

Design and Implementation of Data Management System for Screw Drilling Products Based on C#

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Abstract

With the development of the petroleum industry and the coming of the information age, the data management and maintenance of the enterprise has a great significance to the enterprise. It is very necessary to build a set of system to satisfy the data management of the screw drill, but it is also very difficult. This paper is aimed at the above-mentioned needs of the current enterprise, researching and designing the corresponding screw drilling tool data management system, firstly analyzing the relevant requirements, describing the system function modules used and the relationship between the functional modules. The data management system of the screw drilling tool set up the function of query, add, modify, delete, check and audit according to the need of the management of the screw drilling tool. Implementation of the screw drill machine assembly, leasing business data management, for screw drill related business of the whole tracking, for data query, statistics, so that timely to make improvement and decision making, and the system administrator has complete user management functions and authority module.

Keywords

Screw drilling tool, Data management, C# language.

1. Introduction

Screw drilling tools are drilling tools that provide downhole power for drilling operations such as directional wells and horizontal wells. It can be used with roller cones, diamond drills and other special drills for vertical, directional and horizontal well drilling operations. With the rapid development of modern technology, computer technology has also made a qualitative leap[1]. The use of computers to manage things in daily life has become very popular. It seems that the use of computer technology to achieve sales management of goods is no longer a problem. This is undoubtedly a great boon for medium-sized and small-sized enterprises. The use of computer management technology to support enterprises to efficiently complete the daily affairs of labor commodity management is one of the institutional requirements for enterprises to adapt to modernization. Necessary conditions for standardization and standardization[2].

At present, enterprises and individuals in the world are actively engaged in the construction of information technology, and pursue a management mode of high efficiency and low consumption. The development of this system provides functions such as employee management, product management, and cashier management, which helps managers to provide more convenient methods for commodity sales management issues, thereby reducing unnecessary management[3].

The development goal of the screw drilling tool data management system is to realize dataization, electronicization and networking for the screw drilling tool data. The system will achieve the

following main objectives and tasks: (1) realize the data management of the whole machine assembly and leasing business of the screw drilling tool; (2) realize the whole process tracking of the related business of the screw drilling tool; (3) realize the relevant Data is queried and counted to make timely improvements and decisions on issues.

2. System Requirements Analysis

Software requirements analysis is the beginning of a project and the most important key point of project implementation. It is something that is obtained by studying the user's needs. After fully understanding and confirming the user's complete function of the software requirements, it analyzes various possible solutions and establishes a basic basis for identifiable and verifiable[4-5]. System requirements analysis is the basis for system software design and development. First, system specification and project planning are the basic starting points of system requirements analysis and analysis activities, and they are checked and adjusted from the software perspective; on the other hand, the requirements specification is the main basis for software design, implementation, testing and maintenance. . Good analytical activities help avoid or eliminate early errors as early as possible, increasing software productivity, reducing development costs, and improving software quality. It is the final step in the software definition phase. It is to determine what the system must do, that is, to provide complete, accurate, clear, and specific requirements for the target system[6-7].

2.1. System function overview

The system realizes the basic functions of screw drilling tool management, including user management module, rental business module, and complete machine assembly module. Through the above functions, a simple and convenient screw drilling tool data management system is realized, as shown in Fig. 1.

