AMITY UNIVERSITY, PATNA
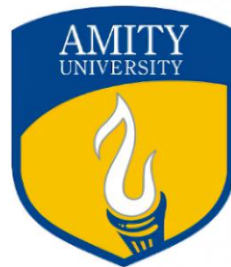
AMITY INSTITUTE OF INFORMATION TECHNOLOGY

Advanced Java Lab
LAB FILE

BCA

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CRUD OPERATIONS

Problem Statement : Connecting JDBC to Eclipse for CRUD Operations with Menu Options.

Objective

The objective of this project is to create a Java program in Eclipse that connects to a database using JDBC (Java Database Connectivity) and allows users to perform CRUD (Create, Read, Update, Delete) operations on a student table. The program will present users with a menu containing six options: insert, select, update student's name, update student's age, update student's gender, delete a record, and exit. Users will be able to interact with the program through the console to manipulate the student records stored in the database.

Detailed Requirements :

1. Database Connectivity - The program must establish a connection to a relational database management system (RDBMS) using JDBC. Database connection parameters such as URL, username, and password should be configurable and provided as constants or properties in the program.

2. Menu Options - The program should display a menu with options like Insert, Select, Update Student's name, Update Student's age, Update Student's gender, Delete and Exit option. Users will input the corresponding option number to execute the desired operation.

3. Insert Operation - Upon selecting the insert option, users will be prompted to input the student's ID, name, age, marks, and gender through the keyboard. The program will then insert this data into the student table in the database.

4. Select Operation - Selecting the select option will display all records from the student table. The program should fetch and display the student ID, name, age, marks, and gender for each record in the table.

5. Update Operation - The program should provide separate options to update the student's name, age, and gender. Upon selecting any of these options, users will input the student ID whose details need to be updated, followed by the new value for the corresponding field. The program will then update the specified field for the given student ID in the database.

6. Delete Operation - Selecting the delete option will prompt users to input the student ID of the record they want to delete. The program will delete the record with the specified student ID from the student table in the database.

7. Error Handling - The program should handle exceptions gracefully, displaying meaningful

error messages to users in case of connection failures, SQL errors, or invalid input. It should also validate user inputs to prevent SQL injection attacks or database errors due to incorrect data formats.

7. Exit - Upon selecting the exit option, the program will terminate gracefully, closing any open resources and releasing database connections.

Tools and Technologies used : Eclipse IDE and Oracle Database 21C Express Edition

