浙江工业大学

本科毕业论文（设计）

论文题目：Design and Implementation of Employee Suggestion Management System

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摘　　要

　　和传统的手机 APP 相比,微信小程序具有方便快捷、无须安装等优势.同时,微信小程序的开发比 iOS 应用程序和 Android 应用程序的开发更简单,成本更低.本文设计并实现了一款基于微信小程序的"员工建议管理系统",该系统旨在对公司员工的建议进行有效管理和跟踪,涉及到发起建议、审批建议、实施建议等整个建议的各个环节.主要完成了如下四个功能模块:(1)员工管理模块:主要包括签到和签到提醒功能,以及按照拼音排序和搜索在职员工的功能;(2)员工建议状态管理:建议状态主要包括:提交状态、实施状态、待确认完成状态、完成状态、离计划实施期限还有七天、延期状态;申请延期时,增加延期到期日期;工作建议的每一步状态变化都有通知发出给相关人员;当建议的状态发生变化时,系统自动发送提醒给相关人员;工作建议推到"待实施阶段"时,必须要有实施人;一分钟之内,不得反复提交建议;系统显示最佳建议列表;(3)建议评论模块:建议所处的每一步状态的负责人可以增加评论和备注;该建议相关状态的人都可以看到该状态的所有评论和备注内容.(4)建议内容管理:员工在提交建议时,可以上传多张照片说明建议内容;实施人在建议实施完成时,能够上传照片进行佐证.

　　本系统主要是使用微信小程序来完成一系列的功能,前端界面的开发主要运用微信小程序框架,使用微信小程序中的 WXML 语言和 WXSS 语言来完成前端页面的总体布局,使用 JavaScript 编写实现小程序中页面的逻辑处理,用 JSON 文件来配置小程序的页面信息;后端开发主要使用 FastAdmin 框架以及 ThinkPHP 框架,同时运用后台数据库 MySQL 来存储数据,使得后端能够及时响应前端,也能确保与数据库进行直接的交互.

关键词： 员工建议管理系统,微信小程序,WXML,FastAdmin,ThinkPHP

ABSTRACT

Compared with traditional mobile apps, WeChat mini programs have advantages such as convenience, speed, and no need to install. Meanwhile, the development of WeChat mini programs is simpler and more cost-effective than the development of iOS and Android applications. This article designs and implements an "Employee Suggestion Management System" based on a WeChat mini program. The system aims to effectively manage and track the suggestions of company employees, involving the entire process of initiating, approving, and implementing suggestions. The following four functional modules have been completed: (1) Employee management module: mainly including check-in and check-in reminder functions, as well as sorting and searching for active employees based on pinyin; (2) Employee suggestion status management: The suggestion status mainly includes: submission status, implementation status, pending confirmation completion status, completion status, seven days before the planned implementation deadline, and extension status; When applying for an extension, add an extension expiration date; Notification is sent to relevant personnel for every change in the status of work suggestions; When the suggested status changes, the system automatically sends a reminder to relevant personnel; When the work proposal is pushed to the "to be implemented stage", there must be an implementer; Do not repeatedly submit suggestions within one minute; The system displays a list of best suggestions; (3) Suggested comments module: It is recommended that the person in charge of each step of the status can add comments and remarks; Anyone with a status related to this suggestion can see all comments and remarks in that status. (4) Suggested content management: Employees can upload multiple photos to explain the suggested content when submitting suggestions; The implementer can upload photos to support the completion of the proposed implementation.

This system mainly uses WeChat mini programs to complete a series of functions. The development of the front-end interface mainly uses the WeChat mini program framework, using the WXML and WXSS languages in WeChat mini programs to complete the overall layout of the front-end page, using JavaScript to write and implement logical processing of the pages in the mini program, and using JSON files to configure the page information of the mini program; The backend development mainly uses the FastAdmin

framework and ThinkPHP framework, while also using the backend database MySQL to store data, enabling the backend to respond to the front-end in a timely manner and ensuring direct interaction with the database.

KEYWORDS: Employee suggestion management system, WeChat mini program, WXML, FastAdmin, ThinkPHP

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Chapter 1 Introduction

1.1   Background and Significance of the Research Project

1.1.1   Project Background

This topic comes from a project given to me by my supervisor - Upgrading and Optimizing an Employee Based Suggestion Management System. It is a WeChat mini program developed by the company for managing employees. After logging into their account, users can make some suggestions and select the corresponding approval leader and project implementer, and can check whether the suggestions have been completed. Correspondingly, the approver needs to approve the task, and the implementer also needs to complete the suggestion. The approval of the proposal and the completion status of the proposal will be displayed accordingly.

1.1.2   Research Significance

Mobile internet technology has greatly changed people's way of life. People almost always carry their phones with them when they go out, and WeChat is the most widely used tool[1] on mobile phones, with a very large user group. Until the end of 2018, WeChat had over 1 billion active users and was still continuously growing. And WeChat mini programs are a new software usage mode formed on the basis of WeChat. Users do not need to download new software and apps, but can open the application by scanning the WeChat end of their mobile phone. This can be said to effectively save the phone's memory, and at the same time, users do not need to uninstall the software after use. This is equivalent to implementing plug and play software based on the WeChat framework, simplifying user operation steps, and helping users save memory[2] and usage costs on their phones, effectively enhancing the user experience. For developers, the threshold for developing WeChat mini programs[3] is low, the difficulty is low, and there are many functions. At the same time, WeChat mini programs also have many interfaces and components to help[4] developers develop software, which is very friendly for developers. Developers can associate with WeChat official account, and then jump between[5] WeChat applet and WeChat official account, which can effectively meet users' multiple

use needs. Therefore, WeChat users and enterprise developers are more willing to adopt the WeChat mini program model for product development.

Compared with traditional mobile apps, WeChat mini programs have the advantages of being more convenient, fast, lightweight, no need to install, easy to use, no need to occupy phone memory, and more convenient to use. Meanwhile, the development process of WeChat mini programs is simpler and cheaper than developing applications on iOS and Android. Moreover, the cost of using WeChat marketing accounts for promoting WeChat mini programs is also very low, which can greatly reduce the budget expenditure for enterprise software development. So, enterprises of different industries and sizes will have good market prospects in using WeChat mini programs. For different types of enterprises, developing WeChat mini programs will lower the learning threshold for software developers, and their learning costs, production costs, marketing costs, and operational costs will be greatly reduced. For small and micro startups, this is both an opportunity and a challenge. This type of enterprise often has limited funds. There is no more money or energy to support the development of large-scale applications, and the emergence of WeChat mini programs can just make up for the disadvantages of these enterprises. This allows the company to quickly meet market demand and develop lightweight WeChat mini programs that attract and meet user needs, laying a solid foundation for the company's subsequent development. For software developers, due to the large number of users, high demand, and low learning costs, WeChat mini programs represent[6] another "golden age" for the developer community. Developers can develop low-cost WeChat mini programs with the least time and fastest speed, while also being loved by users, which is a win-win situation for both parties. Meanwhile, for software developers, this is also an opportunity, as users will be more inclined to use WeChat mini programs that have little difference in experience compared to local app software. This will greatly test the skills and abilities of developers. Software developers must improve the technical content of WeChat mini programs, enhance user interaction interfaces, accelerate system response speed, and develop WeChat mini programs that can meet higher user needs.