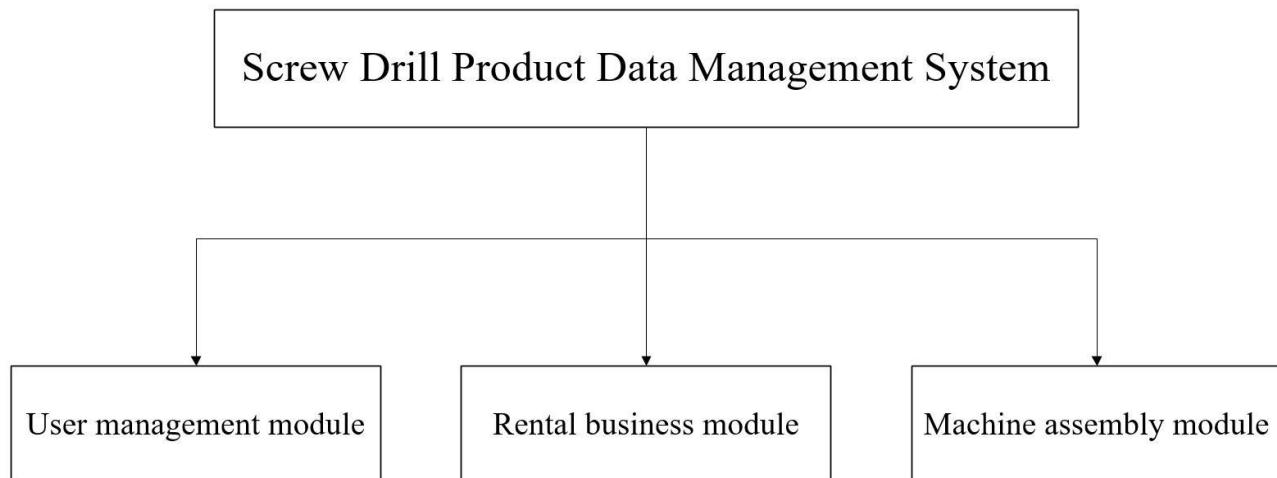


Fig. 1 Three modules of screw drilling tool product data management system

2.1.1 System function requirements

Basic data settings:

- 1) Machine assembly module: whole machine model, serial number (number), order number, material code, date of manufacture, use, drawing number, name of each component, quantity, tracking number, material of important parts, process, manufacturer , number of stators, number of stages, size, pressure value, stator rubber, rotor coating, bending shell degree, centralizer size, shape, technical characteristics, etc.
- 2) Rental business module: area ID, area name, parent area ID, rental library ID, part ID, whole machine model, serial number, user unit, down time, recovery time, usage time, use area and block, well Team, well number, state of use (downhole, circulation, pure drilling), mud displacement, density, type, well depth (starting, drilling), well temperature (stationary, cyclic), weight-on-bit, formation, slope, etc.

3) User management module: user ID, user name, password, department ID, department name, authority ID, permission type (administrator, supervisor, team, department), authority level.

2.1.2 Use case analysis

The use case analysis is mainly illustrated by the example diagram. The example diagram can clearly implement the main event generation process of the graphic system. The illustration is mainly used to explain the customer's business needs, that is, the function that the customer hopes the logistics system can design and implement. The action is the functional module that the client wants the system software to implement, so the example diagram is the first step in the system design analysis phase. This article uses use case techniques to analyze and obtain customer business needs analysis. In order to properly design the system use cases and determine the use case boundaries of the system, find out the system's executors. Fig. 2 shows the use case.

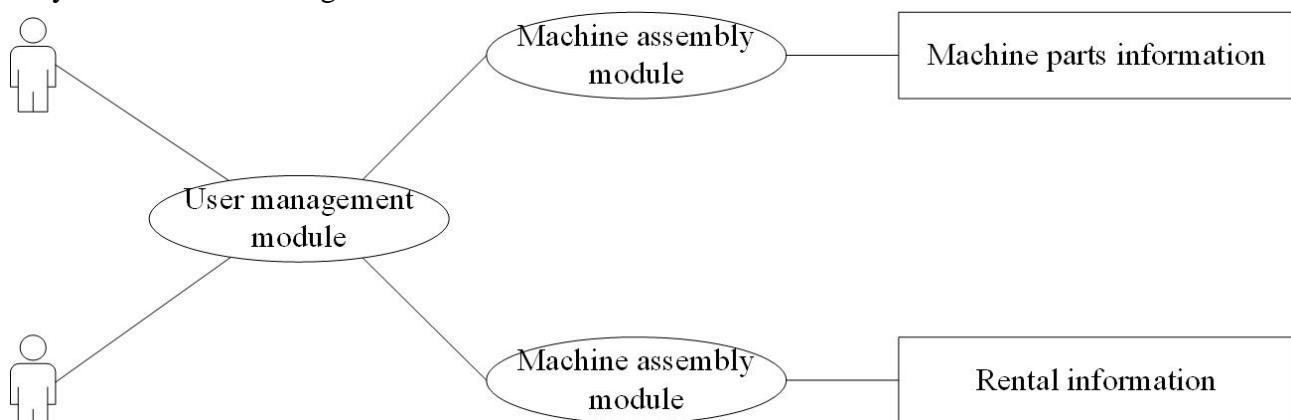


Fig. 2 Use case diagram

2.2 Feasibility Analysis

The feasibility analysis mainly analyzes the economic benefits and social fire benefits obtained after the completion of the project through research, analysis and comparison in various aspects such as technology, economy and operation, and gives advice on how to construct. It is a decision-making method of neutralized system analysis. The project feasibility analysis is required for all project projects. The purpose is to determine whether the problem can be achieved at the minimum cost in the shortest possible time and decide whether it is worth building.

