Based on the Work Process Oriented Theory and Reality integration, Data Base Programming Teaching Design

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Abstract: This paper analyzes the position of JDBC programming in the course of Java language programming, the relationship between the training scheme of software engineering specialty and the subsequent courses, and carries out the integration of theory and practice based on the engineering process orientation, the integration of "teaching, learning and doing" JDBC programming teaching design, and achieves good teaching effect in the teaching practice.

Keywords: JDBC programming; Work process orientation; Fusion of theory and reality; Instructional design; Teaching practice;

I. THE STATUS OF THIS CHAPTER IN THE CURRICULUM

"JDBC programming" belongs to the Java language for database applications. The teaching objective of this chapter is to enable students to develop a small database management information system by themselves or in a team by understanding the basic steps of JDBC programming and mastering the API related to JDBC programming.

Students have learned basic Java syntax, classes and objects, inheritance and polymorphism, exceptions, common classes, collection frameworks, input and output, and more. So in this chapter, students should not only learn new knowledge: the connection to the database, the operation of the data table, the operation data in the table (increase record, delete, modify, query record), transaction management, etc., to use what they have learned in front of the collection of the data in the frame structure (such as linked lists) to encapsulate data retrieved from the database, for data transmission. The common operation is to transfer the encapsulated data to the presentation layer: in the GUI interface programming, the encapsulated data will be transferred to the page display; In Web programming, data is passed to a Web page for display.

Object orientation is the core of this course. Object-Oriented is not only embodied in class encapsulation, class inheritance and method polymorphism, but also a kind of programming idea (OOP). When operating the data in the database, we should follow the standards and processes of software development, build the project scientifically and reasonably, write the program code in a standardized and readable way, and reuse the code without repeating it. In addition, the code should be expandable.

To make your local code correct and reliable, you need to test your classes and methods. The most basic method of testing is unit testing.

II. THE CONNECTION BETWEEN THE TRAINING PLAN OF SOFTWARE ENGINEERING MAJOR AND SUBSEQUENT COURSES IN THIS CHAPTER

How to in this chapter, the teaching content, on the basis of the data encapsulation, object-oriented program design, project management and the system architecture to build, unit test, after the infiltration, knowledge to the students in software engineering, JAVA WEB programming and other subsequent course of learning, a good learning basis, play the course in the position in professional training scheme, The teaching of this chapter is a key point. Java Web Programming Techniques and Android Software Development are two follow-on courses to Java Language Programming, which are highly dependent on database data. "Java Web Programming Technology" is to show the data in the database with HTML pages. JDBC programming is the priority among priorities that students must master. "Android Mobile Software Development" involves SQLite database programming, which is based on JDBC programming technology, that is the content of this chapter.

In addition, other software engineering course "software engineering", the software testing with software development standards related to the development process, unit test and function test, so, this course "JDBC programming" this chapter can be thought of as "software engineering", "software testing" prelude, for students, establish the related concepts of enlightenment, It is very helpful to study the following specialized courses.

From the above analysis, students to lay a solid JDBC programming foundation, will be very important and necessary. Teachers should carefully design the teaching content and mode of this chapter and implement it in accordance with the rules of education and teaching, so that students can master the content of this chapter well.

III. ANALYSIS OF INSTRUCTIONAL DESIGN IDEAS BASED ON WORKING PROCESS ORIENTATION

Work process orientation is a kind of management thought which aims at achieving the work goal and adopts the behavior logic structure. This theory holds that: in the process of the subject's needs and environmental conditions adapt, there are problems and functions for solving problems, and the deviation between the expected goal and the effect that can be achieved is clear and the path to narrow the gap. The decomposition of path is as follows: the project is decomposed into the project, the deployment is decomposed into the layout, and the implementation of the project and the concrete embodiment of the layout are embodied in the process. At the same time, the process is also an important way to divide the rights and responsibilities of the organization. To sum up, in enterprise management, the process and process concrete oriented management ideas, methods, technology integration is the work process oriented system. [1]

The work objectives in the theory of "work process orientation" can be understood as teaching objectives. The teaching objectives of this chapter can be defined as: By understanding the basic steps of JDBC programming, mastering the API related to JDBC programming, using object-oriented program analysis (OOA) and object-oriented programming ideas (OOP), following the standards and norms of software engineering development, students can develop a small database management information system by themselves or with team cooperation.

The purpose of instructional design is to achieve the explicit process of instructional objectives. In order to achieve the teaching objectives of this chapter, teachers should carry out careful teaching design, gradually decompose it into concrete and clear work steps and solutions, and transform abstract concepts into concrete and verifiable implementation results. At the same time, with the output as the orientation and students' learning as the purpose, teachers must let students participate in thinking and discussion, guide students how to analyze, demonstrate and lead students to operate together, clearly and display the programming steps, and guide students to standardize the coding.

