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Design of Rural E-commerce Logistics Information Management System Based on Spring Boot



Abstract: - With the improvement of science and technology, the Internet has more and more affected people's daily life. People can stay at home and learn the latest information, movies, animations, music, etc. through the Internet. They can also buy goods, learn knowledge, and even find jobs through the Internet. It can be seen that the development of the Internet has brought great convenience to people's lives, and many industries have been born. As an emerging Internet industry, e-commerce has provided a large number of job opportunities for the market. Merchants can promote through e-commerce platforms, and customers can purchase goods through the platform. To ensure the normal and orderly flow of this business activity, efficient logistics systems are indispensable. With the rise of the concept of smart logistics, it not only requires employees to have professional theoretical knowledge and management service knowledge, but also professional technical knowledge such as electronic information technology. Designing an efficient logistics information management system requires cultivating smart logistics talents. E-commerce logistics, through information management systems, can not only achieve intelligent management and control of the logistics process, improve logistics efficiency and reduce logistics costs, but also enhance the automation and intelligence level of logistics, promoting the development of the logistics industry towards a more intelligent, efficient, and sustainable direction.

Keywords: Rural e-commerce, e-commerce logistics, management systems, Spring Boot.

I. INTRODUCTION

In recent years, with the help of digital technologies such as the Internet, big data, cloud computing and artificial intelligence, rural e-commerce in China has developed rapidly. According to the data released by China Internet Network Information Center, the scale of rural Internet users in China is growing. By the end of 2022, there are more than 300 million people (the penetration rate exceeds 60%), accounting for about 28% of the number of Internet users in China. The number of rural online stores in China has reached 17.303 million, and the rural online retail sales have reached 21700 million yuan, of which the national online retail sales of agricultural products have reached 531.38 billion yuan.

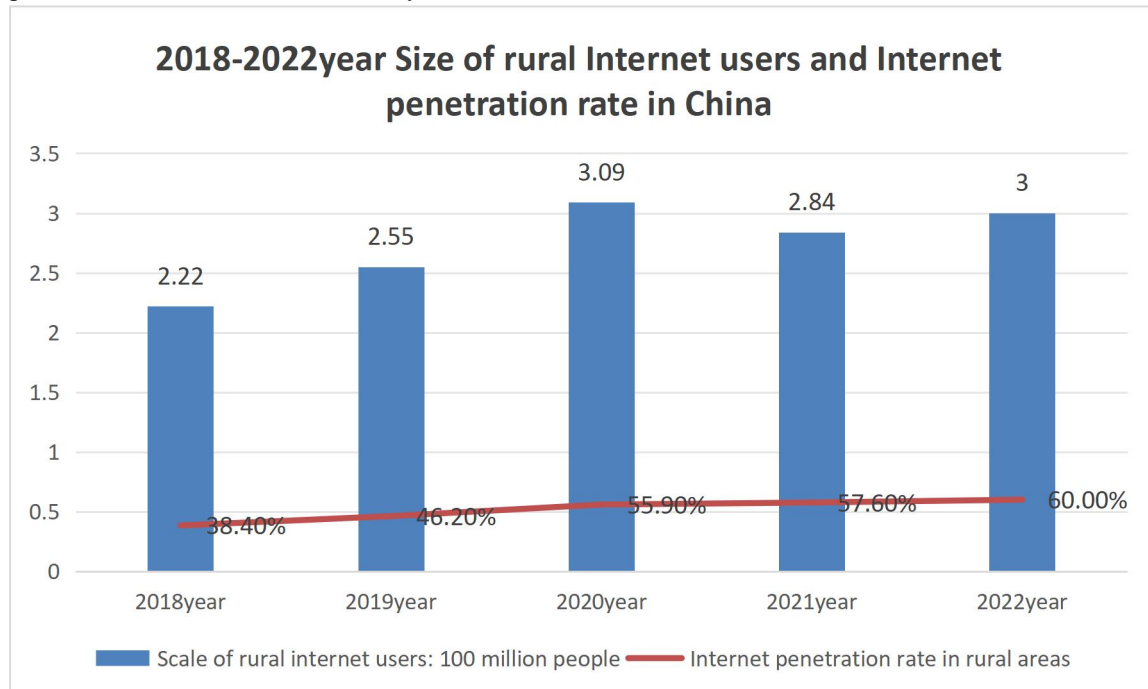


Fig. 1 2018-2022year Size of rural Internet users and Internet penetration rate in China

