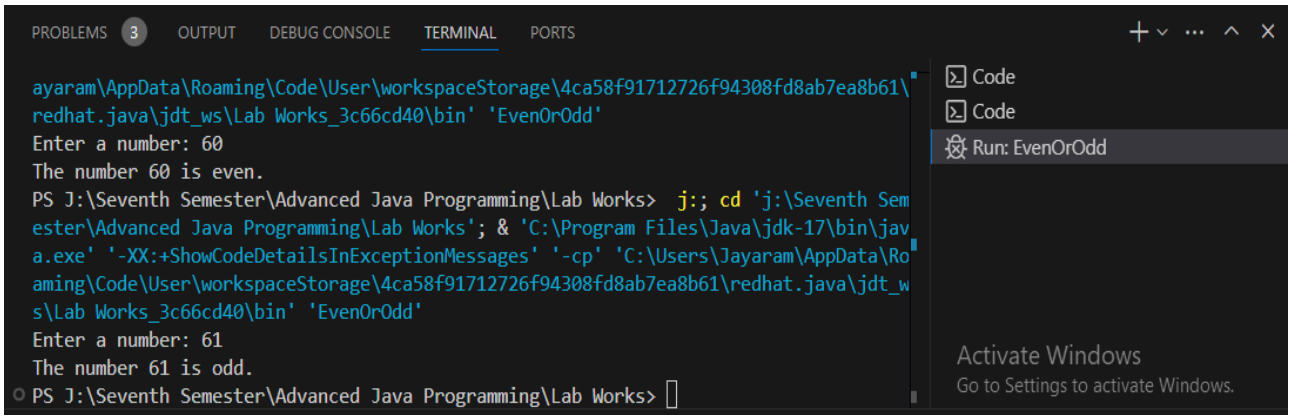
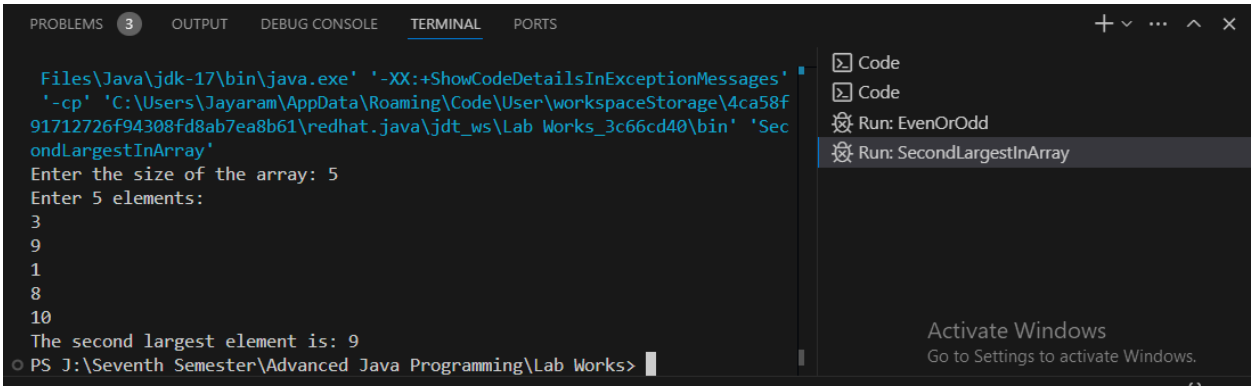
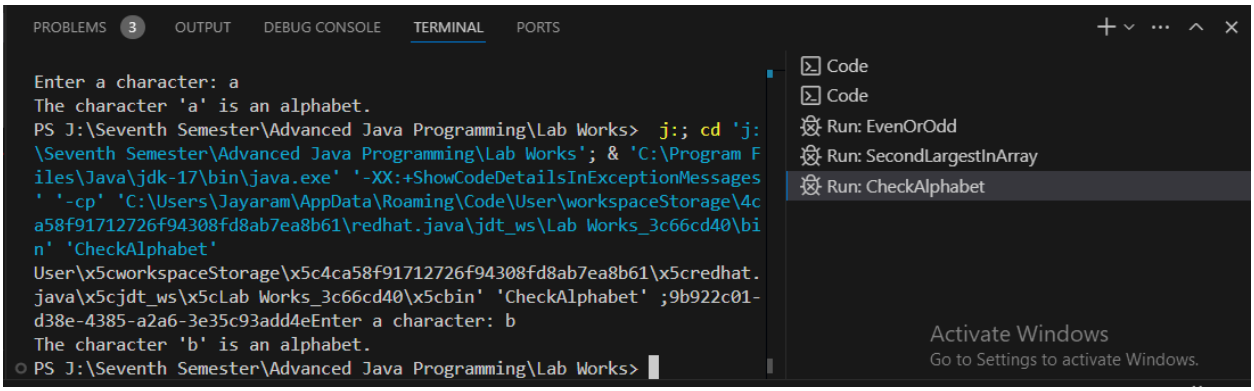
Output of Lab1:



