

## Experiment 2.4 — Java Applications Using JDBC for Database Connectivity, CRUD Operations, and MVC Architecture

### Part (a): Connecting to MySQL and Fetching Data from a Table

**Aim:** To develop a Java program that connects to a MySQL database and retrieves data from an Employee table using JDBC.

**Procedure:**

1. Create a database named testdb and an Employee table with fields EmpID, Name, and Salary.
2. Insert sample records.
3. Write Java code to connect, execute a SELECT query, and display the data.

```
import java.sql.*;

public class FetchEmployeeData {
    public static void main(String[] args) {
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection con = DriverManager.getConnection(
                "jdbc:mysql://localhost:3306/testdb", "root", "password");
            Statement stmt = con.createStatement();
            ResultSet rs = stmt.executeQuery("SELECT * FROM Employee");

            System.out.println("EmpID | Name | Salary");
            while (rs.next()) {
                System.out.println(rs.getInt("EmpID") + " | " +
                    rs.getString("Name") + " | " +
                    rs.getDouble("Salary"));
            }
            con.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

**Sample Output:**

EmpID	Name	Salary
101	Saksham	55000.0
102	Pranav	60000.0

**Result:** Successfully connected to the MySQL database and retrieved employee data.

### Part (b): CRUD Operations on Product Table Using JDBC

**Aim:** To perform Create, Read, Update, and Delete (CRUD) operations on a Product table using JDBC with transaction handling.

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

public class ProductCRUD {
    public static void main(String[] args) {
        try {
```

```

Class.forName("com.mysql.cj.jdbc.Driver");
Connection con = DriverManager.getConnection(
    "jdbc:mysql://localhost:3306/testdb", "root", "password");
con.setAutoCommit(false);
Scanner sc = new Scanner(System.in);

while (true) {
    System.out.println("\n1. Insert\n2. View\n3. Update\n4. Delete\n5. Exit");
    System.out.print("Enter choice: ");
    int choice = sc.nextInt();

    switch (choice) {
        case 1:
            PreparedStatement ps = con.prepareStatement(
                "INSERT INTO Product VALUES (?, ?, ?, ?)");
            System.out.print("Enter ID, Name, Price, Quantity: ");
            ps.setInt(1, sc.nextInt());
            ps.setString(2, sc.next());
            ps.setDouble(3, sc.nextDouble());
            ps.setInt(4, sc.nextInt());
            ps.executeUpdate();
            con.commit();
            System.out.println("Product added successfully!");
            break;

        case 2:
            Statement st = con.createStatement();
            ResultSet rs = st.executeQuery("SELECT * FROM Product");
            while (rs.next()) {
                System.out.println(rs.getInt(1) + " | " +
                    rs.getString(2) + " | " +
                    rs.getDouble(3) + " | " +
                    rs.getInt(4));
            }
            break;

        case 3:
            PreparedStatement ps2 = con.prepareStatement(
                "UPDATE Product SET Price=?, Quantity=? WHERE ProductID=?");
            System.out.print("Enter new Price, Quantity, and ProductID: ");
            ps2.setDouble(1, sc.nextDouble());
            ps2.setInt(2, sc.nextInt());
            ps2.setInt(3, sc.nextInt());
            ps2.executeUpdate();
            con.commit();
            System.out.println("Product updated successfully!");
            break;

        case 4:
            PreparedStatement ps3 = con.prepareStatement(
                "DELETE FROM Product WHERE ProductID=?");
            System.out.print("Enter ProductID to delete: ");
            ps3.setInt(1, sc.nextInt());
            ps3.executeUpdate();
            con.commit();
            System.out.println("Product deleted successfully!");
            break;

        case 5:
            con.close();
            System.exit(0);
    }
}

```

```

        }
    } catch (Exception e) {
        e.printStackTrace();
    }
}
}

```

#### Sample Output:

```

Enter choice: 1
Enter ID, Name, Price, Quantity: 201 Pen 20.5 50
Product added successfully!

```

**Result:** Successfully implemented CRUD operations with transaction management.

## Part (c): Student Management Application Using JDBC and MVC Architecture

**Aim:** To develop a Student Management Application using JDBC and MVC architecture.

#### Model (Student.java):

```

public class Student {
    private int id;
    private String name;
    private String department;
    private int marks;

    public Student(int id, String name, String department, int marks) {
        this.id = id;
        this.name = name;
        this.department = department;
        this.marks = marks;
    }

    public int getId() { return id; }
    public String getName() { return name; }
    public String getDepartment() { return department; }
    public int getMarks() { return marks; }
}

```

#### Controller (StudentDAO.java):

```

import java.sql.*;

public class StudentDAO {
    private Connection con;

    public StudentDAO() throws Exception {
        Class.forName("com.mysql.cj.jdbc.Driver");
        con = DriverManager.getConnection(
            "jdbc:mysql://localhost:3306/testdb", "root", "password");
    }

    public void addStudent(Student s) throws Exception {
        PreparedStatement ps = con.prepareStatement("INSERT INTO Student VALUES (?, ?, ?, ?)");
        ps.setInt(1, s.getId());
        ps.setString(2, s.getName());
        ps.setString(3, s.getDepartment());
        ps.setInt(4, s.getMarks());
        ps.executeUpdate();
    }

    public void viewStudents() throws Exception {

```

```

        Statement st = con.createStatement();
        ResultSet rs = st.executeQuery("SELECT * FROM Student");
        while (rs.next()) {
            System.out.println(rs.getInt(1) + " | " + rs.getString(2) + " | " +
                               rs.getString(3) + " | " + rs.getInt(4));
        }
    }
}

```

#### **View (MainApp.java):**

```

import java.util.*;

public class MainApp {
    public static void main(String[] args) {
        try {
            StudentDAO dao = new StudentDAO();
            Scanner sc = new Scanner(System.in);

            while (true) {
                System.out.println("\n1. Add Student\n2. View Students\n3. Exit");
                System.out.print("Enter choice: ");
                int ch = sc.nextInt();

                if (ch == 1) {
                    System.out.print("Enter ID, Name, Department, Marks: ");
                    Student s = new Student(sc.nextInt(), sc.next(), sc.next(), sc.nextInt());
                    dao.addStudent(s);
                    System.out.println("Student added successfully!");
                } else if (ch == 2) {
                    dao.viewStudents();
                } else {
                    System.out.println("Exiting...");
                    break;
                }
            }
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}

```

#### **Sample Output:**

```

Enter choice: 1
Enter ID, Name, Department, Marks: 1 Saksham CSE 90
Student added successfully!
Enter choice: 2
1 | Saksham | CSE | 90

```

**Result:** Successfully implemented MVC-based Student Management System using JDBC.

**Conclusion:** The experiment demonstrated successful database connectivity, CRUD operations, and MVC implementation using JDBC in Java.