

1. Write a Java program to connect to a MySQL database using JDBC.
2. Create a Java class to insert student records into a database table.
3. Write a JDBC program to fetch and display all student records from the database.
4. Develop a program to search a student by ID using JDBC.
5. Implement an update operation to modify student details in the database using JDBC.
6. Write a Java program to delete a student record from the database using JDBC
7. Develop a program to sort student data in ascending order by name using SQL in JDBC.
8. Write a program to display all students whose percentage is greater than 75 using JDBC and SQL WHERE clause.

```
package Jdbc_conn;

import java.sql.Connection; import java.sql.DriverManager; import java.sql.ResultSet;
import java.sql.SQLException; import java.sql.Statement;

public class Mini_Project {
```

```

public static void main(String[] args) throws ClassNotFoundException,
SQLException {
    String url="jdbc:mysql://localhost:3306/db";
    String user="root";
    String password="j12@KOTA";
    Class.forName("com.mysql.cj.jdbc.Driver");

    Connection con=DriverManager.getConnection(url,user,password);
    System.out.println("Connection Created");
    Statement stmt=con.createStatement();

    // stmt.executeUpdate("create table student (rollno int,name varchar(50),city
    varchar(50),inst_name varchar(50),per int)"); // System.out.println("Table created");

    // stmt.executeUpdate("insert into student values(1, 'Sai', 'Hyderabad', 'ABC College', 85),
    // +(2, 'Nikhil', 'Vijayawada', 'XYZ College', 78) // +(3, 'Kumar', 'Hyderabad', 'PQR
    College', 92) // +(4, 'Eswar', 'Vijayawada', 'LMN College', 81) // +(5, 'Ram', 'Guntur', 'DEF
    College', 89);");

    // System.out.println(stmt.executeUpdate("insert into student values(1, 'Sai', 'Hyderabad',
    'ABC College', 85), " // +(2, 'Nikhil', 'Vijayawada', 'XYZ College', 78), " // +(3, 'Kumar',
    'Hyderabad', 'PQR College', 92), " // +(4, 'Eswar', 'Vijayawada', 'LMN College', 81), " // +(5,
    'Ram', 'Guntur', 'DEF College', 89);")+" rows of data inserted successfully");

    //stmt.executeUpdate("update student set city='Rajamundry' where
    rollno=5");

    // ResultSet rs=stmt.executeQuery("select * from student"); //
    System.out.println("rollno"+'\t'+name+'\t'+city+'\t'+inst_name+'\t'+per); //
    while(rs.next()) // { int rollno=rs.getInt("rollno"); // String name=rs.getString("name"); //
    String city=rs.getString("city"); // String inst_name=rs.getString("inst_name"); // int
    per=rs.getInt("per"); //

    // System.out.println(rollno+'\t'+name+'\t'+city+'\t'+inst_name+'\t'+per); // }

```

```

// ResultSet rs=stmt.executeQuery("select * from student where per=(select max(per) from
student)"); //
System.out.println("rollno"+"\t"+ "name" +"\t" + "city" +"\t\t" + "inst_name" +"\t" + "per"); //
while(rs.next()) // { // int rollno=rs.getInt("rollno"); // String name=rs.getString("name"); //
String city=rs.getString("city"); // String inst_name=rs.getString("inst_name"); // int
per=rs.getInt("per"); //

// System.out.println(rollno+"\t"+name+"\t"+city+"\t"+inst_name+"\t"+per); //

// ResultSet rs=stmt.executeQuery("select * from student order by per asc"); //
System.out.println("rollno"+"\t"+ "name" +"\t" + "city" +"\t\t" + "inst_name" +"\t" + "per"); //
while(rs.next()) // { // int rollno=rs.getInt("rollno"); // String name=rs.getString("name"); //
String city=rs.getString("city"); // String inst_name=rs.getString("inst_name"); // int
per=rs.getInt("per"); //

// System.out.println(rollno+"\t"+name+"\t"+city+"\t"+inst_name+"\t"+per); //

// ResultSet rs = stmt.executeQuery( // "SELECT city, COUNT() as student_count " +
// "FROM stud " + // "GROUP BY city " + // "HAVING COUNT() > 1" // ); //
System.out.println("city"+ "\t\t" + "count"); // while(rs.next()) // { // String
city=rs.getString("city"); // int student_count=rs.getInt("student_count"); //

//
// System.out.println(city+ "\t" + student_count); //

//stmt.executeUpdate("alter table student add age int");
//stmt.executeUpdate("update student set age=20 where rollno=1");

// stmt.executeUpdate("update student set age=21 where rollno=2"); //
stmt.executeUpdate("update student set age=22 where rollno=3"); //
stmt.executeUpdate("update student set age=23 where rollno=4"); //
stmt.executeUpdate("update student set age=24 where rollno=5");

//stmt.executeUpdate("alter table student modify age float");

// stmt.executeUpdate("alter table student modify age int"); // ResultSet
rs=stmt.executeQuery("select * from student"); //
System.out.println("rollno"+ "\t" + "name" + "\t" + "city" + "\t\t" + "inst_name" + "\t" + "per" + "\t" + "ag