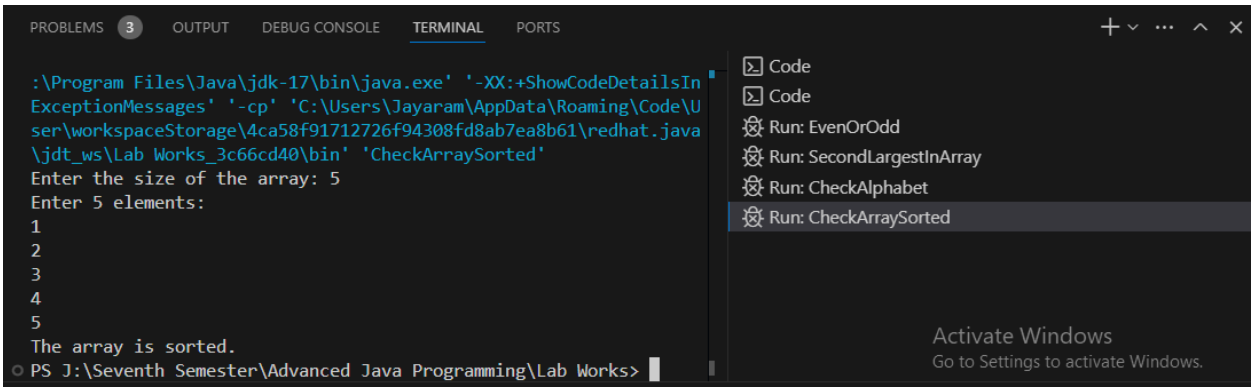
Output of Lab2



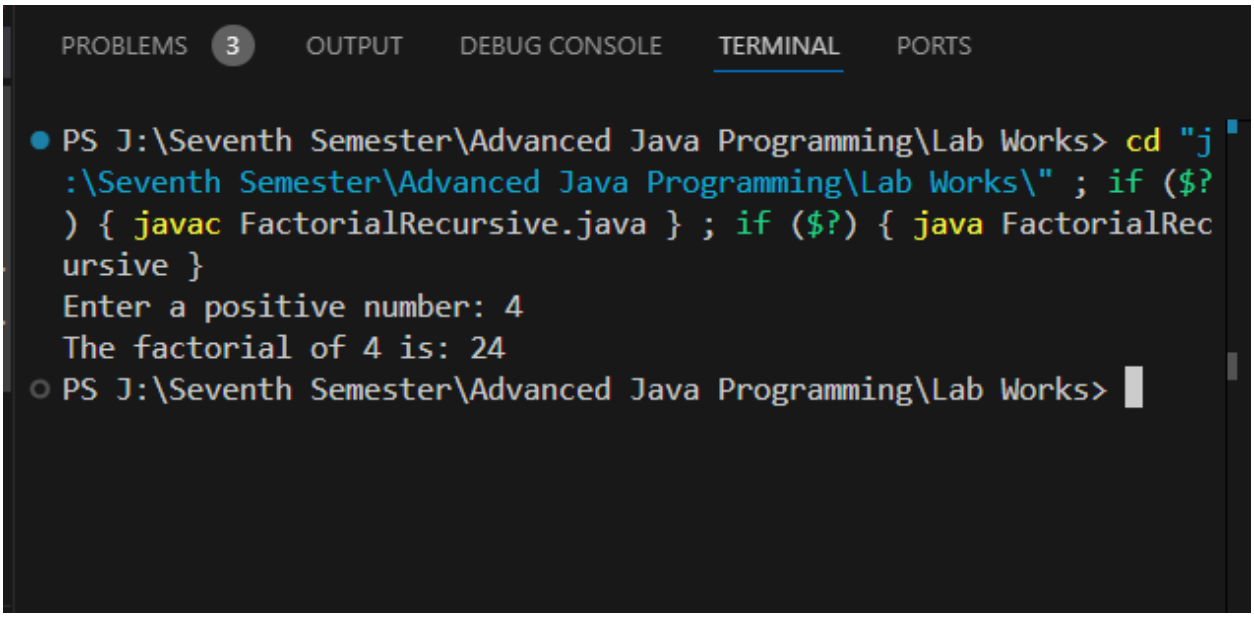
Output of Lab3:



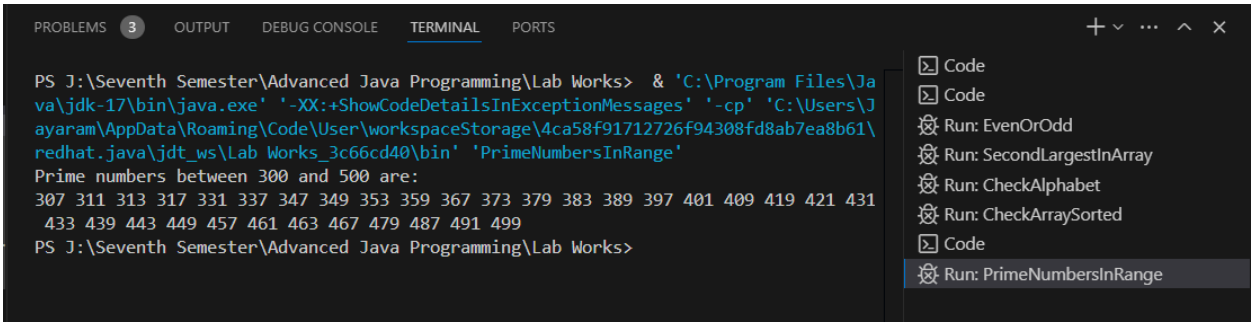
Lab4 :



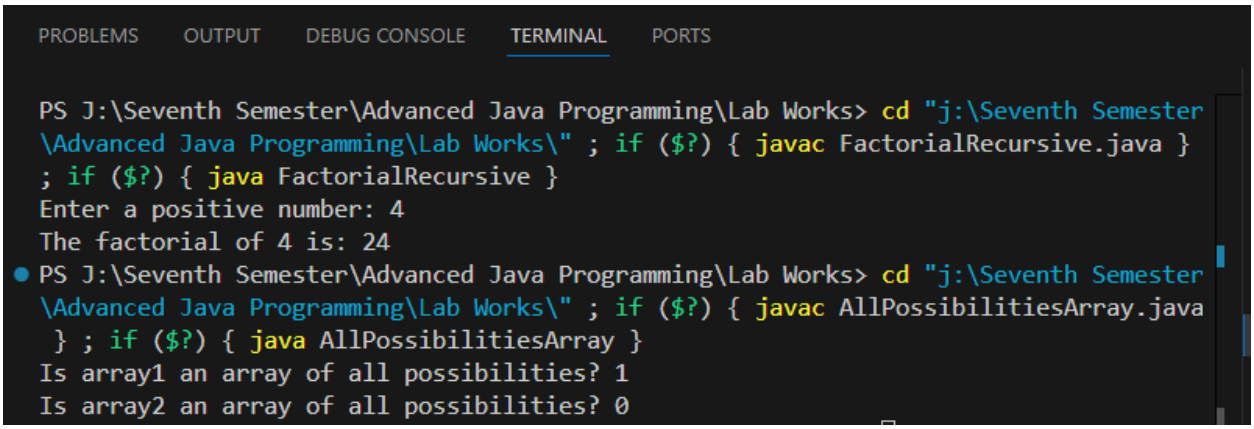
Lab 5:



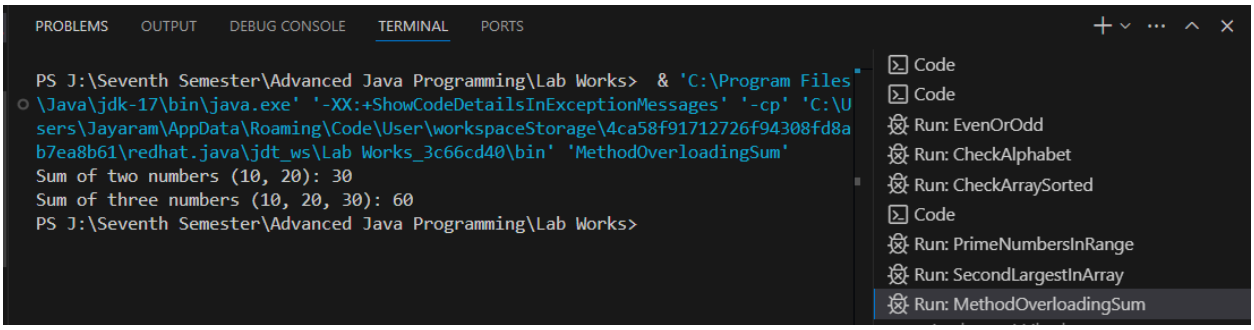
Lab 6:



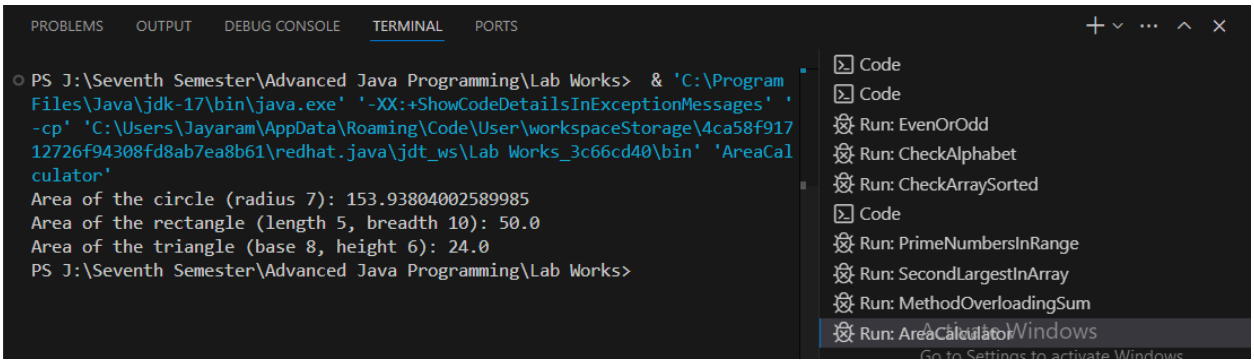
Lab 7:



Lab 8:



Lab 9:



Lab 10:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works> cd "j:\Seve
nth Semester\Advanced Java Programming\Lab Works\" ; if ($?) { javac Nu
mber.java } ; if ($?) { java Number }
The largest number is: 20
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

Lab 11:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C:
\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInEx
ceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User
\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt
_ws\Lab Works_3c66cd40\bin' 'Complex'
First Complex Number: 3.5 + 4.5i
Second Complex Number: 1.5 + 2.5i
Sum of Complex Numbers: 5.0 + 7.0i
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