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Rural e-commerce logistics has evolved from traditional logistics and runs through the entire process of goods being shipped from the seller's warehouse to the buyer's hands. It is a crucial part of e-commerce transactions and is gradually becoming the main business model in rural areas. Through e-commerce logistics, agricultural products can enter cities and urban consumer goods can be sent to rural areas. This not only meets the production and living needs of farmers, but also unleashes the potential for rural consumption, effectively promoting the economic and social development of rural areas. This article takes the B2C operation mode of rural e-commerce logistics as an example, analyzes the current situation of the e-commerce logistics information management system, determines the needs of users for the rural e-commerce logistics management system, and constructs a UML simulation system for use case and functional analysis; Subsequently, based on the analysis of the rural e-commerce logistics information management system, the rural e-commerce logistics information management system was designed using Spring Boot computer technology to determine the required technology, operating environment, and functional modules of the system.

II. ANALYSIS OF THE CURRENT SITUATION OF RURAL E-COMMERCE LOGISTICS

Agricultural e-commerce logistics integrates product production, sales, and logistics processes, bridging the information and logistics barriers between rural and urban areas, and achieving rapid product circulation and sales. In order to promote the continuous improvement and perfection of the rural e-commerce logistics system, the country has successively issued multiple policies to ensure the rapid development of rural e-commerce logistics. Local governments provide sufficient financial support for the construction of rural logistics network systems and attract social capital to invest in the rural e-commerce logistics industry through policy incentives. With the support of policies for e-commerce logistics and the strong impact of the digital economy on the development of modern agriculture, the development scale of rural e-commerce and e-commerce logistics industry is rapidly increasing. With the rapid development of rural e-commerce, the demand for rural e-commerce logistics services, as an intermediate link to undertake production and consumption, continues to rise, and many large Internet e-commerce enterprises have carried out rural logistics layout. According to data statistics from the Ministry of Commerce, the coverage rate of rural e-commerce and express logistics administrative villages reached 90% in 2023. In the past three years, the overall scale of rural e-commerce logistics has maintained an average annual growth rate of 10%, and the development of rural e-commerce logistics industry has achieved outstanding results.

In the current era of digital economy, with the widespread popularization of electronic information technology and digital technology in rural areas, rural e-commerce logistics has developed rapidly, presenting characteristics of informatization, networking, and platformization. Building a rural e-commerce logistics information management platform can strengthen cooperation with online sales companies, share information, optimize and integrate logistics resources, and improve delivery service efficiency. Establishing a complete information management system is an important prerequisite for achieving an efficient online delivery system. By leveraging the fundamental support of big data in the digital economy, we can explore the intensive development of agricultural product logistics, effectively promote the construction of rural e-commerce logistics systems and information management.

III. INTRODUCTION OF SPRING BOOT TECHNOLOGY

Spring Boot is a fast development framework based on the Spring framework, which can help developers quickly establish Spring applications. [5] Spring Boot can make developers focus more on the implementation of business logic rather than too much on the configuration details of the architecture, as it provides many default configurations and conventions, simplifying the development process of Spring applications. The main features of Spring Boot include:

Simplify the deployment process: SpringBoot provides default deployment and automatic deployment, allowing developers to quickly deploy applications by providing basic deployment information.

Embedded Server: Spring Boot integrates commonly used web servers such as Tomcat, Jetty, etc., allowing developers to run applications directly in the form of Jar or War packages.

Automatic assembly: During the software development process, automatic assembly will help developers easily complete development and quickly deploy Spring applications.

Independent operation: The startup program can package the application into an executable jar package, allowing the program to run independently without relying on external environments.