```

```

e"); // while(rs.next()) // { // int rollno=rs.getInt("rollno"); // String
name=rs.getString("name"); // String city=rs.getString("city"); // String
inst_name=rs.getString("inst_name"); // int per=rs.getInt("per"); // int age=rs.getInt("age");
// 

// System.out.println(rollno+"\t"+name+"\t"+city+"\t"+inst_name+"\t"+per+"\t"+age); // }

//stmt.executeUpdate("rename table student to stud");
ResultSet rs=stmt.executeQuery("show tables");
while(rs.next())
{
    String tn=rs.getString(1);
    System.out.println(tn);
}

// ResultSet rs=stmt.executeQuery("select * from stud"); //
System.out.println("rollno"+ "\t" + "name" + "\t" + "city" + "\t" + "inst_name" + "\t" + "per" + "\t" + "ag
e"); // while(rs.next()) // { // int rollno=rs.getInt("rollno"); // String
name=rs.getString("name"); // String city=rs.getString("city"); // String
inst_name=rs.getString("inst_name"); // int per=rs.getInt("per"); // int age=rs.getInt("age");
// 

// System.out.println(rollno+"\t"+name+"\t"+city+"\t"+inst_name+"\t"+per+"\t"+age); // }

//System.out.println(stmt.executeUpdate("delete from stud where
rollno=5")+"rows deleted");
//stmt.executeUpdate("truncate table student");
//stmt.executeUpdate("drop table student");

// stmt.executeUpdate("create table institute (inst_name varchar(50),Fee int)"); //
System.out.println("Table created"); // stmt.executeUpdate("insert into institute
values('ABC College',20000),('XYZ College',40000),('PQR College',25000),('LMN
College',40000),('AZB College',56000)"); // ResultSet rs=stmt.executeQuery("select * from

```

```
institute"); // System.out.println("Institution Name"+\t"+City"); // while(rs.next()) // { //
System.out.println(rs.getString("inst_name")+\t"+rs.getInt("Fee")); // }

// ResultSet rs=stmt.executeQuery("select * from stud inner join institute on
stud.inst_name=institute.inst_name"); //

// while(rs.next()) // { //
System.out.println(rs.getInt("rollno")+\t"+rs.getString("name")+\t"+rs.getString("city")+\t
"+rs.getString("inst_name")+\t"+rs.getInt("per")+\t"+rs.getInt("age")+\t"+rs.getString("ins
t_name")+\t"+rs.getInt("Fee")); // }

// ResultSet rs=stmt.executeQuery("select * from stud left join institute on
stud.inst_name=institute.inst_name"); // while(rs.next()) // { //
System.out.println(rs.getInt("rollno")+\t"+rs.getString("name")+\t"+rs.getString("city")+\t
"+rs.getString("inst_name")+\t"+rs.getInt("per")+\t"+rs.getInt("age")+\t"+rs.getString("ins
t_name")+\t"+rs.getInt("Fee")); // }

//

// ResultSet rs=stmt.executeQuery("select * from stud right join institute on
stud.inst_name=institute.inst_name"); // while(rs.next()) // { //
System.out.println(rs.getInt("rollno")+\t"+rs.getString("name")+\t"+rs.getString("city")+\t
"+rs.getString("inst_name")+\t"+rs.getInt("per")+\t"+rs.getInt("age")+\t"+rs.getString("ins
t_name")+\t"+rs.getInt("Fee")); // }

// ResultSet rs=stmt.executeQuery("select * from stud full join institute;"); //
while(rs.next()) // { //
System.out.println(rs.getInt("rollno")+\t"+rs.getString("name")+\t"+rs.getString("city")+\t
"+rs.getString("inst_name")+\t"+rs.getInt("per")+\t"+rs.getInt("age")+\t"+rs.getString("ins
t_name")+\t"+rs.getInt("Fee")); // }

}

}

}
```

