

Research Article

Vehicle parking management system

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ABSTRACT

This system is in order to reduce the use of artificial parking, parking more convenient management, users more convenient to use.. This system used the Browser/Server architecture, JSP(Java Server Page) as the front r & d tool, SQL Server as the background data warehouse for r & d. The key goal of parking system development is to make it more convenient for users and administrators, the main functions are: free parking space query, user registration use, user login use, free parking reservation, user login password change, administrator for user information query, administrator settlement costs. The system in use can improve the utilization of parking space, saving human costs.

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1. Introduction

With the rapid development of the automobile industry, the number of people who own cars is also increasing. With the popularity of automobile use, People's requirements for automobile management are also increasing. People hope to get better service in vehicle management[1].

Each parking lot situation is different, in which the management of the parking lot is also different. Parking lot management needs to be based on the existing conditions of the parking lot, for user information, the use of parking spaces, the cost of settlement, can be more convenient and effective processing. In the traditional parking lot management system, users cannot know the status of parking spaces in time, which will lead to the situation that users find parking spaces full when they arrive at the parking lot. When managing vehicles, the administrator should record the information of vehicles, the time of entering, and calculate the parking fee according to these data. This has caused great inconvenience, and the whole link is very easy to make mistakes. This paper focuses on

the creation of a fast and effective parking management system. These problems can be solved by online operation through this system. Users will query the reserved parking time of spare vehicles on the website, and the parking fee starts from the scheduled time. it can reduce human costs, fewer errors, more convenient and simple, can be applied to a variety of situations.

The whole system adopts the two-layer mode of separating the business logic layer and the user presentation layer. This developed mode can separate the database operation class from the user layer, which is convenient for code modification and system maintenance in the future. The parking management system can make the parking lot management information and gain an advantage in the increasingly competitive vehicle industry

2. The Hardware Structure and Software

The parking lot management system needs to have the complete configuration to realize its work. The required configurations are: server: Tomcat, development software: MyEclipse, database: MySQL, R & D language: JSP, Java

language. At the same time, enough memory can ensure that the code runs smoothly. In addition to the structure of the web page, in a whole parking lot system, users need to hold a card to park, so as to run the whole system. There are also access cabinets to display the current status. The design of the access cabinet is shown in Fig.1.



Fig.1 The design of the access cabinet

2.1. Server

The server we selected is Tomcat. Tomcat is a free open source web application server. It is a lightweight application server [2]. It is widely used in various systems. It is the first choice for developing and debugging JSP programs. Tomcat is shown in the Fig.2.

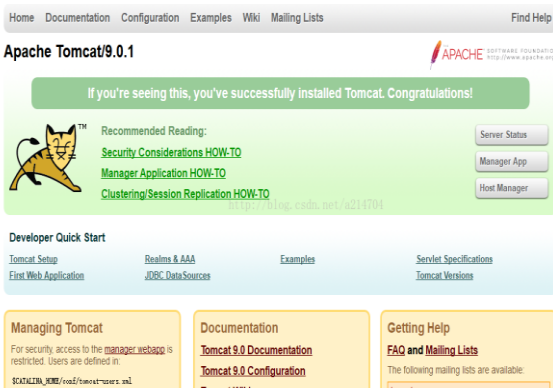


Fig.2. Tomcat server

2.2. Database

Database can effectively and quickly manage data information, while providing the corresponding interface and uniform services for other applications. Three database uses of MySQL:

(1) Multifunctional database: this option provides fast access to both transactional storage engine (InnoDB) and non-transactional storage engine (MyISAM);

(2) Transactional database only, this option mainly optimizes the transactional storage engine (InnoDB), but the non-transactional storage engine (MyISAM) can also be used;

(3) Non transactional database only. This option mainly optimizes the non transactional storage engine (MyISAM). Note that the transactional storage engine (InnoDB) cannot be used.

3. Software Design

After two months of development time, the parking lot management system was developed by an individual through computer design. After coding on the computer, the completed system is tested on the server. The development tool used is Eclipse and the database is Mysql.

3.1. Database design

Because data is a major part of the overall design, the design of the database is particularly important. The main function of the system is to divide it into different tables through the processing of the database. Such as parking information table, user information table, vehicle information table.

3.2. Module detailed functional design

According to the functions of the parking reservation system, the system can be mainly divided into two modules: the front and rear platforms, which are the interaction of database information after user login and the operation of database information after administrator login. Function diagram of parking reservation system is shown in the Fig.3.

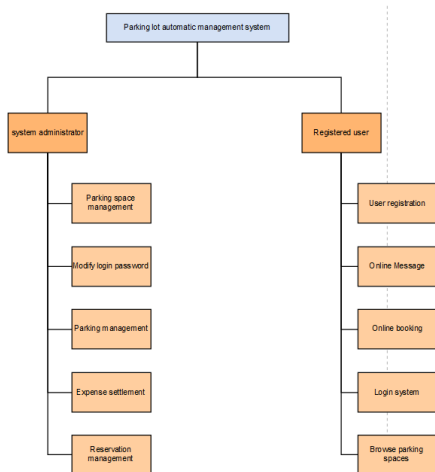


Fig.3. Function diagram of parking reservation system

3.3. Authorized design

Authorized design is shown in Table 1.

