Rajalakshmi Engineering College

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2024_28_III_OOPS Using Java Lab

REC_2028_OOPS using Java_Week 11

Attempt : 1
Total Mark : 20
Marks Obtained : 20

Section 1 : Project

1. Problem Statement

Create a JDBC-based School Management System that handles runtime input to manage student records. The system should allow users to:

Add a new student (student ID, name, grade level, GPA).

Update a student's GPA, ensuring the GPA value is within the valid range (0.0 - 4.0).

View a specific student’s record by student ID.

Display all students in the database.

Exit the application.

The system should connect to a MySQL database using the following default credentials:

DB URL: jdbc:mysql://localhost/ri_db

USER: test

PWD: test123

The students table has already been created with the following structure:

Table Name: students

Input Format

The first line of input consists of an integer choice, representing the operation to be performed:

(1 for Add Student, 2 for Update GPA, 3 for View Student Record, 4 for Display All Students, 5 for Exit)

For choice 1 (Add Student):

- The second line consists of an integer student_id.
- The third line consists of a string name.
- The fourth line consists of a string grade_level.
- The fifth line consists of a double gpa (must be between 0.0 and 4.0).

For choice 2 (Update GPA):

- The second line consists of an integer student_id.
- The third line consists of a double new_gpa (must be between 0.0 and 4.0).

For choice 3 (View Student Record):

- The second line consists of an integer student_id.

For choice 4 (Display All Students):

- No additional inputs are required.

For choice 5 (Exit):

- No additional inputs are required.

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Output Format

The output displays:

For choice 1 (Add Student):

- Print "Student added successfully" if the student was added.
- Print "Failed to add student." if the insertion failed.

For choice 2 (Update GPA):

- Print "GPA updated successfully" if the GPA update was successful.
- Print "Student not found." if the specified student ID does not exist.
- Print "GPA must be between 0.0 and 4.0." if the provided GPA is out of the valid range.

For choice 3 (View Student Record):

- Display the student details in the format:
- ID: [student_id] | Name: [name] | Grade Level: [grade_level] | GPA: [gpa]
- Print "Student not found." if the specified student ID does not exist.

For choice 4 (Display All Students):

- Display each student on a new line in the format:
- ID | Name | Grade Level | GPA
- If there are no records, print nothing (or handle with an appropriate message if desired).

For choice 5 (Exit):

- Print "Exiting School Management System."

For invalid input:

- Print "Invalid choice. Please try again."

Sample Test Case

Input: 1
101
Alice Johnson
10

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3.8
5
Output: Student added successfully
Exiting School Management System.

Answer

```
import java.sql.*;
import java.util.Scanner;

class SchoolManagementSystem {
   public static void main(String[] args) {
      try (Connection conn = DriverManager.getConnection("jdbc:mysql://
localhost/ri_db", "test", "test123");
       Scanner scanner = new Scanner(System.in)) {

        boolean running = true;

        while (running) {

          int choice = scanner.nextInt();

          switch (choice) {
            case 1:
              addStudent(conn, scanner);
              break;
            case 2:
              updateGrades(conn, scanner);
              break;
            case 3:
              viewStudentRecord(conn, scanner);
              break;
            case 4:
              displayAllStudents(conn);
              break;
            case 5:
              System.out.println("Exiting School Management System.");
              running = false;
              break;
            default:
              System.out.println("Invalid choice. Please try again.");
          }
        }
```

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```
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

    public static void addStudent(Connection conn, Scanner scanner) {
        try {
            int studentId = scanner.nextInt();
            scanner.nextLine();
            String name = scanner.nextLine();
            String gradeLevel = scanner.nextLine();
            double gpa = scanner.nextDouble();

            String sql = "INSERT INTO students (student_id, name, grade_level, gpa)
VALUES (?, ?, ?, ?)";
            PreparedStatement pstmt = conn.prepareStatement(sql);
            pstmt.setInt(1, studentId);
            pstmt.setString(2, name);
            pstmt.setString(3, gradeLevel);
            pstmt.setDouble(4, gpa);

            int rowsAffected = pstmt.executeUpdate();
            if (rowsAffected > 0) {
                System.out.println("Student added successfully");
            } else {
                System.out.println("Failed to add student.");
            }
            pstmt.close();
        } catch (SQLException e) {
            System.out.println("Failed to add student.");
        }
    }

    public static void updateGrades(Connection conn, Scanner scanner) {
        try {
            int studentId = scanner.nextInt();
            double newGpa = scanner.nextDouble();

            if (newGpa < 0.0 || newGpa > 4.0) {
                System.out.println("GPA must be between 0.0 and 4.0.");
                return;
            }
```

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```
        String checkSql = "SELECT student_id FROM students WHERE student_id
= ?";
        PreparedStatement checkStmt = conn.prepareStatement(checkSql);
        checkStmt.setInt(1, studentId);
        ResultSet rs = checkStmt.executeQuery();

        if (!rs.next()) {
            System.out.println("Student not found.");
            rs.close();
            checkStmt.close();
            return;
        }
        rs.close();
        checkStmt.close();

        String updateSql = "UPDATE students SET gpa = ? WHERE student_id = ?";
        PreparedStatement updateStmt = conn.prepareStatement(updateSql);
        updateStmt.setDouble(1, newGpa);
        updateStmt.setInt(2, studentId);

        int rowsAffected = updateStmt.executeUpdate();
        if (rowsAffected > 0) {
            System.out.println("GPA updated successfully");
        }
        updateStmt.close();
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

public static void viewStudentRecord(Connection conn, Scanner scanner) {
    try {
        int studentId = scanner.nextInt();

        String sql = "SELECT * FROM students WHERE student_id = ?";
        PreparedStatement pstmt = conn.prepareStatement(sql);
        pstmt.setInt(1, studentId);
        ResultSet rs = pstmt.executeQuery();

        if (rs.next()) {
            int id = rs.getInt("student_id");
            String name = rs.getString("name");
```

```
            String gradeLevel = rs.getString("grade_level");
            double gpa = rs.getDouble("gpa");

            System.out.printf("ID: %d | Name: %s | Grade Level: %s | GPA: %.2f%n",
                              id, name, gradeLevel, gpa);
        } else {
            System.out.println("Student not found.");
        }

        rs.close();
        pstmt.close();
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

public static void displayAllStudents(Connection conn) {
    try {
        String sql = "SELECT * FROM students";
        Statement stmt = conn.createStatement();
        ResultSet rs = stmt.executeQuery(sql);

        System.out.println("ID | Name | Grade Level | GPA");
        while (rs.next()) {
            int id = rs.getInt("student_id");
            String name = rs.getString("name");
            String gradeLevel = rs.getString("grade_level");
            double gpa = rs.getDouble("gpa");

            System.out.printf("%d | %s | %s | %.2f%n", id, name, gradeLevel, gpa);
        }

        rs.close();
        stmt.close();
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

}
```

Status : Correct **Marks : 10/10**

2. Problem Statement

In Café Central, the menu is cataloged and stored in a database.

To efficiently manage the restaurant's menu using Java and JDBC, you must build a Restaurant Management System that supports:

Adding new menu items

Updating menu item prices

Viewing details of a menu item

Displaying all menu items in sorted order

You are given two files:

File 1: MenuItem.java (POJO Class)

This class represents the MenuItem entity.

A MenuItem contains the following details:

Field Description

itemId Unique Menu Item ID (Integer)

name Item Name (String)

category Item Category (String)

price Item Price (Double)

Students must write code in the marked area:

```
class MenuItem {
    private int itemId;
    private String name;
    private String category;
    private double price;

    public MenuItem() {}
```

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```
    public MenuItem(int itemId, String name, String category, double price) {
        // write your code here
    }

    // Include getters and setters
}
```

Expected in this part:

Assign parameter values to instance variables inside the constructor.

Add getters and setters for all attributes.

File 2: MenuItemDAO.java (Data Access Layer)

This class handles all database operations using JDBC.

Students must complete the missing JDBC logic in the following methods:

