Experiment-7

Student Name: Komaldeep Singh **UID :**22BCS14035
Branch: CSE **Section/Group:** IOT-618-A
Semester: 7th **Date of Performance:** 21/03/25
Subject Name: Java Lab **Subject Code:** 22CSH-359

Problem-1 (Easy)

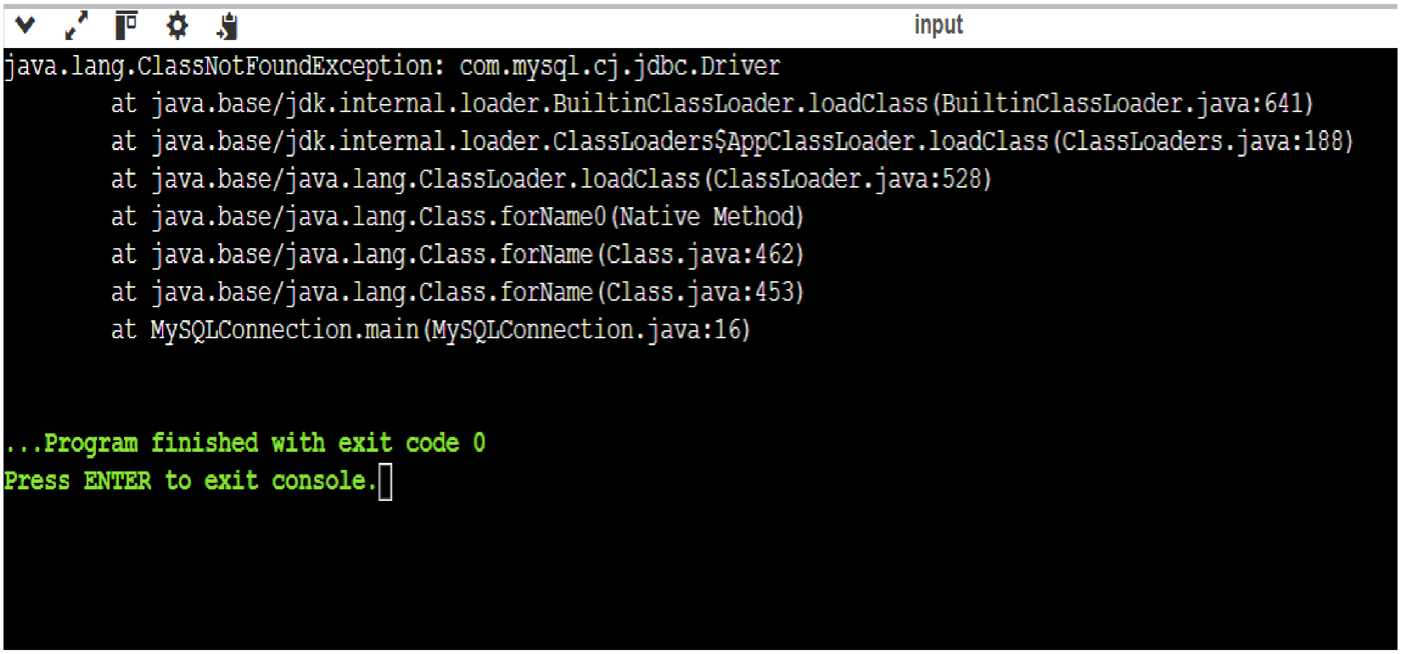
1. Aim:

Create a Java program to connect to a MySQL database and fetch data from a single table. The program should: Use DriverManager and Connection objects. Retrieve and display all records from a table named Employee with columns EmpID, Name, and Salary.

