

Research and Design of the Outpatient Appointment System Based on WEB

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Abstract: With the continuous development of the internet industry, most hospitals have started to adopt online appointment and registration systems. Patients can easily make appointments and register online, saving the waiting time for patients to queue up and register at the hospital. At the same time, it effectively avoids the problem of personnel concentration and cross infection caused by centralized hospital registration. After registering with a real name, the user logs into the registration system, selects the corresponding hospital department, determines the required doctor, makes an online appointment for registration, and then goes to the hospital for treatment at the agreed time. Experiments have shown that the hospital appointment and registration system not only facilitate patients, saves patient time, but also makes hospital registration work efficient and standardized, with good application value.

Keywords: Outpatient appointment; Registration system; WEB.

1. Introduction

With the rapid development of internet technology, more and more people are using online appointment systems, including medical service appointments and registration. The hospital appointment and registration system has also become a necessary requirement. The traditional medical service model has problems such as insufficient utilization of medical resources and long waiting times for patients. Through the appointment and registration system, medical resources can be more fully utilized, improving treatment efficiency, and alleviating the shortage of medical resources [1]. The hospital appointment and registration system can provide efficient and convenient medical services to meet the needs of patients. This system allows patients to seek medical treatment quickly and conveniently, eliminating queuing and waiting for registration, and synchronously completing patient information registration, enabling hospitals to better manage patients, thereby improving the medical environment, improving medical efficiency, and conducting efficient and orderly diagnosis. And enhance the hospital's brand image. The appointment registration system can enhance the hospital's brand image, leave a good impression on patients, and enhance their trust in the hospital.

The online appointment and registration system is a new type of medical service system based on the Internet, aimed at improving the medical environment, simplifying the medical process, and saving patients' time. Through this system, patients can make appointments and register with hospitals and doctors through online platforms, without the need to queue up at the hospital. This system truly embodies the service concept of putting patients at the center and starting from the convenience of patients, and is in line with the development trend of humanized and warm services in hospitals today.

2. Database Design

Database design refers to the design and optimization of the logical mode and physical structure of the database for a given

application environment, and the establishment of the database and its application system, so that it can effectively store and manage data to meet the application needs of various users, including information management requirements and data operation requirements. Information management requirements refer to which data objects should be stored and managed in the database; Data operation requirements refer to the operations performed on data objects, such as query, add, delete, modify, and statistics [2].

2.1. Requirement Analysis

The research and design of appointment and registration systems mainly consider two aspects: patients and hospitals. From the perspective of patients, many patients are unable to make appointments during the regular opening hours of the hospital due to work and other reasons. Therefore, it is necessary to increase the appointment and registration time to meet the actual needs of patients. Provide doctor information: Patients hope to have basic information about the doctor in advance, including professional title, work experience, professional field, etc., in order to choose a suitable doctor based on their own situation. Thirdly, the appointment registration system can provide convenient payment methods. Many patients hope to make online payments through mobile phones and other means to avoid queuing up for payment on site.

From a hospital perspective, firstly, the system can reduce labor costs. By developing an online appointment and registration system, the pressure on hospital human resources can be effectively reduced, and work efficiency and quality can be improved. Secondly, the appointment registration system can also improve the efficiency of medical treatment. Through the appointment and registration system, patients can arrange their time in advance, avoiding queuing and reducing treatment time, while also improving the hospital's treatment efficiency. Thirdly, the appointment and registration system improve the quality of hospital services. Through the appointment and registration system, hospitals can better arrange and manage visits, provide patients with more efficient, accurate, and thoughtful services, thereby

improving the quality of hospital services. Fourthly, the appointment registration system can improve data statistics management. Through the appointment and registration system, hospitals can conveniently monitor and collect data on their medical visits, gain a more comprehensive and accurate understanding of patients' medical needs and the hospital's service status, and adjust and optimize the hospital's service strategy in a timely manner.

2.2. Conceptual Structure Design

The process of abstracting user requirements from requirements analysis into information structure is conceptual structure design. It is the key of the whole database design. The task of conceptual design is to abstract it into a conceptual model based on requirements analysis. The conceptual model is usually expressed by E-R diagram [3]. The outpatient appointment registration system includes the following entities (the attributes of each entity are attached).

- 1). User entity: User ID, name, gender, age, contact information;
- 2). Hospital entity: Hospital name, address, contact phone number;
- 3). Administrator entity: Employee ID, name, hospital name, telephone;
- 4). Department entity: department name, department information, hospital name, current number of appointments, maximum number of appointments;
- 5). Doctor Entity: Doctor ID, Doctor Name, Department name, Telephone;
- 6). Order Entity: User ID, Doctor Name, Order ID, Visit Time, Appointment Time.