1.2 Current Situation at Home and Abroad

As an emerging lightweight application based on the WeChat platform, WeChat mini programs have attracted widespread attention in the market, and the current status and future development of WeChat mini programs have also become a hot topic. During

the weak period of the software application market, WeChat mini programs quickly met the gaps in user demand, gained user love, and successfully pushed the development of light applications into a new stage. In addition, various industrial sectors of WeChat mini programs have gradually been established, successfully supporting an ecological network comparable to the software application market. At that time, WeChat mini programs will become a traffic hub for industries such as retail, e-commerce, and catering, driving a new round of reshuffle among major application platforms. At the same time, today's WeChat mini programs are far from reaching saturation in the huge user market. The demand for WeChat mini programs in several main industries such as retail, life services, gaming and entertainment is still very large. In the near future, I believe there will also be more WeChat mini programs developed and applied in the market. Experts predict that in the coming years, WeChat mini program year may usher in a new round of outbreaks. Research shows that WeChat mini programs have received unanimous praise from users for their lightweight, fast, and user-friendly advantages. A survey shows that the vast majority of users are familiar with WeChat mini programs, and if they encounter good WeChat mini programs, they are also very willing to share them with friends. In fact, the sharing channels of WeChat apps are also gradually expanding: linking to WeChat official account, making WeChat QR code links, pushing WeChat apps, and so on. These convenient promotion functions further improve the WeChat ecosystem. At the same time, the diversified entry points of WeChat mini programs are also very beneficial for the later development of WeChat mini programs, as it can make it more convenient for WeChat mini programs to call API interfaces of some programs, making it convenient for users to develop and use. Although WeChat mini programs can replace some apps, they also have shortcomings. The lack of key features and poor user experience are obstacles to the development of WeChat mini programs. Meanwhile, the development of WeChat mini programs must rely on the WeChat platform, which forces developers to sacrifice some creativity to follow the pace of WeChat development. However, the huge user base that WeChat has is a very obvious advantage, and the user-friendly WeChat mini program can use it to expand its popularity.

1.3   Main Research Content

This topic comes from a project given to me by my supervisor - Upgrading and Optimizing an Employee Based Suggestion Management System. It is a WeChat mini

program developed by the company for managing employees. We need to upgrade and optimize this suggestion management system. Firstly, you need to have a certain understanding of WeChat developer tools and the basic programming language Java. Secondly, you also need to have a certain foundation in the PHP language and be able to use databases. In this project, the backend mainly includes adding check-in and search functions to the backend employee management, as well as adding group messaging functions; In terms of front-end, the main focus is to improve the interactivity of the WeChat mini program interface, such as adding suggested states; When the implementation is completed, it is recommended to upload photos as evidence; Each step of the work proposal's status change requires notification to relevant personnel, and so on.

1.4　Main Challenges

In this section, we only introduced the main challenges that may exist in the employee suggestion management system. This does not mean that we must solve all these problems in our own system.

1. How to upload photos to support the completion of the proposed implementation by the implementer.

2. How to add check-in function and how to provide check-in reminders.

3. How to add search columns to members of various departments and be able to search and sort according to pinyin.

4. How to ensure that there must be an implementer when the work proposal is pushed to the implementation stage.

5. When selecting a suggestion as the best suggestion, how to display the best suggestion and how to display the best suggestion report.

6. How to send a group of information to all users.

7. How to solve version incompatibility of the database system.

1.5　Structure Arrangement of the Paper

The chapters of the paper are arranged as follows:

Chapter 1: Introduction. The introduction section of Chapter 1 mainly introduces the project background, research significance, domestic and international current situation, main research content, and main challenges encountered. Finally, the organizational structure of the entire article is provided.

Chapter 2: Related Work. The relevant work section of Chapter 2 mainly introduces

some technical methods, corresponding software, and frameworks required for developing an employee suggestion management system.

Chapter 3: System Design. The third chapter of system design mainly introduces some of the system design, including overall structural design and functional structural design, and describes the general module framework of the system. At the same time, some requirements of the system are analyzed, including functional requirements and non-functional requirement. Next, the context of the entire system was analyzed, listing the relevant external systems and the scope of users involved. Finally, four features of the whole system are designed and described, and Use Case Diagram is used to show the content of each feature.

Chapter 4: System Display. The system display section in Chapter 4 mainly introduces the front-end and back-end interfaces of the employee suggestion management system, and provides a detailed explanation of the corresponding graphics. The front-end is mainly divided into 5 modules: viewing task module, approving task module, proposing suggestions module, personal information module, and browsing module. The backend is mainly divided into 6 modules: permission management module, user management module, department management module, suggestion management module, check-in management module, and message management module. Each interface has good interactivity and is easy to operate.

Chapter 5: Summary and Outlook. Chapter 5 Summary and Outlook mainly summarizes the content of this article and points out areas for further improvement in the employee based suggestion management system.

1.6 Summary

This chapter mainly introduces the basic background of project research, some significance of project research, the basic status of WeChat mini program development at home and abroad, the main content that needs to be studied in WeChat mini program development, and some main challenges encountered in the development process. Finally, the organizational structure of the entire article is provided.

Chapter 2 Related Work

2.1 Project Related Technologies

2.1.1 Programming Language：WXML 、WXSS 、JavaScript and PHP

In the front-end development project, I mainly used WXML, WXSS, JavaScript and other languages. In the back-end development project, I mainly used PHP language to implement the project content.

WXML (WeiXin Markup Language) is a markup language, similar to HTML, used to define the layout and components of small programs. WXML uses tags to represent components and attributes to set their style and behavior. For example, a<view>tag can be used to represent a container component, and a class attribute can be used to specify the style class name of the component.

WXSS (WeiXin Style Sheets) is a style sheet language, similar to CSS, used to add styles to the layout and components of applets. WXSS uses selectors to match components and declarations to set the style properties of components. For example, you can use the. red text selector to match all components with red text class names, and use color: red; Declare to set the text color to red.