2. Implementation/Code:

```
 import java.sql.*;
public class MySQLConnection {
 public static void main(String[] args) {
  // Database credentials
  String url = "jdbc:mysql://localhost:3306/your_database"; // Replace with your
database name
  String user = "your_username"; // Replace with your username
  String password = "your_password"; // Replace with your password
        // SQL query to fetch employee records
        String query = "SELECT * FROM Employee";
        // Establish connection and retrieve data
        try {
            // Load MySQL JDBC Driver
            Class.forName("com.mysql.cj.jdbc.Driver");
            // Establish connection
            Connection conn = DriverManager.getConnection(url, user, password);
            Statement stmt = conn.createStatement();
            ResultSet rs = stmt.executeQuery(query);

            // Display employee records
            System.out.println("EmpID | Name | Salary");
            while (rs.next()) {
                int id = rs.getInt("EmpID");
                String name = rs.getString("Name");
                double salary = rs.getDouble("Salary");
                System.out.println(id + " | " + name + " | " + salary);
            }

            // Close resources
            rs.close();
            stmt.close();
            conn.close();
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

3. Output:



```
java.lang.ClassNotFoundException: com.mysql.cj.jdbc.Driver
        at java.base/jdk.internal.loader.BuiltinClassLoader.loadClass(BuiltinClassLoader.java:641)
        at java.base/jdk.internal.loader.ClassLoaders$AppClassLoader.loadClass(ClassLoaders.java:188)
        at java.base/java.lang.ClassLoader.loadClass(ClassLoader.java:528)
        at java.base/java.lang.Class.forName0(Native Method)
        at java.base/java.lang.Class.forName(Class.java:462)
        at java.base/java.lang.Class.forName(Class.java:453)
        at MySQLConnection.main(MySQLConnection.java:16)


...Program finished with exit code 0
Press ENTER to exit console.
```

Problem-2 (Medium)

1. Aim:

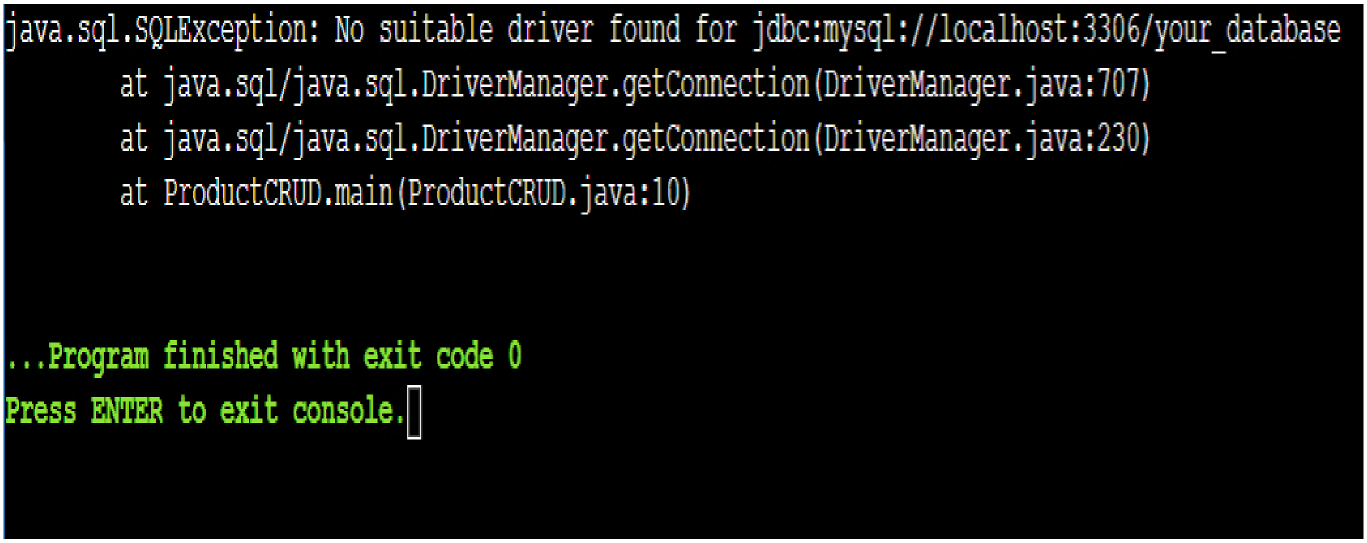
Build a program to perform CRUD operations (Create, Read, Update, Delete) on a database table Product with columns: ProductID, ProductName, Price, and Quantity. The program should include: Menu-driven options for each operation. Transaction handling to ensure data integrity.

2. Implementation/Code:

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

public class ProductCRUD {
    static final String URL = "jdbc:mysql://localhost:3306/your_database";
    static final String USER = "your_username";
    static final String PASSWORD = "your_password";

    public static void main(String[] args) {
        try (Connection conn = DriverManager.getConnection(URL, USER, PASSWORD);
         Scanner scanner = new Scanner(System.in)) {
        Class.forName("com.mysql.cj.jdbc.Driver");

        while (true) {
            System.out.println("\nProduct CRUD Menu:");
            System.out.println("1. Add Product");
            System.out.println("2. View Products");
            System.out.println("3. Update Product");
            System.out.println("4. Delete Product");
            System.out.println("5. Exit");
            System.out.print("Enter choice: ");
            int choice = scanner.nextInt();
            scanner.nextLine();

            switch (choice) {
                case 1:
                    addProduct(conn, scanner);
                    break;
                case 2:
                    viewProducts(conn);
                    break;
                case 3:
                    updateProduct(conn, scanner);
                    break;
                case 4:
                    deleteProduct(conn, scanner);
                    break;
                case 5:
                    System.out.println("Exiting...");
                    return;
                default:
                    System.out.println("Invalid choice, try again.");
            }
        }
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