Lab 12:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C:\
Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExce
ptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\wo
rkspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\
Lab Works_3c66cd40\bin' 'Time'
First Time: 02:45:50
Second Time: 01:20:30
Total Time: 04:06:20
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

Lab 13:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C:\Pro
gram Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionM
essages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceSt
orage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\Lab Works_3c
66cd40\bin' 'Swapper'
Before swapping:
x = 10
y = 20
After swapping:
x = 20
y = 10
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

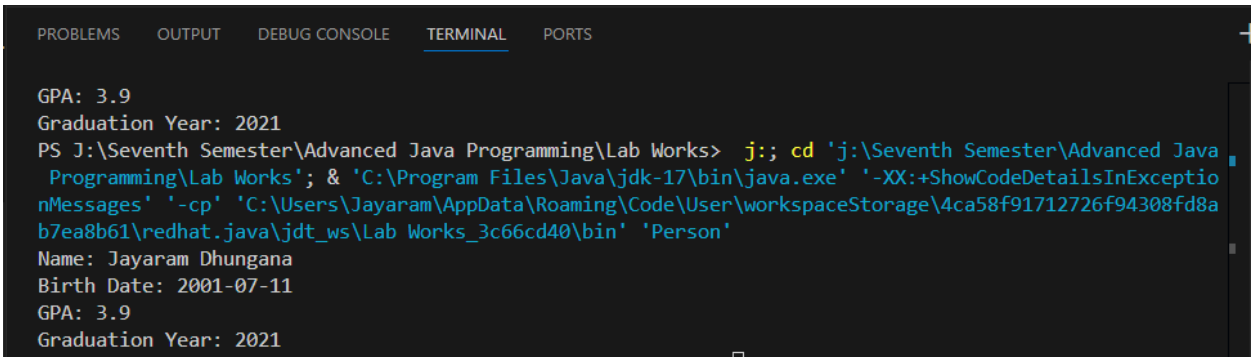
Lab 14:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C:\
Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExce
ptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\wo
rkspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\
Lab Works_3c66cd40\bin' 'Date'
Days since January 1, 2000: 61
Days since January 1, 1900: 60
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

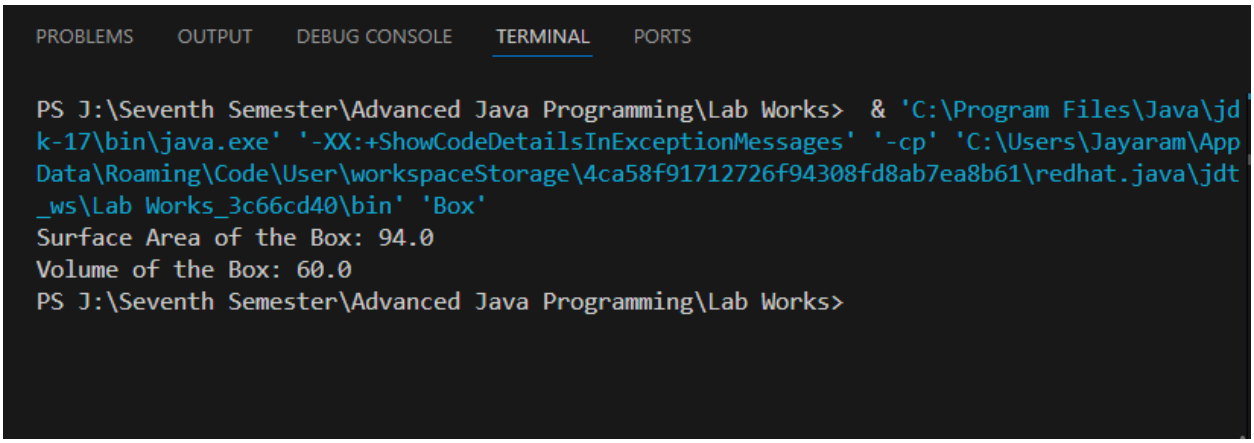
Lab 15:

```
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C
:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsIn
ExceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\U
ser\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java
\jdt_ws\Lab Works_3c66cd40\bin' 'USMoney'
First Amount: $5.80
Second Amount: $1.90
Total Amount: $7.70
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

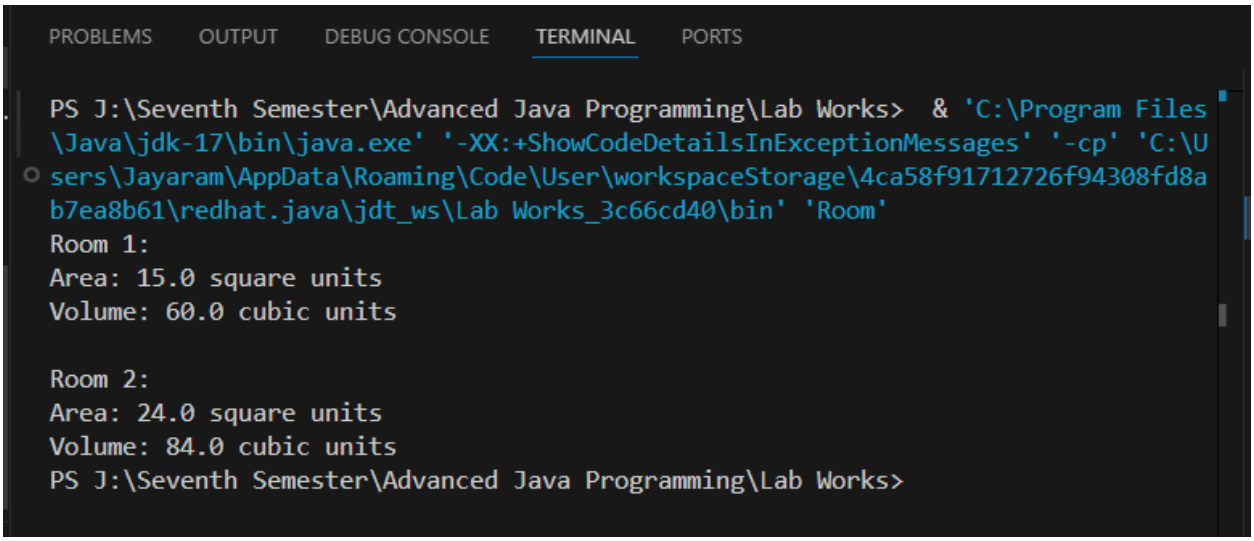
Lab 16:



Lab 17



Lab 18:



Lab 19:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C:\Program
 Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages'
 '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceStorage\4ca58f
91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\Lab Works_3c66cd40\bin' 'Box
19'
Volume of the Shipment: 60.0 cubic units
Weight of the Shipment: 10.0 kg
Cost of the Shipment: 100.0 USD
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

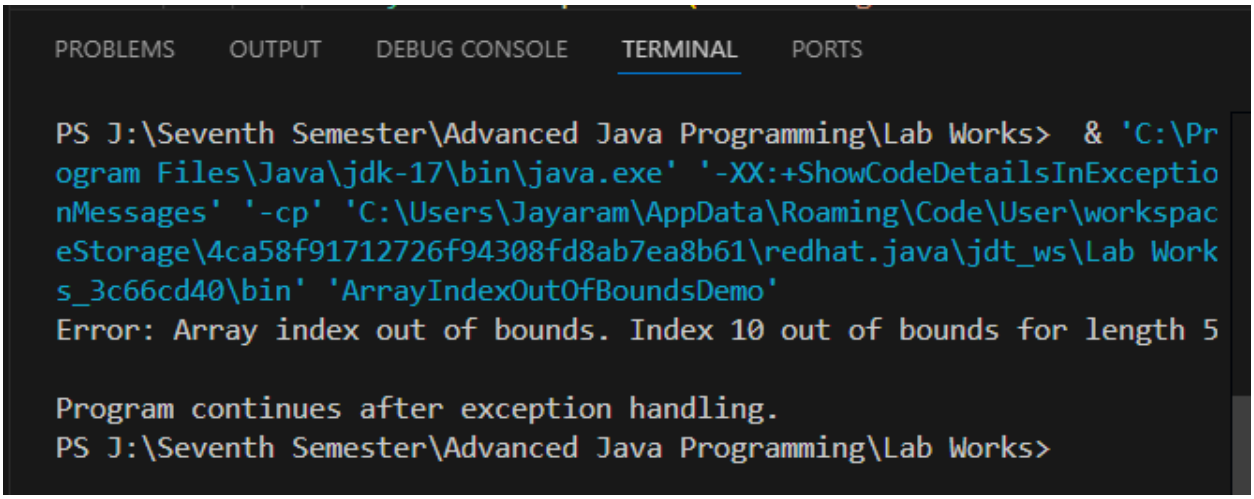
lab 20:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works> cd "j:\Seve
nth Semester\Advanced Java Programming\Lab Works\" ; if ($?) { javac Fi
gure.java } ; if ($?) { java Figure }
Area of Rectangle: 20.0 square units
Area of Triangle: 9.0 square units
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

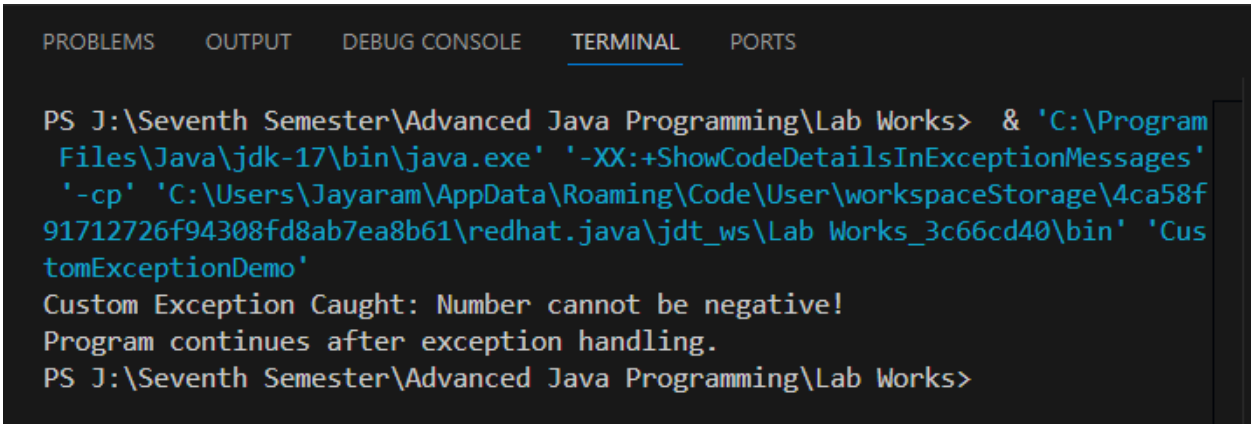
Lab 21

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  & 'C
:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsIn
ExceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\U
ser\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java
\jdt_ws\Lab Works_3c66cd40\bin' 'DivideByZeroDemo'
Error: Cannot divide by zero. / by zero
Program continues after exception handling.
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

Lab 22:


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
PS J:\Seventh Semester\Advanced Java Programming\Lab Works> & 'C:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\Lab Works_3c66cd40\bin' 'ArrayIndexOutOfBoundsDemo'
Error: Array index out of bounds. Index 10 out of bounds for length 5
Program continues after exception handling.
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>

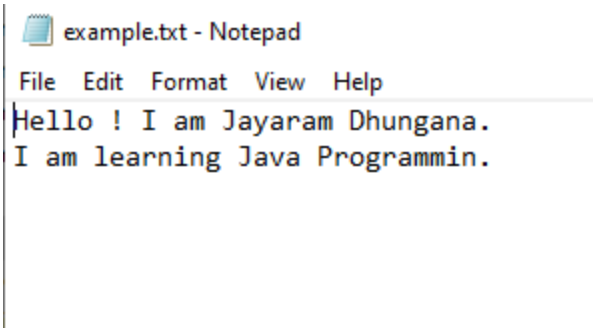
Lab 23:


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
PS J:\Seventh Semester\Advanced Java Programming\Lab Works> & 'C:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\Lab Works_3c66cd40\bin' 'CustomExceptionDemo'
Custom Exception Caught: Number cannot be negative!
Program continues after exception handling.
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>

Lab 24:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  j:; cd 'j:\Seventh Seme
ster\Advanced Java Programming\Lab Works'; & 'C:\Program Files\Java\jdk-17\bin\java.
ster\Advanced Java Programming\Lab Works'; & 'C:\Program Files\Java\jdk-17\bin\java.
exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roami
ng\Code\User\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\La
b Works_3c66cd40\bin' 'FileReaderDemo'
File Contents:
Hello ! I am Jayaram Dhungana.
I am learning Java Programmin.
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>
```