Design

Table description -

```
SQL> desc student_info;
 Name                                      Null?    Type
 ----------------------------------------- -------- ------------------------------
 ID                                                 NUMBER
 NAME                                               VARCHAR2(20)
 AGE                                                NUMBER
 MARKS                                              NUMBER
 GENDER                                             VARCHAR2(12)
```
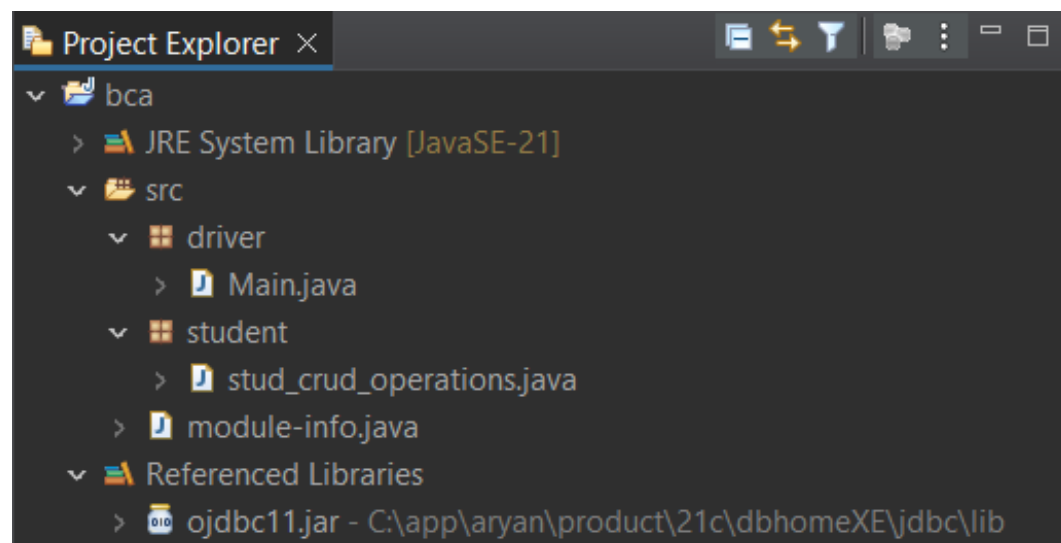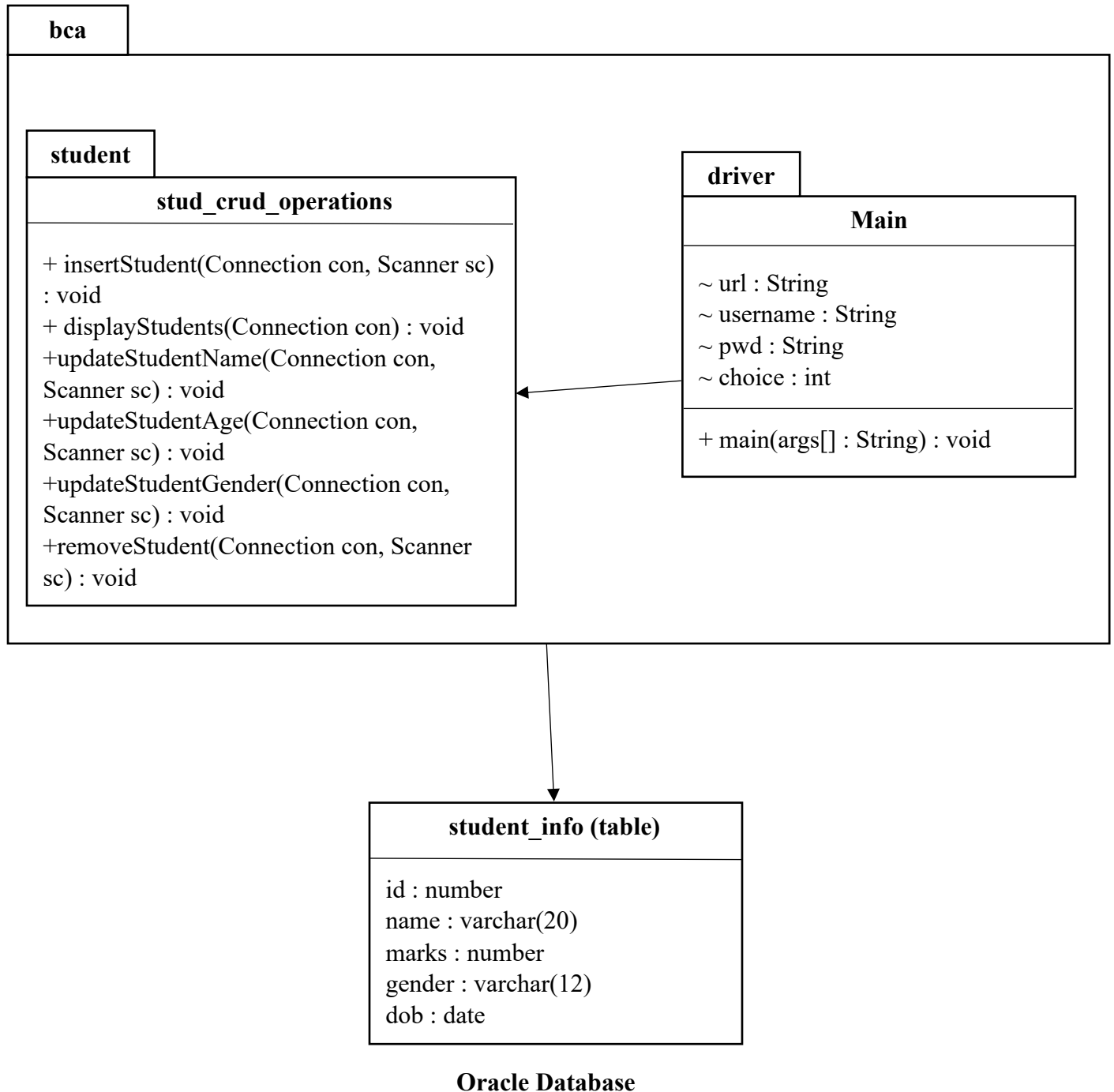
Project Explorer -