```
    private static void addProduct(Connection conn, Scanner scanner) throws
SQLException {
        System.out.print("Enter Product Name: ");
        String name = scanner.nextLine();
        System.out.print("Enter Price: ");
        double price = scanner.nextDouble();
        System.out.print("Enter Quantity: ");
        int quantity = scanner.nextInt();

        String query = "INSERT INTO Product (ProductName, Price, Quantity) VALUES
(?, ?, ?)";
        try (PreparedStatement pstmt = conn.prepareStatement(query)) {
            pstmt.setString(1, name);
            pstmt.setDouble(2, price);
            pstmt.setInt(3, quantity);
            pstmt.executeUpdate();
            System.out.println("Product added successfully.");
        }
    }

    private static void viewProducts(Connection conn) throws SQLException {
        String query = "SELECT * FROM Product";
        try (Statement stmt = conn.createStatement(); ResultSet rs =
stmt.executeQuery(query)) {
            System.out.println("\nProduct List:");
            while (rs.next()) {
                System.out.println(rs.getInt("ProductID") + " | " + rs.getString("ProductName")
+ " | " + rs.getDouble("Price") + " | " + rs.getInt("Quantity"));
            }
        }
    }

    private static void updateProduct(Connection conn, Scanner scanner) throws
SQLException {
        System.out.print("Enter Product ID to update: ");
        int id = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter new Product Name: ");
        String name = scanner.nextLine();
        System.out.print("Enter new Price: ");
        double price = scanner.nextDouble();
        System.out.print("Enter new Quantity: ");
        int quantity = scanner.nextInt();

        String query = "UPDATE Product SET ProductName=?, Price=?, Quantity=?
WHERE ProductID=?";
        try (PreparedStatement pstmt = conn.prepareStatement(query)) {
            pstmt.setString(1, name);
            pstmt.setDouble(2, price);
            pstmt.setInt(3, quantity);
            pstmt.setInt(4, id);
            pstmt.executeUpdate();
            System.out.println("Product updated successfully.");
        }
    }

    private static void deleteProduct(Connection conn, Scanner scanner) throws
SQLException {
        System.out.print("Enter Product ID to delete: ");
        int id = scanner.nextInt();