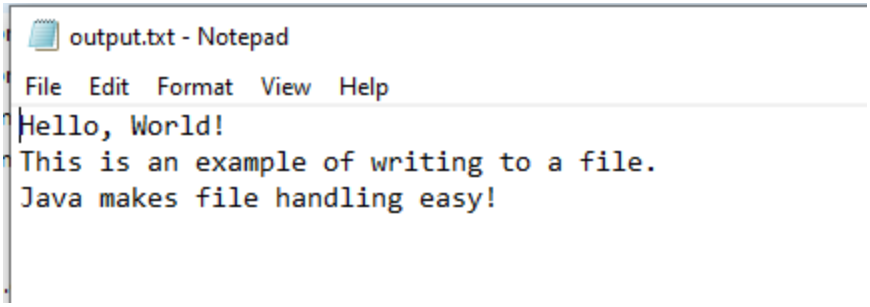
and example.txt is



Lab 25:

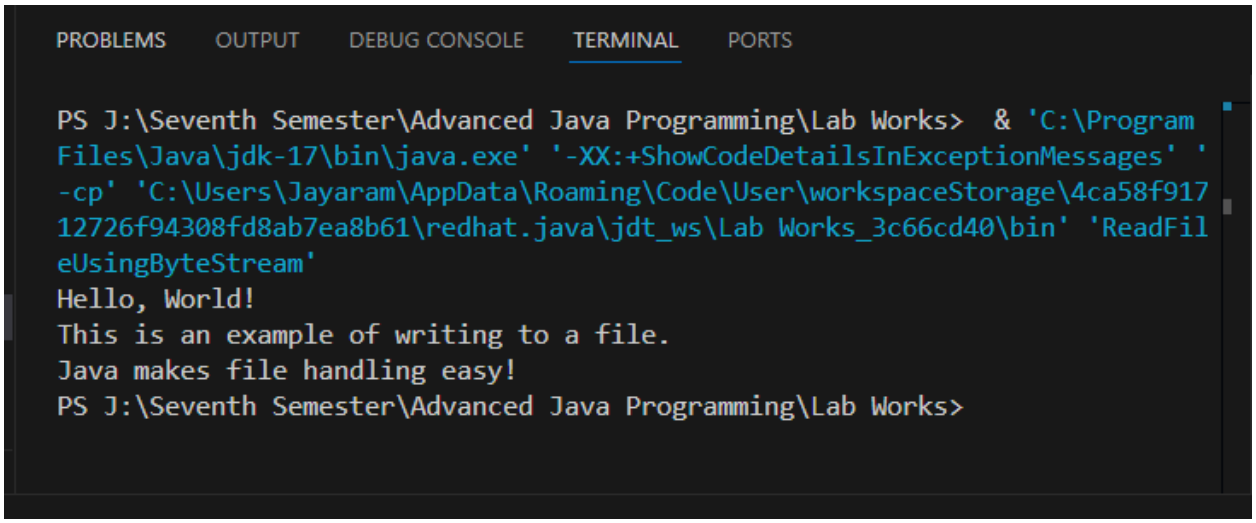
```
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>  j:; cd 'j:
\Seventh Semester\Advanced Java Programming\Lab Works'; & 'C:\Program F
iles\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages
' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceStorage\4c
a58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\Lab Works_3c66cd40\bi
n' 'FileWriterDemo'
Text successfully written to above 20 below 30\output.txt
```