Class Diagram – The class digram for our project will be as follows :

bca

student

stud_crud_operations
+ insertStudent(Connection con, Scanner sc) : void + displayStudents(Connection con) : void +updateStudentName(Connection con, Scanner sc) : void +updateStudentAge(Connection con, Scanner sc) : void +updateStudentGender(Connection con, Scanner sc) : void +removeStudent(Connection con, Scanner sc) : void

driver

Main
~ url : String ~ username : String ~ pwd : String ~ choice : int
+ main(args[] : String) : void

student_info (table)
id : number name : varchar(20) marks : number gender : varchar(12) dob : date

Oracle Database

CODE

<u>stud crud operations.java</u>

```java
package student;


import java.sql.Connection;

import java.sql.ResultSet;

import java.sql.SQLException;

import java.sql.Statement;

import java.util.Scanner;


public class stud_crud_operations {
 public stud_crud_operations() {

      super();

 }
 public void insertStudent(Connection con, Scanner sc) throws
SQLException {

          Statement st = con.createStatement();

          System.out.println("Enter the student's Id: ");

          int id = sc.nextInt();


          System.out.println("Enter the student's name: ");

          String name = sc.next();


          System.out.println("Enter the student's age: ");

          int age = sc.nextInt();


          System.out.println("Enter the student's marks: ");

          double marks = sc.nextDouble();


          System.out.println("Enter the student's gender: ");
```

CODE

```java
        String gender = sc.next();


        String query = String.format("insert into student_info
values(%d, '%s', %d, %f, '%s')", id, name, age, marks, gender);


        int rowsAffected = st.executeUpdate(query);
        System.out.println(rowsAffected + " record
inserted!!!");


    }
 public void displayStudents(Connection con) throws SQLException
{
        Statement st = con.createStatement();
        ResultSet rs = st.executeQuery("select * from
student_info");
        while(rs.next()) {
            System.out.println(rs.getInt(1) + "   " +
rs.getString(2)+"  " + rs.getInt(3) + "   " + rs.getDouble(4)+"
"+rs.getString(5));
        }
    }
 public void updateStudentAge(Connection con, Scanner sc) throws
SQLException {
        Statement st = con.createStatement();
        System.out.println("Enter the student's id: ");
        int id = sc.nextInt();
        System.out.println("Enter the student's new age: ");
        int age = sc.nextInt();
       String query = String.format("update student_info set
age=%d where id = %d", age,id);
        int rowsAffected = st.executeUpdate(query);
```

CODE

```java
            System.out.println(rowsAffected+ " record
updated!!!");
      }
 public void updateStudentName(Connection con, Scanner sc)
throws SQLException {
            Statement st = con.createStatement();
            System.out.println("Enter the student's id: ");
            int id = sc.nextInt();
            System.out.println("Enter the student's new name: ");
            String name = sc.next();
        String query = String.format("update student_info set
name='%s' where id = %d", name,id);
            int rowsAffected = st.executeUpdate(query);
            System.out.println(rowsAffected+ " record
updated!!!");
      }
 public void updateStudentGender(Connection con, Scanner sc)
throws SQLException {
            Statement st = con.createStatement();
            System.out.println("Enter the student's id: ");
            int id = sc.nextInt();
            System.out.println("Enter the student's new name: ");
            String gender = sc.next();
     String query = String.format("update student_info set
gender='%s' where id = %d", gender,id);
            int rowsAffected = st.executeUpdate(query);
            System.out.println(rowsAffected+ " record
updated!!!");
      }
 public void removeStudent(Connection con, Scanner sc) throws
SQLException {
```

CODE

```
        Statement st = con.createStatement();

        System.out.println("Enter the student's id: ");

        int id = sc.nextInt();

        int rowsAffected = st.executeUpdate("delete from
student_info where id = "+id);

        System.out.println(rowsAffected+ " record
deleted!!!");

    }


}
```

Main.java

```
package driver;


import java.sql.Connection;

import java.sql.DriverManager;

import java.sql.SQLException;

import java.util.Scanner;



import student.stud_crud_operations;


public class Main {


    public static void main(String[] args)throws
ClassNotFoundException, SQLException{

        // TODO Auto-generated method stub

       Class.forName("oracle.jdbc.driver.OracleDriver");


        String url = "jdbc:oracle:thin:@localhost:1521:xe";
```

