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Design and Implementation of Convenient Campus System Based on Modular Structure

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Abstract

College students often need to recharge their campus cards and pay water and electricity bills in campus life. Offline payment takes time and effort. If online payment is frequently switched, the user experience will decline. This paper designs and implements a campus application platform for college students based on B/S architecture. It uses modular registration applications. Users can add and delete applications, pay living expenses, modify and add personal information, and open and modify payment functions. The front end of the system is based on the current popular Vue and Element-ui frameworks. The developed web pages can adapt to different resolutions. The back end is based on the popular PHP and Laravel frameworks of enterprises, which can rapidly develop the back end service interface. This paper discusses the system development process from the key stages of software development, such as structure design, function design, data model design, and effect realization.

Keywords

Vue framework, PHP environment, Larravel framework, Modular structure

1. Introduction

With the popularity of Internet applications, more and more things can be solved through online applications. Online shopping, online takeout, mobile travel and other application systems are full of daily life [1]. College students often need to recharge their campus cards and pay water and electricity bills in campus life. Offline payment takes time and effort. If online payment is frequently switched, the user experience will decline. From the perspective of "InternetplusCampus", this paper uses the popular front-end development technology to develop a web-based "Convenient Campus" website system, which is developed in a modular structure. In addition to the basic applications, users can seamlessly integrate the applications they want to add. Multiple applications can be used in one interface to facilitate students' free switching management. This paper will discuss the development process of this system in detail from the perspective of software development cycle [2].

2. Structural design

The basic roles of this system include student users and general administrators. Student users can register accounts, and after successfully logging in to the system, enter the campus system home page, where they can view the personal home page, manage the application panel, or use the application and other functions. When users operate the application panel, they can add applications that meet their own roles or delete the added applications. The system background management address is only open to the role of the general administrator. The administrator can enter the correct account password to log in to the background management interface, and can manage users, basic function management, application management, role management and other operations. The system structure design is shown in Figure 1.

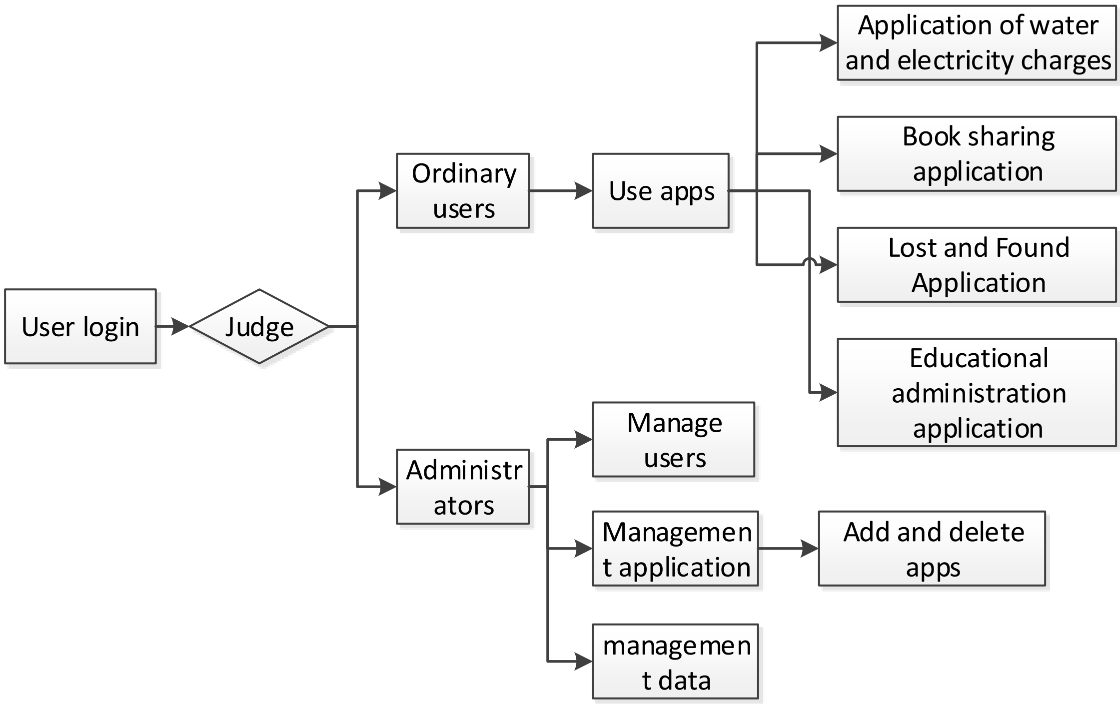

Figure 1. System structure diagram.

3. Modularization

The application management adopts a modular structure. Student users can add and delete applications according to their needs. Administrators can update and maintain the application library. All functional modules are abstracted as an application entity. The application library stores modular application entities. The application description attributes include: application name, access address, application icon, application permissions, application description, etc. The administrator can add the application name and access address through the management system, and set the application permissions so that specific roles can add or see this application; After entering their own interface, ordinary users can freely view the applications within the scope of adding and using permissions, thus realizing the modular structure of the system.