JavaScript is a very popular scripting language on the Internet, often used in HTML and web pages. It can also be widely used in devices such as servers, personal computers, laptops, tablets, and mobile phones. JavaScript is a programming language with function priority, characterized by lightweight, interpretive, or real-time compilation. Although it is known as a scripting language for developing web browser pages, it has also been used in many other places, such as in non browser environments such as in conjunction with WeChat mini program development. JavaScript is a dynamic scripting language based on prototype programming and multiple paradigms, and JavaScript supports object-oriented development and other patterns.

PHP, also known as the "Hypertext Preprocessor", is a scripting language that executes on the server side. PHP is well suited for web development and can be embedded in HTML. The PHP language has learned and borrowed from the C language, absorbed the characteristics of multiple languages such as Java and Perl, and developed its own unique

syntax. It has continuously improved and improved itself based on their strengths, such as object-oriented programming in Java. The main goal of this language was to enable developers to quickly write high-quality web sites. PHP supports both object-oriented[7] and process oriented development, making it very flexible to use.

2.1.2 MVVM

MVVM is an improved version of MVC. The full name of MVVM is Model View View Model. Model is a data analysis model, in which users can define some logic for data analysis. The View module represents the user interface module, which can convert the data analysis model to the interface for display. The main function of ViewModel is to synchronize[8] and coordinate the connections between View and Model.Under the MVVM framework, because there is no direct communication between the View module and the Model module, it is necessary to use the intermediate system ViewModel module to achieve interaction between the two and achieve communication. However, due to the mutual communication between the Model module and the ViewModel module, as well as between the View module and the ViewModel module, the instantaneous changes in the messages of the View module will be immediately reflected in the Model module. Similarly, changes in the content of the Model module will also be immediately reflected in the View module. The information synchronization operation between the View module and the Model module can be achieved independently through the mvvm framework. In an environment without human intervention, developers do not need to consider the issues between operation logic, thus greatly simplifying the development process[9] and reducing development difficulty for developers.As shown in Figure 2.1.

2.1.3 WeChat Mini Program Framework

In this project, the WeChat mini program framework is used in the front-end, which is the WeChat mini program side.

The framework of WeChat mini programs is divided into two parts: one is the view layer, and the other is the logic layer. The view layer is also known as the view layer, and the logical layer is also known as the App Service layer. The view layer, also known as the
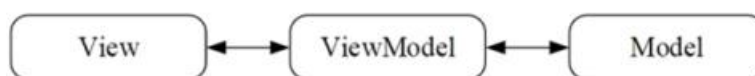
Figure 2-1 : MVVM Functional Diagram

View layer, is written in both the WXML and WXSS languages. The WXML language is mainly similar to the HTML structure of web pages and is often used to build component content for WeChat mini program interfaces. The WXSS language is similar to the CSS structure of web pages and is often used to modify the style of interface components, usually used to modify the appearance of mini programs. The logic layer is mainly composed of JavaScript scripts, responsible for the logic and actions of WeChat mini programs. The logical layer will process the data and send it to the view layer through some methods, while also receiving feedback from the view layer. The view layer displays the data sent by the logical layer to the interface, and then sends the events required by the view layer to the logical layer. This enables the interaction[10] between the visual layer and the logical layer. As shown in Figure 2.1.

The WeChat mini program mainly includes several app files that describe the overall program and multiple page files that describe each page. The main body of a small program is divided into three files, all of which must be placed in the root directory of the project, namely app. js, app. json, and app. wxss. The app.js file is a mini program logic file that can define global data variables and some function files. It can globally configure WeChat mini programs. The app.js determines multiple issues such as the path of the page file, setting of network timeout time, and setting of multiple tabs; And app.json is the settings file for the mini program, serving the global. app.wxss is the mini program style sheet, also serving the global, and takes effect on all pages. If users do not want the style of the global variable, they can also modify it in the wxss file[11] on their own page, and the wxss style on the page will overwrite the style of the global variable.

A mini program page consists of four files, namely wXML, wxss, js, and JSON files. The wXML file is the page structure layer, which is used for page layout. The wxss file is the page style layer, which can better adjust the page style. The js file is the page logic layer, which is responsible for implementing some logical methods of the page. The JSON file is the page configuration layer, which is mainly used to configure some basic properties of the page, This page is not mandatory. These four files must have the same path and file name, which means they must be in the same directory on the same layer. And each WeChat mini program page can also use a. json file with the same name to configure some properties of this page. The file properties[12] configured on the page will overwrite the same global configuration file in app. json.

2.1.4 Vue and ElementUI Component Libraries

In this project, I used the Vue.js framework to implement the front-end interface at the check-in end. In order to quickly develop and improve the elegance of the interface, I used the ElementUI toolkit to assist in development.

Vue is a progressive framework for building user interfaces. The Vue framework differs from other large frameworks in that it can be applied layer by layer from the bottom up during design. Vue's core library only focuses on visual layers, which makes it easy for developers to get started with development and effectively integrate with third-party libraries or existing projects. On the other hand, Vue can also provide support[13] for complex single page applications by combining some modern toolchains and supported class libraries.

Element is a desktop component library based on Vue2.0. It was developed by the front-end team of Hunger Mo and has been used and validated in a large number of daily businesses, with good stability and availability. ElementUI can provide beautiful and reliable desktop components that are convenient for users to call. At the same time, it also implements complete design specifications and emphasizes a strong user experience.

The Element adopts a modular design concept, which is very flexible and can be easily integrated into your project. It includes components such as table beasts, dan period, navigation, layout, and more complex components such as prompt boxes, pop-up windows, menus, and pagination.

2.1.5 Backend Front-end Framework: Fast Admin

In this project, I used the Fast Admin framework for the front-end interface of the backend. You only need to create tables in the database according to certain naming rules, and then use the one click CRUD function to quickly complete the backend add, delete, modify, and query functions.

FastAdmin is an open-source backend framework based on PHP+Bootstrap, using the Apache 2 commercial friendly open source protocol. It is open source and can be used for free commercial use without the need for separate authorization.

And the FastAdmin framework supports one click generation of CRUDs, which can automatically generate controllers, models, views, JS, language packs, menus, recycling bins, and more based on the data table.

2.1.6 PHP Framework: ThinkPHP

In this project, I used the ThinkPHP framework in the backend to achieve some interaction with the front-end and access to the database based on PHP.

ThinkPHP has excellent performance and rich features. It is a lightweight, object-oriented PHP rapid development framework that can support server environments such as Windows, Linux, and Unix, as well as multiple databases such as MySQL, Sqlite, and PgSQL. It has good usability and interactivity.

2.1.7 PHPStudy

PhpStudy is a user-friendly PHP debugging environment, which is a program integration package for PHP debugging environment. This package includes many things such as Apache, PHP, MySQL, phpMyAdmin, ZendOptimizer, etc. It can be installed at once and can be used without additional configuration, making it very convenient to use. At the same time, in addition to the PHP debugging environment, the program also includes development tools, development manuals, etc., making it easy for users to view and use. Extremely friendly to both novice and experienced users.