Output.txt is

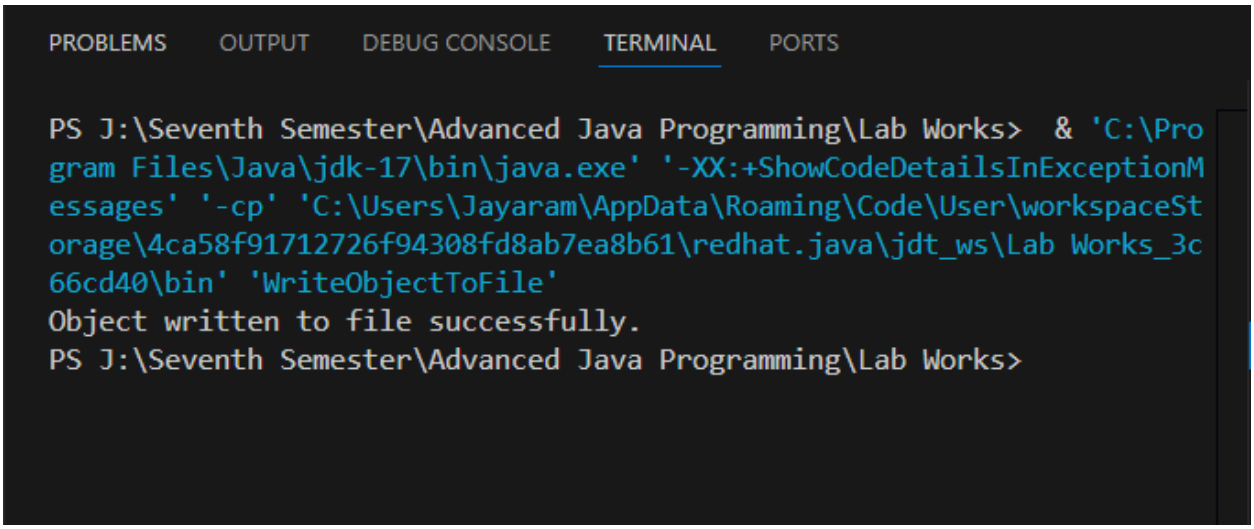


Lab 26:

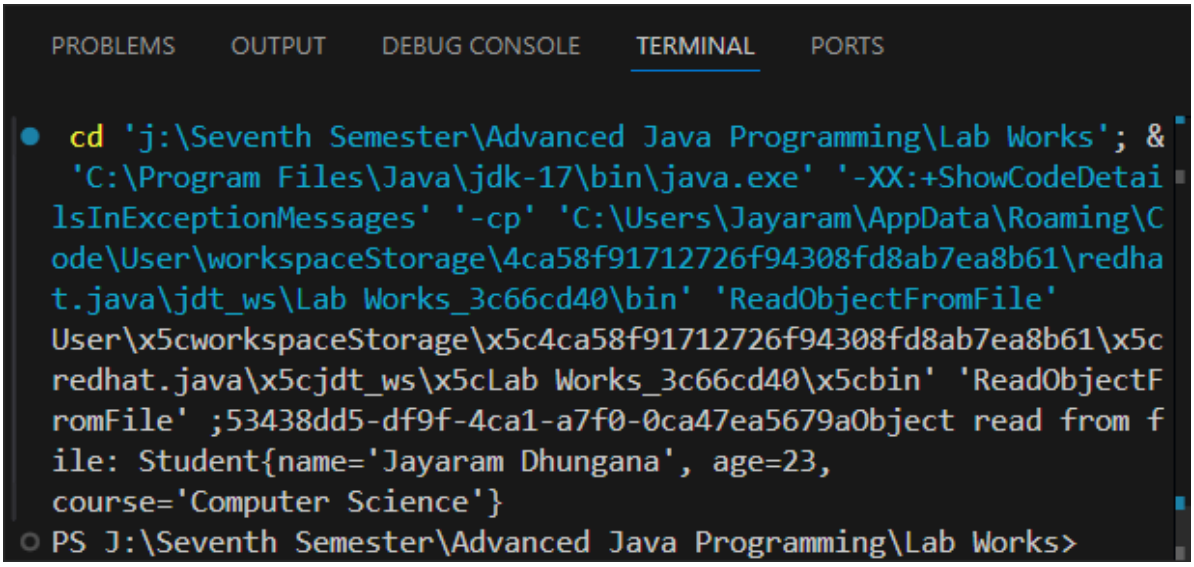
Output.txt is same as above.



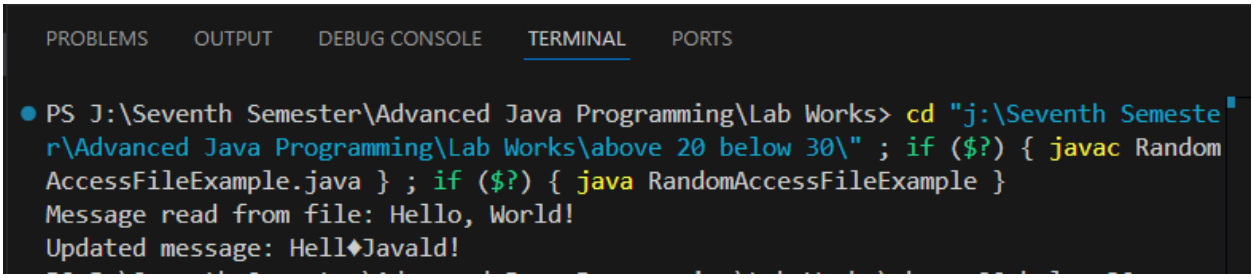
Lab 27:



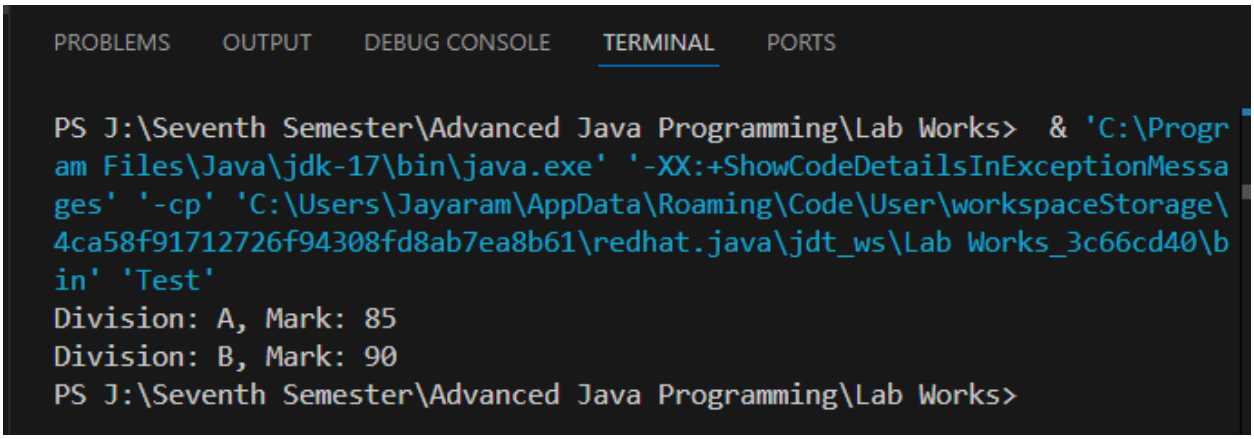
Lab 28:



Lab 29:



Lab 30:


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
PS J:\Seventh Semester\Advanced Java Programming\Lab Works> & 'C:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceStorage\4ca58f91712726f94308fd8ab7ea8b61\redhat.java\jdt_ws\Lab Works_3c66cd40\bin' 'Test'
Division: A, Mark: 85
Division: B, Mark: 90
PS J:\Seventh Semester\Advanced Java Programming\Lab Works>

```java
// 31. Write a Java program to create a class Mobile (type, phone_no).
// Customize the exception such that if the user gives phone_no having less
// than or greater than 10 digits, then the program has to throw an exception
// with the message "Invalid Phone Number".
class InvalidPhoneNumberException extends Exception {
    public InvalidPhoneNumberException(String message) {
        super(message);
    }
}
class Mobile {
    private String type;
    private String phoneNo;
    public Mobile(String type, String phoneNo) throws InvalidPhoneNumberException
{
        if (phoneNo.length() != 10) {
            throw new InvalidPhoneNumberException("Invalid Phone Number: " +
phoneNo);
        }
        this.type = type;
        this.phoneNo = phoneNo;
    }

    public String getType() {
        return type;
    }
    public String getPhoneNo() {
        return phoneNo;
    }
    @Override
    public String toString() {
        return "Mobile[type=" + type + ", phoneNo=" + phoneNo + "]";
    }
    public static void main(String[] args) {
        try {
            // Valid phone number
            Mobile mobile1 = new Mobile("Smartphone", "1234567890");
            System.out.println(mobile1);

            // Invalid phone number
            Mobile mobile2 = new Mobile("Feature Phone", "12345");
            System.out.println(mobile2);
        } catch (InvalidPhoneNumberException e) {
            System.err.println(e.getMessage());
        }
    }
}
```

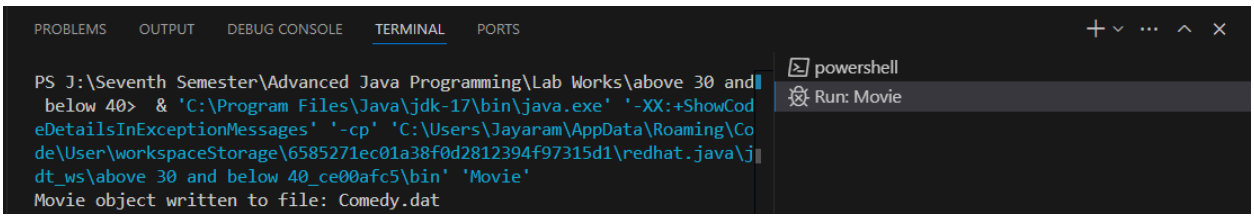
Output:

```
PS J:\Seventh Semester\Advanced Java Programming\Lab Works\above 30 and below 40> cd "j:\Seventh Sem
ester\Advanced Java Programming\Lab Works\above 30 and below 40\" ; if ($?) { javac Mobile.java } ;
if ($?) { java Mobile }
Mobile[type=Smartphone, phoneNo=1234567890]
Invalid Phone Number: 12345
PS J:\Seventh Semester\Advanced Java Programming\Lab Works\above 30 and below 40>
```

Lab 32

```java
/* 32. Create a class named Movie (id, genre). Write the object of Movie class
into a file named “Comedy.dat” having comedy as genre.
*/
import java.io.*;
class Movie implements Serializable {
    private int id;
    private String genre;

    public Movie(int id, String genre) {
        this.id = id;
        this.genre = genre;
    }

    public int getId() {
        return id;
    }

    public String getGenre() {
        return genre;
    }

    @Override
    public String toString() {
        return "Movie[id=" + id + ", genre=" + genre + "]";
    }

    public static void main(String[] args) {
        Movie comedyMovie = new Movie(101, "Comedy");

        try (ObjectOutputStream oos = new ObjectOutputStream(new
FileOutputStream("Comedy.dat"))) {
            if (comedyMovie.getGenre().equalsIgnoreCase("Comedy")) {
                oos.writeObject(comedyMovie);
                System.out.println("Movie object written to file: Comedy.dat");
            } else {
                System.out.println("The genre is not comedy, no file written.");
            }
        } catch (IOException e) {
            System.err.println("Error writing to file: " + e.getMessage());
        }
    }
}
```

Output:

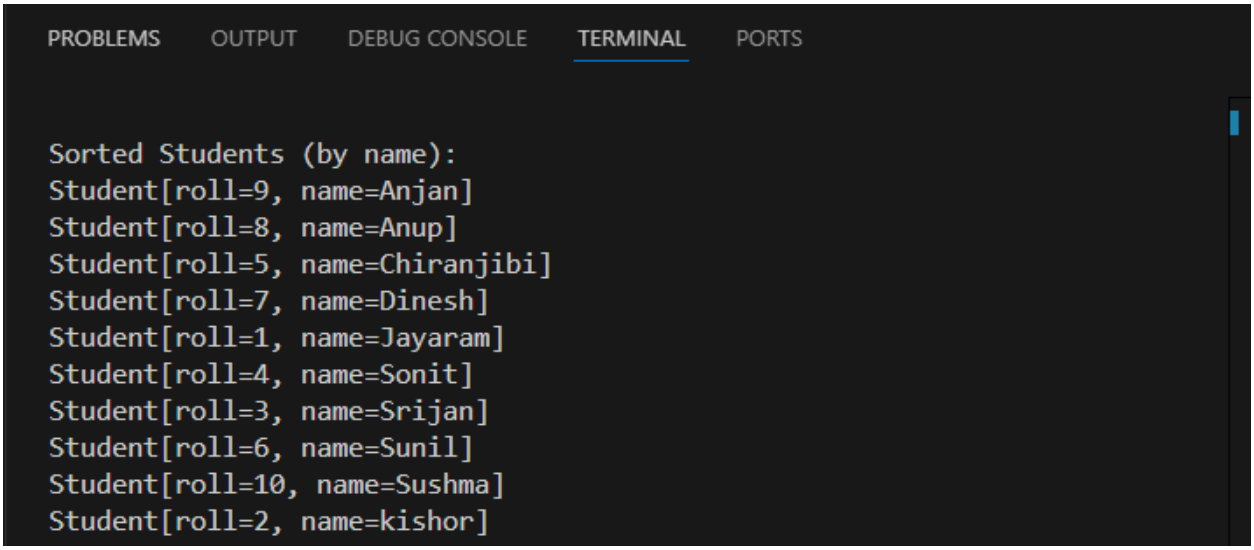


Lab 33:

```java
/*
33. Write a program to create a class Student with data members roll and name.
Sort the 10 objects of this class on the basis of name.
*/

import java.util.Arrays;

class Student {
    private int roll;
    private String name;

    // Constructor
    public Student(int roll, String name) {
        this.roll = roll;
        this.name = name;
    }

    // Getters
    public int getRoll() {
        return roll;
    }

    public String getName() {
        return name;
    }

    @Override
    public String toString() {
        return "Student[roll=" + roll + ", name=" + name + "]";
    }

    public static void main(String[] args) {
        // Array of 10 Student objects
        Student[] students = {
            new Student(1, "Jayaram"),
            new Student(2, "kishor"),
            new Student(3, "Srijan"),
            new Student(4, "Sonit"),
            new Student(5, "Chiranjibi"),
            new Student(6, "Sunil"),
            new Student(7, "Dinesh"),
            new Student(8, "Anup"),
            new Student(9, "Anjan"),
```

```
            new Student(10, "Sushma")
        };

        // Sorting the array based on name
        Arrays.sort(students, (s1, s2) -> s1.getName().compareTo(s2.getName()));

        // Printing sorted array
        System.out.println("\nSorted Students (by name):");
        for (Student student : students) {
            System.out.println(student);
        }
    }
}
```

