

# 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**

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() {}  
  
    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
```

```
}
```

```
    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

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):

- 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();
}
}

public static void addMenuItem(Connection conn, Scanner scanner) {
    try {
        int itemId = scanner.nextInt();
        scanner.nextLine();
        String name = scanner.nextLine();
        String category = scanner.nextLine();
        double price = scanner.nextDouble();

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

            int rows = ps.executeUpdate();
            if (rows > 0) {
                System.out.println("Menu item added successfully");
            } else {
                System.out.println("Failed to add item.");
            }
        }
    } 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 sql = "UPDATE menu SET price = ? WHERE item_id = ?";
        try (PreparedStatement ps = conn.prepareStatement(sql)) {
            ps.setDouble(1, newPrice);
            ps.setInt(2, itemId);

            int rows = ps.executeUpdate();
            if (rows > 0) {
                System.out.println("Item price updated successfully");
            } else {
                System.out.println("Item not found.");
            }
        }
    } catch (SQLException e) {
        System.out.println("Item not found.");
    }
}
```

```
public static void viewItemDetails(Connection conn, Scanner scanner) {
    try {
        int itemId = scanner.nextInt();
        String sql = "SELECT * FROM menu WHERE item_id = ?;

        try (PreparedStatement ps = conn.prepareStatement(sql)) {
            ps.setInt(1, itemId);

            try (ResultSet rs = ps.executeQuery()) {
                if (rs.next()) {
                    System.out.println(
                        "ID: " + rs.getInt("item_id") + "|" +
                        "Name: " + rs.getString("name") + "|" +
                        "Category: " + rs.getString("category") + "|" +
                        "Price: " + String.format("%.2f", rs.getDouble("price"))
                );
            }
        }
    }
}
```

```
        } else {
            System.out.println("Item not found.");
        }
    }
} catch (SQLException e) {
    System.out.println("Item not found.");
}
}

public static void displayAllMenuItems(Connection conn) {
    String sql = "SELECT * FROM menu ORDER BY item_id";

    try (Statement stmt = conn.createStatement();
        ResultSet rs = stmt.executeQuery(sql)) {

        StringBuilder sb = new StringBuilder();
        boolean hasAny = false;

        while (rs.next()) {
            hasAny = true;
            sb.append(rs.getInt("item_id")).append(" | ")
                .append(rs.getString("name")).append(" | ")
                .append(rs.getString("category")).append(" | ")
                .append(String.format("%.2f", rs.getDouble("price")))
                .append(System.lineSeparator());
        }

        if (hasAny) {
            System.out.println("ID | Name | Category | Price");
            System.out.print(sb.toString().trim());
            System.out.println();
        }
    }
    } catch (SQLException e) {
    }
}

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

```

private double price;

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; }
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**

## 2. 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.

#### ***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  
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.");  
                }  
            }  
        }  
    }  
}
```

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

public static void addStudent(Connection conn, Scanner scanner) {
    int studentId = scanner.nextInt();
    scanner.nextLine(); // Consume newline

    String name = scanner.nextLine();

    String gradeLevel = scanner.nextLine();

    double gpa = scanner.nextDouble();

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

        int rowsInserted = stmt.executeUpdate();
        System.out.println(rowsInserted > 0 ? "Student added successfully" :
"Failed to add student.");
    } catch (SQLException e) {
        System.out.println("Error adding student: " + e.getMessage());
    }
}

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

    double newGpa = scanner.nextDouble();

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

```
String updateQuery = "UPDATE students SET gpa = ? WHERE student_id = ?";  
try (PreparedStatement stmt = conn.prepareStatement(updateQuery)) {  
    stmt.setDouble(1, newGpa);  
    stmt.setInt(2, studentId);  
  
    int rowsUpdated = stmt.executeUpdate();  
    System.out.println(rowsUpdated > 0 ? "GPA updated successfully" :  
    "Student not found.");  
} catch (SQLException e) {  
    System.out.println("Error updating GPA: " + e.getMessage());  
}  
}  
  
public static void viewStudentRecord(Connection conn, Scanner scanner) {  
    int studentId = scanner.nextInt();  
  
    String selectQuery = "SELECT * FROM students WHERE student_id = ?";  
    try (PreparedStatement stmt = conn.prepareStatement(selectQuery)) {  
        stmt.setInt(1, studentId);  
  
        ResultSet rs = stmt.executeQuery();  
        if (rs.next()) {  
            System.out.printf("ID: %d | Name: %s | Grade Level: %s | GPA: %.2f%n",  
                rs.getInt("student_id"),  
                rs.getString("name"),  
                rs.getString("grade_level"),  
                rs.getDouble("gpa"));  
        } else {  
            System.out.println("Student not found.");  
        }  
    } catch (SQLException e) {  
        System.out.println("Error retrieving student record: " + e.getMessage());  
    }  
}  
  
public static void displayAllStudents(Connection conn) {  
    String displayQuery = "SELECT * FROM students ";  
    try (Statement stmt = conn.createStatement());  
    ResultSet rs = stmt.executeQuery(displayQuery)) {  
        System.out.println("ID | Name | Grade Level | GPA");  
    }  
}
```

```
        while (rs.next()) {
            System.out.printf("%d | %s | %s | %.2f%n",
                rs.getInt("student_id"),
                rs.getString("name"),
                rs.getString("grade_level"),
                rs.getDouble("gpa"));
        }
    } catch (SQLException e) {
        System.out.println("Error displaying students: " + e.getMessage());
    }
}
```

**Status : Correct**

**Marks : 10/10**