2.1.8 Front-end Development Software: WeChat Developer Tool

In this project, the WeChat developer tool is used on the front-end, which is the WeChat mini program side. It can help you achieve interface design and some event handling JavaScript scripts on the front-end.

At the development language level, the WeChat developer tool is not significantly different from traditional languages on the internet. The WeChat developer tool uses JavaScript scripts to write logical code, while also using the WXML language to describe the structure of the page, and using the WXSS language to describe the style of nodes. However, this is because the small program differs from traditional web pages in terms of interface rendering and logical operation, So traditional web development and debugging tools cannot be used. Therefore, we usually use WeChat developer tools to improve the code development function, compilation and operation function, interface design and logic debugging, real machine preview function, and submission and release version of WeChat mini programs.

2.1.9 Backend Development Software: PHPStorm

In this project, I used PHPStrom software for backend development.

PhpStorm is a tool developed by JetBrains for PHP integrated development. It can effectively improve user development efficiency, deeply understand user code, provide code completion function, fast navigation function, and error checking function. At the same time, it can also assist users in adjusting their code at any time, providing unit testing or visual debugging functions.

2.1.10   Database Software: Navicat

In this project, the database software I used was Navicat software.

Navicat software is a database management tool that can create multiple database connections. It supports a variety of different types of databases and allows users to easily manage various types of databases such as MySQL, Oracle, SQLite, MariaDB, PostgreSQL, SQL Server, and MongoDB. It is also compatible with Alibaba Cloud, Tencent Cloud, Huawei Cloud, Microsoft Azure, Amazon Aurora, Amazon Redshift, Amazon RDS, etc Oracle Cloud and MongoDB Atlas are compatible with various cloud databases. In Navicat software, you can create, manage, and maintain databases. The functions of Navicat software can meet the needs of all developers, and it also has good interface interaction ability, making it very simple and easy to operate for database server beginners. Navicat's user interface design is excellent, allowing you to quickly create and access information in a very secure and simple way. At the same time, Navicat provides customers with up to 7 languages to choose from, making it recognized as the world's most popular database front-end user interface tool.

2.1.11   Database System: MySQL

In this project, the database system used is the MySQL database.

MySQL is a relational database management system, which is developed by the Swedish company MySQL AB and is a product of Oracle.

The MySQL database uses the SQL language, which is a standardized language for accessing databases and is also the most commonly used language by people. Due to its small size, fast speed, and low cost, especially open source, most small and medium-sized websites choose MySQL as their database for development. This also makes MySQL database one of the most popular relational database management systems in the world today.

2.2 Summary

This chapter mainly introduces some technical methods involved in developing an employee suggestion management system, the corresponding software used during development, and the basic framework for development.

Chapter 3 System Design and Analysis

3.1   Research Objectives

Based on learning from many cases of WeChat mini programs, I propose my own design and implementation. In the current situation where WeChat mini programs are widely used, the aim is to build a WeChat mini program to help enterprise employees provide good feedback and suggestions to superiors, and enable superiors to handle suggestions in a timely manner, making it convenient for administrators to manage backend data. The research goal of this project is to use WeChat developer tools to implement an employee suggestion management system. Due to the large structure and functions of the entire employee suggestion management system, the workload during development, and some functions are already quite complete, the basic content of this study is not about the implementation of the entire management system. On the contrary, the basic content of this study is to upgrade and optimize the front-end and back-end modules of the suggestion management system.

3.2   Overall System Structure Design

Overall, the system can be divided into two modules: a front-end module that only employees can access, namely the WeChat mini program side, and a back-end module that only administrators can log in, namely the web server side. As shown in Figure 3.1.

Figure   3-1 : System overall structure design diagram

3.3 System Functional Structure Design

3.3.1 Front-end Module Design

The functions of the front-end module include the view task module, approval task module, suggestion module, personal information module, and browsing module, as shown in Figure 3.2.

3.3.2 Backend Module Design

The backend module mainly includes permission management module, user management module, department management module, suggestion management module, check-in management module, and message management module, as shown in Figure 3.3. The upgrade of the employee based WeChat mini program mainly includes the addition of some content in the check-in management module, some content in the message management module, and the improvement of the user management module. The main function of the check-in management module is to view the check-in status of employees; The main function of the message management module is to edit the content of the group post and then send it to all employees in the group; The main function of the user management module is to manage users.

3.4 Requirements Analysis

In order to better apply the system to practical applications, this article also analyzed the project requirements before designing the system, and divided them into functional requirements and non functional requirements.

3.4.1 Functional Requirements

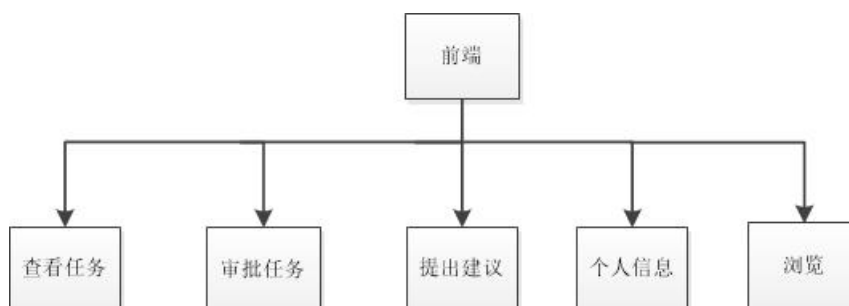1. Add check-in function and check-in reminder.

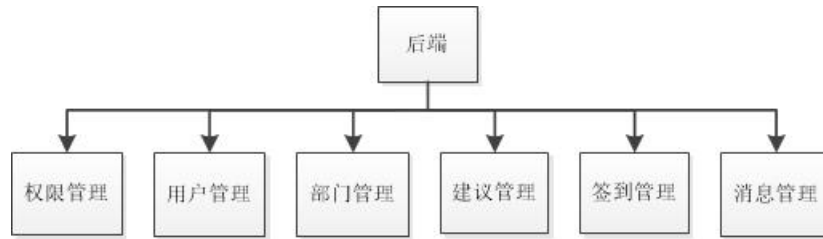Figure   3-2 : Front end functional module diagram

Figure 3-3 : Backend functional module diagram

2. Each department's personnel should add a search bar, sort and search according to pinyin.

3. The recommended status is divided into the following states: submission status, implementation status, pending confirmation completion status, 7 days before the planned implementation deadline, and extension status.

4. When applying for an extension, add an extension expiration date. After being in this state for one week, it automatically enters the "Implementation in Progress" state.