CODE

```java
        String username = "SYSTEM";

        String pwd = "aryan123";


        Connection con = DriverManager.getConnection(url,
username, pwd);

        Scanner sc = new Scanner(System.in);

        stud_crud_operations S = new stud_crud_operations();

        while(true) {

            //Display menu

            System.out.println("\nChoose the operation you
want to perform :");

            System.out.println("1. Insert");

            System.out.println("2. Select");

            System.out.println("3. Update Student's name");

            System.out.println("4. Update Student's age");

            System.out.println("5. Update Student's gender");

            System.out.println("6. Delete");

            System.out.println("7. Exit");

            System.out.println("\nPlease enter your choice :");


            // Reading the input from the user


            int choice = sc.nextInt();


            switch (choice) {

                case 1:

                    System.out.println("\nPerforming INSERT
operation......\n");

                    S.insertStudent(con, sc);

                    break;
```

CODE

```java
                case 2:
                    System.out.println("\nPerforming SELECT
operation......\n");
                    S.displayStudents(con);
                    break;
                case 3:
                    System.out.println("\nPerforming UPDATE
operation......\n");
                    S.updateStudentName(con, sc);
                    break;
                case 4:
                    System.out.println("\nPerforming UPDATE
operation......\n");
                    S.updateStudentAge(con, sc);
                    break;
                case 5:
                    System.out.println("\nPerforming UPDATE
operation......\n");
                    S.updateStudentGender(con, sc);
                    break;
                case 6:
                    System.out.println("\nPerforming DELETE
operation......\n");
                    S.removeStudent(con, sc);
                    break;
                case 7:
                    System.out.println("\nExiting......\n");
                    sc.close();
                    System.exit(0);
                    break;
```

CODE

```java
        default:

            System.out.println("\nInvalid choice\n");

    }

    }

}


}
```

