Design and Implementation of Cloud Rhythm Fitness Platform

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Abstract: In recent years, the epidemic has not created the demand for home fitness, but accelerated the refinement and change of fitness scenes. Compared with traditional physical fitness rooms, people in family scenes have a higher demand for online fitness. The increase of fitness demand and the diversification of fitness methods are both challenges and development opportunities for the fitness industry. This paper introduces the implementation process of Cloud Rhythm fitness platform. Through system analysis, system design and system implementation process, the system functions are divided in detail, and the data storage problem is solved through database design.

1. Introduction

In order to improve the national health quality, the state has introduced a number of policies in recent years to boost the development of sports health industry. In 2020, COVID-19 will spread all over the world. In order to reduce the impact of the epidemic on the sports industry, the country has issued the Notice on Vigorously Promoting Scientific Fitness at Home, encouraging residents to exercise at home, and boosting the counter attack of home fitness, Internet fitness and other industries [1]. In 2021, the State will issue the Implementation Plan for the Shortcomings Making Project of National Fitness Facilities during the Fourteenth Five Year Plan Period. Policies such as Opinions on Strengthening the Management of National Fitness Equipment Allocation in Public Places, Guiding Opinions on Promoting the Construction of Sports Parks, and National Fitness Plan (2021-2025) are committed to providing citizens with a better fitness environment and constantly promoting the development of the fitness industry [2].

In the post epidemic era, the traditional form of fitness can no longer meet the needs of the public. To develop the fitness industry, new ideas and ideas are needed [3]. Traditional offline gyms should learn to use online advantages to meet people's more diversified health needs through the integrated business form of "online+offline".

2. System Analysis

2.1. Business Process Analysis

The system mainly realizes user management, course information management, service information management, course ordering information management, modifying login password and other functional modules. The system business flow diagram is shown in Figure 1.
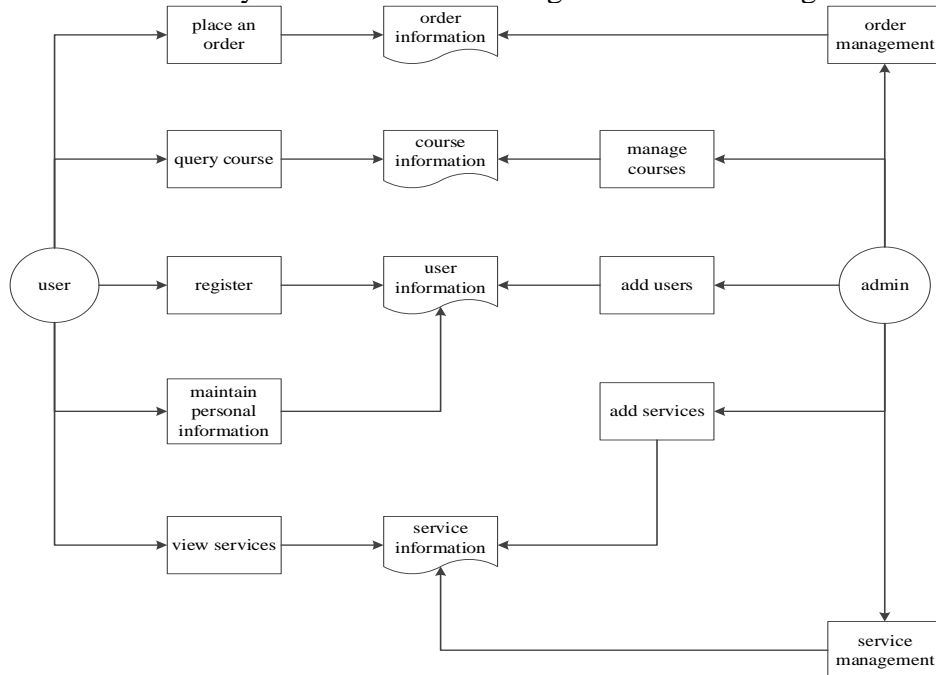

Figure 1: System business process diagram.