Convenient testing: Spring Boot provides rich testing support, allowing developers to test various units and integration tests more conveniently.

IV. ANALYSIS OF SYSTEM REQUIREMENT

The rural e-commerce logistics information management system, as an important component of e-commerce, is a very important part of the entire business process. The rural e-commerce logistics information management system serves merchants, can greatly improve enterprise operation efficiency, enhance user satisfaction, and promote the construction of e-commerce logistics systems in rural areas. The rural e-commerce logistics information management system mainly includes seven modules: login module, system management module, product classification management module, product module, order management module, mall user management module, and inventory management module, as shown in the figure2.

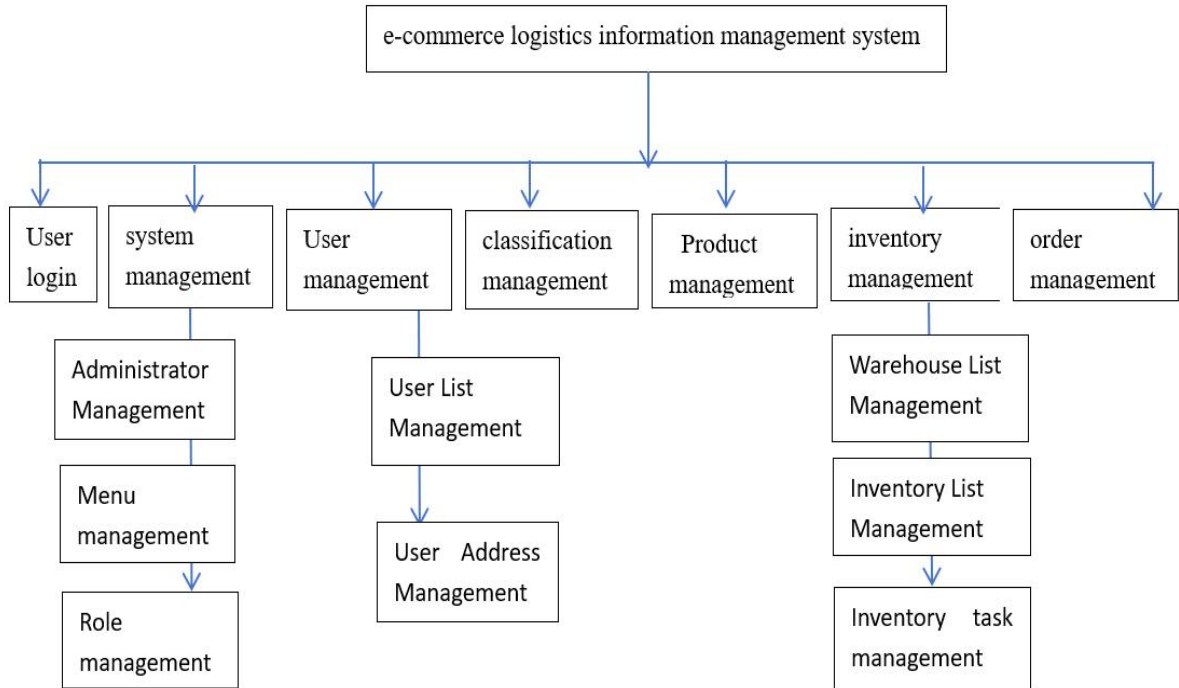


Fig. 2 e-commerce logistics information management system module

V. OVERALL SYSTEM DESIGN

A. system architecture design

The rural e-commerce information management system adopts CentOS7 as the server-side platform; The system server uses jdbc technology to access the MySQL database, and the system is built using a three-layer architecture of MVC, view, model, and controller. Build the project using a front-end and back-end separation approach to reduce system coupling, and implement interaction in a restful style between the front-end and back-end. The system architecture is shown in Figure3:

B. system database design

The operation of the rural e-commerce logistics information management system involves many links, and several of the main database designs of the system are shown in the table below.