INPUT/OUTPUT

Inserting a couple of rows in the table

```
Problems  Servers  Terminal  Data Source Explorer  Properties  Console ×  Progress  Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231028

Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
1

Performing INSERT operation......

Enter the student's Id:
47
Enter the student's name:
Amar
Enter the student's age:
21
Enter the student's marks:
68.4
Enter the student's gender:
Male
1 record inserted!!!
```
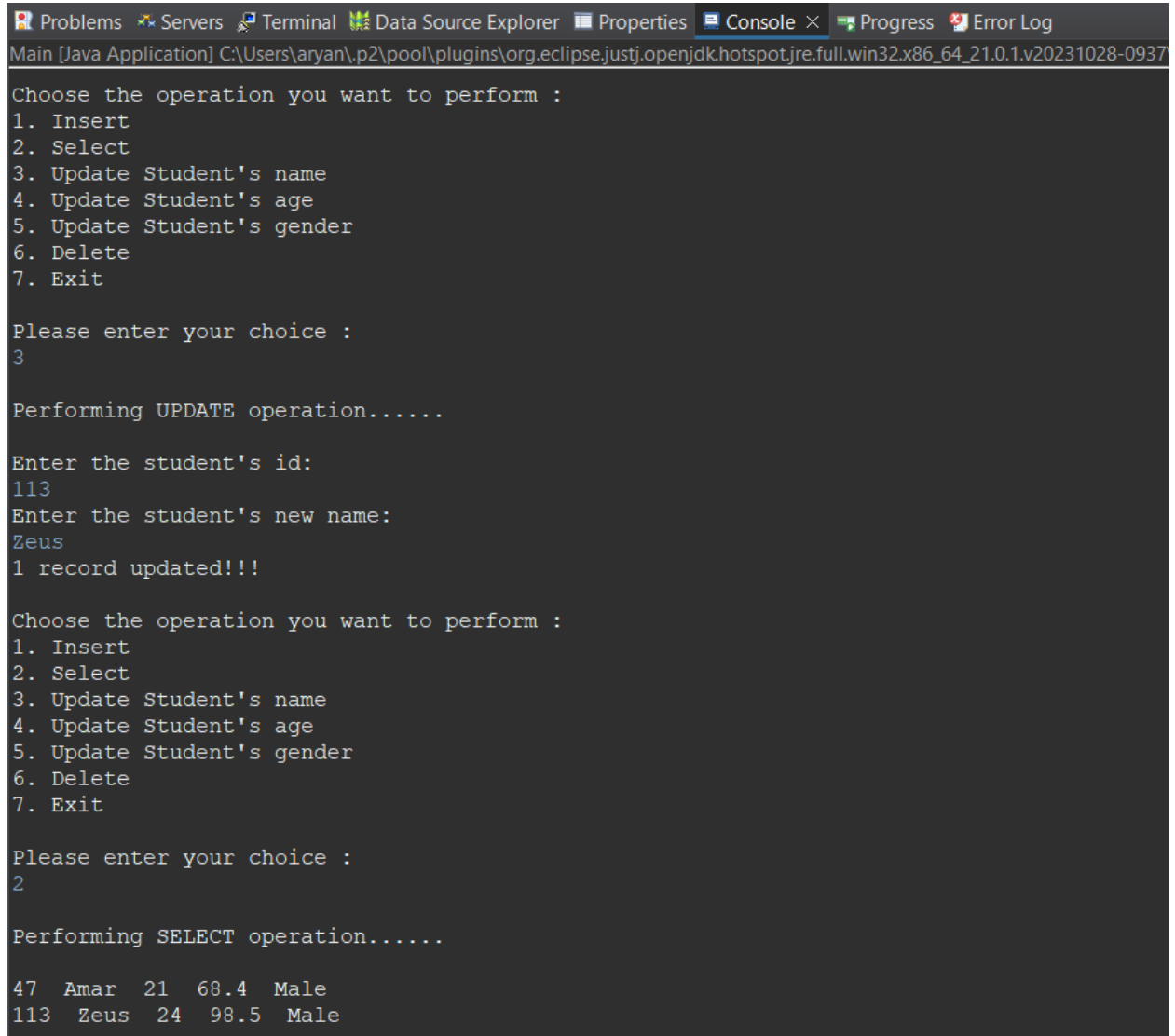
```
Problems  Servers  Terminal  Data Source Explorer  Properties  Console ×  Progress  Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231028-09

Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
1

Performing INSERT operation......

Enter the student's Id:
113
Enter the student's name:
Max
Enter the student's age:
24
Enter the student's marks:
98.5
Enter the student's gender:
Male
1 record inserted!!!
```
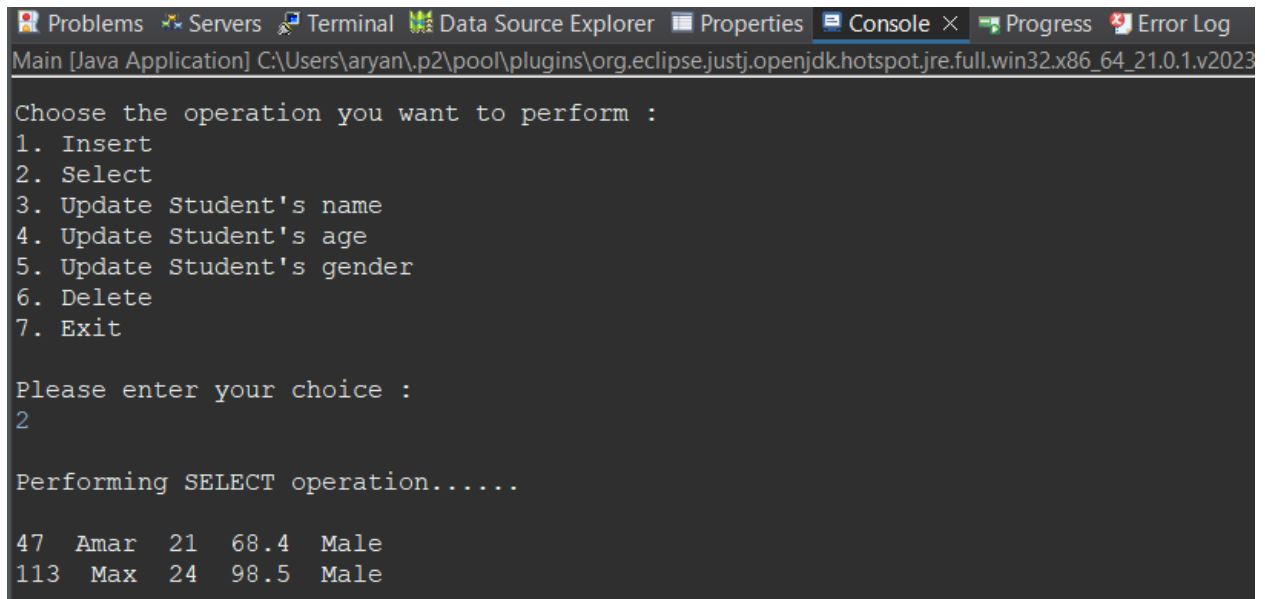
Inserting a couple of rows in the table