```
class MenuItemDAO {

    public void addMenuItem(Connection conn, MenuItem menuItem)
throws SQLException {
        // write your code here
    }

    public void updateItemPrice(Connection conn, int itemId, double
newPrice) throws SQLException {
        // write your code here
    }

    public void deleteMenuItem(Connection conn, int itemId) throws
SQLException {
        // write your code here
    }
```

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```
    public MenuItem viewItemDetails(Connection conn, int itemId) throws
SQLException {
        // write your code here
    }

    public List<MenuItem> displayAllMenuItems(Connection conn) throws
SQLException {
        // write your code here
    }

    private MenuItem mapToMenuItem(ResultSet rs) throws SQLException {
        return new MenuItem(
            // write your code here
        );
    }
}
```

Expected in this part:

Write SQL queries for INSERT, UPDATE, DELETE, SELECT.

Execute queries using PreparedStatement or Statement.

Map ResultSet rows to MenuItem objects using mapToMenuItem().

Return a List<MenuItem> where required.

The system should connect to a MySQL database using the following default credentials:

DB URL: jdbc:mysql://localhost/ri_db

USER: test

PWD: test123

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The menu table has already been created with the following structure:

Table Name: menu

Input Format

The first line of input consists of an integer choice, representing the operation to be performed (1 for Add Item, 2 for Restock item, 3 for reduce item, 4 for Display, 5 for Exit).

For choice 1 (Add Menu Item):

- The second line consists of an integer item_id.
- The third line consists of a string name.
- The fourth line consists of a string category.
- The fifth line consists of a double price.

For choice 2 (Update Item Price):

- The second line consists of an integer item_id.
- The third line consists of a double new_price.

For choice 3 (View Item Details):

- The second line consists of an integer item_id.

For choice 4 (Display All Menu Items):

- No additional inputs are required.

For choice 5 (Exit):

- No additional inputs are required.

Output Format

For choice 1 (Add Menu Item):

- Print "Menu item added successfully" if the item was added.
- Print "Failed to add item." if the insertion failed.

For choice 2 (Update Item Price):

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- Print "Item price updated successfully" if the price update was successful.
- Print "Item not found." if the specified item ID does not exist.

For choice 3 (View Item Details):

- Display the item details in the format:
- ID: [item_id] | Name: [name] | Category: [category] | Price: [price]
- Print "Item not found." if the specified item ID does not exist.

For choice 4 (Display All Menu Items):

- Display each item on a new line in the format:
- ID | Name | Category | Price
- If no items are available, print nothing (or handle with an appropriate message if desired).

For choice 5 (Exit):

- Print "Exiting Restaurant Management System."

For invalid input:

- Print "Invalid choice. Please try again."

Sample Test Case

Input: 1
11
Margherita Pizza
Main Course
12.99
4
5
Output: Menu item added successfully
ID | Name | Category | Price
11 | Margherita Pizza | Main Course | 12.99
Exiting Restaurant Management System.

Answer

```
import java.sql.*;
import java.util.Scanner;

class RestaurantManagementSystem {
```

```
    public static void main(String[] args) {
        try (Connection conn = DriverManager.getConnection("jdbc:mysql://
localhost/ri_db", "test", "test123");
             Scanner scanner = new Scanner(System.in)) {

            boolean running = true;

            while (running) {
                int choice = scanner.nextInt();

                switch (choice) {
                    case 1:
                        addMenuItem(conn, scanner);
                        break;
                    case 2:
                        updateItemPrice(conn, scanner);
                        break;
                    case 3:
                        viewItemDetails(conn, scanner);
                        break;
                    case 4:
                        displayAllMenuItems(conn);
                        break;
                    case 5:
                        System.out.println("Exiting Restaurant Management System.");
                        running = false;
                        break;
                    default:
                        System.out.println("Invalid choice. Please try again.");
                }
            }
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

// You are using Java
public static void addMenuItem(Connection conn, Scanner scanner) {
    try {
        int itemId = scanner.nextInt();
        scanner.nextLine();
        String name = scanner.nextLine();
        String category = scanner.nextLine();
```

