Family financial management system based on big data environment

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Abstract. In order to meet the needs of family finance, this study is based on the ECLIPSE R&D platform, the front-end R&D uses the technology of JSP, and the MySQL database technology is used to realize the management of the data and information involved in the system.The C/S form is the most basic mode of the family finance system, which mainly includes the management of the family's members, the management of the family's income and expenditures, the development of the family's financial plan, the management of the family's bank funds, and so on. bank funds, etc.

Keywords: JSP; MySQL; Family Finance; Big Data

1   Introduction

With the advent of the big data era and the increasingly widespread use of the Internet in modern society, new financial management tools and views on financial management are constantly being created, rapidly changing the traditional financial management concepts of families and individuals. Financial management is not complicated to say, on the one hand, it can improve the efficiency of capital utilization, on the other hand, it can reduce the transaction cost of consumption and avoid unnecessary consumption. It is of great practical significance to people's family life to design a reasonable family financial system and realize the growth of family assets. Many scholars at home and abroad research on this, Huang Wei [1] analyzed the modern Web front-end development technology system, for the modern Web front-end development problems, put forward relevant optimization proposals. Yanyan Zhang [2] based on B/S architecture, using MyEclipse as the development platform, and the application of J2ee technology in the SSH three-tier framework structure and javaweb technology, in order to facilitate the compact MySQL as the backend database. Zhu Hailin [3] based on the JavaEE platform, development mode using JSP Modle1: JSP + JavaBean, the user can enter the IP address of the server through the browser, it can be convenient for remote monitoring. Yu Jia[4] designed a family financial management information system based on VB, the system is simple and practical, versatile, with good portability. The family financial system mainly

includes: family member module, family member role login, daily expenditure module, daily income module, income and expenditure statistics module, income and expenditure query module, background management module, consumption record module and so on.[5]

2 Method

The traditional manual statistics of financial management are inefficient and difficult to analyze, which can no longer meet the financial needs of people today. This system is a family financial management system. It consists of front-end use subsystem and back-end management subsystem. The development environment of this system adopts JSP+MySQL library for development. The running operating system is the various versions of windows operating system, and Tomcat server needs to be configured. Through the demand survey report, statistics of various data to analyze the needs of the system, to understand all aspects of life consumption, ready to divide the system into six areas: personnel management, basic management, daily management, statistical analysis and management.

2.1 Business process maps

Business process diagram is a kind of chart that describes the business relationship between units and personnel in the system, the sequence of operations and the flow of management information, using it can help analysts to find out the unreasonable flow of business processes, which is the physical model. Used to describe the system
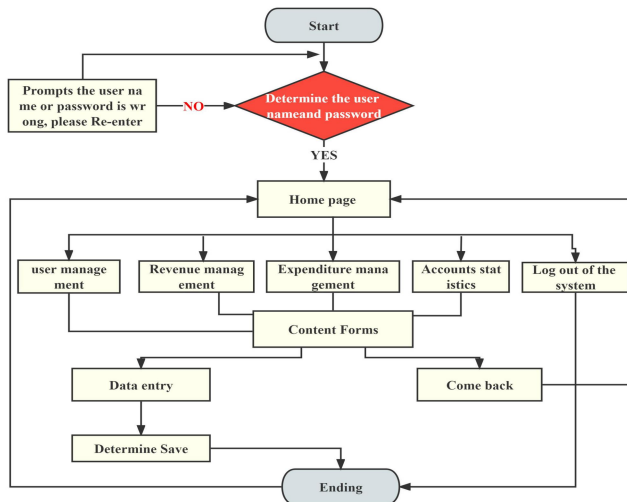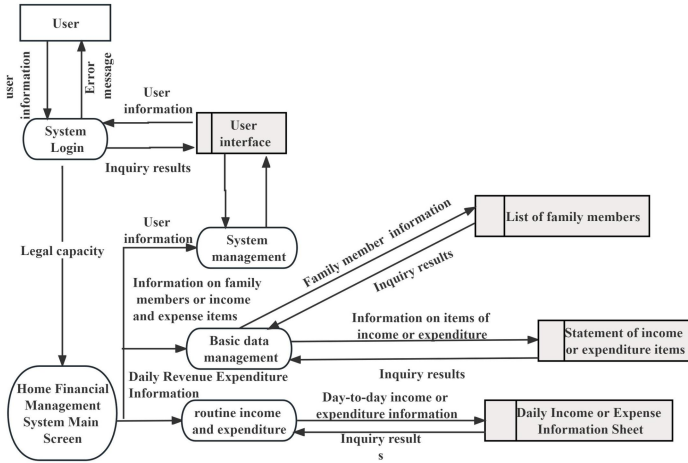