INPUT/OUTPUT
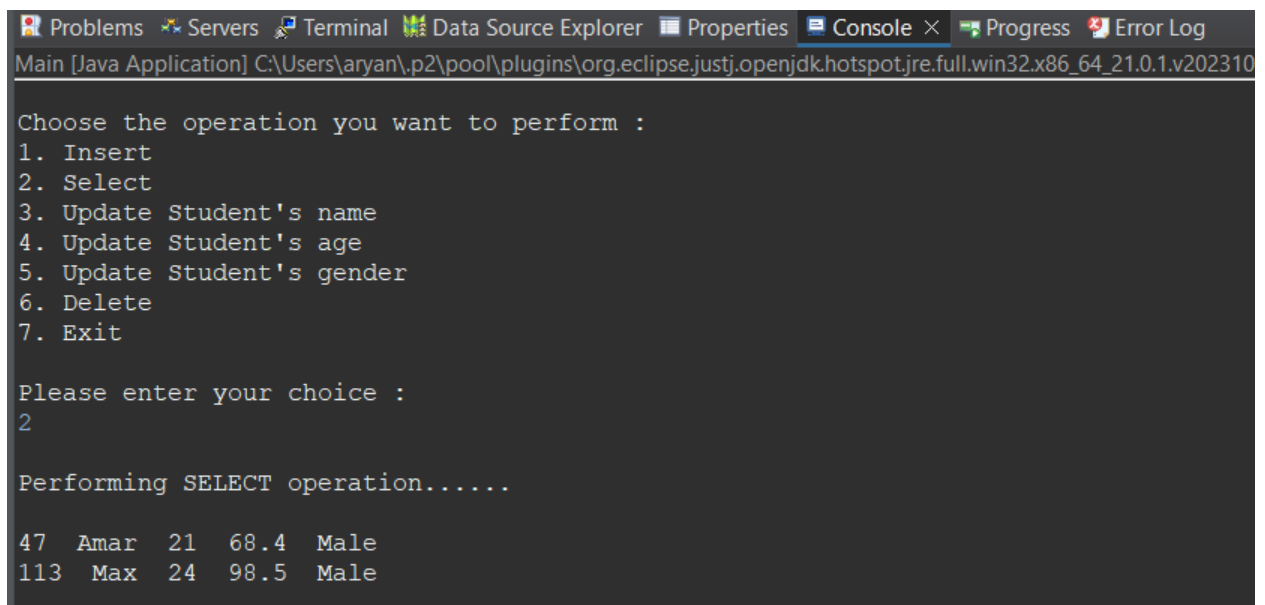
Reading/Retrieving the data from the table

Updating the name of the student

Before Updation :

