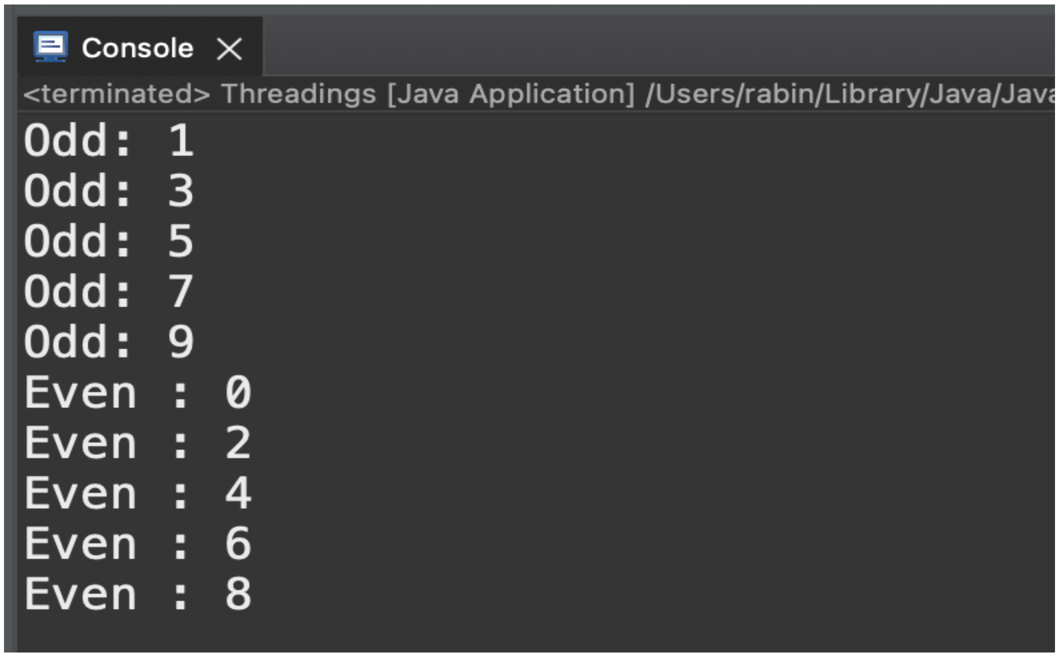
Implement a Java program that creates two threads. One thread should print even numbers, and the other should print odd numbers from 1 to 10.

```
package thread;
public class Threadings {

	class A extends Thread {
		public void run() {
			for (int i = 0; i < 10; i++) {
				if (i % 2 == 0) {
					System.out.println("Even : " + i);
				}
			}
		}
	}

	class B extends Thread {
		public void run() {
			for (int i = 0; i < 10; i++) {
				if (i % 2 != 0) {
					System.out.println("Odd: " + i);
				}
			}
		}
	}

	public static void main(String[] args) {
		Threadings threadings = new Threadings(); // create an instance of the outer class
		A a = threadings.new A(); // create an instance of class A
		B b = threadings.new B(); // create an instance of class B
		try {
			a.sleep(100);
		} catch (InterruptedException e) {
			// TODO Auto-generated catch block
			e.printStackTrace();
		}

		a.start(); // start the thread for class A
		b.start(); // start the thread for class B
	}
}
```

OUTPUT:



Console

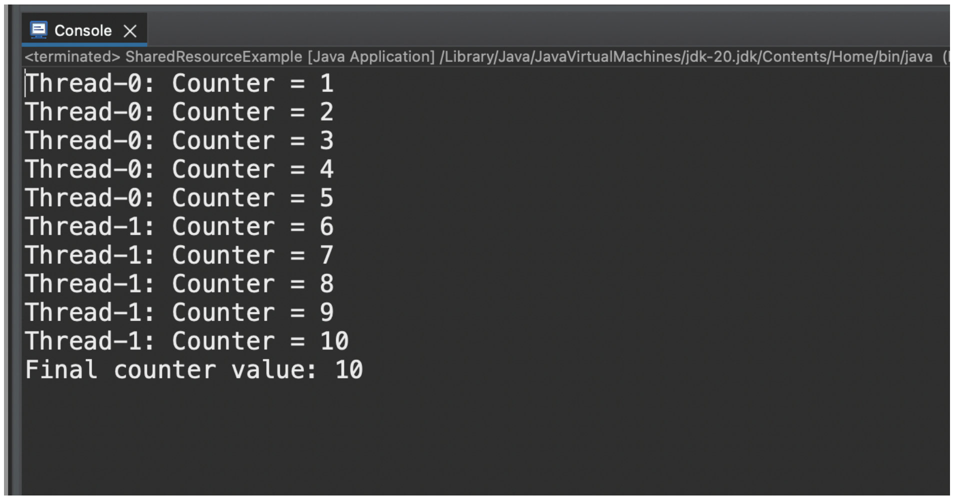
```
<terminated> Threadings [Java Application] /Users/rabin/Library/Java/Java
Odd: 1
Odd: 3
Odd: 5
Odd: 7
Odd: 9
Even : 0
Even : 2
Even : 4
Even : 6
Even : 8
```

Create a Java program with two threads sharing a common resource (e.g., a counter). Implement synchronization to ensure that the threads alternate incrementing the counter.

```java
package thread;

public class SharedResourceExample {
  private static final int MAX_COUNT = 5;
  private static int counter = 0;

  public static void main(String[] args) {
    // Create two threads
    Thread thread1 = new Thread(new IncrementTask());
    Thread thread2 = new Thread(new IncrementTask());

    // Start the threads
    thread1.start();
    thread2.start();

    try {
      // Wait for both threads to finish
      thread1.join();
      thread2.join();
    } catch (InterruptedException e) {
      e.printStackTrace();
```

```
        }

        System.out.println("Final counter value: " + counter);
    }

    static class IncrementTask implements Runnable {
        @Override
        public void run() {
            for (int i = 0; i < MAX_COUNT; i++) {
                synchronized (SharedResourceExample.class) {
                    // Increment the counter
                    counter++;
                    System.out.println(Thread.currentThread().getName() + ": Counter = " + counter);
                }
            }
        }
    }
}
```

OUTPUT:

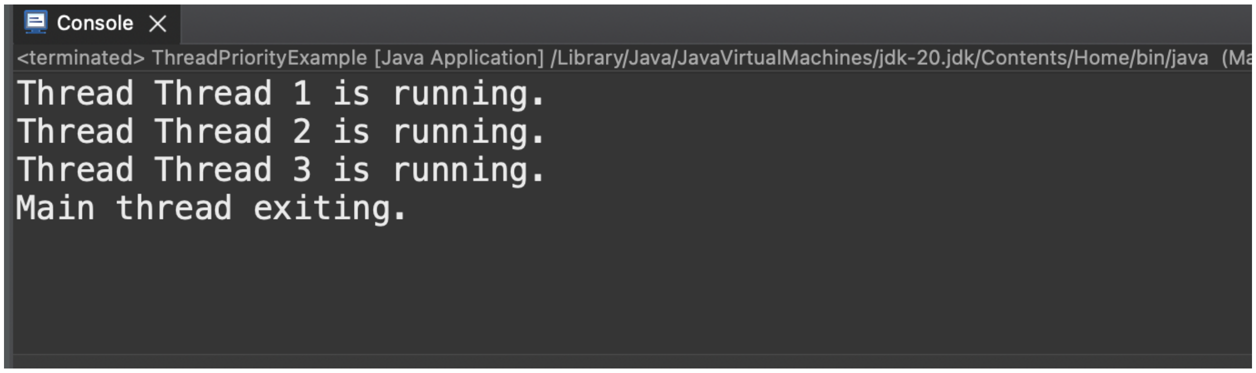


```
<terminated> SharedResourceExample [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents/Home/bin/java
Thread-0: Counter = 1
Thread-0: Counter = 2
Thread-0: Counter = 3
Thread-0: Counter = 4
Thread-0: Counter = 5
Thread-1: Counter = 6
Thread-1: Counter = 7
Thread-1: Counter = 8
Thread-1: Counter = 9
Thread-1: Counter = 10
Final counter value: 10
```

Develop a Java program that creates three threads with different priorities.

```
package thread;
public class ThreadPriorityExample {
   public static void main(String[] args) {
      PriorityThread thread1 = new PriorityThread("Thread 1");
      PriorityThread thread2 = new PriorityThread("Thread 2");
      PriorityThread thread3 = new PriorityThread("Thread 3");

      // Set thread priorities
      thread1.setPriority(Thread.MIN_PRIORITY); // Lowest priority (1)
      thread2.setPriority(Thread.NORM_PRIORITY); // Default priority (5)
      thread3.setPriority(Thread.MAX_PRIORITY); // Highest priority (10)

      // Start the threads
      thread1.start();
      thread2.start();
      thread3.start();

      // Wait for all threads to finish
      try {
         thread1.join();
         thread2.join();
         thread3.join();
      } catch (InterruptedException e) {
         e.printStackTrace();
      }

      System.out.println("Main thread exiting.");
   }
}
```

OUTPUT:

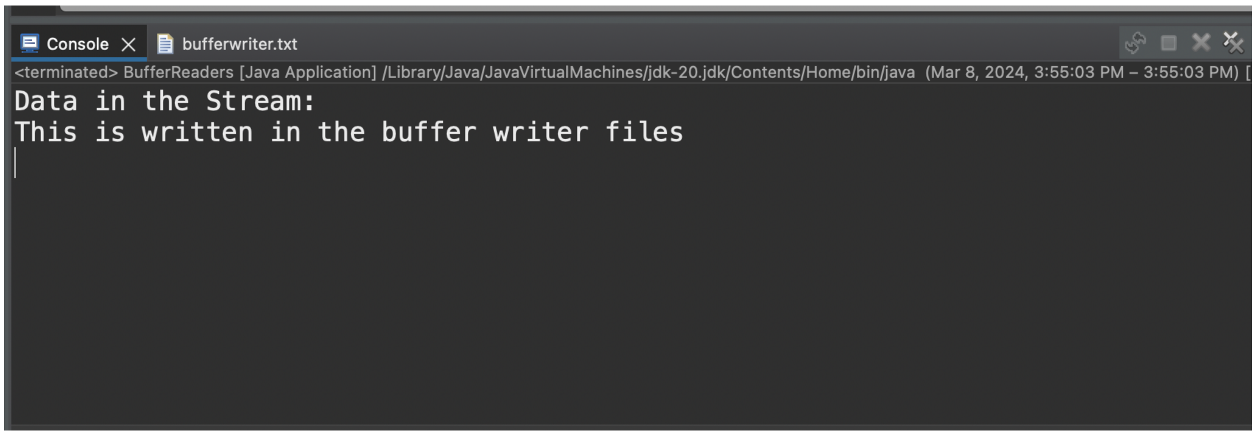


```
<terminated> ThreadPriorityExample [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents/Home/bin/java  (Ma
Thread Thread 1 is running.
Thread Thread 2 is running.
Thread Thread 3 is running.
Main thread exiting.
```

Create a Java program that reads data from a text file and displays it on the console. Ensure Proper exception handling.

```
package File_Handling;
import java.io.BufferedReader;
import java.io.FileNotFoundException;
import java.io.FileReader;
import java.io.IOException;

public class BufferReaders {
	public static void main(String[] args) {
		char[] array = new char[100];
		try {
			// creates a file reader
			FileReader readFile = new FileReader("../Classroom/src/bufferwriter.txt");
			// Creates a buffer reader
			BufferedReader buffers = new BufferedReader(readFile);
			// Reads characters
			try {
				System.out.println("Data in the Stream: ");
				buffers.read(array);
			} catch (IOException e) {
				e.printStackTrace();
			}
			System.out.println(array);

		} catch (FileNotFoundException e) {
			e.printStackTrace();
		}
	}
}
```

OUTPUT:

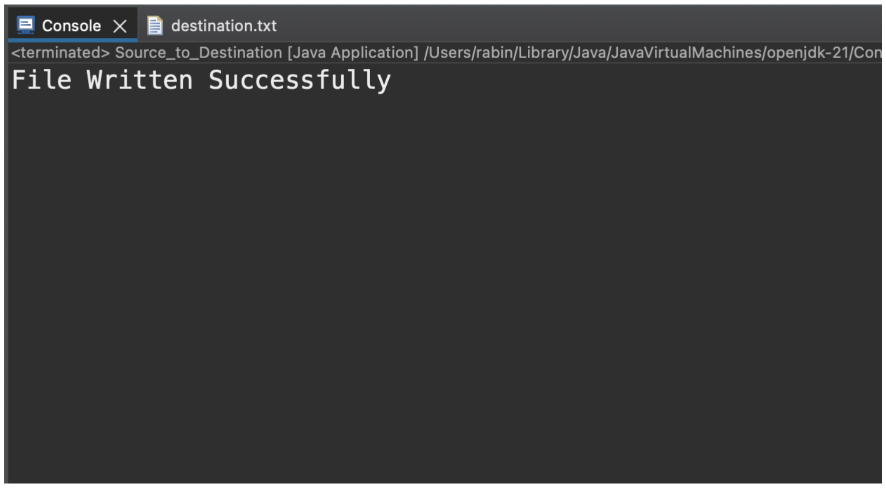


```
<terminated> BufferReaders [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents/Home/bin/java  (Mar 8, 2024, 3:55:03 PM – 3:55:03 PM)
Data in the Stream:
This is written in the buffer writer files
```

Write a Java program to copy the contents of one text file to another new file.

```
package File_Handling;

import java.io.BufferedReader;
import java.io.FileOutputStream;
import java.io.FileReader;
import java.io.OutputStreamWriter;

public class Source_to_Destination {

	public static void main(String[] args) {

		try {
			// Read data from the source file
			BufferedReader reader = new BufferedReader(new FileReader("../Classroom/src/bufferwriters.txt"));

			StringBuilder stringBuilder = new StringBuilder();
			String line;
			while ((line = reader.readLine()) != null) {
				stringBuilder.append(line);
				stringBuilder.append(System.lineSeparator());
			}
			reader.close();
			String data = stringBuilder.toString();

			// Creates a FileOutputStream
			FileOutputStream file = new FileOutputStream("../Classroom/src/destination.txt");

			// Creates an OutputStreamWriter
			OutputStreamWriter output = new OutputStreamWriter(file);

			// Writes string to the file
			output.write(data);
			System.out.println("\n File Written Successfully");

			// Closes the writer
			output.close(); // close outputStream
		} catch (Exception e) {
			e.printStackTrace();
		}
	}
}
```

OUTPUT:



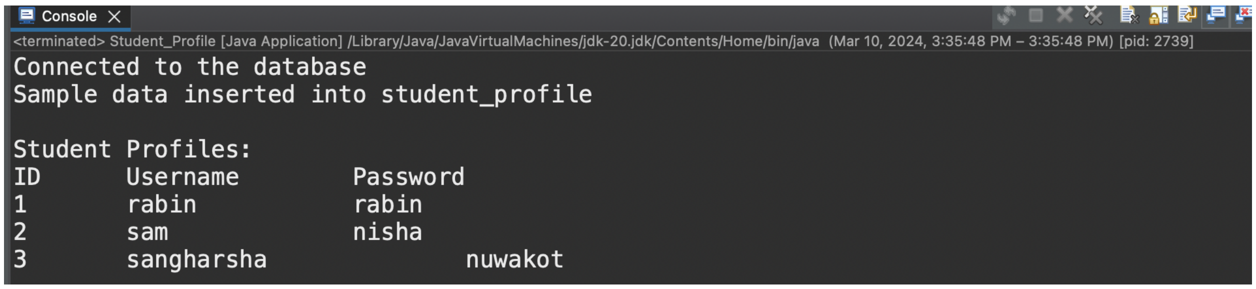
Console   destination.txt

```
<terminated> Source_to_Destination [Java Application] /Users/rabin/Library/Java/JavaVirtualMachines/openjdk-21/Con
File Written Successfully
```

Database Operations in Java:
Write a Java program that connects to a MySQL or PostgreSQL database and performs operations. Create a table named student_profile in the database, including fields for username and password. Write a Java function to select and display data from the student_profile table in tabular form.

```
package mysql;

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

public class Student_Profile {
	final String DRIVER = "com.mysql.cj.jdbc.Driver"; // Driver link provided

	// Database connection details
	final static String DBNAME = "JavaCollege"; // Database table name
	final static String HOST = "localhost"; // Database server host
	final static String DBUSER = "root"; // database Username
	final static String DBPASS = "Neupane@11"; // Database password
	final static int PORT = 3306; // Database port name
	final static String URL = "jdbc:mysql://" + HOST + ":" + PORT + "/" + DBNAME; // JDBC
connection URL

	// JDBC variables for opening and managing connection
	private static Connection connection;
	private static Statement statement;

	public static void main(String[] args) {
		try {
			// Open a connection
			connection = DriverManager.getConnection(URL, DBUSER, DBPASS);
			System.out.println("Connected to the database");

			// Insert sample data into student_profile
			insertSampleData();

			// Select and display data from student_profile table
			selectAndDisplayData();
		} catch (SQLException e) {
			e.printStackTrace();
		} finally {
			try {
				if (connection != null) {
					connection.close();
				}
			} catch (SQLException e) {
				e.printStackTrace();
			}
		}
	}

	// Insert sample data into student_profile
	private static void insertSampleData() throws SQLException {
		statement = connection.createStatement();
		String insertDataSQL = "INSERT INTO student_profile (id, username, password)
VALUES " + "(1, 'rabin', 'rabin'),"
				+ "(2, 'sam', 'nisha')," + "(3, 'sangharsha', 'nuwakot')";

		statement.executeUpdate(insertDataSQL);
		System.out.println("Sample data inserted into student_profile");
	}

	// Select and display data from student_profile table
	private static void selectAndDisplayData() throws SQLException {
		statement = connection.createStatement();
		String selectDataSQL = "SELECT * FROM student_profile";
		ResultSet resultSet = statement.executeQuery(selectDataSQL);

		System.out.println("\nStudent Profiles:");
		System.out.println("ID\tUsername\tPassword");
		while (resultSet.next()) {
			int id = resultSet.getInt("id");
			String username = resultSet.getString("username");
			String password = resultSet.getString("password");
			System.out.println(id + "\t" + username + "\t\t" + password);
		}
	}
}
```

