Experiment - 7

Student Name: Yash Goel   **UID:** 23BCS11498
Branch: BE-CSE   **Section/Group:** KRG-2B
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Subject Name: Project Based Learning in Java

1. **Aim:**

To build a Java program that performs CRUD (Create, Read, Update, Delete) operations on a Product table using JDBC with transaction handling.

2. **Objective:**

To learn how to implement CRUD operations using JDBC, apply transaction handling, and use a menu-driven program for database operations.

3. **Apparatus / Input Used:**

• Java (JDK 8 or above)
• MySQL Database
• JDBC API
• MySQL Table: Product(ProductID, ProductName, Price, Quantity)
• IDE: Eclipse / IntelliJ / VS Code

4. **Procedure:**

   1. Create a MySQL table **Product(ProductID, ProductName, Price, Quantity)**
   2. Load the MySQL JDBC Driver using Class.forName()
   3. Establish a connection using DriverManager.getConnection()
   4. Create a menu-driven program with options: Add, View, Update, Delete
   5. Use **PreparedStatement** for secure queries
   6. Use connection.setAutoCommit(false) for manual transaction mode
   7. Use commit() on successful operations
   8. Use rollback() on errors
   9. Close all JDBC resources properly (Connection, Statement, ResultSet)

5. **Program Code:**

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

```java
public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            Connection con = DriverManager.getConnection(
                "jdbc:mysql://localhost:3306/testdb", "root", "password"
            );
            con.setAutoCommit(false);
            int choice;

            while (true) {
                System.out.println("\n--- Product Management Menu ---");
                System.out.println("1. Add Product");
                System.out.println("2. View All Products");
                System.out.println("3. Update Product");
                System.out.println("4. Delete Product");
                System.out.println("5. Exit");
                System.out.print("Enter choice: ");
                choice = sc.nextInt();

                if (choice == 1) {
                    PreparedStatement ps = con.prepareStatement(
                        "INSERT INTO Product VALUES (?, ?, ?, ?)"
                    );
                    System.out.print("Enter Product ID: ");
                    ps.setInt(1, sc.nextInt());
                    System.out.print("Enter Product Name: ");
                    ps.setString(2, sc.next());
                    System.out.print("Enter Price: ");
                    ps.setDouble(3, sc.nextDouble());
                    System.out.print("Enter Quantity: ");
                    ps.setInt(4, sc.nextInt());
                    ps.executeUpdate();
                    con.commit();
                    System.out.println("Product Added Successfully!");
                }
                else if (choice == 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) + " | " +
```

```java
                rs.getInt(4)
            );
        }
    }
    else if (choice == 3) {
        PreparedStatement ps = con.prepareStatement(
            "UPDATE Product SET Price=?, Quantity=? WHERE ProductID=?"
        );
        System.out.print("Enter Product ID: ");
        ps.setInt(3, sc.nextInt());
        System.out.print("Enter New Price: ");
        ps.setDouble(1, sc.nextDouble());
        System.out.print("Enter New Quantity: ");
        ps.setInt(2, sc.nextInt());
        ps.executeUpdate();
        con.commit();
        System.out.println("Product Updated Successfully!");
    }
    else if (choice == 4) {
        PreparedStatement ps = con.prepareStatement(
            "DELETE FROM Product WHERE ProductID=?"
        );
        System.out.print("Enter Product ID: ");
        ps.setInt(1, sc.nextInt());
        ps.executeUpdate();
        con.commit();
        System.out.println("Product Deleted Successfully!");
    }
    else if (choice == 5) {
        System.out.println("Exiting...");
        break;
    }
    else {
        System.out.println("Invalid Choice");
    }
    }
    con.close();
    }
    catch (Exception e) {
        System.out.println("Error! Rolling Back...");
    }
    }
}
```
Sample Output:

```
--- Product Management Menu ---

  1.  Add Product

  2.  View All Products

  3.  Update Product

  4.  Delete Product

  5.  Exit

Enter choice: 1

Enter Product ID: 101

Enter Product Name: Laptop

Enter Price: 999.99

Enter Quantity: 10

Product Added Successfully!


--- Product Management Menu ---

  1.  Add Product

  2.  View All Products

  3.  Update Product

  4.  Delete Product

  5.  Exit

Enter choice: 2

101 | Laptop | 999.99 | 10
```