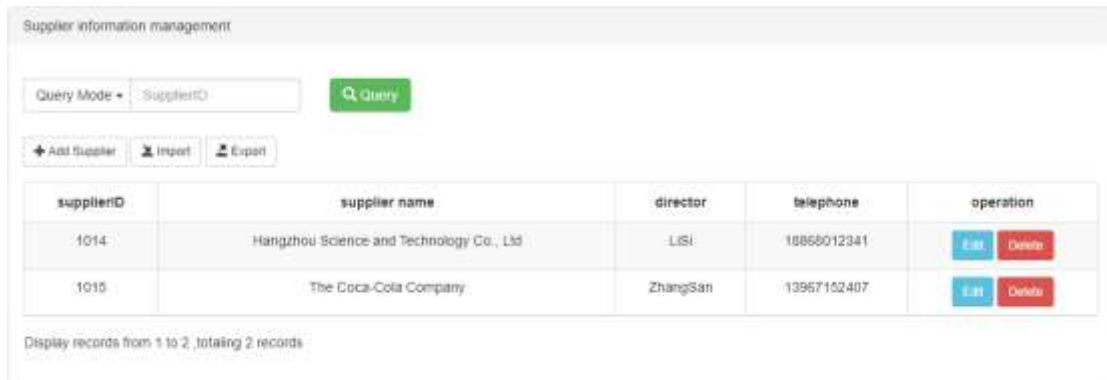
Display records from 1 to 3, totaling 3 records

Figure 7 Administrator information management

4.4 Basic Data

Under this module, there are four sub-functions: supplier information management, customer information management, goods information management, and warehouse information management.

Under the supplier information management function, the administrator can query the required supplier information according to the supplier ID and supplier name. As shown in Figure 8.



The screenshot shows a web interface for 'Supplier information management'. It includes a search bar with 'SupplierID' and a 'Query' button. Below the search bar are buttons for 'Add Supplier', 'Import', and 'Export'. The main table displays supplier records with columns for supplierID, supplier name, director, telephone, and operation. The operation column contains 'Edit' and 'Delete' buttons for each record.

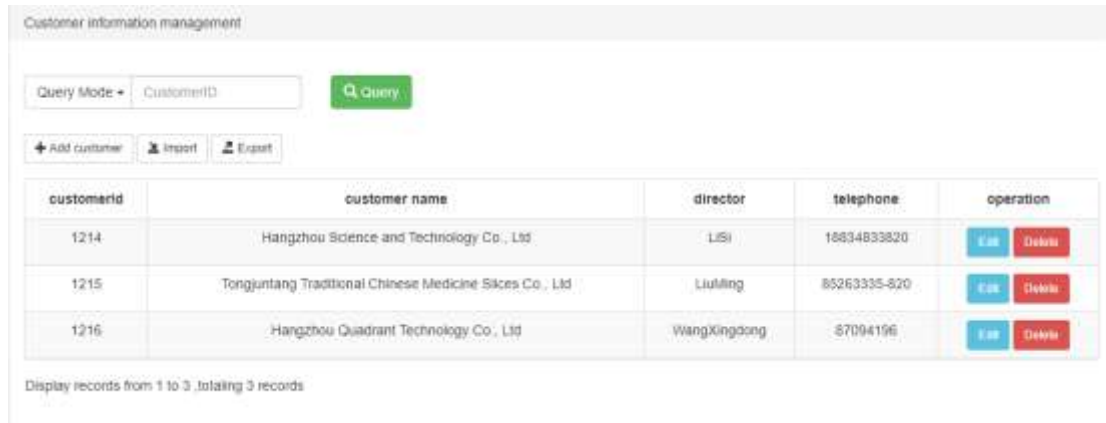
supplierID	supplier name	director	telephone	operation
1014	Hangzhou Science and Technology Co., Ltd	LiSi	18865012341	Edit Delete
1015	The Coca-Cola Company	ZhangSan	13967152407	Edit Delete

Display records from 1 to 2, totaling 2 records

Figure 8 Supplier information management

Under the customer information management function, the administrator can query all customer information, or accurately query customer information according to customer ID and

customer name. The information queried should be displayed to users according to customer ID, customer name, person in charge, and telephone. As shown in Figure 9.