5. Every change in the status of work suggestions needs to be notified to relevant personnel;

6. When the suggested status changes, the system automatically sends a reminder to relevant personnel;

When the work proposal is pushed to the "to be implemented stage", there must be an implementer;

8. Do not submit suggestions repeatedly within 1 minute.

9. Add the best suggestion type, which can be displayed on this page once it is classified as the best suggestion in the background.

10. When submitting suggestions, employees must upload multiple photos, and the system must allow them to be scrolled left and right for viewing;

11. The person in charge of each status step can return the status to the previous status and add comments/comments.

12. People in each step of the status can see all comments/remarks in that status.

13. The implementer can upload photos to support the completion of the proposed implementation.

14. The backend can customize the reminder content;

15. In the report pulled out by the backend, it is necessary to include suggestions

for all statuses (if it is currently a construction return and is pending approval, it cannot appear in the report);

16. When selecting a suggestion as the best suggestion, the display of the suggestion should be different from other suggestions, or a column should be added to display the content, with a note indicating the best suggestion. (Currently, even if washing is the best suggestion, there is no difference from other suggestions);

17. When selecting the best suggestion in the background, it is necessary to add (the selection items for the best suggestion type, year, and month), and the best suggestion report can be pulled out separately;

18. Add information notification function, which means that the notification content can be input later and sent to all users in groups.

19. Change the main color tone of the interface to Cytova green.

3.4.2 Non-functional Requirement

1. The entire system requires simple operation, beautiful interface, and easy for users to use.

2. The process of users submitting suggestions should be very convenient. Users should be able to quickly and accurately submit their suggestions without any computer foundation, and successfully select the approver and implementer they want.

3. The interface should have good interactivity, and each action of the user should have corresponding responses.

4. The system should have good security to ensure that user data is not leaked.

3.5 Design of Limiting Conditions

1. When the work proposal is pushed to the "to be implemented stage", there must be an implementer

2. Do not repeatedly submit suggestions within 1 minute

3.6 System Context

In order to better analyze the structure of the entire system, we have drawn a context diagram of the system, as shown in Figure 3.4. This figure includes recommended management systems, users, and servers.

3.6.1 User

The main users in my system are employees of the company. Employees can be the proposers of suggestions, provide them with pictures to support them, and also view the approval and completion status of the suggestions. At the same time, employees can also be approvers, approving tasks submitted to them by others, and selecting task implementers. At the same time, employees can also be task implementers. If someone posts a task for you to complete, you can complete the task within the specified time and provide feedback on the completion status of the task. At the same time, employees can also view personal information and complete daily check-in and other tasks.
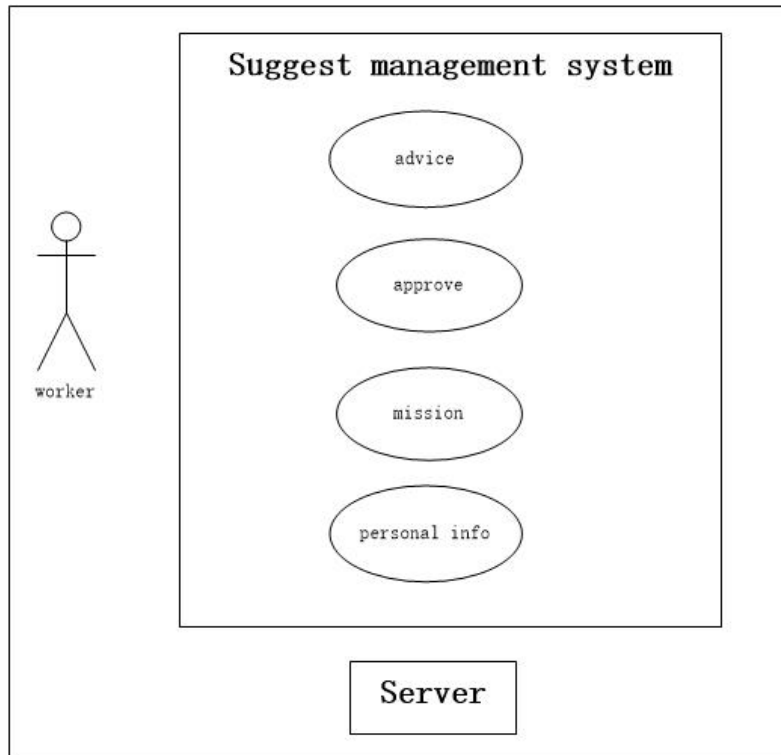
Figure 3-4 : System Context Diagram

3.6.2 Server

The server is an external system of the employee suggestion management system. The database inside the server provides data support for the mini program, and the back-end server also has a series of functions, mainly including permission management, department management, user management, suggestion management, check-in management, message management, and so on. This upgrade and optimization of the employee

suggestion management system mainly includes the addition of a message management module, a check-in management module, and an improved user management module. In the message management module, I mainly added the function of sending group messages. Administrators can add group messages and send them to every employee. If they feel that the message is not suitable, they can also withdraw and delete the message. In the check-in management module, I have mainly added a check-in function, where employees can check in on the mini program, and administrators can also view the check-in status of employees on the backend interface. In the user management module, I mainly added the function of user query. Administrators can click the query button to query. To ensure the convenience of the query, I have set up ID query, department query, username query, pinyin query, SSO number query, mobile number query, and audit status query. Each query can be individually queried for matching users, making it easier for administrators to quickly find the employees they are looking for. The review status includes three states: being reviewed, approved, and rejected. This allows administrators to quickly find the personnel they want to review and promptly remedy any audit rejections caused by careless errors.

3.7   Suggestion Management System

In order to better analyze the structure of the whole system, I drew a Use Case Diagram of the system, as shown in Figure 3.5. The system is based on a backend database and mainly includes several different functional modules, including suggestions, approvals, tasks, and personal information. Next, we use Use Case Diagram to introduce the different functions of each module.

3.7.1   Suggestion Module

The suggestion module is generally divided into two parts, one is to provide suggestions, and the other is to view records. The suggestion module allows employees to provide suggestions. Employees need to choose the appropriate approval department and approver, and then they can state the detailed content of the suggestions and improvement plans, and upload images to support them. The viewing record module is divided into three parts, namely my suggestions, confirmation of completion, and best suggestions. In my suggestion and confirmation completion module, employees can easily view a series of suggestions they have previously proposed and some completed suggestions. In the Best Suggestions module, employees can view a series of employee best sugges-

tions published by the administrator, and click to view the detailed content of the best suggestions.

3.7.2 Approval Module

The approval module is generally divided into two parts, namely approval and viewing records. The approval module allows employees to perform approval operations. Once the employee becomes the approver of a task, the content that needs to be approved will appear in this module. The employee needs to choose whether to approve the suggestion, and if it cannot be resolved, it will be transferred to the second level approver. If approved, it is necessary to select the implementer, as well as the start and end time of the implementation, and also provide some approval suggestions. The view record module is divided into two parts, namely the approved module and the confirmed completed module. In the approved module, you can view some of the approved content. In the confirmation completion module, you can learn about the task completion status of the suggested implementer.