The ER diagram of enterprise information management system is as follows:

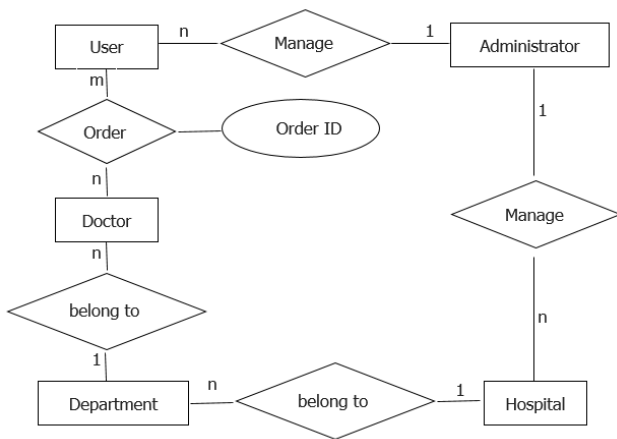


Figure 1. E-R diagram of appointment registration system

2.3. Logic Structure Design

The task of logical structure design is to convert the ER diagram designed in the conceptual structure design stage into a logical structure consistent with the data model supported by the database management system. The database we selected is SQL server, which supports relational data model [4].

When an entity is converted into a relationship mode, the attribute of the relationship is the attribute of the entity, and the code of the relationship is the code of the entity.

The ER diagram is converted into the relationship mode as follows:

- 1). User entity (User ID, Name, Gender, Age, Address,

Telephone)

- 2). Hospital entity (Hospital name, Address, Telephone)

- 3). Administrator entity (Employee ID, Name, Telephone)

4). Department entity (Department name, Department information, Hospital name,)

5). Doctor Entity (Doctor ID, Doctor Name, Department name, Current number of appointments, Maximum number of appointments, Telephone)

6). Order Entity (User ID, Doctor ID, Order ID, Visit Time, Appointment Time)

2.4. Physical Structure Design

The process of selecting the most suitable physical structure for a given logical data model is physical design. In relational database, it mainly refers to access method and storage structure.

Convert the above relationship model into data tables as follows:

Table 1. User-Table

Serial number	Column name	data type	constraint
1	User_id	varchar	Not null, primary key
2	User_name	varchar	Not null
3	Gender	varchar	Not null
4	Age	INT	Not null
5	Address	varchar	Not null
6	Telephone	varchar	Not null

Table 2. Hospital-Table

Serial number	Column name	data type	constraint
1	Hospital name	varchar	Not null, primary key
2	Address	varchar	Not null
3	Telephone	varchar	Not null

Table 3. Administrator -Table

Serial number	Column name	data type	constraint
1	Employee ID	varchar	Not null, primary key
2	Name	varchar	Not null
3	Telephone	varchar	Not null

Table 4. Department-Table

Serial number	Column name	data type	constraint
1	Department name	varchar	Not null, primary key
2	Department information	varchar	Not null
3	Hospital name	varchar	Not null

Table 5. Doctor -Table

Serial number	Column name	data type	constraint
1	Doctor ID	varchar	Not null, primary key
2	Doctor Name	varchar	Not null
3	Department name	varchar	Not null
4	Current number of appointments	varchar	Not null
5	Maximum number of appointments	varchar	Not null
6	Telephone	varchar	Not null

Table 6. Order -Table

Serial number	Column name	data type	constraint
1	User ID	varchar	Not null, primary key
2	Doctor ID	varchar	Not null
3	Order ID	varchar	Not null
4	Visit Time	Date time	Not null
5	Appointment Time	Date time	Not null

3. System Implementation

After the demand analysis, conceptual design, logical design and physical design, the appointment registration system uses the data definition language to create the database, establish the data table, import the data, realize, test and run in the SQLSERVER database management system. Data analysis, modification, adjustment and other maintenance work and subsequent development work can be carried out for the database [5].

In the database management system, we need to use data definition language to create database, establish basic tables, index, views and import data.

Implement basic table: use SQL statements to create User table, hospital table, administrator table, department table, doctor table and order table, and define the name, meaning, data type, length and data integrity of each column.

Index implementation: use SQL statements to establish the index of doctor and department respectively.

Implementation view: use SQL statements to create a complete order view, department basic information view and doctor basic information view respectively.

4. System Testing

System testing includes two important tasks: data loading and application coding and debugging. We perform the following tests on the appointment registration system:

Appointment registration: Enter patient information correctly, select department and doctor, schedule a visit, and check if successful appointment registration can be made. Test whether the concurrent appointment function of the system is normal when multiple users register simultaneously.

Visit Record Query: Query existing visit records and pending visit records in the system to verify whether the system's data management and query functions are normal.

Data addition, deletion, modification, and query function: We can use insert statements to add data to each table separately. The deletion statement can implement the deletion operation proposed by the user, deleting the corresponding data from the corresponding basic table in the database. Data modification: We use update statements to modify various

data. Data query: Various query operations proposed by users can be achieved by using SQL statements to query corresponding information from the database. The query operation can achieve various query methods such as single table query, join query, nested query, etc., and can query various query requirements proposed by users under various conditions.

After various tests, all the required functions of the system have been achieved, with good system performance and high safety factor, achieving the expected results.

5. Conclusion

The outpatient appointment and registration system provide convenient online appointment and registration services for patients. The paper introduces the design and implementation of the appointment registration system based on practical needs. A complete appointment and registration system has been designed and developed using SQL Server as the database management system. Patients can query information about hospitals, corresponding departments, doctors and experts online, select doctors who meet their needs, complete appointment and registration, generate orders, and meet their registration needs. The system improves the medical environment, simplifies the medical process, and saves patients' on-site queuing and registration time. At the same time, it can effectively reduce the pressure on hospital human resources, improve work efficiency and service quality. Practice has proven that the system has good practicality.

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