INPUT/OUTPUT

After Updation :

```
Problems  Servers  Terminal  Data Source Explorer  Properties  Console ×  Progress  Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231028-0937"
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
3

Performing UPDATE operation......

Enter the student's id:
113
Enter the student's new name:
Zeus
1 record updated!!!

Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
2

Performing SELECT operation......

47   Amar   21   68.4   Male
113  Zeus   24   98.5   Male
```
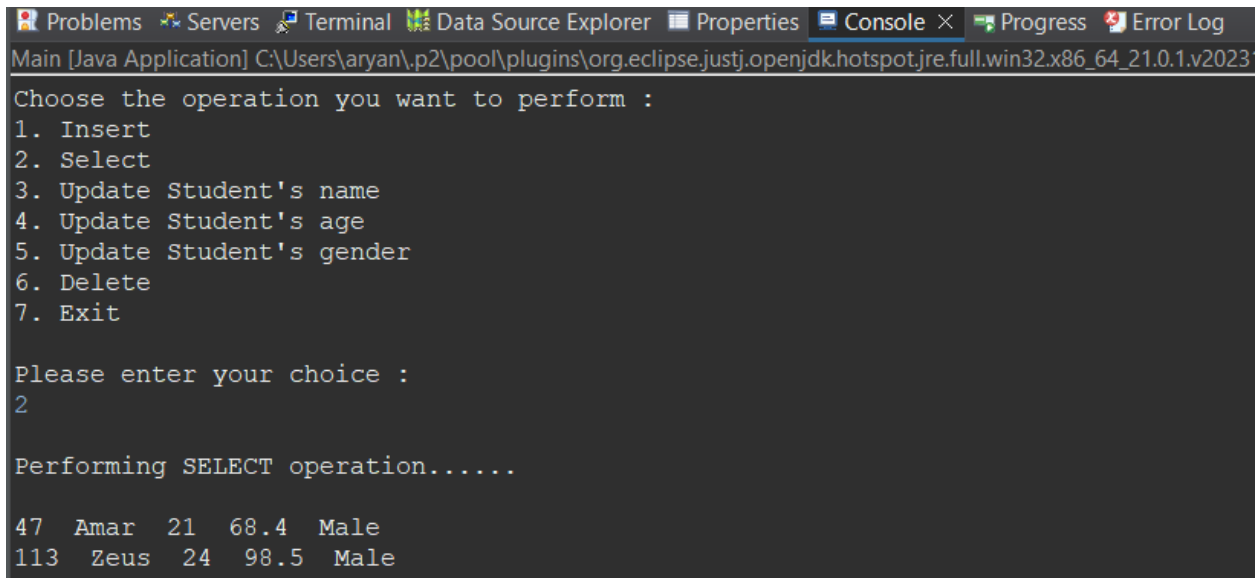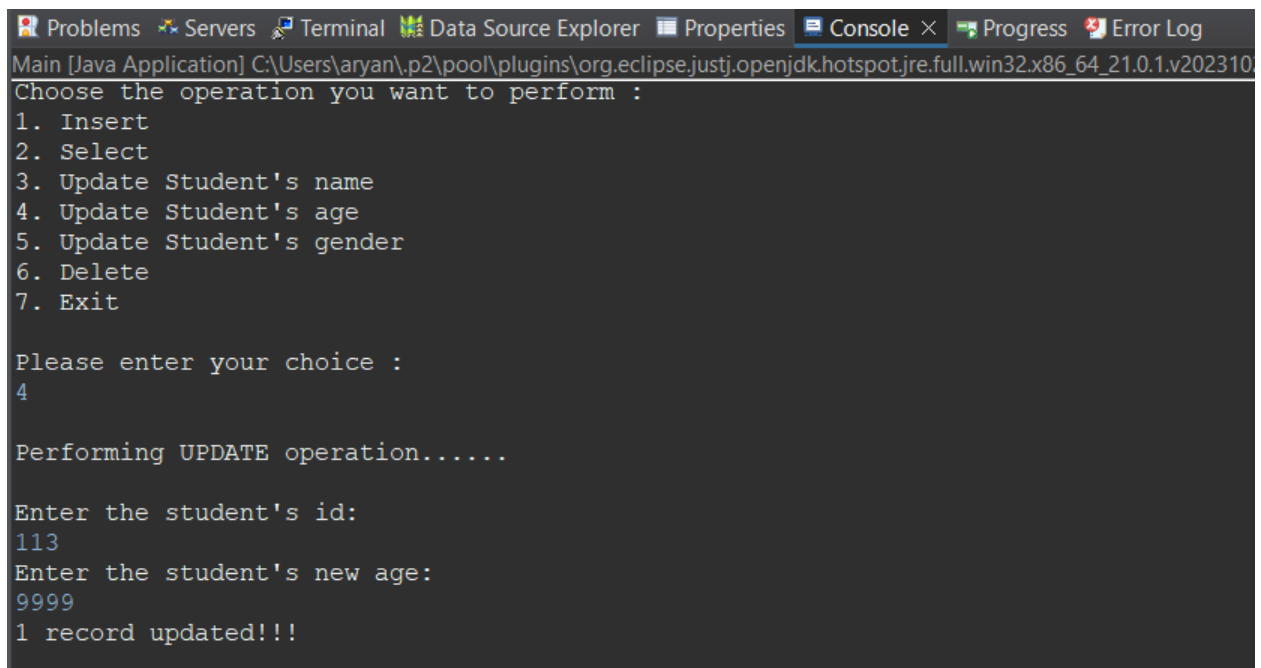
INPUT/OUTPUT

Updating the age of the student

Before Updation :

```
Problems  Servers  Terminal  Data Source Explorer  Properties  Console ✕  Progress  Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v2023
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
2

Performing SELECT operation......

47   Amar   21   68.4   Male
113   Zeus   24   98.5   Male
```

