

The design and implementation of UML-based students' information management system

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Abstract. Based on the background of the development of colleges and universities students' information management system, this paper discussed the application problems of UML in this system modeling. The unified modeling language (UML) is adopted to carry on the modelling for the framework relation of students' information management system, it discussed the main mechanisms, ideas and methods of visual modeling of UML in this system, the whole process of system requirement analysis and system design is given from different aspects, which achieved the specification and expansion of the system data and enhanced the interaction of the system. The visual model promotes the communication between developers and users, and ensures the smooth progress of system development.

Introduction

The management of colleges and universities students is an important part of all the works for colleges and universities, the level of its management will directly affect the quality of personnel training. In the process of realizing the informationization of higher education, the development of colleges and universities students' information management system is also an important part of informationization. According to task requirements of project for colleges and universities students' management, this paper mainly expounded the requirement analysis and design of management information system in the process of system development.

Analysis of System Requirements

System requirements analysis, namely the software requirements analysis, is the first step and the most important link of system development. Its basic task is to accurately answer the problem "what does the system do?", This requires a full investigation about the needs of users, and then thoroughly understand and describe the requirements in the aspects of the function, performance and interface of the software, etc. UML modeling can be used as an effective method for requirement analysis and system design. As shown in Figure 1.

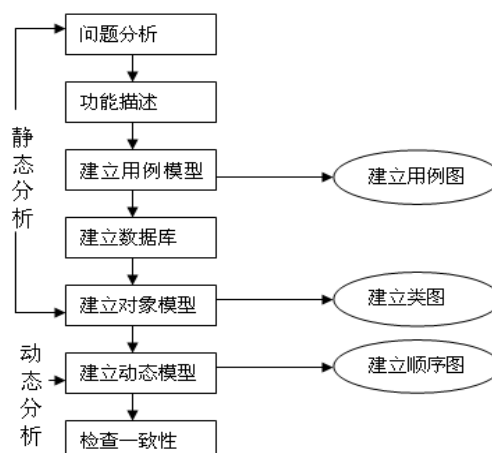


Figure 1. Modeling process of UML requirement analysis

The purpose of the analysis is to obtain and describe all the requirements of the system, therefore, the analysis phase is a typical process of cooperating with users or customers, which usually completed by the developers with the users or customers together. At this stage, developers should not consider the implementation details of code or program, they should focus on understanding the logic of the existing business, and through full communication with users, gradually understand and describe the system model with users' confirmation, which includes the use case model and domain model (domain, key classes in the system). The main job of the use case model is to describe the business process in the real world, and rarely involves the concept of the system.

Colleges and universities students' information system provides management functions, such as sorting, statistics, etc., which depending on the functions of different modules, system administrators can add, modify and delete the students' information. Different colleges and universities can set up and increase the corresponding modules according to their financial capacities and the requirements and degree of informatization management. The colleges and universities students' information system developed in this paper mainly includes 6 subsystems, such as system landing, class management, payment management, course management, performance management and students' file management. The use-case model in the top-level of the system is shown in Figure 2.

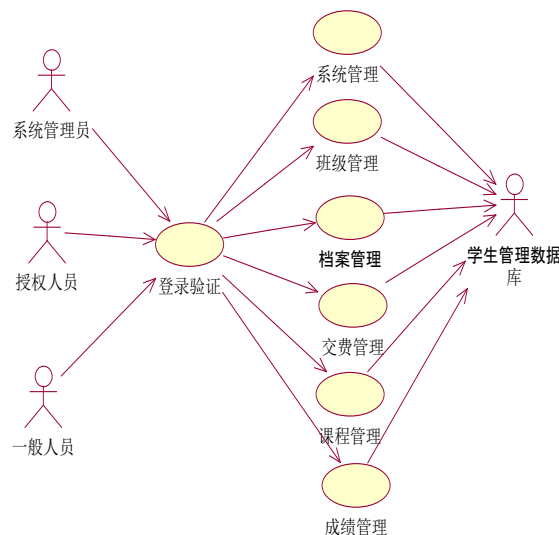


Figure 2. Use case diagram in the top-level of the system

Teachers, leaders at all levels and administrators can visit the students' all kinds of situations through their own names and department numbers, and print the required information according to the corresponding set-up permissions. All the students in school can inquire their personal information, curriculum plan and performance by their own student numbers and names, and complete some operations in this system, such as course selection, etc.