IV. BASED ON THE ENGINEERING PROCESS ORIENTED INTEGRATION OF THEORY AND PRACTICE, "TEACHING, LEARNING AND DOING" INTEGRATION OF JDBC PROGRAMMING TEACHING DESIGN

The instructional design ideas of this chapter can be preliminarily divided into:

(1) the JDBC first meeting

Teaching content: introduction of basic concepts, related API, basic development steps of JDBC.

Form of teaching: teacher introduction.

Teaching Suggestions: Considering the teaching form of teacher's explanation and students' passive acceptance, students are not impressed enough. Therefore, students are required to come back to further understand the content of this section after learning the subsequent knowledge points in this chapter.

After class test: teachers can design some JDBC conceptual knowledge points test questions in the test questions of this chapter, and release them to students at the end of the class, and then open the book to answer; After learning all the contents of this chapter, these test questions are used repeatedly. At this time, answer the questions in closed book.

(2) Procedure-oriented programming: the basic operation of the database by JDBC

Teaching content: establish a connection, create and delete database tables, operation of data in tables (add, delete, modify, and query records), close a connection.

Method of teaching: the teacher leads the students to think, discuss, and then demonstrates the operation, and leads the students to operate.

Teaching task: to realize the operation of adding, deleting, modifying and checking the data of a table (taking the student table as an example).

Teaching Analysis and Teaching Suggestions: Now that we have explained to the students that this chapter is to use Java programs to operate the database, then how to operate? As soon as possible in order to satisfy students' curiosity and desire for knowledge, let the student feel real and figure out how to use JAVA program steps and can realize the function of the database operation, teachers should use the most quick and convenient way to achieve the above effect, suggest using procedure-oriented programming thought is introduced: what to do, what to do, after finally, how to finish.

Teaching implementation: first establish data connection, and save the connection object □ prepare SQL statement execution object and SQL statement string to execute SQL statement (the execution results can be verified to the database) and close the SQL statement execution object and database connection object.

After-class testing: Students create another table (such as teacher information table or course information table) according to the code in class, and use the process-oriented design idea to realize the data maintenance of a single table.

(3) Object-oriented programming: operations on the table are encapsulated as the operation class of the table

Method of teaching: the teacher leads the students to think, discuss, and then demonstrates the operation, and leads the students to operate.

Teaching task: Realize the operation of adding, deleting, modifying and checking the data in one or more tables.

Teaching Analysis and Teaching Suggestions: This operation seems to be the same task as the second step, but the design idea is different. Using the object-oriented programming idea, the code of each working step needs to be reorganized.

Teaching implementation: the operation of the student table is designed as a class StudentDAO, and methods are designed to connect the database, add records, delete records, modify records, query all records, query a single record, and close objects, and then each method is implemented step by step, in which: The methods that call the database connection and close the object are five "repeats" of the procedure-oriented programming steps, repeating the work process, not the content. The code in the method is finished, and unit tests are used to verify the correctness of the function implementation.

Classroom discussion and analysis with students: how should the return value types and formal parameters of the five methods be designed?

It is similar to add, delete and modify records. The return value can be defined as int. Query all records should be represented by a collection, and query a single record should be represented by a encapsulated class. Teachers can analyze the parameters of the method one by one. It is important to emphasize to the student that you define a student class whose properties match the fields in the student table, and the data in the table is encapsulated into objects that can be passed into the method as parameters or as the return value of the method.

Instruct the students to think and discuss: we have completed the data maintenance operation of a table, if in the project development, there are multiple table operations, how to design the operation class of the table and the methods in it? ....

Teacher: the operation of multiple tables, each table operation are designed an operation class.

Student discussion: How are the methods of each table operation class designed? , each table is designed to "database connect, add records, delete records, modify records, query all

records, query a single record, close the object" these 7 methods? ....

Teachers' misgivings: involved in multiple tables of database connection and close the object, the method of operation will need more than one table in the class of these two methods and public variables extracted into the parent class (which can be named BaseDao), multiple tables action classes inherit it, so that to reach the principle of object-oriented programming, code reuse, rather than a repeat.

The teacher demonstrated and led the students to complete the above operations. After modifying the code, unit tests were carried out again to prove the correctness of the realized functions.

After class test: the students will design the database table by themselves in step 2, imitating the operation steps in class, and realize data maintenance with object-oriented design idea.