The construction plan of this data management system is mainly analyzed from three aspects: technical feasibility, economic feasibility and operational feasibility.

2.2.1 Technical feasibility

At present, the development of domestic technology is very mature. We have made in-depth analysis of the tools developed, the development environment and the hardware environment of the system. According to the existing conditions and analysis results, the conditions are very good, and In order to be able to complete the development work better, and give ample development period, it is expected that the development of the demand function can be successfully completed within the planned time.

In terms of software implementation, the program development uses Microsoft's development platform Microsoft Visual Studio 2010, the development programming language uses C#, and the background data used by this system is SQL Server 2008. The hardware is also a computer with a relatively high configuration, and the hardware specifications such as CPU and memory can meet the requirements of users.

2.2.2 Economic feasibility

This data management system has a very high development value. Its initial investment is not large, mainly including development, management and maintenance costs in the system design process, as well as the purchase and installation costs of new equipment. The system does not require further investment for a long time after delivery, and management and maintenance costs are small. And the

investment in the new system will greatly reduce the labor related costs, and has a very positive effect on improving work efficiency, reducing resource consumption and waste.

Through analysis and calculation, it can be concluded that the later operational value is much larger than the previous investment, so the system will have a very promising development prospect.

2.2.3 Operational feasibility

The system interface is clear and intuitive and easy to operate. It can accurately record, retrieve and manage the data information and user information about the screw drilling tools, help the department to master and analyze the data, and then assist the operators to make correct decisions in a timely manner. At the same time, the system also facilitates the leaders to drill information and departments. The management of personnel has greatly improved the management level and efficiency of the department.

The graphical user interface used by the system makes it easy for users to understand and master the use of the system. Moreover, the friendly interface design and beautiful interface are one of the important considerations for the design of the system, which makes the user feel comfortable using the system and makes the system also have good interactivity and operability.

In terms of the interface implementation of the function, the system adopts a combination of menu operation and command button operation, which makes the operation very simple and convenient.

3. System overview design

At this stage, the general design of the system is completed and the data structure and software structure of the system are clarified. In the software design phase, it is mainly the process of transforming a software requirement into a software representation.

The guiding idea of the outline design phase is to realize the modular mechanism of the system. First, a set of standard rules and tabular tools are used to analyze and identify which functional modules need to be designed, and the connection relationship between the functional modules, and then design related operations to form a Complete the system architecture and architecture.

This system uses the C/S model. The system front-end is designed in C# language, accessing the back-end database server through TCP/IP; the back-end database is Microsoft's SQL Server 2008. Use SQL Server 2008 to develop a back-end database for providing data services. SQL Server 2008 is a typical relational database management system. The system has the advantages of good data consistency, strong integrity and high security. The system adopts a structured design method and determines the requirements according to the actual work content. The whole data management system is divided and treated as a large module. From the top down, the modular structure design technology is used to decompose the module, and then the whole module is packaged and assembled according to the structure of the system from bottom to bottom, and finally the data management system is realized. Development. The system has three integral modules that contain the following sub-modules. The specific module functions are divided as follows:

The whole machine assembly module: mainly includes the screw drilling tool information input and query two parts.

Rental business module: mainly includes renting the whole machine, renting assembly and accessories, on-site use, maintenance, and cost settlement.

User Management Module: mainly includes system administrators, supervisors, teams, or department personnel.

The detailed function module diagram of this system is shown in Fig. 3:

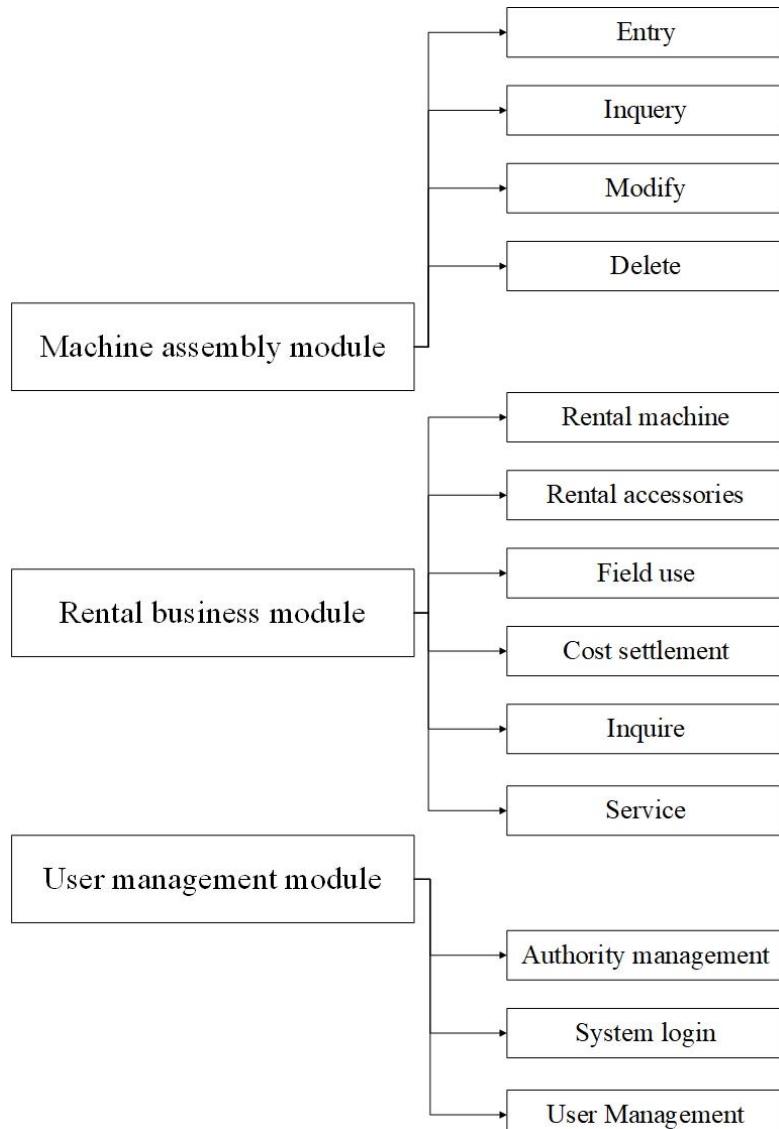


Fig. 3 System detailed function module

4. Detailed design and implementation of the system

In order to achieve the requirements of how to achieve the system well, the detailed design of the system is very necessary, so we need to go through the design work, after detailed design, to determine the precise system requirements, the design results can be achieved in the system programming. It is time to write programs directly in the development language based on this description.

The purpose of the detailed design is not to write the program specifically, but to design the "blueprint" of the program. When the system is actually developed, the required program code can be written according to the blueprint. Detailed design requires not only the logical implementation of the functionality of each module, but the most important is to make the designed programming process as concise as possible.

The three modules included in the system are as follows: the whole machine assembly module, the rental business module, and the user management module.

The function of the login module is to verify the identity of the logged in user. During the system login process, after the user enters the user name and password, the system will query the user information in the system user table of the database to determine whether the user information exists. If the user information is found and the user information is valid, it will compare whether the password entered by the user is correct, and whether the password information recorded in the

database is consistent. If it is correct, the system prompts a valid user and pops up the main interface window of the system. The login is successful; otherwise, the illegal user information is prompted, so that the user can log in correctly; if the user name is not found, the user fails to log in and an error message is displayed. Only legitimate system users who have successfully registered can enter the system.

The system uses the rights management mechanism and is divided into three levels of authority: (1) system administrator (2) supervisor leadership (3) team or department personnel. Each level of user has different permissions:

The system administrator has the highest authority of the system, which can add, delete, change, and check all functions of the system, and authorize the operation of other users.

The supervisor can edit all the information (enter, import, modify, delete), save, submit, and review the system;

The team or department personnel, according to the department (assembly group, repair team, technical department, operation department, sales department and each leasing station), can only edit (enter, import, modify, delete) the relevant information of the department or the leasing station., save, submit operations;

All users must log in to the system with a username and password. The system login module process is shown in Fig. 4:

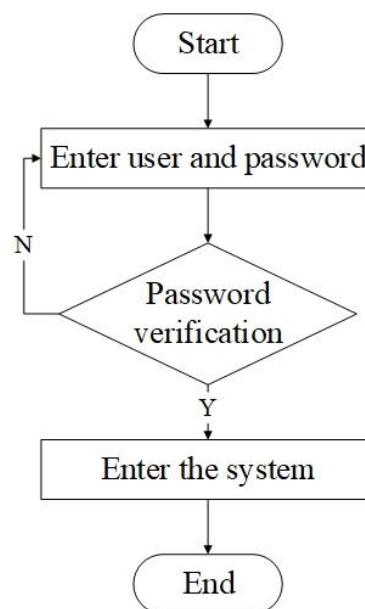


Fig. 4 User login process

In order to improve the security of software operation, users must authenticate before entering the system and verify their identity by entering personal information. You can also enter it through the virtual keyboard during the input process. If the user name and password are correct, click the login button to enter the system. If you make a mistake, you will be prompted for a password error and continue typing.