Customer information management

Query Mode: CustomerID

customerid	customer name	director	telephone	operation
1214	Hangzhou Science and Technology Co., Ltd	LiSi	18834833820	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
1215	Tongjuntang Traditional Chinese Medicine Slices Co., Ltd	Liuling	85263335-820	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
1216	Hangzhou Quadrant Technology Co., Ltd	WangXingdong	87094196	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

Display records from 1 to 3 ,totaling 3 records

Figure 9 Customer information management

Under the cargo information management function, the administrator can query the detailed information of all goods, and can also accurately query according to the goods ID and cargo name. The information found should be displayed to the administrator according to the goods ID, goods name, goods type, goods size, and goods value.

Under the warehouse information management function, the administrator can query the detailed information of all repository, or accurately query according to repository ID and warehouse address. The information found should be displayed to the administrator according to

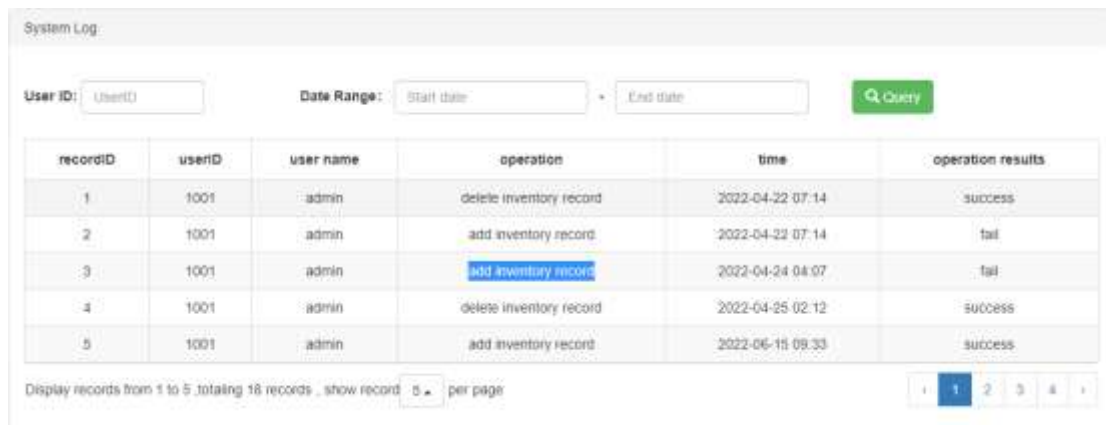
repository ID, repository address, repository administrator, and status.

4.5. System maintenance

Under the current module, there are two sub-functions: password change and system log.

With the password change function, the administrator can modify a password that he knows well and has high confidentiality to protect the system from malicious intrusion.

Under the system log function, you can view what operations have been performed by different administrators at different times. As shown in Figure 10.



System Log

User ID: Date Range: -

recordID	userID	user name	operation	time	operation results
1	1001	admin	delete inventory record	2022-04-22 07:14	success
2	1001	admin	add inventory record	2022-04-22 07:14	fail
3	1001	admin	add inventory record	2022-04-24 04:07	fail
4	1001	admin	delete inventory record	2022-04-25 02:12	success
5	1001	admin	add inventory record	2022-06-15 09:33	success

Display records from 1 to 5 ,totaling 18 records , show record per page

Figure 10 System Log

V. CONCLUSION

By using Java language, Spring framework, and MySQL as the background database, the system has realized the functions of goods in and out and querying warehouse goods, which not only greatly enhances the accuracy of warehouse management, but also reduces the work content of managers, improves the work efficiency and reduces the cost of warehouse management. However, the interface

and functions of the system still need to be further improved to make the system closer to life and more realistic.

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