2.2. Data Flow Analysis

2.2.1. Top-level Diagram of Data Flow Diagram

Data flow diagram is a main tool that can comprehensively describe the logical model of information system [4]. It can comprehensively reflect the flow, processing and storage of information in the system with several symbols. Data flow diagram is abstract and general [5]. Abstraction is shown in that it completely discards the collective material, leaving only the flow, processing and storage of data; Generality is shown in that it can connect different business processing processes in information to form a whole. In order to use computers for information management, it is also necessary to further absorb material elements, collect relevant information and draw the data flow chart of the original system.

The system runs from running the program to processing the data. After processing, the data is stored in the database. At the same time, you can continue to process the data [6]. If no processing operation is performed after running the program, the end program can be executed. The data flow diagram depicts the logical model of the system. There are no specific physical elements in the diagram, but only the flow and processing of information in the system.

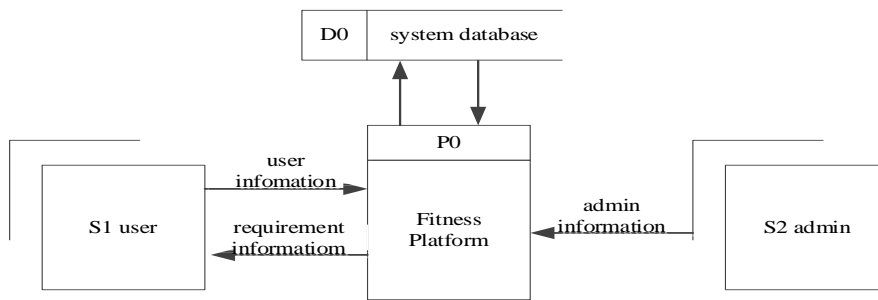The top level of the data flow diagram is shown in Figure 2.

Figure 2: Top-level diagram of the data flow.

2.2.2 Data Flow Diagram Layer Diagram

The first layer of data flow chart is a detailed division of the zero layer, which divides the entire fitness platform into user information processing, course information processing, service information processing, and order information processing. The first layer data flow diagram is shown in Figure 3-Figure 6.
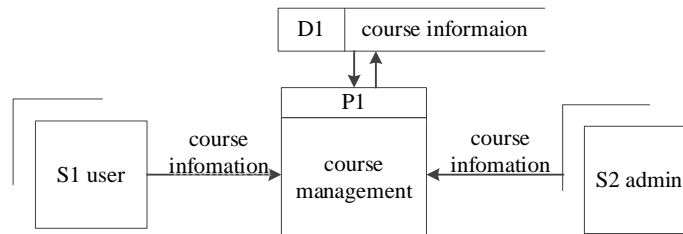

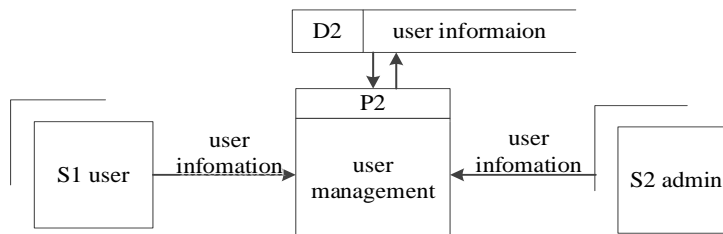Figure 3: Course data flow on the first floor.

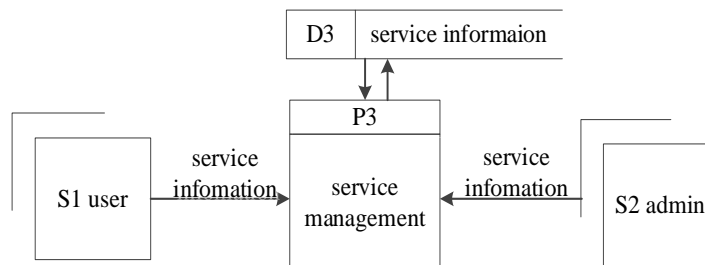

Figure 4: User data flow on the first floor.