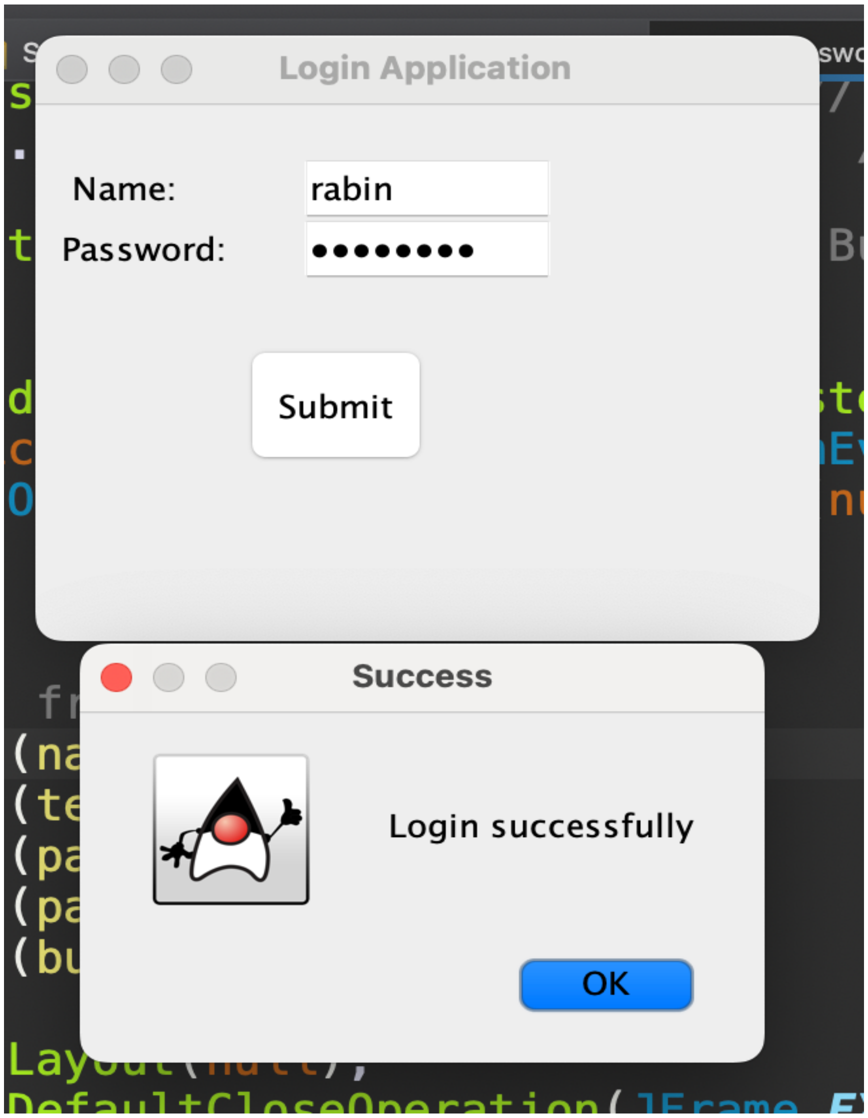
OUTPUT:



```
<terminated> Student_Profile [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents/Home/bin/java  (Mar 10, 2024, 3:35:48 PM – 3:35:48 PM) [pid: 2739]
Connected to the database
Sample data inserted into student_profile

Student Profiles:
ID      Username        Password
1       rabin           rabin
2       sam             nisha
3       sangharsha              nuwakot
```

Java Swing GUI Program:
Write a Java Swing program with a GUI containing username and password fields, and a submit button. Connect the program to the student_profile database created in the previous program. If the provided credentials exist in the table, move to a success window; otherwise, display the error message Credentials not matched.

```
package mysql_Database;

// imports
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JOptionPane;
import javax.swing.JTextField;
import javax.swing.JButton;
import javax.swing.JPasswordField;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.sql.Statement;

public class Id_Password_Database {

	public static void main(String[] args) {
		final String DRIVER = "com.mysql.cj.jdbc.Driver"; // JDBC Driver class

		// Database connection details
		final String DBNAME = "JavaCollege"; // Database table name
		final String HOST = "localhost"; // Database server host
		final String DBUSER = "root"; // database Username
		final String DBPASS = "Neupane@11"; // Database password
		final int PORT = 3306; // Database port name
		final String URL = "jdbc:mysql://" + HOST + ":" + PORT + "/" + DBNAME; // JDBC
connection URL

		// JFrame and UI objects
		JFrame frame = new JFrame("Login Application");
		JLabel name = new JLabel(" Name:");
		JLabel password = new JLabel("Password: ");
		JButton button = new JButton("Submit");
		JTextField textField = new JTextField();
		JPasswordField passfield = new JPasswordField(); // create for passwordField

		// position set Display
		name.setBounds(10, 20, 150, 30); // name label position
		textField.setBounds(100, 20, 100, 30); // name text field position

		password.setBounds(10, 45, 150, 30); // Password name position
		passfield.setBounds(100, 45, 100, 30); // password text field Position

		button.setBounds(80, 100, 70, 50); // Submit Button position

		// Action Listener for Submit
		button.addActionListener(new ActionListener() {
			public void actionPerformed(ActionEvent e) {
				try {
					// Retrieve username and password from UI components

					String username = textField.getText();
					char[] passwordChars = passfield.getPassword();
					String password = new String(passwordChars);

					// JDBC connection SETUP
					Class.forName(DRIVER); // Loading Driver
					Connection conn = DriverManager.getConnection(URL,
DBUSER, DBPASS); // Establish the connection

					// Insert Records
					Statement state = conn.createStatement(); // object create
for connection
					String sql = "SELECT * FROM student_profile where
username='" + username + "' and password='"+ password + "'";
					ResultSet rs = state.executeQuery(sql); // Get all records
from table

					// Create an instance
					Display_From_Database tableData = new
Display_From_Database();

					if (rs.next()) {
						System.out.println(rs.getInt("id") + "\t \t" +
rs.getString("username") + "\t\t"+ rs.getString("password"));
						JOptionPane.showMessageDialog(null, "Login
successfully", "Success",
        JOptionPane.INFORMATION_MESSAGE);
                                        tableData.show(); // Display data from database
                                    } else {
                                        System.out.println("Invalid login credentials");
                                        JOptionPane.showMessageDialog(null, "Invalid
login credentials", "Error",
                                                        JOptionPane.ERROR_MESSAGE);
                                    }
                                    rs.close();
                                    state.close();
                                    conn.close();

                                } catch (SQLException ex) {
                                    System.out.println(ex);

                                } catch (ClassNotFoundException e1) {
                                    // TODO Auto-generated catch block
                                    e1.printStackTrace();
                                }

                        }
                });
                // add components to frames
                frame.add(name);
                frame.add(textField);
                frame.add(password);
                frame.add(passfield);
                frame.add(button);

                // Set layout and display settings for the frame
                frame.setLayout(null);
                frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
                frame.setSize(300, 250);
                frame.setVisible(true);

        }
}
```
OUTPUT:


Login Application

Name: rabin

Password: ●●●●●●●●●

Submit

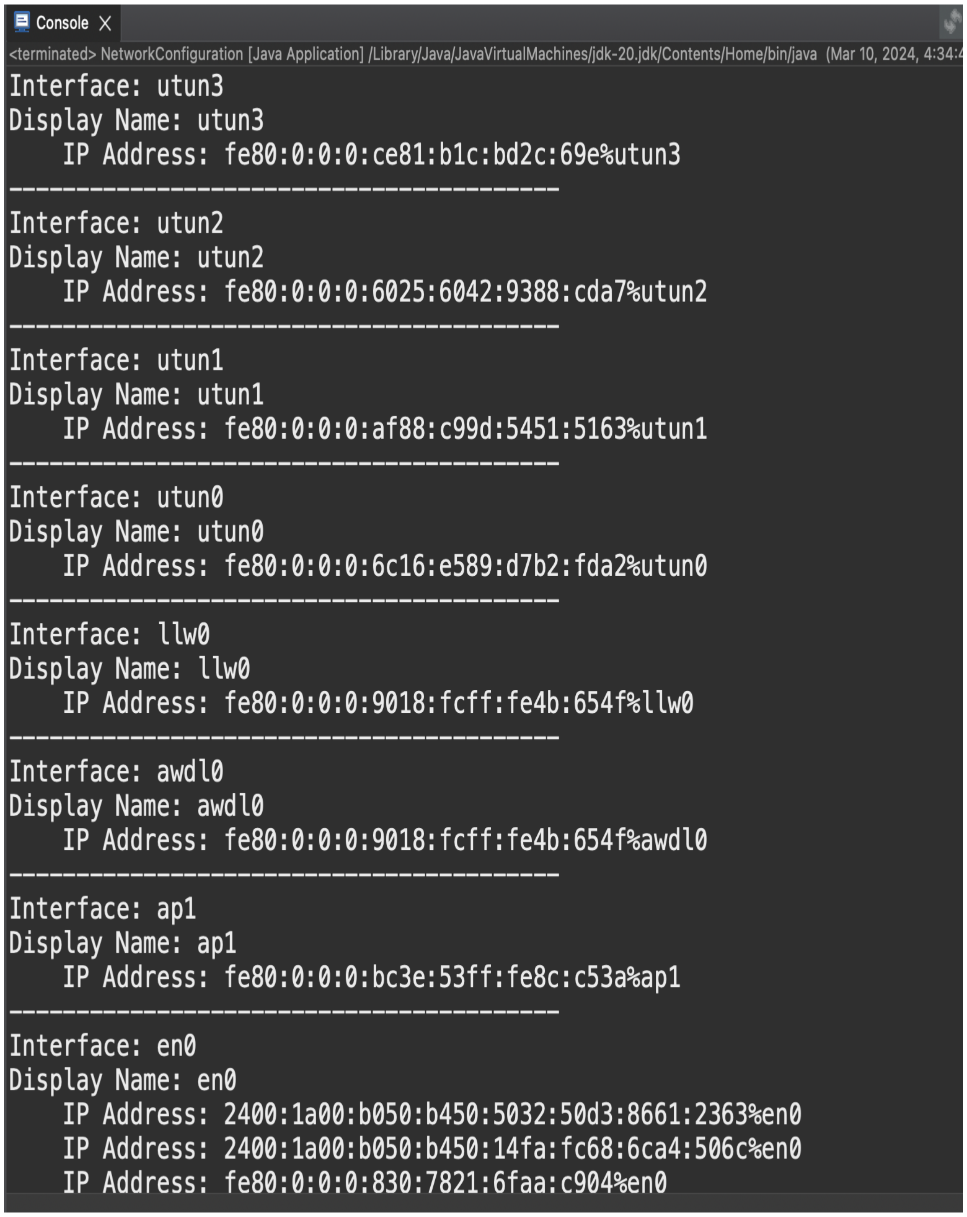
Success

Login successfully

OK

Java Program for Network Configuration:
Write a simple Java program that displays the network configuration of your computer.

```
package network_Configuration;

import java.net.InetAddress;
import java.net.NetworkInterface;
import java.net.SocketException;
import java.util.Enumeration;
public class NetworkConfiguration {
  public static void main(String[] args) {
    try {
      // Get all network interfaces
      Enumeration<NetworkInterface>                    networkInterfaces                    =
NetworkInterface.getNetworkInterfaces();
      while (networkInterfaces.hasMoreElements()) {
        NetworkInterface networkInterface = networkInterfaces.nextElement();
        System.out.println("Interface: " + networkInterface.getName());
        System.out.println("Display Name: " + networkInterface.getDisplayName());

        // Get all IP addresses for the network interface
        Enumeration<InetAddress> inetAddresses = networkInterface.getInetAddresses();
        while (inetAddresses.hasMoreElements()) {
          InetAddress inetAddress = inetAddresses.nextElement();
          System.out.println("    IP Address: " + inetAddress.getHostAddress());
        }
        System.out.println("----------------------------------------");
      }
    } catch (SocketException e) {
      e.printStackTrace();
    }
  }
}
```
OUTPUT:


Console

<terminated> NetworkConfiguration [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents/Home/bin/java (Mar 10, 2024, 4:34:4

```
Interface: utun3
Display Name: utun3
    IP Address: fe80:0:0:0:ce81:b1c:bd2c:69e%utun3
-----------------------------------------
Interface: utun2
Display Name: utun2
    IP Address: fe80:0:0:0:6025:6042:9388:cda7%utun2
-----------------------------------------
Interface: utun1
Display Name: utun1
    IP Address: fe80:0:0:0:af88:c99d:5451:5163%utun1
-----------------------------------------
Interface: utun0
Display Name: utun0
    IP Address: fe80:0:0:0:6c16:e589:d7b2:fda2%utun0
-----------------------------------------
Interface: llw0
Display Name: llw0
    IP Address: fe80:0:0:0:9018:fcff:fe4b:654f%llw0
-----------------------------------------
Interface: awdl0
Display Name: awdl0
    IP Address: fe80:0:0:0:9018:fcff:fe4b:654f%awdl0
-----------------------------------------
Interface: ap1
Display Name: ap1
    IP Address: fe80:0:0:0:bc3e:53ff:fe8c:c53a%ap1
-----------------------------------------
Interface: en0
Display Name: en0
    IP Address: 2400:1a00:b050:b450:5032:50d3:8661:2363%en0
    IP Address: 2400:1a00:b050:b450:14fa:fc68:6ca4:506c%en0
    IP Address: fe80:0:0:0:830:7821:6faa:c904%en0
```

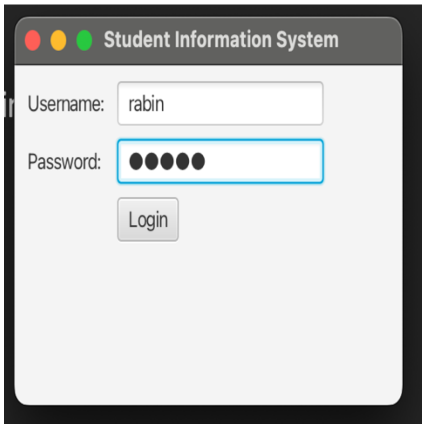
Create a JavaFX Program for a Student Information System:

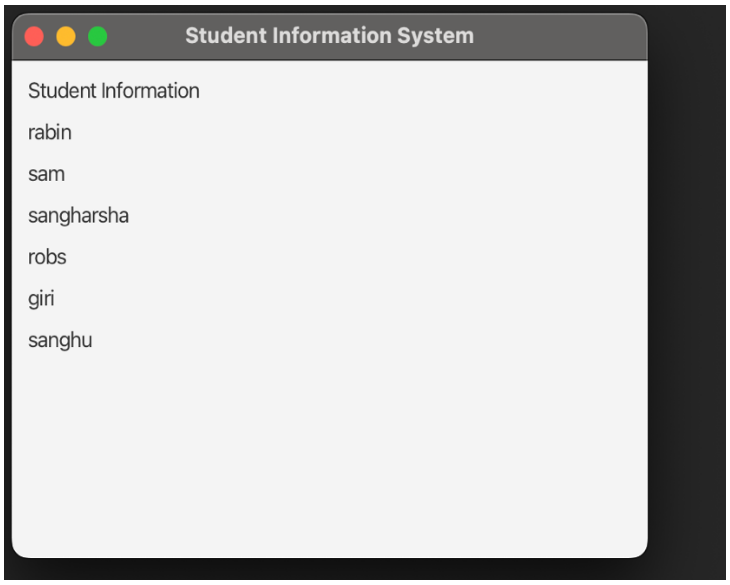
Develop a JavaFX program to achieve the following tasks:
Login Page:
Implement a login page using JavaFX. Allow users to input their credentials (e.g., username and password).
Display Student Information:
Connect the program to the student_profile table in the database. After successful login, create a display page to showcase information from the student_profile table, such as student details.
Ensure that the program provides a seamless transition from the login page to the student information display page in the JavaFX application.

```java
package com.example.javafxdemo;

import javafx.application.Application;
import javafx.geometry.Insets;
import javafx.scene.Scene;
import javafx.scene.control.*;
import javafx.scene.layout.GridPane;
import javafx.stage.Stage;
import java.sql.*;

public class StudentInformationSystem extends Application {

  @Override
  public void start(Stage primaryStage) {
    primaryStage.setTitle("Student Information System");

    // Login Page
    GridPane loginGrid = new GridPane();
    loginGrid.setPadding(new Insets(10, 10, 10, 10));
    loginGrid.setVgap(8);
    loginGrid.setHgap(10);

    // Username Label
    Label usernameLabel = new Label("Username:");
    GridPane.setConstraints(usernameLabel, 0, 0);

    // Username Input
    TextField usernameInput = new TextField();
    GridPane.setConstraints(usernameInput, 1, 0);

    // Password Label
```

```
        Label passwordLabel = new Label("Password:");
        GridPane.setConstraints(passwordLabel, 0, 1);

        // Password Input
        PasswordField passwordInput = new PasswordField();
        GridPane.setConstraints(passwordInput, 1, 1);

        // Login Button
        Button loginButton = new Button("Login");
        GridPane.setConstraints(loginButton, 1, 2);
        loginButton.setOnAction(e -> {
            // Authenticate user here (e.g., check credentials against database)
            // If authenticated, show student information page
            primaryStage.setScene(createStudentInfoScene());
        });

        loginGrid.getChildren().addAll(usernameLabel, usernameInput, passwordLabel,
passwordInput, loginButton);

        Scene loginScene = new Scene(loginGrid, 300, 200);

        primaryStage.setScene(loginScene);
        primaryStage.show();
    }

    // Method to create the student information display page
    private Scene createStudentInfoScene() {
        GridPane studentInfoGrid = new GridPane();
        studentInfoGrid.setPadding(new Insets(10, 10, 10, 10));
        studentInfoGrid.setVgap(8);
        studentInfoGrid.setHgap(10);

        // Placeholder student information display
        Label studentLabel = new Label("Student Information");
        GridPane.setConstraints(studentLabel, 0, 0);

        // Display student information fetched from the database
        try {
            final String DRIVER = "com.mysql.cj.jdbc.Driver";
            final String DBNAME = "JavaCollege";
            final String HOST = "localhost";
            final String DBUSER = "root";
            final String DBPASS = "Neupane@11";
            final int PORT = 3306;
            final String URL = "jdbc:mysql://" + HOST + ":" + PORT + "/" + DBNAME;

            Class.forName(DRIVER);
            try (Connection conn = DriverManager.getConnection(URL, DBUSER, DBPASS)) {
                String sql = "SELECT username FROM student_profile";
                try (PreparedStatement statement = conn.prepareStatement(sql);
                     ResultSet resultSet = statement.executeQuery()) {
                    int row = 1;
                    while (resultSet.next()) {
                        String data = resultSet.getString("username");
                        Label usernameLabel = new Label(data);
                        GridPane.setConstraints(usernameLabel, 0, row++);
                        studentInfoGrid.getChildren().add(usernameLabel);
                    }
                }
            }
        } catch (ClassNotFoundException | SQLException e) {
            e.printStackTrace();
            Alert alert = new Alert(Alert.AlertType.ERROR);
            alert.setTitle("Error");
            alert.setHeaderText("Database Error");
            alert.setContentText("An error occurred while accessing the database.");
            alert.showAndWait();
        }

        studentInfoGrid.getChildren().add(studentLabel);

        return new Scene(studentInfoGrid, 400, 300);
    }

    public static void main(String[] args) {
        launch(args);
    }
}
```