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```
        double price = scanner.nextDouble();

        String sql = "INSERT INTO menu (item_id, name, category, price) VALUES
(?, ?, ?, ?)";
        PreparedStatement pstmt = conn.prepareStatement(sql);
        pstmt.setInt(1, itemId);
        pstmt.setString(2, name);
        pstmt.setString(3, category);
        pstmt.setDouble(4, price);

        int rowsAffected = pstmt.executeUpdate();
        if (rowsAffected > 0) {
            System.out.println("Menu item added successfully");
        } else {
            System.out.println("Failed to add item.");
        }
        pstmt.close();
    } catch (SQLException e) {
        System.out.println("Failed to add item.");
    }
}

public static void updateItemPrice(Connection conn, Scanner scanner) {
    try {
        int itemId = scanner.nextInt();
        double newPrice = scanner.nextDouble();

        String checkSql = "SELECT item_id FROM menu WHERE item_id = ?";
        PreparedStatement checkStmt = conn.prepareStatement(checkSql);
        checkStmt.setInt(1, itemId);
        ResultSet rs = checkStmt.executeQuery();

        if (!rs.next()) {
            System.out.println("Item not found.");
            rs.close();
            checkStmt.close();
            return;
        }
        rs.close();
        checkStmt.close();

        String updateSql = "UPDATE menu SET price = ? WHERE item_id = ?";
```

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```
            PreparedStatement updateStmt = conn.prepareStatement(updateSql);
            updateStmt.setDouble(1, newPrice);
            updateStmt.setInt(2, itemId);

            int rowsAffected = updateStmt.executeUpdate();
            if (rowsAffected > 0) {
                System.out.println("Item price updated successfully");
            }
            updateStmt.close();
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

    public static void viewItemDetails(Connection conn, Scanner scanner) {
        try {
            int itemId = scanner.nextInt();

            String sql = "SELECT * FROM menu WHERE item_id = ?";
            PreparedStatement pstmt = conn.prepareStatement(sql);
            pstmt.setInt(1, itemId);
            ResultSet rs = pstmt.executeQuery();

            if (rs.next()) {
                int id = rs.getInt("item_id");
                String name = rs.getString("name");
                String category = rs.getString("category");
                double price = rs.getDouble("price");

                System.out.printf("ID: %d | Name: %s | Category: %s | Price: %.2f%n",
                                  id, name, category, price);
            } else {
                System.out.println("Item not found.");
            }

            rs.close();
            pstmt.close();
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }
```

```
public static void displayAllMenuItems(Connection conn) {
    try {
        String sql = "SELECT * FROM menu ORDER BY item_id";
        Statement stmt = conn.createStatement();
        ResultSet rs = stmt.executeQuery(sql);

        System.out.println("ID | Name | Category      | Price");
        while (rs.next()) {
            int id = rs.getInt("item_id");
            String name = rs.getString("name");
            String category = rs.getString("category");
            double price = rs.getDouble("price");

            System.out.printf("%d | %s | %s | %.2f%n", id, name, category, price);
        }

        rs.close();
        stmt.close();
    } catch (SQLException e) {
        e.printStackTrace();
    }
}

 class MenuItem {
    private int itemId;
    private String name;
    private String category;
    private double price;

    public MenuItem() {}

    public MenuItem(int itemId, String name, String category, double price) {
        this.itemId = itemId;
        this.name = name;
        this.category = category;
        this.price = price;
    }

    public int getItemId() {
        return itemId;
    }
```

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```
    public String getName() {
        return name;
    }

    public String getCategory() {
        return category;
    }

    public double getPrice() {
        return price;
    }

    public void setItemId(int itemId) {
        this.itemId = itemId;
    }

    public void setName(String name) {
        this.name = name;
    }

    public void setCategory(String category) {
        this.category = category;
    }

    public void setPrice(double price) {
        this.price = price;
    }
}

}

//
```

Status : Correct **Marks : 10/10**

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