Figure 5: Service data flow on the first floor.
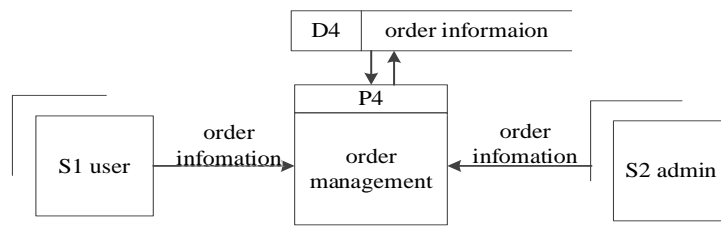
Figure 6: Oder data flow on the first floor.

3. System Design

3.1. Overall Structural Design

Based on the design principle of information system, the system architecture is divided into three layers: user interface layer, business layer, and data access layer.

Data access layer: mainly refers to the operation layer of the original data (in the form of a database or text file to store data), not the original data, that is, the operation of data, not the database, specifically providing data services for the business logic layer or the presentation layer.

Business logic layer: mainly refers to the operation of specific problems, which can also be understood as the operation of data layer, and the processing of data business logic. If the data layer is a building block, the logic layer is the construction of these building blocks.

Presentation layer: mainly represents the Web mode. If the logical layer is quite powerful and perfect, no matter how the presentation layer is defined and changed, the logical layer will provide services perfectly.

3.2. Database Design

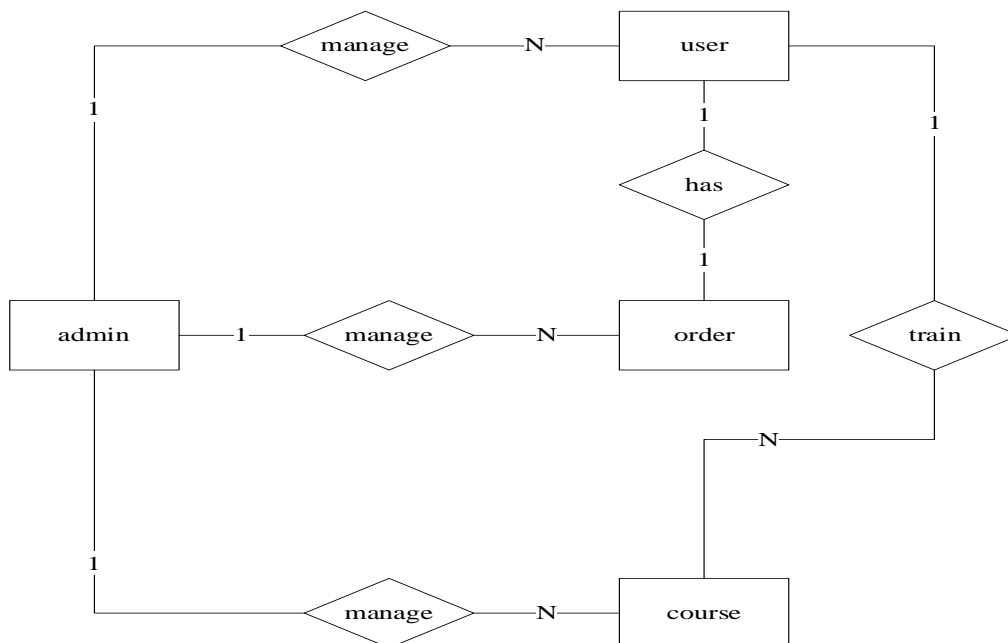### 3.2.1. Conceptual Design

Figure 7: Total system E-R diagram.

When designing a database system, you should fully understand the needs of users in all aspects, including existing and future needs. The database design has the following steps: (1) database demand analysis; (2) Conceptual structure design of database; (3) Logical structure design of database; (4) Database requirement analysis [7]. The following steps are described respectively:

Database conceptual structure design: with the above data items and data structures, we can easily design various entities that meet user needs and the relationships between entities, which lays the foundation for future logical structure design [8]. Entities also have their own specific information, and each entity is connected to form a data flow. By analyzing the requirements of this system, the entity attribute diagram can be obtained, as shown in Figure 7.