OUTPUT



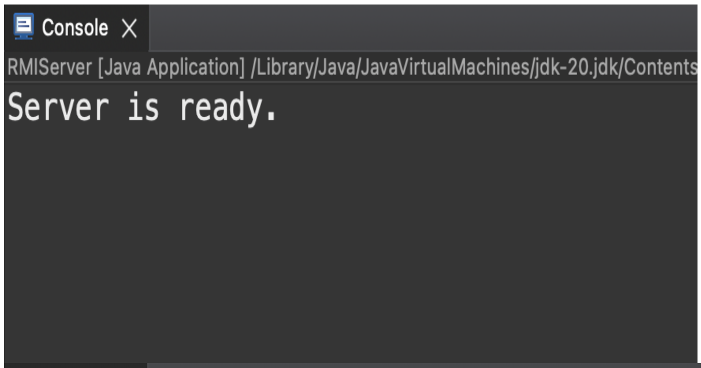


```
Student Information
rabin
sam
sangharsha
robs
giri
sanghu
```

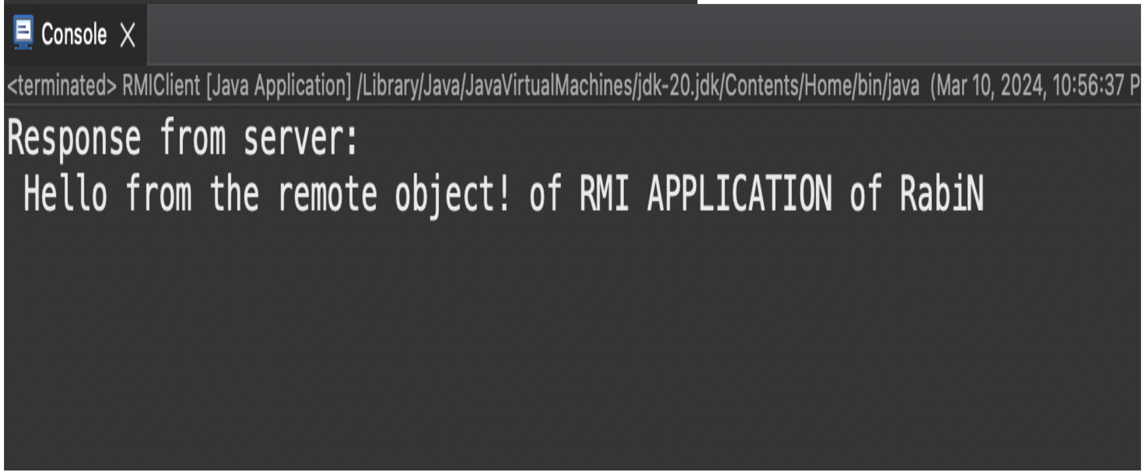
Write a program to illustrate the architecture of JAVA RMI

```
package rmi;
import java.rmi.Remote;
import java.rmi.RemoteException;

interface MyRemoteInterface extends Remote {
	String sayHello() throws RemoteException;
}


package rmi;
import java.rmi.RemoteException;
class MyRemoteObject implements MyRemoteInterface {
		@Override
		public String sayHello() throws RemoteException {
			return "\n Hello from the remote object! of RMI APPLICATION of RabiN";
		}
}

package rmi;
//Server program
import java.rmi.RemoteException;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.rmi.server.UnicastRemoteObject;

public class RMIServer {
 public static void main(String[] args) {
     try {
         MyRemoteObject remoteObject = new MyRemoteObject();
         MyRemoteInterface stub = (MyRemoteInterface)
UnicastRemoteObject.exportObject(remoteObject, 0);

         Registry registry = LocateRegistry.createRegistry(1099);
         registry.rebind("MyRemoteObject", stub);

         System.out.println("Server is ready.");
     } catch (RemoteException e) {
         System.err.println("Server exception: " + e.toString());
         e.printStackTrace();
     }
 }
}
package rmi;
//Client program
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;

public class RMIClient {

	public static void main(String[] args) {
		try {
			Registry registry = LocateRegistry.getRegistry("localhost", 1099);
			MyRemoteInterface remoteObject = (MyRemoteInterface)
registry.lookup("MyRemoteObject");

			String response = remoteObject.sayHello();
			System.out.println("Response from server: " + response);
		} catch (Exception e) {
			System.err.println("Client exception: " + e.toString());
			e.printStackTrace();
		}
	}
}
```

OUTPUT:



```
RMIServer [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents
Server is ready.
```



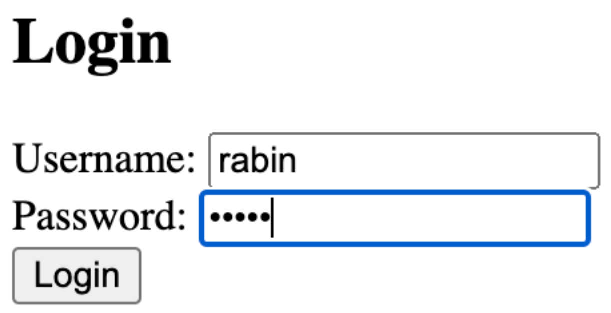
```
<terminated> RMIClient [Java Application] /Library/Java/JavaVirtualMachines/jdk-20.jdk/Contents/Home/bin/java (Mar 10, 2024, 10:56:37 P
Response from server:
 Hello from the remote object! of RMI APPLICATION of RabiN
```

