**ENTERPRISE ARCHITECTURE**

**Lab Sheet 1 - JDBC**

**GAM/IT/2022/F/0096**

**Part 1: Set Up MySQL Database**

* Install MySQL (if you haven't already) and create a database for the lab.
* Open MySQL Workbench or command line and execute the following SQL commands:

CREATE DATABASE employee\_db;

CREATE TABLE employees (

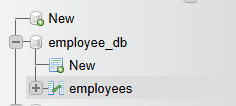
id INT PRIMARY KEY AUTO\_INCREMENT,

name VARCHAR(100),

position VARCHAR(100),

salary DECIMAL(10, 2)

);

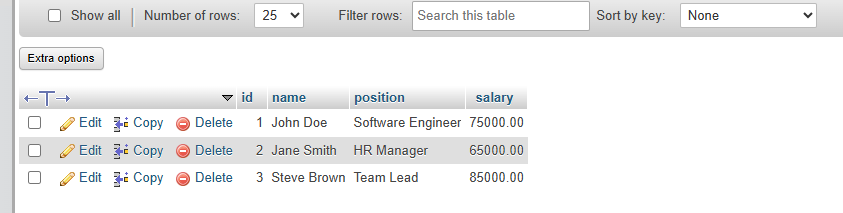
Output:

INSERT INTO employees (name, position, salary) VALUES ('John Doe', 'Software Engineer', 75000);

INSERT INTO employees (name, position, salary) VALUES ('Jane Smith', 'HR Manager', 65000);

INSERT INTO employees (name, position, salary) VALUES ('Steve Brown', 'Team Lead', 85000);

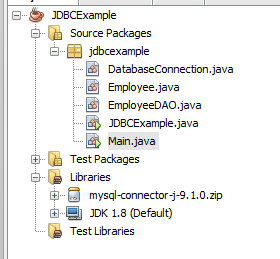
Output:



**Part 2: Set Up NetBeans Project**

1. Open NetBeans IDE 8.2.
2. Create a new Java application:
   * Go to File **>** New Project.
   * Select Java as the project type, and choose Java Application.
   * Name your project JDBCExample.
3. Add MySQL JDBC Driver to your project:
   * Right-click on the project in the Projects pane.
   * Select Properties.
   * In the Libraries tab, click Add JAR/Folder.
   * Navigate to the location of your mysql-connector-java-x.x.xx.jar file and add it.

Output:



**Part 3: Establish JDBC Connection**

* Create a DatabaseConnection.java class to establish a connection to your database.

package jdbcexample;

import java.sql.Connection;

import java.sql.DriverManager;

import java.sql.SQLException;

public class DatabaseConnection {

private static final String URL = "jdbc:mysql://localhost:3306/employee\_db"; // Database URL

private static final String USER = "root"; // Your MySQL username

private static final String PASSWORD = "password"; // Your MySQL password

public static Connection getConnection() throws SQLException {

try {

// Load the JDBC driver

Class.forName("com.mysql.cj.jdbc.Driver");

// Return the database connection

return DriverManager.getConnection(URL, USER, PASSWORD);

} catch (ClassNotFoundException | SQLException e) {

System.out.println("Connection failed: " + e.getMessage());

throw new SQLException("Failed to establish connection.");

}

}

**Part 4: Perform CRUD Operations**

* Create EmployeeDAO.java for CRUD Operations:

package jdbcexample;

import java.sql.\*;

import java.util.ArrayList;

import java.util.List;

public class EmployeeDAO {

// Create an employee

public static void addEmployee(String name, String position, double salary) {

String sql = "INSERT INTO employees (name, position, salary) VALUES (?, ?, ?)";

try (Connection conn = DatabaseConnection.getConnection();

PreparedStatement stmt = conn.prepareStatement(sql)) {

stmt.setString(1, name);

stmt.setString(2, position);

stmt.setDouble(3, salary);

int rowsAffected = stmt.executeUpdate();

System.out.println("Employee added successfully. Rows affected: " + rowsAffected);

} catch (SQLException e) {

e.printStackTrace()