3.7.3 Task Module

The task module allows employees to view tasks. This module can be divided into three parts: to-do tasks, ongoing tasks, and completed tasks. Employees can see the tasks to be completed in the to-do module; Seeing ongoing tasks in the ongoing task module to avoid forgetting; In the completed task module, you can see some tasks that have already been completed.

3.7.4 Personal Information Module

The personal information module is generally divided into two parts: check-in and viewing information. In the check-in module, employees can perform check-in operations. In the viewing information module, if an employee has not yet signed in today, they will receive a check-in reminder; Employees can also view the approval results and notifications of their proposed suggestions; You can also see messages sent by administrators to all users in groups; You can also view and modify employees' personal details, or switch accounts.
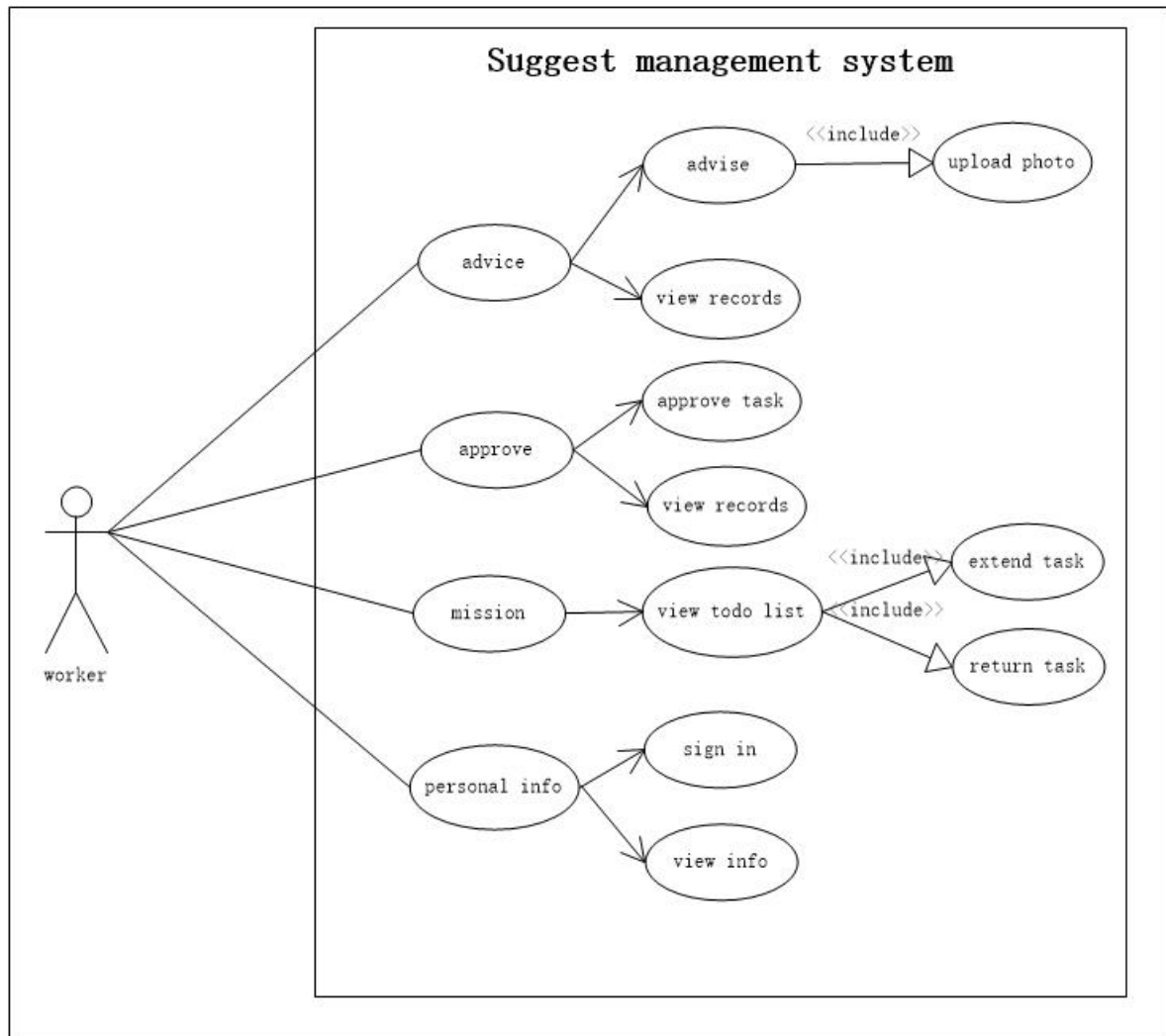
Figure 3-5 : Use Case Diagram

3.8 Summary

This chapter mainly introduces some of the overall design of the system, including overall structural design and functional structural design, and then describes the content of the different modules of the system. Then it analyzes some requirements of the suggestion management system, including functional requirements and non-functional requirement. Next, the context of the entire system was analyzed, listing the relevant external systems and the scope of users involved. Finally, four features of the whole system are designed and described, and Use Case Diagram are used to show the basic contents of different features.

Chapter 4 System Demonstration

4.1 Interface Overview

The implementation technology of the employee suggestion management system is very rich, so choosing the appropriate technology to implement the system is also a very important content. Because if the chosen technology is not appropriate, it will also cause some trouble to the implementation system, and it is more likely to affect the system's performance. This chapter mainly introduces the interface of an employee based suggestion management system. The system consists of two parts: a front-end system implemented by WeChat mini programs, and a web back-end system built using Vue.js and PHP. At the same time, in order to achieve a more elegant and concise interface, we used element UI tools to assist in web development. The front-end interface includes a viewing task module, an approval task module, a suggestion module, and a personal information module; The backend interface mainly includes permission management module, user management module, department management module, suggestion management module, check-in management module, and message management module. All interfaces are highly interactive and elegant. The system is designed to be easy to operate, allowing users to easily operate each functional module without any computer knowledge. The following section will explain several important interfaces from the front and back ends.

4.2 Front end module

The functions of the front-end module include the view task module, approval task module, suggestion module, personal information module, and browsing module.

4.2.1 View Task Module

This functional module has three parts, namely to-do tasks, ongoing tasks, and completed tasks. As shown in Figure 4.1. If someone makes a suggestion and you are the person who needs to complete it, then the suggestion will be displayed in your to-do list. The to-do tasks will be listed in chronological order according to the suggested release time. You can see all the to-do tasks you need to complete, and you can click into the to-do tasks to view detailed task items, including who proposed the suggestion, the completion status of the task, and the detailed content of the task. The ongoing tasks and completed

tasks are the same. You can click into each section to view the ongoing tasks and some completed tasks.