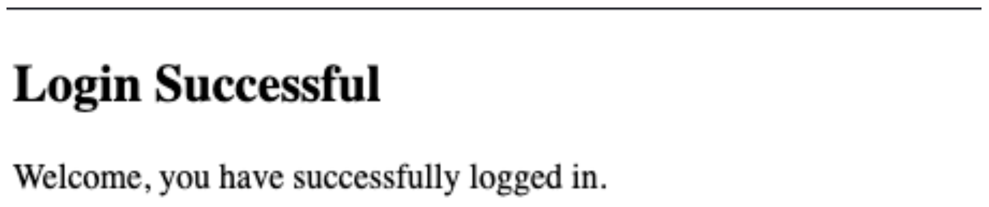
JSP Handling HTML Form Data:
Write a JSP program that handles HTML form data. Create a login page in JSP, check if the credentials match the ones stored in the database table, and forward to a success page or show an
error. Additionally, create a separate page to display a list of users.

```
// LOGIN .JSP
<%@ page language="java" contentType="text/html; charset=UTF-8"
   pageEncoding="UTF-8"%>
<%@ page import="java.sql.*" %>
<!DOCTYPE html>
<html>
<head>
   <meta charset="UTF-8">
   <title>Login Page</title>
</head>
<body>
   <h2>Login</h2>
   <form method="post" action="loginController.jsp">
      Username: <input type="text" name="username" required><br>
      Password: <input type="password" name="password" required><br>
      <input type="submit" value="Login">
```

```
    </form>
</body>
</html>

//loginController
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<%@ page import="java.sql.*" %>
<%@ page import="java.io.*" %>

<%
    // Establish database connection
    Connection conn = null;
    String url = "jdbc:mysql://localhost:3306/JavaCollege";
    String user = "root";
    String password = "Neupane@11";

    try {
        Class.forName("com.mysql.jdbc.Driver");
        conn = DriverManager.getConnection(url, user, password);
        Statement statement = conn.createStatement();

        // Retrieve form data
        String username = request.getParameter("username");
        String passwordInput = request.getParameter("password");

        // Query database for user
        String query = "SELECT * FROM Login_Check WHERE username='" + username + "' AND
password='" + passwordInput + "'";
        ResultSet rs = statement.executeQuery(query);

        if (rs.next()) {
            // If user exists, forward to success page
            response.sendRedirect("success.jsp");
        } else {
            // If user does not exist, show error
            out.println("Invalid credentials. Please try again.");
        }

        rs.close();
        statement.close();
    } catch (Exception e) {
        e.printStackTrace();
    } finally {
        if (conn != null) {
            try {
                conn.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }
%>

// success.jsp
<%@ page language="java" contentType="text/html; charset=UTF-8"
    pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
    <meta charset="UTF-8">
    <title>Success</title>
</head>
<body>
    <h2>Login Successful</h2>
    <p>Welcome, you have successfully logged in.</p>
</body>
</html>
```

OUTPUT:




Login Successful

Welcome, you have successfully logged in.

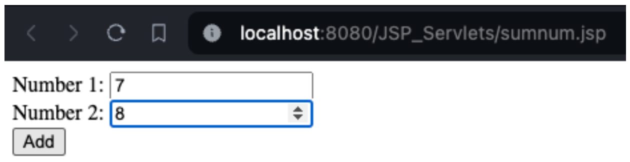
Java Servlet Handling HTML Form:
Write a Java servlet program that handles HTML form data. Create an HTML form page with two fields (number1 and number2). Retrieve data from the HTML form in the servlet, add the numbers, and display the result back on the HTML page.

```
<%@ page language="java" contentType="text/html; charset=UTF-8"
   pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>Insert title here</title>
</head>
<body>
          <form method="get" action="Addition">
      Number 1: <input type="number" name="number1" required><br>
      Number 2: <input type="number" name="number2" required><br>
      <input type="submit" value="Add">
   </form>
```

```
</body>
</html>

import jakarta.servlet.ServletException;
import jakarta.servlet.annotation.WebServlet;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import java.io.IOException;
import java.io.PrintWriter;

@WebServlet("/Addition")
public class Addition extends HttpServlet {
  private static final long serialVersionUID = 1L;

  public Addition() {
    super();
  }

  protected void doGet(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
    // Get parameters from the request
    String number1Str = request.getParameter("number1");
    String number2Str = request.getParameter("number2");

    // Check if parameters are null or empty
    if (number1Str == null || number1Str.isEmpty() || number2Str == null ||
number2Str.isEmpty()) {
      // Handle the case when parameters are missing or empty
      response.getWriter().println("Please provide both numbers.");
      return;
    }

    try {
      // Convert parameters to integers
      int number1 = Integer.parseInt(number1Str);
      int number2 = Integer.parseInt(number2Str);

      // Add the numbers
      int sum = number1 + number2;

      // Set response content type
      response.setContentType("text/html");
```

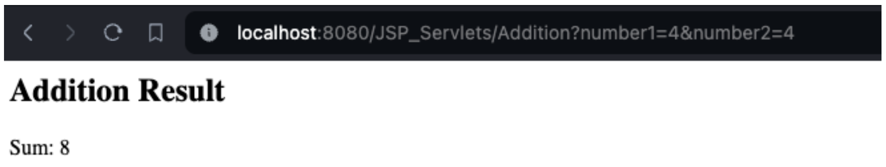
```
            // Get the PrintWriter
            PrintWriter out = response.getWriter();

            // Write HTML response
            out.println("<html><head><title>Addition Result</title></head><body>");
            out.println("<h2>Addition Result</h2>");
            out.println("<p>Number 1: " + number1 + "</p>");
            out.println("<p>Number 2: " + number2 + "</p>");
            out.println("<p>Sum: " + sum + "</p>");
            out.println("</body></html>");
        } catch (NumberFormatException e) {
            // Handle the case when parameters cannot be parsed as integers
            response.getWriter().println("Invalid number format. Please provide valid numbers.");
        }
    }

    protected void doPost(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
        // Forward POST requests to the doGet method
        doGet(request, response);
    }
}
```

OUTPUT:



localhost:8080/JSP_Servlets/sumnum.jsp

Number 1: 7
Number 2: 8



localhost:8080/JSP_Servlets/Addition?number1=4&number2=4

Addition Result

Sum: 8