System Design

The purpose of system design is to produce a usable and complete solution, and convert the solution into procedure code more easily. This stage is based on the model designed with a three-layer architecture, which will consider all the problems of the implementation techniques. The models, at the analysis stage, should be extended and refined, the classes defined at the analysis stage should be further extended, as well as new classes should be defined to deal with technical problems, and then the final UML model come into being.

The design can be divided into two stages, one is Architecture Design, which is used to define packet (subsystem) and describe the dependency among packets as well as communication mechanisms. Naturally, its aim is to design a clear and simple architecture with few dependencies

and avoid two-way dependence as far as possible. The other one is Detailed Design. At this stage, all the classes are described in detail to provide the code-writing programmer a clear specification. Dynamic models in UML are used to illustrate how the objects of class performed in a specific situation.

Students' information management system is a typical database application program, which is composed by professional management, students' file management, students' payment management, course management, performance management, payment management and some other modules. The structure diagram is shown in Figure 3.

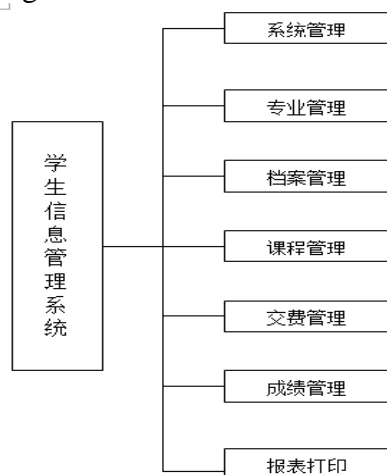


Figure 3. Architecture diagram of students' information management system

(1) System management module

The main task of this module is to maintain the normal operation and the security setting of the system, including adding users, modifying passwords and re-login, etc.

(2) Professional management module

The function of this module is to realize the class management of the whole school, which includes class visit, class adding and class inquiry, etc., the three functional modules are independent and complete the class management of the whole school.

(3) Students' file management module

The main function of this module is to realize the management of students' personal information, including file adding, file browsing, file query and some other functions, so as to making the school management departments have a quick query and understanding for the basic situations of the school.

(4) Curriculum management module

Curriculums of each class are setting in this module, and the selection situation of textbook for each course are also set up, which provides convenience for the work of the school textbook management departments and the teaching management staffs at dean's office. This module includes two modules: basic course design and class curriculum setting.

(5) Performance management module

The work of performance management at school is one of the main methods to test the students' learning situation, this module includes setting of test types, the two test types are test subjects and examining subjects, and the performance adding, performance visiting, performance inquiring and some other functional modules are also set up.

(6) Payment management module

The input, modification and deletion of different charge standards are provided to all majors and classes in this module, as well as the functional modules, such as the arrears list query, arrears amount query and arrears percentage of a same major and class, etc.

(7) Report forms printing module

The module mainly provides the printing function for the corresponding report forms of each module.

In order to reduce the complexity of the application system, we define the smaller parts as classes and encapsulate it into packets. Similarly, in order to reduce the complexity of the solution domain, we also decompose the system into subsystems, and forming a number of smaller components, the subsystems are composed by many classes of solution domains. The characteristics of the subsystem is determined by the services provided to other subsystems. A service is a set of operations with common goals. A set of operations, provided by a certain subsystem to other subsystems, forms a subsystem interface. The subsystem interface is also called API (Application Programming Interface), which includes the names, parameters, types and returned values of the operations. System design focuses on defining the services provided by each subsystem, namely, listing the operations, parameters, and their high-level behaviors. Object design focus on defining the interface of the subsystem, namely, the types of parameters and the return value of each operation. Which also includes the function interface of the operation system invoked by application software.

The database design mainly adopts the Access database launched by Microsoft, this is a desktop database integrated into Office by Microsoft, which can be synthetically used with other Office suites, and it is quick and convenient. Due to Access possesses remarkable simplicity and validity, a lot of desktop database systems use Access as their background databases. Also, the advantage of using Access it that you can use Server SQL, Microsoft's database server software, if your system is extended to the mode of Browser/Server. At this moment, the program only needs a simple modification about the link (data source of ADO), which provides a very powerful condition for the smooth expansion of the program.