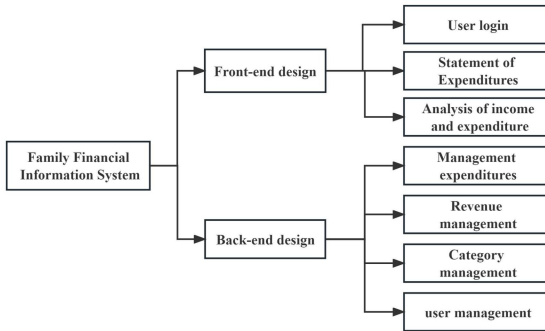**Fig. 1.** System flow chart

Fig. 2. Data flow chart
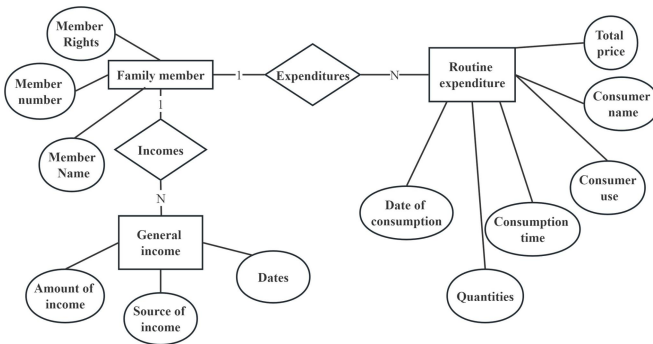

Fig. 3. System structure diagram

Fig. 4. E-R diagram

organizational structure, business processes. With some prescribed symbols and lines to indicate a specific business to find out the unreasonable flow of business processes, which is the physical model. Used to describe the system organizational structure, business processes. With some prescribed symbols and lines to indicate a specific business process. The drawing of the business process diagram is carried out in accordance with the actual processing steps and processes of the business. The system flow chart is shown in Fig. 1.The data flow chart is shown in Fig. 2.

2.2   System framework

The system design should delineate the physical elements that make up the system programs, files, databases, manual processes, and documents, but each physical element is still at the black-box level, and the specifics of what is in these black boxes will be designed in detail later. Another important task in the overall design phase is to design the structure of the software, that is, to determine what modules make up each program in the system and how these modules relate to each other.The general framework of the system is shown in Fig. 3.

The system is divided into two main parts: the front-end management includes user login module, expenditure report module, income analysis module; the back-end management

Table 1. User information table

Field Name	Type	Length	Null Allowed	Statement
Username	VARCHAR	15	No	Primary keys
ID	INT	*	No	Primary keys
Password	VARCHAR	20	No	
Phone Number	INT	20	No	
E-mail	VARCHAR	50	Yes	
Birthday	CHAR	10	No	
Gender	SIX	2	No	
Appellation	VARCHAR	20	No	

Table 2. Table of income categories

Field Name	Type	Length	NullAllowed	Statement
Username	VARCHAR	15	No	Primary keys
ID	INT	*	No	Primary keys
Income Category	VARCHAR	10	No	Subject ID
Description Of Income Category	VARCHAR	60	No	Subject ID

includes   management   expenditure   module,income   management   module, classification management module, user management module and other functional modules.[6]Users register and log in to the system, and the system verifies the users' rights. This system realizes the registration and login of users, income and

expenditure statistics, and the addition of member sections.In structured system design, modules are generally divided by function, usually called functional modules. Reasonable division of functional modules can greatly reduce duplication of efforts, improve the efficiency of development work and increase the maintainability of the system. The system is divided into two user rights i.e. backend administrator and user.