Part of the module development source code:

```
private void butLogin_Click(object sender, EventArgs e)
```

```
{
  if(txtName.Text!=""&txtPass.Text!="")
  {
    SqlDataReader temDR=MyClass.getcom("select * from tb_Login where
Name='"+txtName.Text.Trim()+"and Pass='"+txtPass.Text.Trim()+"'");
    bool ifcom=temDR.Read();
```

```

if(ifcom)
{
    DataClass.Mymeans.Login_Name=txtName.Text.Trim();
    DataClass.Mymeans.Login_ID=temDR.GetString(0);
    DataClass.Mymeans.My_con.Close();
    DataClass.Mymeans.My_con.Dispose();
    DataClass.Mymeans.Login_n=(int)(this.Tag);
    MessageBox.Show("Login successful!", " Prompt", MessageBoxButtons.OK,
MessageBoxIcon.Information);
    this.Close();
}
else
{
    MessageBox.Show("Wrong user name or password!", " Prompt ",
MessageBoxButtons.OK, MessageBoxIcon.Information);
    txtName.Text = "";
    txtPass.Text = "";
}
else
{
    MessageBox.Show("Please complete the login information!", " Prompt ",
MessageBoxButtons.OK, MessageBoxIcon.Information);
}
}

```

5. System test step analysis

Unit testing is also called module testing. Unit testing is usually placed in the encoding process. After each programmer writes a module, it usually tests and checks the module code that he has written. It is checked with the module function specified in the detailed design specification. Whether it matches the defined algorithm. It is found that the error caused by the coding and the error generated in the detailed design are the main purpose of unit testing. The unit test generally adopts the test method of white box test. The test scheme of the system user login module unit is as follows:

1. User login module input test plan: enter user name, password, click login
2. User login module output result prediction: the correct input, the user will successfully log in to the main interface
3. User login module test result prediction:
 - a. Test record username: 111 password: 111
 - b. Analysis of the results, successfully log in to the main interface of the system, indicating that the module is normal

The so-called integration test is also called assembly test or joint test. The integration test of this system is based on unit test, and all system modules are assembled and combined according to the design requirements for integration testing. Its purpose is to detect whether the requirements meet the business processing standards, and whether the processing logic of the business is rigorous and accurate.

Integration test objectives: Detect whether the requirements meet the business processing standards and whether the data transmission is correct.

Integration test scope: Use the program structure constructed by the unit test components as required.

The method used by the integration test: the valid data and the invalid data input system are tested according to the test case to see if the expected standard is met.

Standards for integration testing: Successfully implemented many integration tests as specified in the test plan, corrected the errors found and passed the review of the panel.

The confirmation test is also called the validity test. The purpose of the test is to determine if the software being tested meets the requirements listed in the requirements specification. Verify that the functionality and performance of the software meets the user's requirements.

1. Confirmation of test standards: The screw drilling tool management system confirms that a series of tests and processes are to be carried out in accordance with the development of the test plan, mainly to indicate whether the software is consistent with the requirements. Focus on whether the software meets all the functions and capabilities specified in the contract, and whether the documentation is complete and accurate.

2. Configuration review: The purpose is to ensure that the screw drilling tool management system software is fully configured, classified and ordered, and includes the details required for software maintenance.

6. Conclusion

The system data uses the SQL Server 2008 database system as the underlying structure, which has strong stability, portability, scalability and security. All library table structures in the database are designed as required, with less data redundancy. The operation of the underlying database is thus more reasonable and faster, and the operating efficiency of the system is improved.

In order to make it easy for users to understand and master the use of the system, the system uses a graphical user interface. Moreover, the system interface is friendly in design and the interface is beautiful. It is one of the important considerations for the design of the system. Users will feel comfortable in operation and use, and the system also has good operability and interactivity.

In order to make the operation very simple and convenient, in terms of the interface implementation of the function, the system adopts a combination of menu operation and command button operation.

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