System implementation

The system structure is based on B / S architecture, the students' management information system is deployed on the dedicated computers of teachers and administrators and the database is deployed on a dedicated server. Print server does not need to develop a special application software. For the software environment, Windows XP operating system is adopted, and for servers, the Server operating system of Windows Server 2003 is used.

The landing interface of the system mainly includes the user name and password, all the functions of the system are integrated on the interface. There are 6 functional menus and 19 submenus (functional modules) in all, so as to achieve specific functions of the system, such as class management, file management, payment management, course management and performance management etc., at the same time, the security management of this system can be accomplished in the system management module. User management module is the security setting module of this system, depending on the requirements and needs for the system by different departments and users of the school, the hierarchical management is implemented, and the sort management for users' rights and categories is carried out.

The interface is shown in Figure 4.

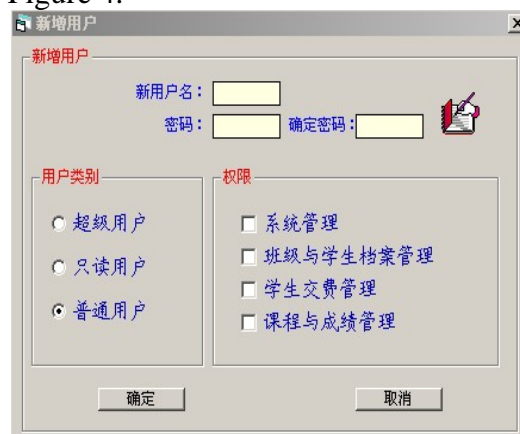


Figure 4. Interface of User Management Module

Query interface for students' score is shown in Figure 5.

Ordinary users chose the query objects according to their needs, and click button "OK" to complete the query successfully.

专业	班级	学号	姓名	计算机组成	计算机应用与提高	管理信息系统	信息法律法规	办公软件	备注
机电	0331	09	张三	67	50	79	85	77	

Figure 5. Students' score query window for ordinary users

Code of Students' score query interface for ordinary users

```
Private Sub Command1_Click()
    Dim kl As String
    Dim db As New ADODB.Connection
    Dim rs As New ADODB.Recordset
    Dim sql As String
    Dim rs1 As New ADODB.Recordset
    Dim sql1 As String
    kl = Combo1.Text
    db.ConnectionString = "Provider=Microsoft.Jet.OLEDB.4.0;Data Source=E:\zlf\db1.mdb;Persist Security Info=False"
    db.Open
    sql = "select * from table 1 of students' score "
    rs.Open sql, db, adOpenStatic, adLockReadOnly
    sql1 = "select * from table 1 of students' score where name='" & kl & "'"
    rs1.Open sql1, db, adOpenStatic, adLockReadOnly
    If rs.RecordCount = 0 Then
        MsgBox " no records in the table " ' If it is empty, the pop-up dialog box appears
    Else
        rs.MoveFirst ' If it's not empty, then locating at the selected records
        Text1.Text = rs1.Fields(0).Value
        Text2.Text = rs1.Fields(1).Value ' Display the contents of the corresponding field
        Text3.Text = rs1.Fields(2).Value
        Text4.Text = rs1.Fields(3).Value
        Text5.Text = rs1.Fields(4).Value
        Text6.Text = rs1.Fields(5).Value
        Text7.Text = rs1.Fields(6).Value
        Text8.Text = rs1.Fields(7).Value
        Text9.Text = rs1.Fields(8).Value
        Text10.Text = rs1.Fields(9).Value
        MsgBox ("Query Successfully")
    End If
End Sub
```

Conclusion

Based on the background of the development of colleges and universities students' information management system, the system is analyzed and designed by using UML object-oriented modeling mechanism. In the process of modeling, the organic integration of system analysis, design, and

implementation is realized by using UML. The rich views provided by UML describes different aspects of the system from multiple perspectives, which can be effectively used in the modeling, analysis and design of the software system. During learning and using the UML modeling, my understanding about UML is not very clear, I will strengthen the learning of UML in the future.

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