}

}

// Read all employees

public static List<Employee> getAllEmployees() {

List<Employee> employees = new ArrayList<>();

String sql = "SELECT \* FROM employees";

try (Connection conn = DatabaseConnection.getConnection();

Statement stmt = conn.createStatement();

ResultSet rs = stmt.executeQuery(sql)) {

while (rs.next()) {

Employee employee = new Employee(

rs.getInt("id"),

rs.getString("name"),

rs.getString("position"),

rs.getDouble("salary")

);

employees.add(employee);

}

} catch (SQLException e) {

e.printStackTrace();

}

return employees;

}

// Update an employee's information

public static void updateEmployee(int id, String name, String position, double salary) {

String sql = "UPDATE employees SET name = ?, position = ?, salary = ? WHERE id = ?";

try (Connection conn = DatabaseConnection.getConnection();

PreparedStatement stmt = conn.prepareStatement(sql)) {

stmt.setString(1, name);

stmt.setString(2, position);

stmt.setDouble(3, salary);

stmt.setInt(4, id);

int rowsAffected = stmt.executeUpdate();

System.out.println("Employee updated successfully. Rows affected: " + rowsAffected);

} catch (SQLException e) {

e.printStackTrace();

}

}

// Delete an employee

public static void deleteEmployee(int id) {

String sql = "DELETE FROM employees WHERE id = ?";

try (Connection conn = DatabaseConnection.getConnection();

PreparedStatement stmt = conn.prepareStatement(sql)) {

stmt.setInt(1, id);

int rowsAffected = stmt.executeUpdate();

System.out.println("Employee deleted successfully. Rows affected: " + rowsAffected);

} catch (SQLException e) {

e.printStackTrace();

}

}

}

**Part 5: Create Employee.java Class**

* Create a simple Employee.java POJO (Plain Old Java Object) to represent employee data.

package jdbcexample;

public class Employee {

private int id;

private String name;

private String position;

private double salary;

public Employee(int id, String name, String position, double salary) {

this.id = id;

this.name = name;

this.position = position;

this.salary = salary;

}

// Getters and setters

public int getId() { return id; }

public void setId(int id) { this.id = id; }

public String getName() { return name; }

public void setName(String name) { this.name = name; }

public String getPosition() { return position; }

public void setPosition(String position) { this.position = position; }

public double getSalary() { return salary; }

public void setSalary(double salary) { this.salary = salary; }

@Override

public String toString() {

return "Employee{id=" + id + ", name='" + name + "', position='" + position + "', salary=" + salary + '}';

}

}

**Part 6: Test the Application**

* Create a **Main.java** class to test the CRUD operations.

package jdbcexample;

import java.util.List;

public class Main {

public static void main(String[] args) {

// Add employees

EmployeeDAO.addEmployee("Alice Cooper", "Developer", 70000);

EmployeeDAO.addEmployee("Bob Marley", "Manager", 80000);

// Update employee

EmployeeDAO.updateEmployee(1, "John Doe", "Senior Software Engineer", 90000);

// Get all employees

List<Employee> employees = EmployeeDAO.getAllEmployees();

employees.forEach(System.out::println);

// Delete employee

EmployeeDAO.deleteEmployee(2);

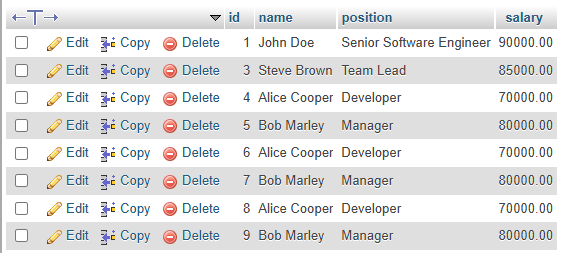
}

}

**Part 7:**

**Run the Application**

* **Run the program** and observe how the database is updated with the CRUD operations.
  + First, the employees will be added to the database.
  + Then, one employee's details will be updated.
  + All employees will be fetched and displayed in the console.
  + Finally, one employee will be deleted.

Output: