Design and Implementation of Smart Community Property Management System Based on Spring Boot

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Abstract: Based on SpringBoot framework, this paper designs and implements the smart property management system of the community. MVVM mode is adopted for development, and Vue is used for the front-end page Js progressive framework, combined with WeChat applet as the mobile terminal, improves the convenience of users' use. SpringBoot framework is selected for background management, and MYSQL is used for database. An intelligent property management system including household information management, equipment repair reporting, maintenance management, news information and notice management, parking space management, payment management and other functions has been developed. Through this system, buildings, households, equipment Personnel and other information are comprehensively managed to meet the needs of property management enterprises for efficient management, and are suitable for all kinds of property management enterprises.

Keywords: Springboot, Vue, Estate Management, MVVM.

1. Introduction

With the continuous acceleration of China's urbanization process, the increase of residents' income, and the rapid promotion of smart cities and urbanization, the service demand of property owners no longer stays at the traditional property service levels such as sanitation, environmental greening, equipment, facilities and order maintenance, but increases the demand for personalized extension services. Property management refers to the management of various houses, ancillary facilities and sites put into use after completion acceptance by specialized agencies and personnel in accordance with the contract and agreement. At the same time, professional management will be carried out for the surrounding environment, sanitation, public green space, facilities and equipment maintenance of the community to provide residents with comprehensive services in all aspects. With the rapid development of information technology, building a community O2O platform by using mobile Internet, cloud computing, big data and other means to improve the service efficiency of property management has become an indispensable part of modern community property management and services, helping community management move towards a new service model that is more efficient, convenient and user-friendly [1]. Traditional property management mainly relies on a large number of manpower in daily work scenarios such as charging, visitor registration, and data statistics. Service efficiency is low. Service response and progress feedback such as owner's repair request are not timely. Access control, road gates and other facilities and equipment have poor compatibility with the platform [2]. It is unable to interconnect and share data, forming an information island. Therefore, based on big data technology, WeChat mini program interface and the mainstream technical framework [3] in recent years, we developed a smart property management system to achieve the integration of various property information management needs such as payment and charging, work order repair, owner complaint communication, information release, access control and anti-theft through the latest technical means, forming a smart property service management application technology platform, Only in this way can we effectively improve and enhance the daily business operation efficiency of the property service enterprises, and ensure that the property service enterprises achieve the scientific management objectives and standardized management objectives. In recent years, China's informatization level has been constantly improved, but most of the property management systems are less intelligent. They still rely heavily on traditional manual input methods to manage and process residential properties. The integration of terminal equipment related to properties is not high, and the efficiency needs to be improved. On the other hand, most of the property systems have a low degree of interaction or lack convenient communication channels, and community property managers lack communication with community owners.

2. Design of Property Management Information System Based on Spring Boot

The Spring Boot framework is a product of the mature development of the Spring framework. The Spring Boot framework can make Spring programs run faster, reduce the configuration files for writing programs as much as possible, and make it easier to create independent, production based applications [4]. Therefore, we choose to use the microservice framework Spring Boot to develop the intelligent property management system. By using microservices, we can achieve loose coupling of each microservice. Each microservice only focuses on one task. These small micro services can be combined to form a more powerful system. The system developed with microservice architecture has the advantages of easy testing, strong scalability, easy system iteration, etc. It can reduce the development cost of community property management system, shorten the development cycle, and improve team efficiency. In terms of data storage, multiple databases can be selected, such as Oracle, MySQL, Microsoft

SQL server, etc. Front end development frameworks include Angular, React, Vue [5], etc. Through demand analysis, the system decided to adopt B/S architecture, MVVM (Model View View Model) mode [6], Vue framework [7] for the front end, Spring Boot framework for the back end, and MYSQL for the database development. Through MVVM development mode, the system can realize the separation of front-end and back-end. The front-end only needs to call the interface provided by the back-end to call the data. Like MVC mode [8], MVVM mode has the advantages of low coupling, independent development and testability.
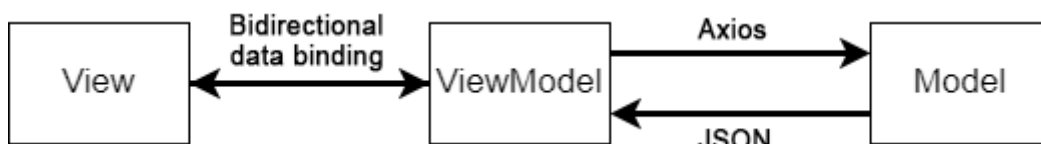

Figure 1. The "MVVM" Mode Architecture

2.1. System function analysis

Through the analysis of the property management system of the community, the project has built an effective system integrating information management, property office, property and owner information interaction, simplifying daily property management work, improving property management efficiency, and making the communication between property and owner more real-time and convenient. The system realizes the business process of traditional property through online and mobile terminals. For example, the functions for owners and property enterprises include online communication, online announcement, online repair report, online complaint, online voting, satisfaction survey, etc. Each module has strong flexibility and scalability, and each module is relatively independent, but data and permissions can be interconnected.