(4) Interface oriented programming, database table operation class further upgrade

Method of teaching: the teacher leads the students to think, discuss, and then demonstrates the operation, and leads the students to operate.

Teaching task: Realize the operation of adding, deleting, modifying and checking the data in one or more tables.

Teaching Analysis and Teaching Suggestions: This operation seems to have the same task as Step 2 and Step 3, but the design idea is different. Using the interface-oriented programming idea, the code of each working step needs to be reorganized. Interface is a Java concept, the use of flexibility, can be implemented in a variety of ways. If the database operation defined interface and abstract methods, you can use JDBC programming, can also use DBUtils, or use Spring, MyBatis and other technologies to achieve database operations can be. Therefore, the advantage of using interface programming is obvious, and it is easy to extend the system in the future. Programming to interface is a common way in project development.

Teaching implementation: The operation of the student table is designed as an interface studentDAO, which contains the methods of "add records, delete records, modify records, query all records, query a single record". In addition, we create StudentDAO interface implementation class Student DAOImpl, let it inherit the parent class BaseDao, then we implement each abstract method in StudentDAO interface, and test the correctness of the method.

Instructional extensions: Teachers can demonstrate how to implement the StudentDAO interface using DBUtils, Spring, MyBatis (choose one). Send the required JAR package and implementation code to students for further study and review.

Ask the students to think and discuss the benefits of programming to an interface.

Testing after class: students will design the database table by themselves in step 2, and implement data maintenance by using the interface-oriented design idea according to the operation steps in class.

At this point, based on the working process oriented theory used in this chapter, the design of teaching, achieve the result of the following: to achieve the teaching goal, teachers can according to the process oriented programming and object oriented programming and the programming to an interface three teaching steps, step by step guide students to realize the

function of the information in the database table maintenance. In the course of this work, students repeat the JDBC programming steps three times: first, basic database operation steps; Secondly, the student information is treated as an object for class encapsulation, and the data is maintained through the class design method of table operation. Finally, the use of interface programming to increase the system's expansibility and maintainability. Each repetition completes seemingly the same task, but the knowledge points of the exercises are constantly expanding. Each time, new design ideas are infiltrated into it, and each time, it is close to the standard development process of software engineering development. It is a natural, logical and coherent process for students' learning.

V. JDBC PROGRAMMING TEACHING DESIGN IN SOME DETAILS OF THE SUPPLEMENT

In the fourth part (the integration of theory and practice based on the engineering process orientation, and the JDBC programming teaching design with the integration of "teaching, learning and doing"), the framework of this chapter's teaching design is analyzed in broad lines. In the teaching practice, there are several details that need to be further implemented:

(1) due to open this course in software engineering, software engineering (big data direction), the third term is not yet open database courses, therefore, need to supplement after "1, JDBC meet" common SQL command of database operations, including: database creation, create and delete tables, records of add, delete, modify, and query operations. Here, choose medium and small relational database management system (MYSQL database) is appropriate.

(2) In the section of "2, procedure-oriented programming", the Connection interface, Statement interface and ResultSet interface in the java.sql package are involved. After the Statement interface is introduced to complete database operations, the use of the PreparedStatement interface is introduced. The latter has obvious advantages over the former: readability and error-prone when preparing SQL strings; SQL statement is precompiled, fast execution speed, good performance; Prevent SQL injection problems.

(3) In "3, object-oriented programming", after the realization of the five methods of table operation, explain the significance of software testing to the students, and lead the students to use JUnit tool to conduct unit testing on the method, which lays a foundation for the subsequent course "Software Testing".

(4) The teaching mode is based on case teaching, which sometimes fails to take into account all the knowledge points of the chapter. The course teaching should pay attention to the systematic, so the knowledge points outside the case should be supplemented in the appropriate opportunity. In JDBC programming, there is another concept: transactions and transaction management, which should be explained at the end of "3. Object-Oriented Programming" or "4. Interface Oriented Programming". It is possible to assume the following task: adding a student and removing another student are executed together. In the actual project also has its application needs, such as: an experimental class to implement elimination system, meet a certain condition with the students to quit, there are new students to join. Teachers should guide students on how to create a method to complete this function. And verify: in the absence of transaction management, the program will behave? And then to demonstrate how to conduct transaction management, again verify the implementation of transaction management, the program has what kind of performance. Students experience the role of business management.

SUMMARY

JDBC programming based on engineering process oriented teaching design has realized the theory and practice, the unification of the teachers' teaching and students' practice and, for many years of teaching practice shows that students can achieve solid master database programming technology, shop to do a good potential for subsequent courses, students can better adapt to the subsequent course of study.

References

[1] Baidu Encyclopedia: work process oriented
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