**Use PreparedStatement to insert multiple student records into the database.**

```
package Jdbc_conn;

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.util.ArrayList;
import java.util.List;
import java.sql.*;
import java.util.*;

// 1. Student class (Java Bean)

class Student {
    int rollno;
    String name;
    int age;

    Student(int rollno, String name, int age) {
        this.rollno = rollno;
```

```
this.name = name;  
this.age = age;  
}  
  
}  
  
public class prepare_stmt1 {  
    public static void main(String[] args) {  
        // 2. Database credentials  
  
        String url = "jdbc:mysql://localhost:3306/db"; // Replace with your DB name  
  
        String user = "root"; // Replace with your DB user  
  
        String password = "j12@KOTA"; // Replace with your DB password  
  
        // 3. List of students to insert  
  
        List<Student> students = new ArrayList<>();  
  
        students.add(new Student(101, "Neeva Sharma", 20));  
  
        students.add(new Student(102, "Reeva Sharma", 20));  
  
        students.add(new Student(103, "Shiva Upadhyay", 20));  
  
        students.add(new Student(104, "Amit Verma", 22));  
  
        students.add(new Student(105, "Sonal Mehta", 19));  
  
        // 4. JDBC code  
  
        try (Connection con = DriverManager.getConnection(url, user, password)) {
```

```
// Insert records

String insertQuery = "INSERT INTO students1 (rollno, name, age) VALUES (?, ?, ?)";

PreparedStatement insertPst = con.prepareStatement(insertQuery);

for (Student s : students) {

    insertPst.setInt(1, s.rollno);

    insertPst.setString(2, s.name);

    insertPst.setInt(3, s.age);

    insertPst.addBatch() // Adds this set of data to the batch

}

int[] result = insertPst.executeBatch() // Executes all insertions

System.out.println(result.length + " records inserted successfully.\n");

// Fetch and print all records

String selectQuery = "SELECT * FROM students1";

PreparedStatement selectPst = con.prepareStatement(selectQuery);

ResultSet rs = selectPst.executeQuery();

System.out.println("ID\tName\t\tMarks");

System.out.println("-----");

while (rs.next()) {
```

```

        int rollno = rs.getInt("rollno");

        String name = rs.getString("name");

        int age = rs.getInt("age");

        System.out.printf("%d\t%-20s\t%d\n", rollno, name, age);

    }

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

```

## 17. Create a Hospital Management System database. Using JDBC, implement:

- Register new patient
- Assign doctor
- Generate billing

### MySQL Table Creation Script

CREATE DATABASE IF NOT EXISTS hospital\_db;

USE hospital\_db;

-- Staff Table

```
CREATE TABLE staff (
    staff_id INT AUTO_INCREMENT PRIMARY KEY,
    username VARCHAR(50) UNIQUE NOT NULL,
    password VARCHAR(100) NOT NULL,
    role ENUM('Admin', 'Staff') NOT NULL
);
```

-- Patients Table

```
CREATE TABLE patients (
    patient_id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100) NOT NULL,
    age INT,
    gender ENUM('Male', 'Female', 'Other'),
    phone VARCHAR(15),
    address VARCHAR(255)
);
```

-- Doctors Table

```
CREATE TABLE doctors (
    doctor_id INT AUTO_INCREMENT PRIMARY KEY,
    name VARCHAR(100),
    specialization VARCHAR(100),
    phone VARCHAR(15)
);
```

-- Appointments Table

```
CREATE TABLE appointments (
    appointment_id INT AUTO_INCREMENT PRIMARY KEY,
    patient_id INT,
    doctor_id INT,
    appointment_date DATE,
    reason VARCHAR(255),
    FOREIGN KEY (patient_id) REFERENCES
    patients(patient_id),
```

```
    FOREIGN KEY (doctor_id) REFERENCES
    doctors(doctor_id)
);
```

-- Billing Table

```
CREATE TABLE billing (
    billing_id INT AUTO_INCREMENT PRIMARY KEY,
    patient_id INT,
    appointment_id INT,
    total_amount DECIMAL(10,2),
    discharge_date DATE,
    summary TEXT,
    FOREIGN KEY (patient_id) REFERENCES
    patients(patient_id),
    FOREIGN KEY (appointment_id) REFERENCES
    appointments(appointment_id)
);
```