2.2. Overall system design

The system adopts B/S architecture, and the community property management system adopts B/S architecture, which can logically divide the whole system into three layers: Web client, Web server, and database server; The three-layer structure should not only complete its own functions but also be connected with adjacent layers. Under the B/S architecture, the basic architecture of the management system is shown in Figure 2.
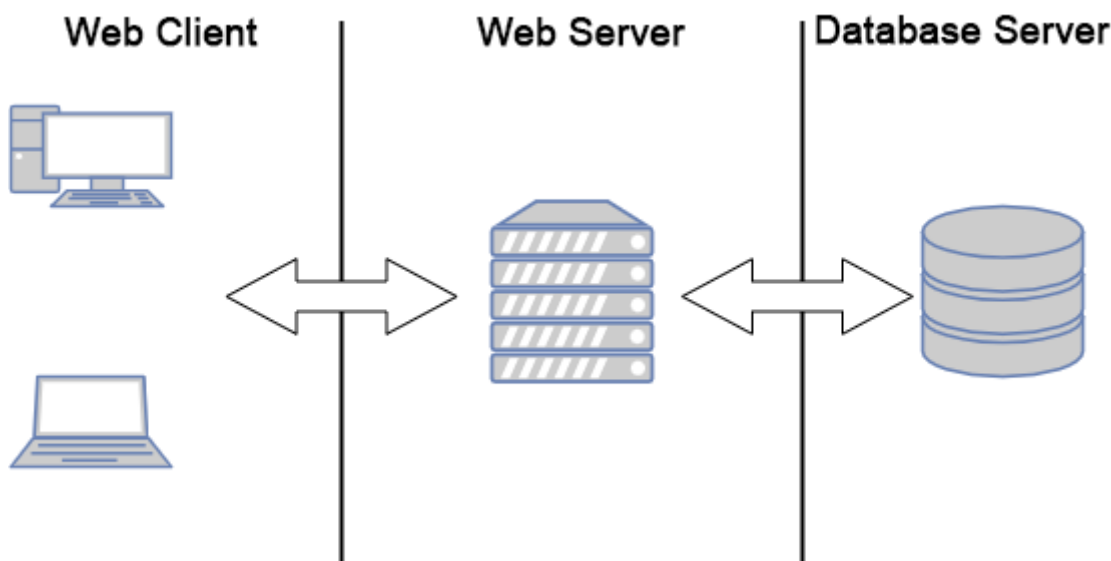

Figure 2. Basic Structure of Property Management System

2.3. System database design

To meet the functional requirements of the system, conceptual model (ER model) and relational data model are designed through requirements analysis. Take the administrator as an example, the administrator is the main operator of the property management system of the community, and they mainly provide convenient services for the owners of the community. The administrator needs to handle the core business of the community, such as property management and parking fee management. Manage the parking spaces in the community, determine the ownership of the parking spaces, and point out which parking spaces are to be sold or have been sold. The property manager should be able to count the property fee collection of the owners of the community, and classify the owners who have paid and have not paid. For basic businesses, such as equipment management, complaint management, maintenance management, building management and other property managers can complete basic data recording and modification. To sum up, the use case diagram of property manager is shown in Figure 3.
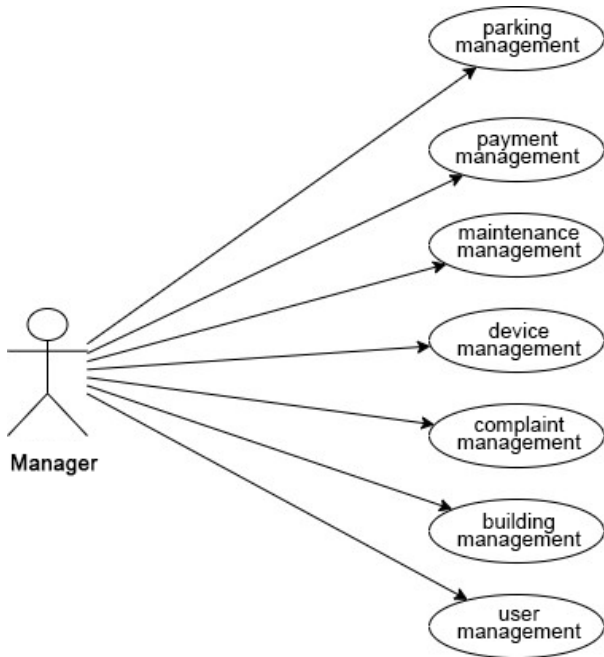
Figure 3. Use Case Diagram of Property Manager

