

Experiment-7

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Subject Name: Java Lab

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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:

```
//Aditya Prabhakar
//22BCS12889

import java.sql.*;

public class SQLiteConnection {
    public static void main(String[] args) {
        String url = "jdbc:sqlite:employees.db"; // Your SQLite database file

        try {
            // Load SQLite JDBC Driver
            Class.forName("org.sqlite.JDBC");

            // Establish Connection
```

```
Connection conn = DriverManager.getConnection(url);
System.out.println("Connected to SQLite database!");

// Create Employee Table if it doesn't exist
String createTableSQL = "CREATE TABLE IF NOT EXISTS Employee ("
    + "EmpID INTEGER PRIMARY KEY AUTOINCREMENT, "
    + "Name TEXT NOT NULL, "
    + "Salary REAL NOT NULL"
    + ");";

Statement stmt = conn.createStatement();
stmt.execute(createTableSQL);
System.out.println("Employee table is ready.");

// Insert Sample Data (if table was empty)
String insertSQL = "INSERT INTO Employee (Name, Salary) "
    + "SELECT 'Alice', 50000.00 WHERE NOT EXISTS (SELECT 1
FROM Employee);";
stmt.execute(insertSQL);

// Query Employee Table
ResultSet rs = stmt.executeQuery("SELECT * FROM Employee");

// Display Results
System.out.println("Employee Details:");
while (rs.next()) {
    System.out.println("EmpID: " + rs.getInt("EmpID") +
        ", Name: " + rs.getString("Name") +
```

```
        ", Salary: " + rs.getDouble("Salary"));
    }

    // Close resources
    rs.close();
    stmt.close();
    conn.close();
    System.out.println("Database operation completed.");

} catch (ClassNotFoundException e) {
    System.out.println("SQLite JDBC Driver not found. Ensure sqlite-jdbc-
3.49.1.0.jar is in classpath.");
    e.printStackTrace();
} catch (SQLException e) {
    e.printStackTrace();
}
}
```

3. Output:

```
Connected to SQLite database!
Employee table is ready.
Employee Details:
EmpID: 1, Name: Alice, Salary: 50000.0
Database operation completed.
```

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:

```
//Aditya Prabhakar
//22BCS12889
import java.sql.*;
import java.util.Scanner;

public class ProductCRUD {
    static final String URL = "jdbc:sqlite:products.db"; // SQLite database file

    public static void main(String[] args) {
        try (Connection conn = DriverManager.getConnection(URL);
            Scanner scanner = new Scanner(System.in)) {

            Class.forName("org.sqlite.JDBC");
            createTable(conn); // Ensure the table exists

            while (true) {
                System.out.println("\n--- Product CRUD Menu ---");
                System.out.println("1. Create Product");
                System.out.println("2. Read 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();

switch (choice) {
    case 1:
        createProduct(conn, scanner);
        break;
    case 2:
        readProducts(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 createTable(Connection conn) throws SQLException {
    String sql = "CREATE TABLE IF NOT EXISTS Product ("
        + "ProductID INTEGER PRIMARY KEY AUTOINCREMENT, "
        + "ProductName TEXT NOT NULL, "
        + "Price REAL NOT NULL, "
        + "Quantity INTEGER NOT NULL);";
    try (Statement stmt = conn.createStatement()) {
        stmt.execute(sql);
    }
}

private static void createProduct(Connection conn, Scanner scanner) throws
SQLException {
```

```
System.out.print("Enter Product Name: ");
scanner.nextLine(); // Consume newline
String name = scanner.nextLine();
System.out.print("Enter Price: ");
double price = scanner.nextDouble();
System.out.print("Enter Quantity: ");
int quantity = scanner.nextInt();

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

private static void readProducts(Connection conn) throws SQLException {
    String sql = "SELECT * FROM Product";
    try (Statement stmt = conn.createStatement(); ResultSet rs =
stmt.executeQuery(sql)) {
        System.out.println("\n--- Product List ---");
        while (rs.next()) {
            System.out.println("ID: " + rs.getInt("ProductID") +
                                ", Name: " + rs.getString("ProductName") +
                                ", Price: " + rs.getDouble("Price") +
                                ", Quantity: " + 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();
    System.out.print("Enter new Price: ");
    double price = scanner.nextDouble();
    System.out.print("Enter new Quantity: ");
    int quantity = scanner.nextInt();
}
```

```
String sql = "UPDATE Product SET Price = ?, Quantity = ? WHERE ProductID =
?";
try (PreparedStatement pstmt = conn.prepareStatement(sql)) {
    pstmt.setDouble(1, price);
    pstmt.setInt(2, quantity);
    pstmt.setInt(3, id);
    int rowsAffected = pstmt.executeUpdate();
    System.out.println(rowsAffected > 0 ? "Product updated successfully!" : "Product
not found.");
}
}
private static void deleteProduct(Connection conn, Scanner scanner) throws
SQLException {
    System.out.print("Enter Product ID to delete: ");
    int id = scanner.nextInt();
    String sql = "DELETE FROM Product WHERE ProductID = ?";
    try (PreparedStatement pstmt = conn.prepareStatement(sql)) {
        pstmt.setInt(1, id);
        int rowsAffected = pstmt.executeUpdate();
        System.out.println(rowsAffected > 0 ? "Product deleted successfully!" : "Product
not found.");
    }
}
}
```

3. Output:

```
--- Product CRUD Menu ---
1. Create Product
2. Read Products
3. Update Product
4. Delete Product
5. Exit
Enter choice: 1
Enter Product Name: Apple
Enter Price: 500
Enter Quantity: 25
Product added successfully!
```

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:

```
//Aditya Prabhakar
//22BCS12889
import java.util.Scanner;

public class StudentManagementApp {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        StudentDAO dao = new StudentDAO();
        StudentView view = new StudentView();

        while (true) {
            System.out.println("\n--- Student 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("Choose an option: ");
            int choice = scanner.nextInt();

            switch (choice) {
                case 1:
                    scanner.nextLine(); // Consume newline
```



```
System.out.print("Enter Name: ");
String name = scanner.nextLine();
System.out.print("Enter Department: ");
String department = scanner.nextLine();
System.out.print("Enter Marks: ");
double marks = scanner.nextDouble();
dao.addStudent(new Student(0, name, department, marks));
break;
```

case 2:

```
view.displayStudents(dao.getAllStudents());
break;
```

case 3:

```
System.out.print("Enter Student ID to update: ");
int id = scanner.nextInt();
scanner.nextLine(); // Consume newline
System.out.print("Enter New Name: ");
String newName = scanner.nextLine();
System.out.print("Enter New Department: ");
String newDepartment = scanner.nextLine();
System.out.print("Enter New Marks: ");
double newMarks = scanner.nextDouble();
dao.updateStudent(id, newName, newDepartment, newMarks);
break;
```

case 4:

```
System.out.print("Enter Student ID to delete: ");
int deleteId = scanner.nextInt();
dao.deleteStudent(deleteId);
break;
```

case 5:

```
System.out.println("Exiting...");
scanner.close();
return;
```

default:

```
        System.out.println("Invalid choice, please try again.");  
    }  
}  
}
```

3. Output:

```
--- Student Management System ---  
1. Add Student  
2. View Students  
3. Update Student  
4. Delete Student  
5. Exit  
Choose an option: |
```