3.2.2. Logical Design

After the conceptual design of the database of the gymnasium system, the analysis is carried out according to the given entity structure diagram, and the logical design of the database of the system is as follows:

(1) Course course information table (course number, course name, club name, validity period, creation time, update time);

(2) Order order information table (order number, course number, user number, creation date, update date);

(3) Service information table (service number, service name, service picture, content, creation date, update date);

(4) User information table (user number, login name, login password, name, gender, e-mail, telephone, address, authority, creation date, update date).

3.2.3. Physical Design

Through the table design, you can clearly understand the relationship between tables, providing a good modification environment for further improving the structure definition in the future. The database table of the fitness system is shown in Table 1-Table 4.

Table 1: Course information

Column	Data Type	Length	Primary Key	Description
CourseId	int	4	▲	course number
CourseName	nvarchar	100		course name
ClubName	nvarchar	100		club name
ValidDate	nvarchar	100		validdate
CreateDate	DateTime	8		creation date
UpdateDate	DateTime	8		update date

Table 2: Order information

Column Name	Data Type	Length	Primary Key	Description
OrderId	int	4	▲	order number
CourseId	int	4		course
UserId	int	4		user number
CreateDate	DateTime	8		creation date
UpdateDate	DateTime	8		update date

Table 3: Service information

Column Name	Data Type	Length	Primary Key	Description
ServiceId	int	4	▲	service number
ServiceName	nvarchar	50		service name
ServiceImage	nvarchar	100		service picture
Content	nText	16		content
CreateDate	DateTime	8		creation date
UpdateDate	DateTime	8		update date

Table 4: User information

Column Name	Data Type	Length	Primary Key	Description
UserId	int	4	▲	user number
LoginName	nvarchar	50		login name
LoginPwd	nvarchar	50		login password
UserName	nvarchar	50		name
Sex	int	4		gender
Email	nvarchar	50		e-mail
Tel	nvarchar	50		telephone
Address	nvarchar	200		address
Right	int	4		authority
CreateDate	DateTime	8		creation date
UpdateDate	DateTime	8		update date

4. System Implementation and Testing

Software testing is generally divided into unit testing and integration testing. Unit testing refers to deriving unit test cases from the detailed unit design[9]. It can take two test forms: functional testing and structural testing. Integration testing generally finds errors in the outline design[10].

4.1. Unit Testing

According to the test method of the fitness management system mentioned above, the system has been tested in detail. The specific tests are as follows:

(1) Function test for login: the administrator fills in the user name and password. If the user name or password is wrong, whether the system will give the correct error prompt information. When the administrator fills in the user name and password, the user name or password will be left blank, and whether the system will give the corresponding prompt information. After the administrator fills in the correct user name and password, whether the user can enter the system interface for operation.

(2) Function test for adding operation: the administrator will empty the dialog box with asterisk in the form to be filled in and submit it. Whether the system will give an error prompt to ask the user to fill in. Fill in all the necessary information with asterisk and submit it. The information will be recorded in the data base.

(3) Function test the query operation: the administrator fills in the query criteria and submits them to check whether the information provided by the system meets the query criteria. Check whether the information provided does not meet the criteria and whether there is any information that meets the criteria, but the system does not provide it.

4.2. System Error Handling Test

For a good system, it is not only necessary to give correct output to the correct input information given by the user, but also to give a prompt for the wrong input given by the user and perform corresponding operations [11]. In this module, for the error input given by the user, the system will have a corresponding error handling mechanism to handle the error, give the cause of the error, and guide the user to correct the practical method of the error, so that the system operation will not be automatically launched after the error information is captured.

When testing the fitness management system, we focused on the error handling test of the system, and found no problems in the test, which confirmed the availability of the system.

5. Conclusion

This paper analyzes the cloud rhythm fitness platform in detail, analyzes the business flow chart, data flow chart and database design, and tests the implementation and functions of the platform. With this platform, people can watch the exhibition and fitness activities anytime and anywhere to create a good social environment for national fitness.

Acknowledgements

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