Through the discussion and analysis of demand analysis, confirm the relevant entities included in the community property management system. Take the administrator and the owner entity as an example, the administrator entity has the attributes of administrator ID, account number, password and telephone. The administrator E-R diagram is shown in Figure 4.
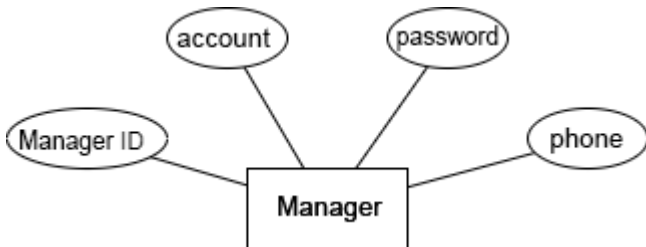

Figure 4. The E-R Diagram of Property Manager

The owner entity has the attributes of owner ID, account number, password, telephone and address. The Owner's E-R diagram is shown in Figure 5.
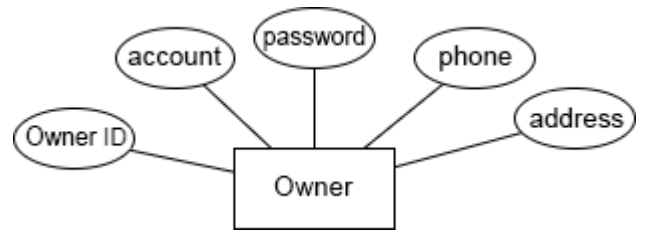

Figure 5. The E-R Diagram of Owner

On the basis of conceptual design, the overall E-R diagram of the system is obtained according to the design, and the entities in the E-R diagram, the attributes of entities, and the relationships between entities are transformed into relational patterns. The partially transformed relationship mode is as follows:

Resident (owner ID, account number, name, address, contact information)

Water meter (meter number, owner number, name, payment or not, number of water meters in this month, payment date)

Electricity meter (meter number, owner number, name, payment or not, number of meters in this month, payment date)

Property management fee list (form number, owner number, name, whether to pay, property fee, payment date).

Through the analysis of the design requirements of the entire database, multiple data storage tables can be designed according to the entity relationship diagram, and each table stores the corresponding specific information, as shown in Table 1 and Table 2.

(1) User Table

The user table is used to store the user information in the community property management system. The field name userID represents the user ID, the field name username represents the user name, the field name password represents the login password, and the field name power is used to determine the user role when logging in, and the address represents the residential address. The overall situation is shown in Table 1 below.

Table 1. User Database Table

Field Name	Type	Empty	Primary key	Unique	Field Description
userID	int	No	Yes	Yes	User ID
username	int	No	No	Yes	Login account
password	string	No	No	No	Login password
power	int	No	No	No	Judge the user's role
address	string	Yes	No	No	Residential address

(2) Expense information table

The expense information table is mainly used to record the property fees and parking fees of the community. The field name expensesID represents the expense ID, the field name type represents the expense type, the field name price represents the charge amount, the field name expenseStatus represents the charge status, the field name start represents the start time, the field name end represents the end time, the field name time represents the payment time The field name remark indicates the remark information. The overall situation is shown in Table 2 below.

Table 2. Cost Information Database Table

Field Name	Type	Empty	Primary key	Unique	Field Description
expenses ID	int	No	Yes	Yes	Charge ID
type	int	No	No	No	Expense Type
price	int	No	No	No	Charge amount
expense Status	int	No	No	no	Charging status
start	data	No	No	No	Start time
end	data	No	no	No	End time
time	data	Yes	No	No	Payment date
remark	string	yes	No	No	Remarks

3. System Functions Realization

The main relevant functional modules of the system include administrator login, user login, resident information management, equipment repair, maintenance management, news information and notice management, parking space management, payment management and other modules. Now, the user registration login module and the account management module of background management are introduced.

3.1. User registration and login authentication

The mobile terminal is implemented with WeChat applet, which is faster and more convenient. The business logic processing is realized through Vue front-end framework and Javascript. The registration and login authentication process is as follows: The owner user needs to authorize WeChat personal information to log in when entering the system for the first time. After successful login, users can enter the "Profile" interface to modify their personal information. After successful login authentication, the applet will automatically jump to the home page.

3.2. Ledger management function module

The ledger management function enables account opening and closing, automatic generation of management fees, shared expenses, offsetting prepaid expenses, bank withholding, daily charges and other functions. It can also set the bill template for the above items to achieve automatic calculation and statistics of bills. The mobile terminal can also view the relevant bill data at any time, greatly improving the management efficiency of the property. Relevant interfaces are shown in Figure 6 and Figure 7.
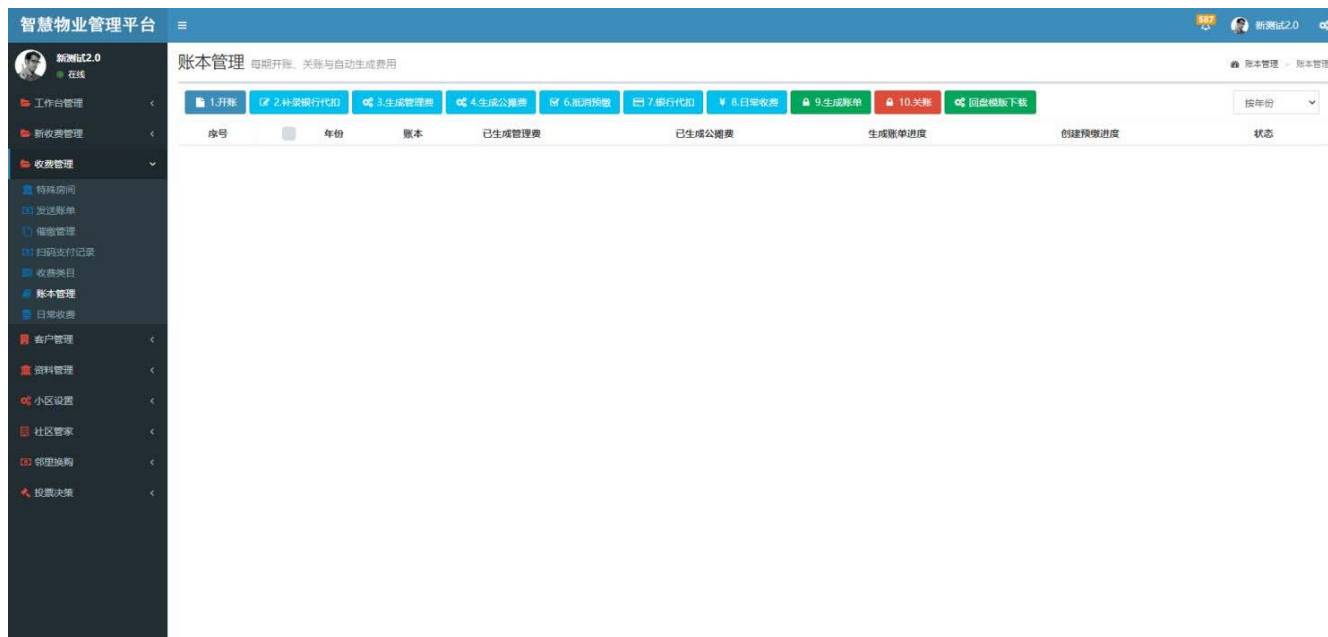

Figure 6. Interface of ledger management module

Figure 7. Interface of ledger management module on Wechat MiniProgram

4. Summary

This paper introduces the function design and system implementation of smart property management based on SpringBoot. The system selects WeChat applet as the mobile terminal, which is convenient and convenient for owners without installing applications. On the basis of demand analysis, the database design and the design and implementation of various functional modules are carried out, and the security and maintainability of the system are fully considered. Spring Boot framework is selected for background management to avoid complicated configuration operations, so as to focus on processing business logic and improve development efficiency. The smart property management system combines WeChat applet and SpringBoot technology to achieve system functions, which is suitable for all kinds of property management enterprises, meets the needs of property management enterprises for efficient management, and improves the efficiency of property management.

Acknowledgment

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