Java Code Structure

## **1. DBConnection.java**

```
import java.sql.Connection;  
  
import java.sql.DriverManager;  
  
  
  
public class DBConnection {  
  
    private static final String URL =  
"jdbc:mysql://localhost:3306/hospital_db";  
  
    private static final String USER = "root";  
  
    private static final String PASSWORD = "root";  
  
  
  
    public static Connection getConnection() throws  
Exception {  
  
    Class.forName("com.mysql.cj.jdbc.Driver");  
  
    return DriverManager.getConnection(URL, USER,  
PASSWORD);  
  
}  
}
```

## **2. LoginService.java**

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

public class LoginService {

    public static boolean login(String username, String
password) {

        try (Connection con =
DBConnection.getConnection()) {

            String query = "SELECT * FROM staff WHERE
username = ? AND password = ?";

            PreparedStatement ps =
con.prepareStatement(query);

            ps.setString(1, username);

            ps.setString(2, password);

            ResultSet rs = ps.executeQuery();

            return rs.next(); // login success if a match is found
        } catch (Exception e) {

            e.printStackTrace();
        }
    }
}
```

```
        return false;  
    }  
}  
}
```

### 3. PatientService.java

```
import java.sql.*;  
  
import java.util.Scanner;  
  
  
  
public class PatientService {  
    public static void registerPatient(Scanner sc) {  
        try (Connection con =  
DBConnection.getConnection()) {  
            System.out.print("Name: ");  
            String name = sc.nextLine();  
            System.out.print("Age: ");  
            int age = sc.nextInt();  
            sc.nextLine();
```

```
System.out.print("Gender: ");
String gender = sc.nextLine();

System.out.print("Phone: ");
String phone = sc.nextLine();

System.out.print("Address: ");
String address = sc.nextLine();

String sql = "INSERT INTO patients (name, age,
gender, phone, address) VALUES (?, ?, ?, ?, ?)";

PreparedStatement ps =
con.prepareStatement(sql);

ps.setString(1, name);
ps.setInt(2, age);
ps.setString(3, gender);
ps.setString(4, phone);
ps.setString(5, address);

ps.executeUpdate();
```

```
        System.out.println("✓ Patient registered  
successfully.");  
    } catch (Exception e) {  
        e.printStackTrace();  
    }  
}
```

```
public static void viewPatients() {  
    try (Connection con =  
DBConnection.getConnection()) {  
        String sql = "SELECT * FROM patients";  
        Statement stmt = con.createStatement();  
        ResultSet rs = stmt.executeQuery(sql);  
  
        System.out.printf("\n%-5s %-20s %-5s %-10s %-  
15s %-30s\n", "ID", "Name", "Age", "Gender", "Phone",  
"Address");  
        while (rs.next()) {
```

```
        System.out.printf("%-5d %-20s %-5d %-10s %-\n"
15s %-30s\n",
                rs.getInt("patient_id"),
rs.getString("name"), rs.getInt("age"),
                rs.getString("gender"),
rs.getString("phone"), rs.getString("address"));

        }

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

}
```

#### 4. AppointmentService.java

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

public class AppointmentService {
```

```
public static void bookAppointment(Scanner sc) {  
    try (Connection con =  
        DBConnection.getConnection()) {  
  
        System.out.print("Enter Patient ID: ");  
  
        int patientId = sc.nextInt();  
  
        System.out.print("Enter Doctor ID: ");  
  
        int doctorId = sc.nextInt();  
  
        sc.nextLine();  
  
        System.out.print("Enter Appointment Date (YYYY-  
MM-DD): ");  
  
        String date = sc.nextLine();  
  
        System.out.print("Reason: ");  
  
        String reason = sc.nextLine();  
  
        String sql = "INSERT INTO appointments  
(patient_id, doctor_id, appointment_date, reason)  
VALUES (?, ?, ?, ?)";  
  
        PreparedStatement ps =  
            con.prepareStatement(sql);
```

```
        ps.setInt(1, patientId);

        ps.setInt(2, doctorId);

        ps.setDate(3, Date.valueOf(date));

        ps.setString(4, reason);

        ps.executeUpdate();

        System.out.println("☑ Appointment booked.");

    } catch (Exception e) {

        e.printStackTrace();

    }

}
```