        String query = "DELETE FROM Product WHERE ProductID=?";
        try (PreparedStatement pstmt = conn.prepareStatement(query)) {
            pstmt.setInt(1, id);
            pstmt.executeUpdate();
            System.out.println("Product deleted successfully.");
        }
    }
}
```

3. Output:



```
java.sql.SQLException: No suitable driver found for jdbc:mysql://localhost:3306/your_database
        at java.sql/java.sql.DriverManager.getConnection(DriverManager.java:707)
        at java.sql/java.sql.DriverManager.getConnection(DriverManager.java:230)
        at ProductCRUD.main(ProductCRUD.java:10)


...Program finished with exit code 0
Press ENTER to exit console.
```

Problem-3 (Hard)

1. Aim:

Develop a Java application using JDBC and MVC architecture to manage student data. The application should: Use a Student class as the model with fields like StudentID, Name, Department, and Marks. Include a database table to store student data. Allow the user to perform CRUD operations through a simple menu-driven view. Implement database operations in a separate controller class.

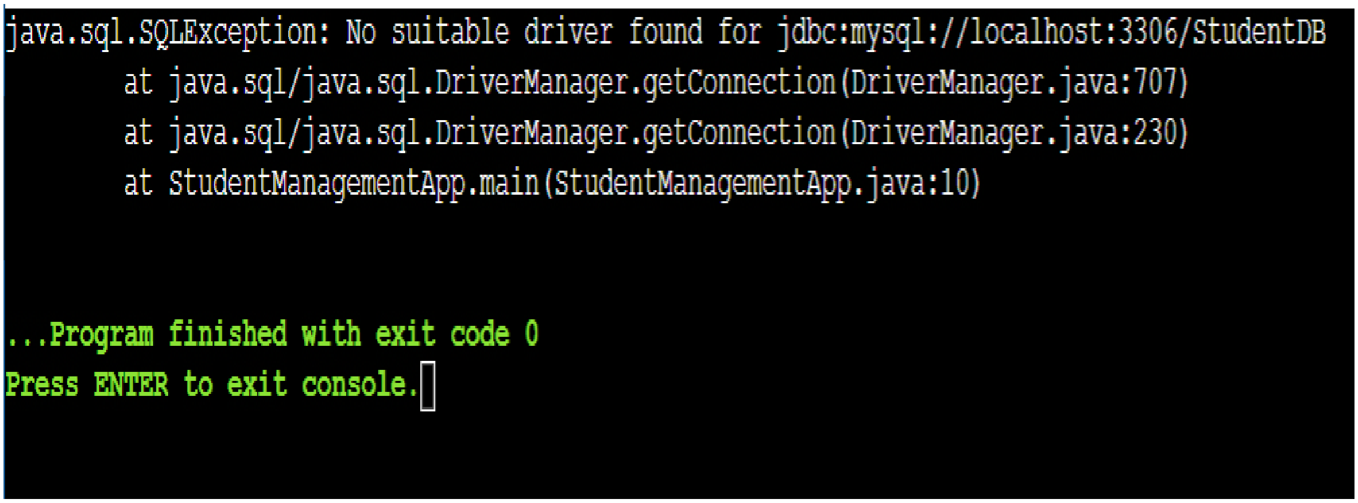
2. Implementation/Code:

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

public class StudentManagementApp {
  static final String URL = "jdbc:mysql://localhost:3306/StudentDB";
  static final String USER = "your_username";
  static final String PASSWORD = "your_password";

  public static void main(String[] args) {
    try (Connection conn = DriverManager.getConnection(URL, USER, PASSWORD);
     Scanner scanner = new Scanner(System.in)) {
    Class.forName("com.mysql.cj.jdbc.Driver");
    conn.setAutoCommit(false);

    while (true) {
        System.out.println("\nStudent Management System:");
        System.out.println("1. Add Student");
        System.out.println("2. View Students");
        System.out.println("3. Update Student");
        System.out.println("4. Delete Student");
        System.out.println("5. Exit");
        System.out.print("Enter choice: ");
        int choice = scanner.nextInt();
        scanner.nextLine();

        switch (choice) {
            case 1:
                addStudent(conn, scanner);
                break;
            case 2:
                viewStudents(conn);
                break;
            case 3:
                updateStudent(conn, scanner);
                break;
            case 4:
                deleteStudent(conn, scanner);
                break;
            case 5:
                System.out.println("Exiting...");
                return;
            default:
                System.out.println("Invalid choice, try again.");
        }
    }
} catch (Exception e) {
    e.printStackTrace();
}
```

```
    }

    private static void addStudent(Connection conn, Scanner scanner) throws
SQLException {
        System.out.print("Enter Student ID: ");
        int id = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter Name: ");
        String name = scanner.nextLine();
        System.out.print("Enter Department: ");
        String dept = scanner.nextLine();
        System.out.print("Enter Marks: ");