After Updation :

```
Problems  Servers  Terminal  Data Source Explorer  Properties  Console ✕  Progress  Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v202310
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
4

Performing UPDATE operation......

Enter the student's id:
113
Enter the student's new age:
9999
1 record updated!!!
```

INPUT/OUTPUT

```
Problems  Servers  Terminal  Data Source Explorer  Properties  Console ×  Progress  Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
2

Performing SELECT operation......

47   Amar   21   68.4   Male
113  Zeus   9999  98.5   Male
```

Updating the gender of the student

Before Updation :

INPUT/OUTPUT

After Updation :

```
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
5

Performing UPDATE operation......

Enter the student's id:
113
Enter the student's new name:
God
1 record updated!!!

Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
2

Performing SELECT operation......

47   Amar   21   68.4   Male
113  Zeus   9999  98.5  God
```

INPUT/OUTPUT

<u>Deleting a record from the table</u>

Before Deletion :

```
 Problems  ✲ Servers  ⚡ Terminal  ░ Data Source Explorer  ▣ Properties  ▣ Console ✕  ⬆ Progress  ⚠ Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231

Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
2

Performing SELECT operation......

47   Amar   21   68.4   Male
113   Zeus   9999   98.5   God
```

After Deletion :

```
 Problems  ✲ Servers  ⚡ Terminal  ░ Data Source Explorer  ▣ Properties  ▣ Console ✕  ⬆ Progress  ⚠ Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
6

Performing DELETE operation......

Enter the student's id:
113
1 record deleted!!!
```
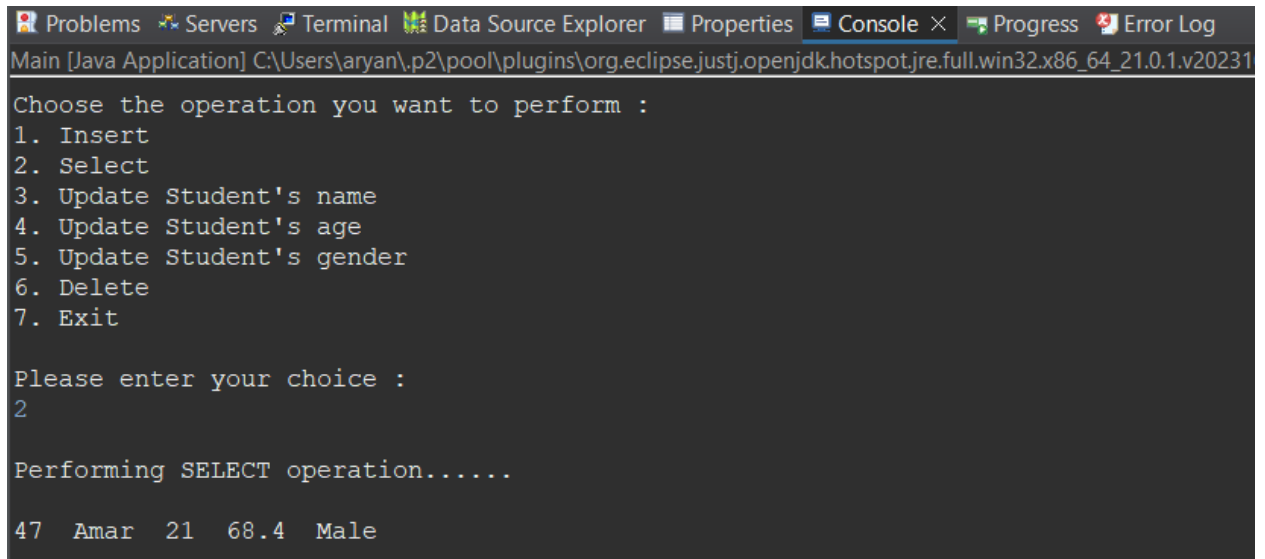
INPUT/OUTPUT


```
Problems    Servers    Terminal    Data Source Explorer    Properties    Console ×    Progress    Error Log
Main [Java Application] C:\Users\aryan\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.1.v20231
Choose the operation you want to perform :
1. Insert
2. Select
3. Update Student's name
4. Update Student's age
5. Update Student's gender
6. Delete
7. Exit

Please enter your choice :
2

Performing SELECT operation......

47   Amar   21   68.4   Male
```