4. Design of database model

By analyzing the system participation roles, we can get two entities: ordinary user and administrator user. The most important tables of user entities are user identity table (yb-user_identity) and user information table (yb-user_info); Ordinary users can add, delete, modify and query applications; For the customization and modularization of functions by users, each function module is designed as an independent table, and then linked to the basic user module table through foreign keys. The specific design table is as follows:

1) Yb-user: user table, which stores user registration information;

2) yb-user_Info: user information table, which stores the basic information of the user_ID foreign key associated user table;

3) yb-user_Identity: the user identity table, which stores the user's identity information through the user_Id and role_ID foreign key is associated with user table and role table;

4) Yb-consume: the consumption record table, which stores the user's consumption records_ID foreign key associated user table;

5) Yb-pay: payment table, which stores the user's payment information through the user_ID foreign key associated user table;

6) Yb-aa: aatable, which stores AAinformation between users through user_Id and utilities_ The ID foreign key is associated with the user table and the water and electricity bill table;

7) Yb-role: role table, storing system roles;

8) Yb-app: application table, storage system application;

9) Yb-item: lost and found form, which stores the lost and found information published by the user_ID foreign key associated user table;

10) Yb-comment: Lost and Found Comment Form, which stores the comments and retrieval of lost and found items, via user_Id and item_ID foreign key is associated with user table and lost and found table;

11) Yb-utilities: water and electricity meter, which stores the user's monthly water and electricity consumption information;

12) Yb-book: book sharing table, which stores the books shared by users_ The id foreign key is associated with the user table.

5. Technical framework

The front end of the system selects the popular Vue framework and Element-ui framework. Vue is a popular progressive framework for building data-driven web interfaces [3]. Vue framework supports the use of simple APIs to achieve data binding and composite view of responses. The core idea of Vue is to build a user interface by building reusable components. It is simple and flexible. Its biggest characteristics are: lightweight framework, two-way binding of data, instructions, components, and Vue's ecological vuex (centralized state management), vue-route, etc; Element UI is a UI framework developed based on Vue. The built-in CSS Media Query function of Element UI can develop responsive web pages and automatically adapt to different resolution effects; By using rich Web components, including drop-down menus, button groups, button drop-down menus, navigation, navigation bar, path navigation, paging, typesetting, thumbnails, warning dialog boxes, progress bars, media objects, etc., you can quickly build a beautiful and fully functional front end of the website, and can also perform on-demand mapping without causing too much redundancy and minimizing the file [4].

The backend of the system is developed in the popular PHP environment, which is a general open source script language [5]. PHP syntax absorbs the characteristics of C, Java and Perl, is easy to learn and widely used, and is mainly applicable to the field of Web development. It can execute dynamic web pages faster than CGI and Perl. Compared with CGI technology, writing dynamic pages with PHP embeds programs into HTML documents for execution, and the execution efficiency is much higher than CGI that completely generates HTML tags; PHP can also execute compiled code. Compilation can achieve encryption and optimize code operation, making the code run faster. Use the popular Larravel framework in the PHP based environment. Larravel is a concise and elegant PHP Web development framework (PHP Web Framework) [6]. Its code style abandons clutter, and it can quickly build a perfect network APP, and each line of code can be concise and expressive. It already has a set of advanced PHP Active Record implementation in Laravel, which can easily apply "constraints" to both sides of the relationship, so that it can completely control the data.

6. Key Functions and Implementation

This system is aimed at college students on campus, providing users with multiple functions to add and delete, so that users can easily customize the modular system. Next, select several key functions to analyze their implementation.

6.1 User home page

This is a module for customized application. Through this module, users can view the applications they have added and use, and also add and delete some applications from their home page, leaving the following applications, so as to customize their home page. The user clicks the plus sign to pop up the add application operation box. Click "Add Application" or "Added" to add and delete the application. You can also enter keywords in the search bar to search for the required application for operation. For example, click "Add Book Sharing" application, and the button will display as "Added". The "Book Sharing" application menu will appear on the user homepage interface, and the operation of deleting the application is similar, the app will disappear from the home page after deletion.

6.2 Application management

The background administrator maintains the application library through the application management module to add, modify and delete applications. When adding applications, the administrator can enter the application name, access route, application icon, access permissions, etc. The access route is the access URL path of the application, which can be an internal module address or an external URL address. If it is an external address, the external application can be linked to the user's home page; Application icons distinguish different applications by uploading pictures; Application permissions enable different users to have corresponding access rights to different applications by selecting predefined roles. For example, students can query their own water and electricity charges, and administrators can query all students' water and electricity charges. Through the management of permissions and applications, different users can freely customize the modular system home page.

6.3 Water and electricity fee module

The water and electricity fee module is the basic application module of the system. The user role is mainly divided into ordinary users and administrators. Ordinary users can check the water and electricity charges that should be paid in the corresponding month of their dormitories, and pay by selecting one-button payment and AApayment. One-button payment will pay the fees that should be paid in full this month, and AApayment will pay the fees that should be paid per capita, and can send a prompt to users who do not pay within the specified time to remind them to pay, you can also view the details of the historical water and electricity charges of your dormitory. The administrator can manage the water and electricity charges, check the information of all students' water and electricity charges, paid, and whether they have been paid, or import the detailed data of each month's water and electricity into the database through excelform, or export the filtered data into excelform.

7. Conclusion

PHP is a widely used web application development language in the industry. The Laravel framework is a web framework based on PHP, which has MVC structure and is easy to develop server-side applications quickly; Vue and Element UI are popular front-end development frameworks that can quickly produce responsive pages. This article is based on the popular front and back end framework in the industry [7], and uses the modular structure to build the campus application platform commonly used by college students. In the next step, we will continue to develop more applications and add them to the system. This article discusses the design and implementation of the convenient campus system in detail from the perspective of the software development cycle, which is believed to have certain reference significance for readers to carry out software development.

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