        double marks = scanner.nextDouble();

        String query = "INSERT INTO Student (StudentID, Name, Department, Marks)
VALUES (?, ?, ?, ?)";
        try (PreparedStatement pstmt = conn.prepareStatement(query)) {
            pstmt.setInt(1, id);
            pstmt.setString(2, name);
            pstmt.setString(3, dept);
            pstmt.setDouble(4, marks);
            pstmt.executeUpdate();
            conn.commit();
            System.out.println("Student added successfully.");
        } catch (SQLException e) {
            conn.rollback();
            throw e;
        }
    }

    private static void viewStudents(Connection conn) throws SQLException {
        String query = "SELECT * FROM Student";
        try (Statement stmt = conn.createStatement(); ResultSet rs =
stmt.executeQuery(query)) {
            System.out.println("\nStudent List:");
            while (rs.next()) {
                System.out.println(rs.getInt("StudentID") + " | " + rs.getString("Name") + " | "
+ rs.getString("Department") + " | " + rs.getDouble("Marks"));
```

```
            }
        }
    }

    private static void updateStudent(Connection conn, Scanner scanner) throws
SQLException {
        System.out.print("Enter Student ID to update: ");
        int id = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter new Name: ");
        String name = scanner.nextLine();
        System.out.print("Enter new Department: ");
        String dept = scanner.nextLine();
        System.out.print("Enter new Marks: ");
        double marks = scanner.nextDouble();

        String query = "UPDATE Student SET Name=?, Department=?, Marks=? WHERE
StudentID=?";
        try (PreparedStatement pstmt = conn.prepareStatement(query)) {
            pstmt.setString(1, name);
            pstmt.setString(2, dept);
            pstmt.setDouble(3, marks);
            pstmt.setInt(4, id);
            pstmt.executeUpdate();
            conn.commit();
            System.out.println("Student updated successfully.");
        } catch (SQLException e) {
            conn.rollback();
            throw e;
        }
    }

    private static void deleteStudent(Connection conn, Scanner scanner) throws
SQLException {
        System.out.print("Enter Student ID to delete: ");
        int id = scanner.nextInt();

        String query = "DELETE FROM Student WHERE StudentID=?";
        try (PreparedStatement pstmt = conn.prepareStatement(query)) {
            pstmt.setInt(1, id);
            pstmt.executeUpdate();
            conn.commit();
            System.out.println("Student deleted successfully.");
        } catch (SQLException e) {
            conn.rollback();
            throw e;
        }
    }
}
```

3. Output:



```
java.sql.SQLException: No suitable driver found for jdbc:mysql://localhost:3306/StudentDB
        at java.sql/java.sql.DriverManager.getConnection(DriverManager.java:707)
        at java.sql/java.sql.DriverManager.getConnection(DriverManager.java:230)
        at StudentManagementApp.main(StudentManagementApp.java:10)


...Program finished with exit code 0
Press ENTER to exit console.
```