2.3   Database design

2.3.1 Conceptual structural design

2.3.1.1 E-R diagram
     In order to visualize the relationships between the entities and their attributes in the data model and to reduce errors and design flaws, the approach to conceptual data modeling used in this paper is the Entity-Relationship Approach (ERA). This approach describes real-world entities using E-R diagrams, also known as E-R models.[7]The family financial system E-R diagram is shown in Fig. 4.

2.3.1.2 E-R diagrams converted to relational models
     Converting an E-R diagram into a relational model means converting entities, their attributes, and the links between them into a relational paradigm. A design paradigm is a collection of relational schemas that conform to a certain level. In the process of creating a database, paradigm is the process of transforming it into a number of tables, this approach makes the results obtained from the database more explicit and is a process of refinement after the initial work of identifying the data elements, relationships in the

Table 3. Expenditure information sheet

Field Name	Type	Length	Null Allowed	Statement
Username	VARCHAR	15	No	Primary keys
ID	INT	*	No	Primary keys
Date Of Disbursement	CHAR	10	No	
Amount Paid	INT	*	No	
Statement Of Expenditure	VARCHAR	60	No	

Table 4. Statistical information table

Field Name	Type	Length	Null Allowed	Statement
Username	VARCHAR	15	No	Primary keys
ID	INT	*	No	Primary keys
Class Name	CHAR	10	Yes	
Aggregate Amount	INT	*	Yes	
Proportional Nambers	INT	*	Yes	
Billing Type	VARCHAR	60	No	

Table 5. Login system module test cases

Function Module	login.jsp				
Functional Characteristics	User Authentication				
Test Purpose	Verify that legitimate information is entered, allow legitimate logins, and prevent illegal logins.				
Test Data		Username=a	Password=a		
Operating Steps	Operation Description	Data	Expected Outcome	Net Effect	Test Mode
1	Enter the user name,password and press the "Login System"button.	Username=a password=555	"Incorrect user name or password"	"Incorrect user name or password" is displayed.	Normal
2	Enter the user name,password and press the "Login System" button	Username=a Password=a	Enter the system	Enter the system	Normal

database, and defining the required tables and the items ineach table.User information (user name, user number, password, phone number, e-mail, birthday, gender); Income Category Information (Income Category, Income Category Description); Income information (income person, income number, income category, date, amount, notes); Expense category information (expense category, expense category description); Expenditure information (Expenditure person, Expenditure number, Expenditure category, Date, Amount, Remarks); Statistical information table (user name, user number, category name, total amount).

2.3.2 Logical architecture design

In order for the system to be carried out and managed better, it is necessary to record data information such as income and expenditure as well as family members [8][9]. So a database is required to store the information. The table used to store the user's data information where the ID used for registration of the user is set as the primary key. It also records the user name, password for the user system, and personal information such as name, gender, and age. The requirements for the database are mainly in the form of submitting information, updating information, deleting information, saving information, etc. The existence of this information depends on the function of each function. The existence of all these information depends on the demand for information of each functional module. The input and output of information in the database is realized through the specific operation of the functional

modules. User information table, which is used to store the basic information of the user. The table records the user's details, including user name, user number, password, phone number, e-mail, birthday, gender. The specific logical structure of the table is shown in Table 1.

Income category table to hold the number of the user's income and the description of the income. The specific logical structure of the table is shown in Table 2.

Expenditure information table for basic information about the user's expenditures. The table records the person who served the expenditure, the expenditure number, the type of expenditure, the date, the amount, and the remarks. The specific logical structure of the table is shown in Table 3.

Statistical information table for basic information about statistics. The table records the user name, category name, total amount, percentage number, and billing type. Among the billing types are expense types and income types. Expense types include clothing, transportation, food, etc., and income types include salaries, bonuses, business income, etc.The specific logical structure of the table is shown in Table 4.

2.4   Result analysis

The black and white box test is conducted for each module of this system. This test is mainly illustrated with the login module as an example. The test method used is black-box testing. [10]The test results are shown in Table 5.

3   Conclusion

This system is based on ECLIPSE R&D platform, using JSP technology and MySQL database technology to realize the management of data and information involved in the system. It is analyzed through experimental tests. The results show that this system has good security, with normal family member module, family member role login, daily expenditure module, daily income module, income and expenditure statistics module, income and expenditure query module, backstage management module, consumption record module and so on, which can well meet the basic family financial needs.

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