The product information table is shown in Table1:

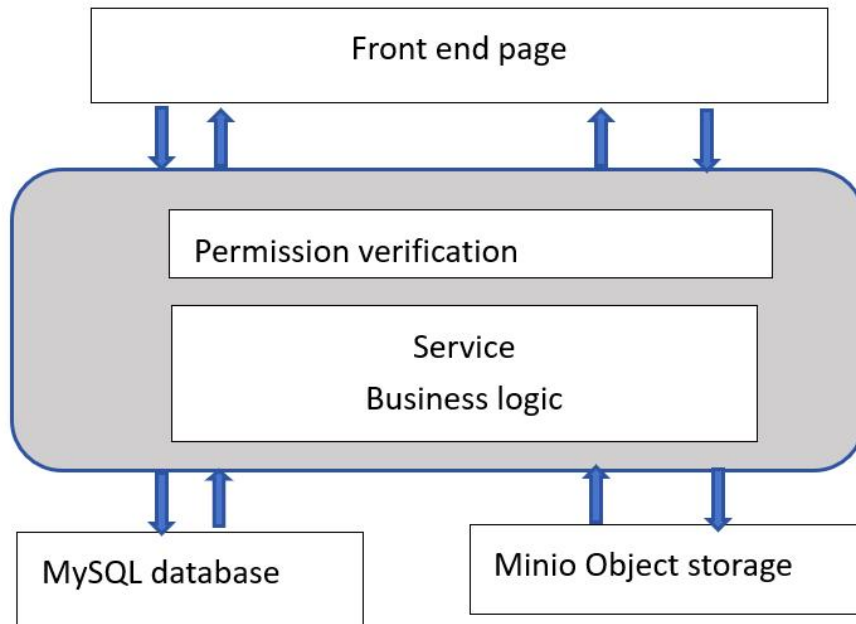


Fig. 3 System architecture diagram

Table 1 Product Information Table

Column name	data type	primary key	annotation
category_id	int		Type ID
category_name	varchar(255)		Product type name
count	int		Product quantity
cover	varchar(255)		cover
create_time	datetime		Creation date
description	varchar(900)		describe
id	int	PRI	
name	varchar(255)		Product Name
price	decimal(10,2)		price
shelf_time	datetime		Listing date
state	tinyint		state
update_time	datetime		Update date

The inventory information table is shown in Table2:

Table 2 Inventory Information Table

Column name	data type	primary key	annotation
count	int		inventory
id	int	PRI	Table ID
product_id	int		Product ID
product_name	varchar(255)		Product Name
update_time	datetime		Update time
warehouse_number	varchar(20)		Warehouse name

The user order table is shown in Table 3:

Table 3 User Order Table

Column name	data type	primary key	annotation
address_id	int		Address ID
address_name	varchar(50)		Address Name
amount_payable	decimal(10,3)		Actual payment amount
create_time	datetime		Creation time
description	varchar(255)		describe
finish_time	datetime		Completion time

id	int	PRI	Table ID
number	varchar(20)		Order number
pay	decimal(10,3)		Payable amount
product_id	int		Product ID
product_name	varchar(20)		Product Name
status	int		state
user_id	int		User ID
user_name	varchar(20)		User Name
warehouse_number	int		Warehouse number

VI. CONCLUSION

This article is based on the Spring Boot framework to design a rural e-commerce logistics information management system. The rural e-commerce logistics information management system is an important component of rural e-commerce platforms, mainly used to manage various business data such as goods, orders, users, inventory management, etc. It is one of the key factors for the smooth operation of rural e-commerce platforms. This article takes the rural e-commerce logistics information management system as the research object, aiming to improve the management efficiency and user experience of rural e-commerce platforms. The development of a rural e-commerce logistics information management system based on Spring Boot can promote the informatization development of rural e-commerce logistics, improve the utilization efficiency of information resources on rural e-commerce platforms, explore the intensive development of rural logistics, and effectively promote the construction and informatization management of rural e-commerce logistics systems. The further upgrading of current digital technology has enabled the logistics industry to undergo digital transformation. In order to adapt to new technologies and models, it is necessary to make cultivating talents with intelligent logistics skills a key task in entering the digital economy era.

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