Table 1. Authorized design

Authorization number	User name	Object name	Jurisdiction
001	Administrator	Administrators	add,delete,check and change
002	User	User	add,delete,check and change

Fig.4 is the user perspective interface, which users can operate according to their own needs.

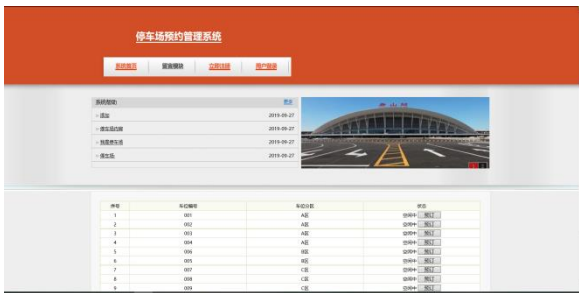


Fig.4. User action page

Fig.5 is the administrator operation interface, in which the administrator can manage the parking space and user information.

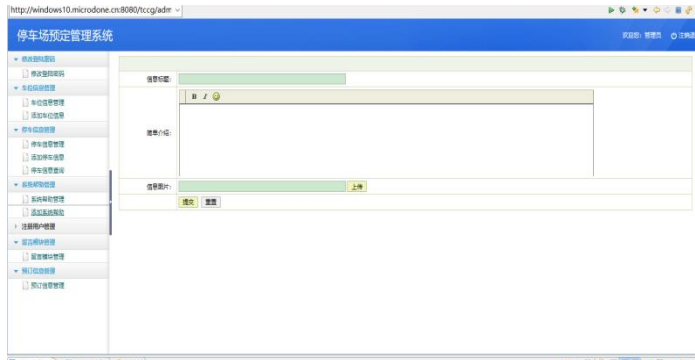


Fig.5. administrator operation interface

4. Software Test

The content of software testing [3],[4] includes software code testing and software system function testing. The concrete work is to input the concrete data when the code runs, runs the code, in the running process will appear the result, thus can judge the correctness of the program.

In order to test the accuracy of the system, an online settlement is made for a vehicle that has been parked for two hours. As shown in Fig.6.

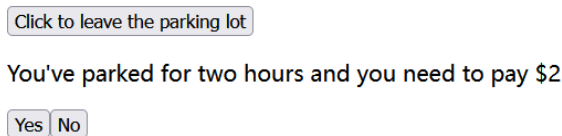


Fig.6. Expense test

4.1. General check of source code

The inspection is mainly a functional spot check of some key modules to check the modules. For example, whether the names of variables and functions in the code meet the specification requirements of the development software; You can also check whether the notes in the program are standardized, whether the amount of notes meets the requirements and whether the notes are identified accurately; Check whether the data display meets the standards, etc.

(1) Naming convention check

Check whether the naming in the source code, such as variables, functions, objects, etc., comply with the agreed specifications.

(2) Note check

Check whether the notes of the program meet the specifications, whether the amount of notes meets the specified requirements, and whether the instructions of notes are correct. For example, the amount of notes is required to be more than 20%.

(3) Interface inspection

Check whether the database interface and external interface are named properly, whether they are correctly connected with functions, and whether they clarify the functions to be completed.

(4) Data type check

Some of the codes involved have definitions of numbers. For example, whether the floating point type is used to define the price, the definition of date, the definition of number, etc. are in line with the specification.

5. Conclusion

Parking lot vehicle management system is a typical information management system, its development functions mainly include: through computer management of vehicle and other people's contact information, to achieve paperless management, through query and analysis, statistics of all kinds of data, through powerful query and search for efficient data to improve the efficiency of work.

The purpose of this paper is to design a practical parking lot management system, hoping to reduce manual operation. The design process of the system has gone through the stage of requirement analysis, conceptual design, logical structure design, database physical design, database implementation and maintenance, as well as system coding and testing, and finally completed an applicable parking lot management system.

This system used the Browser/Server architecture, JSP(Java Server Page) as the front r & d tool, SQL Server as the background data warehouse for r & d. The system key functions realized in the last system include: user registration and login, message block, parking reservation, change of login password, parking information management, parking information management, fee settlement block and parking information query. The design and manufacture of this parking space autonomous management system can increase the effect of parking space management to a large extent, all reflecting the information period of the special good.

References

1. Beibei Ding, Xiaona Yang, Investigation and Analysis on the development status of intelligent transportation in China, *Automobile Practical technology*, 2021, 46: pp.199-201.
2. Yuankun Du, Yuxin Huang, Tomcat6.0 Configuration and application of connection pool, *Computer CD software and Application*, 2015, 18(02): pp.114-115.
3. Qile Qi, Research on Key Technologies of embedded computer software testing, *Electronic production*, 2021, 21: pp. 99-100+78.
4. Bo Weng, Yanfeng Yan, Research on software testing in big data environment, *Internet Weekly*, 2021, 22:pp. 42-44.

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