## 5. BillingService.java

```
import java.sql.*;

import java.util.Scanner;

public class BillingService {
```

```
public static void generateBill(Scanner sc) {  
    try (Connection con =  
        DBConnection.getConnection()) {  
  
        System.out.print("Enter Appointment ID: ");  
  
        int appointmentId = sc.nextInt();  
  
        sc.nextLine();  
  
        System.out.print("Enter Patient ID: ");  
  
        int patientId = sc.nextInt();  
  
        sc.nextLine();  
  
        System.out.print("Enter Total Amount: ");  
  
        double amount = sc.nextDouble();  
  
        sc.nextLine();  
  
        System.out.print("Enter Discharge Date (YYYY-  
MM-DD): ");  
  
        String date = sc.nextLine();  
  
        System.out.print("Enter Summary: ");  
  
        String summary = sc.nextLine();
```

```
String sql = "INSERT INTO billing (patient_id,  
appointment_id, total_amount, discharge_date,  
summary) VALUES (?, ?, ?, ?, ?);  
  
PreparedStatement ps =  
con.prepareStatement(sql);  
  
ps.setInt(1, patientId);  
  
ps.setInt(2, appointmentId);  
  
ps.setDouble(3, amount);  
  
ps.setDate(4, Date.valueOf(date));  
  
ps.setString(5, summary);  
  
  
  
ps.executeUpdate();  
  
System.out.println("☑ Billing generated.");  
} catch (Exception e) {  
e.printStackTrace();  
}  
}  
}
```

## 6. Main.java

```
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("👤 Username: ");

        String username = sc.nextLine();

        System.out.print("🔒 Password: ");

        String password = sc.nextLine();

        if (!LoginService.login(username, password)) {

            System.out.println("✖ Login failed. Exiting...");

            return;
        }
    }
}
```

```
while (true) {  
    System.out.println("\n  Hospital Management  
Menu");  
    System.out.println("1. Register Patient");  
    System.out.println("2. View Patients");  
    System.out.println("3. Book Appointment");  
    System.out.println("4. Generate Billing");  
    System.out.println("5. Exit");  
    System.out.print("Choose option: ");  
    int choice = sc.nextInt();  
  
    switch (choice) {  
        case 1 -> PatientService.registerPatient(sc);  
        case 2 -> PatientService.viewPatients();  
        case 3 ->  
            AppointmentService.bookAppointment(sc);  
        case 4 -> BillingService.generateBill(sc);  
        case 5 -> {  
    }  
}
```

```
        System.out.println("⬅ END Goodbye!");

    return;

}

default -> System.out.println(" ? Invalid
option");

}

}

}
```

## 1. Set Up MySQL Database

Run the **SQL script** to create the database and tables:

-- Paste this into MySQL Workbench or CLI

```
CREATE DATABASE IF NOT EXISTS hospital_db;
```

```
USE hospital_db;
```

```
CREATE TABLE staff (
```

```
staff_id INT AUTO_INCREMENT PRIMARY KEY,  
username VARCHAR(50) UNIQUE NOT NULL,  
password VARCHAR(100) NOT NULL,  
role ENUM('Admin', 'Staff') NOT NULL  
);
```

```
CREATE TABLE patients (  
patient_id INT AUTO_INCREMENT PRIMARY KEY,  
name VARCHAR(100) NOT NULL,  
age INT,  
gender ENUM('Male', 'Female', 'Other'),  
phone VARCHAR(15),  
address VARCHAR(255)  
);
```

```
CREATE TABLE doctors (  
doctor_id INT AUTO_INCREMENT PRIMARY KEY,  
name VARCHAR(100),
```

```
specialization VARCHAR(100),  
phone VARCHAR(15)  
);
```

```
CREATE TABLE appointments (  
    appointment_id INT AUTO_INCREMENT PRIMARY KEY,  
    patient_id INT,  
    doctor_id INT,  
    appointment_date DATE,  
    reason VARCHAR(255),  
    FOREIGN KEY (patient_id) REFERENCES  
    patients(patient_id),  
    FOREIGN KEY (doctor_id) REFERENCES  
    doctors(doctor_id)  
);
```

```
CREATE TABLE billing (  
    billing_id INT AUTO_INCREMENT PRIMARY KEY,
```

```
patient_id INT,  
appointment_id INT,  
total_amount DECIMAL(10,2),  
discharge_date DATE,  
summary TEXT,  
FOREIGN KEY (patient_id) REFERENCES  
patients(patient_id),  
FOREIGN KEY (appointment_id) REFERENCES  
appointments(appointment_id)  
);
```