Figure   4-1 : View task module diagram

4.2.2   Approval Task Module

This functional module also has three parts, namely pending approval, approved, and confirmed. As shown in Figure 4.2. When a person puts forward a suggestion and selects you as the approver, the task will enter your pending approval task. The tasks to be approved will also be listed in chronological order, where you can see all the approval content you need to complete, and you can click in the "Pending Approval" section to view the detailed approval content. The same goes for approved tasks. When you have approved a task, it will be transferred to the approved content. In the confirmation completion section, when the implementer, who is the person responsible for completing the task, completes the approved task, the task will be transferred to the confirmation completion interface.

Figure　4-2 : Approval Task Module Diagram

4.2.3　Suggestion Module

This module has four parts: New Writing Suggestions, My Suggestions, Confirmed Completion, and Best Suggestions. In the new suggestion section, as shown in Figure 4.3, you can provide suggestions. Suggestions are divided into three categories: safety, quality, and lean. You can choose the appropriate suggestion classification. Next, you can select the corresponding approval department and approver to approve your suggestion. You can list the detailed content and improvement plan of the suggestion, and upload multiple images to support it. In my suggestions section, you can see all the suggestions you have made in the past. In the confirmation completion section, you can see whether the suggestions you have proposed have been completed. If they have been completed, they will be displayed in the confirmation completion interface. In the Best Suggestions section, you can see a series of best suggestions set by the administrator in the background. This best suggestion is publicly available to everyone, and every employee can

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see the best suggestions. You can click to enter this section to view the specific content of the best suggestions.

Figure 4-3 : Suggestion module diagram

4.2.4 Personal Information Module

This module has six parts, namely check-in, messages, system messages, to-do events, personal information, and account switching. As shown in Figure 4.4. In the check-in section, you can click on check-in, and the system will display that you have successfully signed in. The backend database will also record your check-in and the time you signed in. In the message section, you can see a series of message notifications sent to you by others. In the system message section, the group message content edited by the administrator in the backend database will be sent to all employees, and this message will be displayed in the system message interface. When you enter the to-do list, if you have not yet signed in today, the system will display that you have not signed in today, reminding you to proceed with the check-in work. If there are no unfinished events, the system will remind you that there are currently no to-do lists. In the personal information

interface, you can see your detailed personal information, including name, SSO number, department, and phone number. In the account switching interface, you can perform a series of operations such as logging out, logging in to another account, registering a new account, or clicking on 'forget password' to reset the password.

Figure 4-4 : Personal Information Module Diagram

4.2.5   Browsing Module

In the browsing module, which is the homepage section of the WeChat mini program. As shown in Figure 4.5. You can see the latest notifications released by the administrator through the backend, and you can also click in to view the corresponding content. At the same time, you can also see the latest updates of other employees. When an employee's suggestion is approved, the information will be presented in the latest updates. When the status of the task changes, that is, the task changes from not implemented to being implemented or completed, The task will also be displayed again in the latest updates.

Figure   4-5 : Browse module diagram

4.3   Backend Module

The backend module includes permission management module, user management module, department management module, suggestion management module, check-in management module, and message management module.

4.3.1   Main Interface

This is the main interface of the backend console. As shown in Figure 4.6. Here you can see the real-time total number of suggestions put forward by employees, as well as the suggestions waiting for approval. At the same time, you can also see the latest suggestions, tasks, and articles below. The upgrade of the employee based WeChat mini program mainly includes the addition of a check-in management module, a message management module, and an improved user management module.
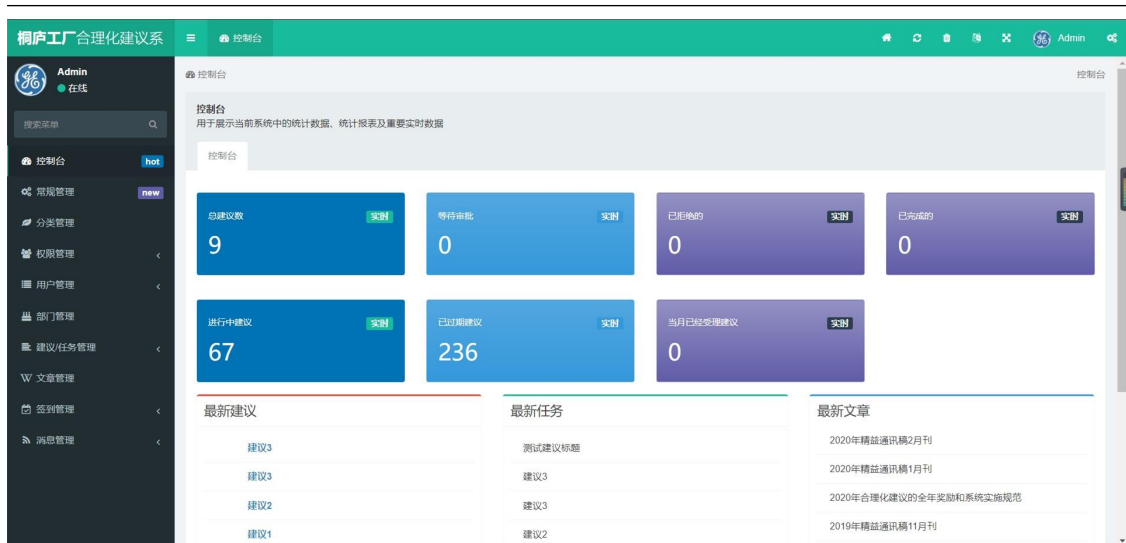
Figure   4-6 : Main Interface

4.3.2   Sign-in Management Module

The main function of the check-in management module is to view the check-in status of employees. As shown in Figure 4.7. When employees perform check-in operations on the WeChat mini program, the corresponding check-in time and signer will be displayed on the backend and sorted in chronological order.
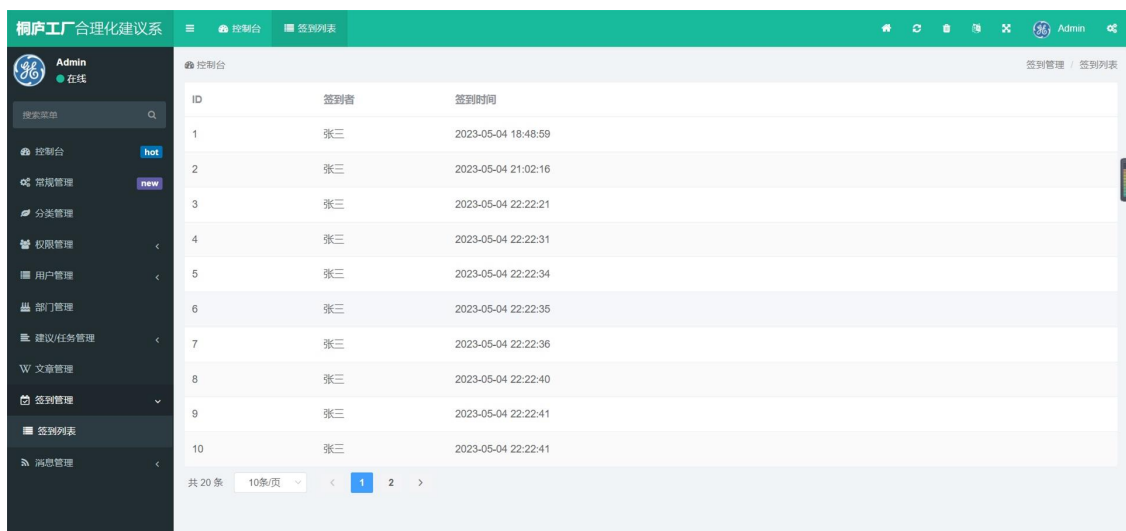

Figure   4-7 : Sign-in Management Module Diagram

4.3.3 Message Management Module

The main function of the message management module is to edit the content of the group post and then send it to all employees. As shown in Figure 4.8. You can click the modify button on the right to modify the title and content, or delete the information. This information will be sent to all employees in a group and displayed in their system messages.

Figure 4-8 : Message Management Module Diagram

4.3.4 User Management Module

The main function of the user management module is to manage users. As shown in Figure 4.9. Administrators can click the leftmost button in the action bar to set it as the approval leader, so that other employees can find this person to approve tasks. Administrators can also click the middle button to modify user data, or click the rightmost button to delete the user. At the same time, the user management module has also added a search bar to facilitate administrators' user query operations. Administrators can query specific users through a series of restrictions such as ID number, department, username, and pinyin, and the queried users will be displayed below.
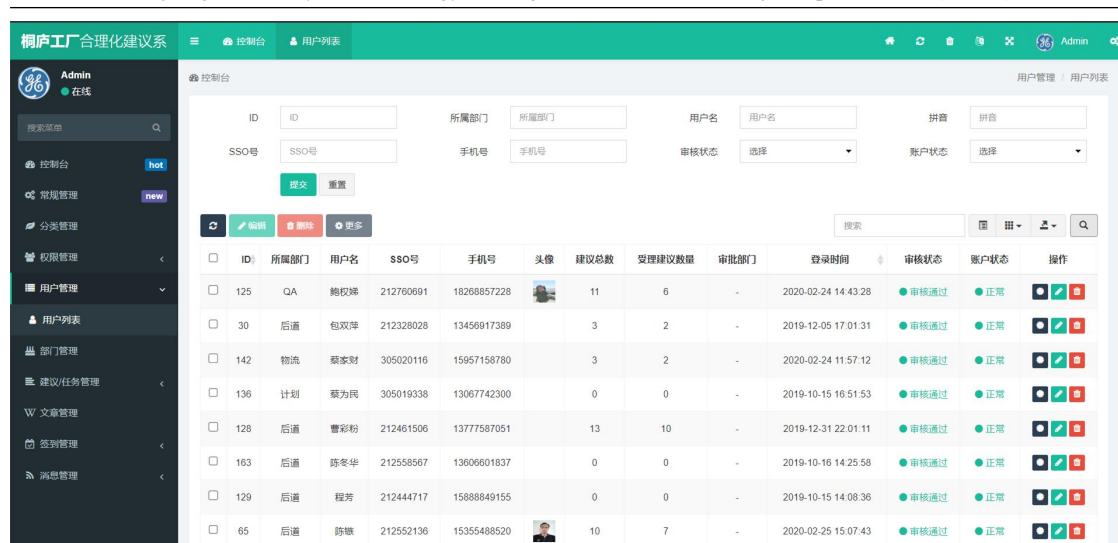
Figure 4-9 : User Management Module Diagram

4.4 Summary

This chapter mainly introduces the front-end and back-end interfaces of the employee suggestion management system, and provides a detailed explanation of the corresponding graphics. The front-end is mainly divided into 5 modules: viewing task module, approving task module, proposing suggestions module, personal information module, and browsing module. The backend is mainly divided into 6 modules: permission management module, user management module, department management module, suggestion management module, check-in management module, and message management module. The interactivity of each interface is very good, the system responds promptly, and the user operation is also very convenient.

Chapter 5 Summary and Future Work

5.1 Summary of this Project

This article first introduces the background and basic significance of this study, then analyzes the current situation at home and abroad, and then proposes the main content and potential challenges of this study. Afterwards, a brief description was given of some relevant technologies involved in developing an employee suggestion management system. Then it describes the overall structure design and functional structure design of the proposal management system, and analyzes the functional requirements and non-functional requirement of the system. Finally, the various interfaces of the system were presented, and the roles of each part in the system and the functions that need to be implemented were elaborated in detail.

This employee suggestion management system is developed based on a WeChat mini program, which solves a series of problems such as employees' inconvenience in providing suggestions and inability to understand the implementation status after suggestions are proposed. The newly added user query function makes it more convenient for administrators to manage users; The group sending function of information also makes it more convenient for administrators to notify employees of the latest notifications; The newly added check-in function allows employees to clock in promptly every day and makes it easier for administrators to view their check-in status. Further improvements will be made to the mini program based on usage and suggestions in the future.

5.2 Further Research and Prospects

The employee suggestion management system designed in this article is already usable, but there are still some functional deficiencies that require further research:

1) The check-in function is incomplete, and the interface interactivity of the check-in function is not strong, making it difficult to visually see whether the check-in has been successful today. At the same time, the check-in function also fails to achieve targeted check-in. This convenience needs to be further improved to enhance interface interactivity.

2) The stakeholders of each suggestion (proposal initiator, proposal approver, pro-

posal executor) should be able to see the implementation status of the entire suggestion, represented by a suggestion chain;

3) The stakeholders of each suggestion can communicate with each other and discuss issues that may arise during the implementation process, such as:,

1. How can approvers reject suggestions?

2. If the executor encounters problems during the specific execution process or has doubts about the suggestion itself, how can they consult the initiator of the suggestion?

4) The response speed of the front-end WeChat mini program is not ideal, and sometimes there may be situations where the loading program is too slow. In future research, methods such as subcontracting loading, streamlining code, and reducing request times can be used to continue improving the performance of the small program side.

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Appendix

附录 1 毕业设计文献综述

附录 2 毕业设计开题报告

附录 3 毕业设计外文翻译（中文译文与外文原文）