Output



Lab 34:

```
/*
34. Create a class named Book with instance variables title and price.
Add a method named setVar to pass parameters for title and price.
Add another method named showVar to display values of these variables.
Now in main(), declare 4 objects of Book and display the records of books that
start with “Java”.
*/
class Book {
    private String title;
    private double price;

    // Method to set the values of title and price
    public void setVar(String title, double price) {
        this.title = title;
        this.price = price;
    }

    // Method to display the values of title and price
    public void showVar() {
        System.out.println("Book[title=" + title + ", price=" + price + "]");
    }

    // Getter for title
    public String getTitle() {
        return title;
    }

    public static void main(String[] args) {
        // Array of 4 Book objects
        Book[] books = new Book[4];

        // Initializing the books
        books[0] = new Book();
        books[0].setVar("Java Programming", 450.0);

        books[1] = new Book();
        books[1].setVar("Python Essentials", 550.0);

        books[2] = new Book();
        books[2].setVar("Java in Depth", 650.0);

        books[3] = new Book();
        books[3].setVar("C++ Basics", 300.0);
```

```
        // Displaying books that start with "Java"
        System.out.println("\nBooks that start with 'Java':");
        for (Book book : books) {
            if (book.getTitle().startsWith("Java")) {
                book.showVar();
            }
        }
    }
}
```

Output:

```
Books that start with 'Java':
Book[title=Java Programming, price=450.0]
Book[title=Java in Depth, price=650.0]
```

Lab 35:

```
/*
35. Create a Shape interface having methods area() and perimeter().
Create two subclasses, Circle and Rectangle that implement the Shape interface.
Create a class Sample with main method and demonstrate the area and perimeters
of both the Shape classes. You need to handle the values of length, breadth, and
radius in respective classes to calculate their area and perimeter.
*/

// Shape Interface
interface Shape {
    double area();
    double perimeter();
}

// Circle Class
class Circle implements Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }

    @Override
    public double area() {
        return Math.PI * radius * radius;
    }

    @Override
    public double perimeter() {
        return 2 * Math.PI * radius;
    }
}

// Rectangle Class
class Rectangle implements Shape {
    private double length;
    private double breadth;

    public Rectangle(double length, double breadth) {
        this.length = length;
        this.breadth = breadth;
    }

    @Override
```

```
    public double area() {
        return length * breadth;
    }

    @Override
    public double perimeter() {
        return 2 * (length + breadth);
    }
}

// Sample Class with Main Method
public class Sample {
    public static void main(String[] args) {
        // Create a Circle object
        Shape circle = new Circle(5.0); // radius = 5.0
        System.out.println("\nCircle:");
        System.out.println("Area: " + circle.area());
        System.out.println("Perimeter: " + circle.perimeter());

        // Create a Rectangle object
        Shape rectangle = new Rectangle(4.0, 6.0); // length = 4.0, breadth = 6.0
        System.out.println("\nRectangle:");
        System.out.println("Area: " + rectangle.area());
        System.out.println("Perimeter: " + rectangle.perimeter());
    }
}
```

Output:

```
                                        Circle:
Area: 78.53981633974483
Perimeter: 31.41592653589793

Rectangle:
Area: 24.0
Perimeter: 20.0
```

Lab 36:

```java
/*
36. Create a class Student with private member variables name and percentage.
Write methods to set, display and return values of private variables in the
Student class. Create 10 different objects of the Student class, set the values,
and display the name of the Student who has the highest percentage in the main
method of another class named StudentDemo.
*/

class Student {
    private String name;
    private double percentage;

    // Method to set values
    public void setValues(String name, double percentage) {
        this.name = name;
        this.percentage = percentage;
    }

    // Method to display values
    public void displayValues() {
        System.out.println("Student[name=" + name + ", percentage=" + percentage
+ "]");
    }

    // Method to get name
    public String getName() {
        return name;
    }

    // Method to get percentage
    public double getPercentage() {
        return percentage;
    }
}

public class StudentDemo {
    public static void main(String[] args) {
        // Array to hold 10 Student objects
        Student[] students = new Student[10];

        // Initializing and setting values for 10 students
        students[0] = new Student();
        students[0].setValues("Jayaram", 88.5);

        students[1] = new Student();
        students[1].setValues("Kishor", 91.0);

        students[2] = new Student();
        students[2].setValues("Srijan", 79.3);

        students[3] = new Student();
```

```
        students[3].setValues("Nar", 85.0);

        students[4] = new Student();
        students[4].setValues("Sanjay", 93.2);

        students[5] = new Student();
        students[5].setValues("Anup", 68.5);

        students[6] = new Student();
        students[6].setValues("Anjan", 75.0);

        students[7] = new Student();
        students[7].setValues("Sonit", 89.7);

        students[8] = new Student();
        students[8].setValues("Chiranjibi", 94.1);

        students[9] = new Student();
        students[9].setValues("Dinesh", 72.5);

        // Finding the student with the highest percentage
        Student topStudent = students[0];
        for (Student student : students) {
            if (student.getPercentage() > topStudent.getPercentage()) {
                topStudent = student;
            }
        }

        // Displaying the name of the student with the highest percentage
        System.out.println("\nThe student with the highest percentage:");
        topStudent.displayValues();
    }
}
```

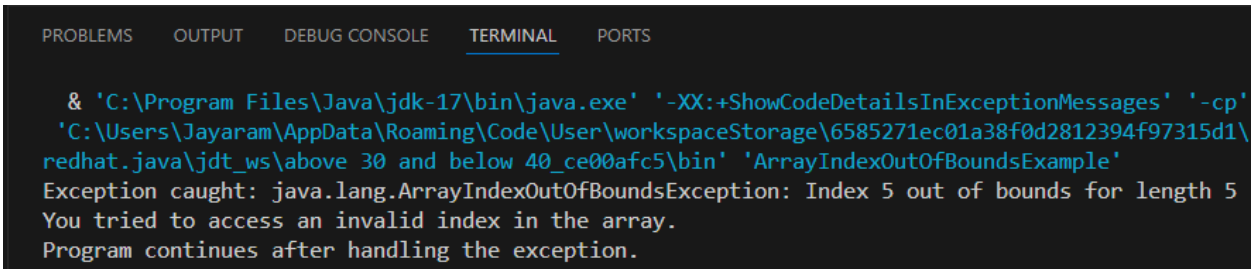
Output:

```
The student with the highest percentage:
Student[name=Chiranjibi, percentage=94.1]
```

Lab 37:

```java
/*
37. Write a program to illustrate the concept of ArrayIndexOutOfBoundsException.
*/

public class ArrayIndexOutOfBoundsExample {
    public static void main(String[] args) {
        try {
            // Initialize an array with 5 elements
            int[] numbers = {10, 20, 30, 40, 50};

            // Attempt to access an invalid index (out of bounds)
            System.out.println("Accessing element at index 5: " + numbers[5]);
        } catch (ArrayIndexOutOfBoundsException e) {
            // Handle the exception
            System.err.println("Exception caught: " + e);
            System.err.println("You tried to access an invalid index in the
array.");
        }

        // Program continues execution
        System.out.println("Program continues after handling the exception.");
    }
}
```

Output:



Lab 38:

```
/*
38. Write a Java program to read data from the file “text.txt”
and write the data into the file “best.txt”.
*/

import java.io.*;

public class FileCopyExample {
    public static void main(String[] args) {
        // Specify the input and output file names
        String inputFile = "text.txt";
        String outputFile = "best.txt";

        // Try-with-resources to ensure proper closure of streams
        try (
            BufferedReader reader = new BufferedReader(new
FileReader(inputFile));
            BufferedWriter writer = new BufferedWriter(new
FileWriter(outputFile))
        ) {
            String line;

            // Read from input file and write to output file line by line
            while ((line = reader.readLine()) != null) {
                writer.write(line);
                writer.newLine(); // Add a newline after each line
            }

            System.out.println("Data successfully copied from " + inputFile + "
to " + outputFile);
        } catch (FileNotFoundException e) {
            System.err.println("Error: The file " + inputFile + " was not
found.");
        } catch (IOException e) {
            System.err.println("Error occurred while reading or writing the file:
" + e.getMessage());
        }
    }
}
```

text.txt

text.txt

```
1   Hello ,I am Jayaram Dhungana. I learning Java Programmming.
2
```

best.txt

best.txt

```
1   Hello ,I am Jayaram Dhungana. I learning Java Programmming.
2
```

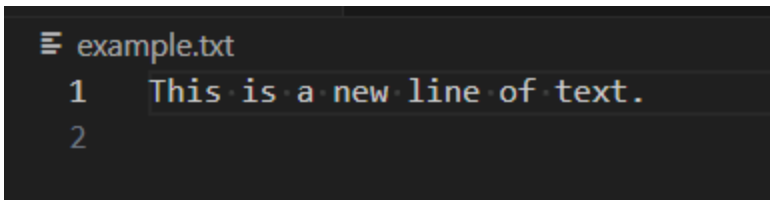
and Output:

```
PS J:\Seventh Semester\Advanced Java Programming\Lab Works\above 30 and below 40>  j:;
 cd 'j:\Seventh Semester\Advanced Java Programming\Lab Works\above 30 and below 40'; &
 'C:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages'
 '-cp' 'C:\Users\Jayaram\AppData\Roaming\Code\User\workspaceStorage\6585271ec01a38f0d2
812394f97315d1\redhat.java\jdt_ws\above 30 and below 40_ce00afc5\bin' 'FileCopyExample
'
Data successfully copied from text.txt to best.txt
```

Lab 39:

```java
/*
39. Write a Java program writes line of text to existing file.
 Also read the content of this file and write down on monitor
*/

import java.io.*;

public class FileReadWriteExample {
    public static void main(String[] args) {
        String filePath = "example.txt";  // The file to read and write to

        // Writing a line of text to the file
        try (FileWriter writer = new FileWriter(filePath, true); // 'true' for
             BufferedWriter bufferedWriter = new BufferedWriter(writer)) {
            bufferedWriter.write("This is a new line of text.");
            bufferedWriter.newLine();  // To ensure a new line after the text
            System.out.println("Text written to file successfully.");
        } catch (IOException e) {
            System.err.println("Error writing to the file: " + e.getMessage());
        }

        // Reading the content of the file and printing it on the monitor
        try (FileReader reader = new FileReader(filePath);
             BufferedReader bufferedReader = new BufferedReader(reader)) {
            String line;
            System.out.println("\nContent of the file:");
            while ((line = bufferedReader.readLine()) != null) {
                System.out.println(line);
            }
        } catch (IOException e) {
            System.err.println("Error reading from the file: " + e.getMessage());
        }
    }
}
```

Output:




```
Content of the file:
This is a new line of text.
```

Lab 40:

```java
/*40.   Write a Java program reads N names of students and then sort them in ascending order. */
import java.util.*;

public class StudentNameSorter {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        // Input number of students
        System.out.print("Enter the number of students: ");
        int n = scanner.nextInt();
        scanner.nextLine();  // Consume the leftover newline character

        // Create an array or list to store student names
        List<String> studentNames = new ArrayList<>();

        // Input student names
        System.out.println("Enter the names of the students:");
        for (int i = 0; i < n; i++) {
            String name = scanner.nextLine();
            studentNames.add(name);
        }

        // Sort the names in ascending order
        Collections.sort(studentNames);

        // Output the sorted names
        System.out.println("\nSorted names of students:");
        for (String name : studentNames) {
            System.out.println(name);
        }

        // Close the scanner
        scanner.close();
    }
}
```

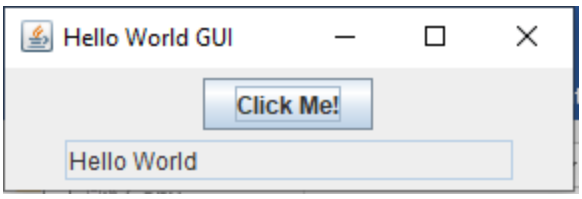
Output:

```
Enter the number of students: 5
Enter the names of the students:
Jayaram
Bharat
Renuka
Anjali
Sabitri

Sorted names of students:
Anjali
Bharat
Jayaram
Renuka
Sabitri
```

41:

```java
/*41.   Write a Simple GUI program that displays “hello World” in a
text field. The program should display if user clicks a button.

 */
import javax.swing.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class HelloWorldGUI {
    public static void main(String[] args) {
        // Create the frame for the GUI
        JFrame frame = new JFrame("Hello World GUI");

        // Create a text field to display the message
        JTextField textField = new JTextField(20);
        textField.setEditable(false);  // Make the text field non-editable

        // Create a button that will trigger the action
        JButton button = new JButton("Click Me!");

        // Add an ActionListener to the button
        button.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                textField.setText("Hello World");
            }
        });

        // Set the layout of the frame
        frame.setLayout(new FlowLayout());

        // Add the button and text field to the frame
        frame.add(button);
        frame.add(textField);

        // Set default close operation and frame size
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(300, 100);
        frame.setVisible(true);
    }
}
```

Output:

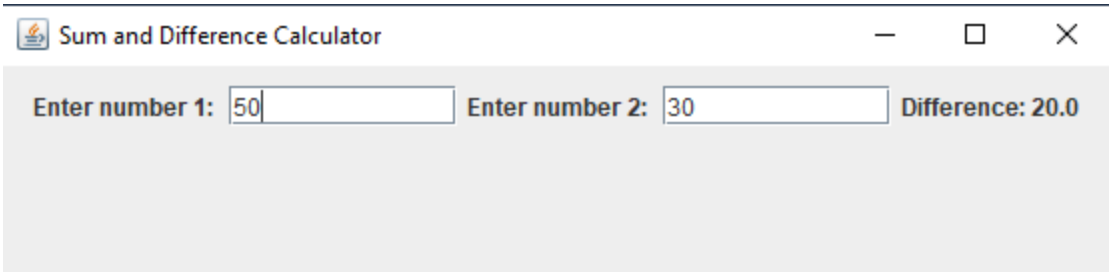


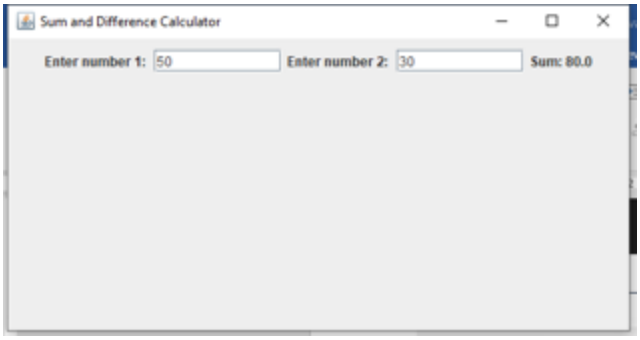
Lab 42:

```
/*42.    Write GUI program using Swing components to find sum and
difference of two numbers. Use two text fields for giving input and
 a label for output. The program
should display sum if user presses mouse and difference if user release mouse. */
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

public class SumDifferenceCalculator {
    public static void main(String[] args) {
        // Create the frame for the GUI
        JFrame frame = new JFrame("Sum and Difference Calculator");

        // Create two text fields for user input
        JTextField num1Field = new JTextField(10);
        JTextField num2Field = new JTextField(10);

        // Create a label to display the result
        JLabel resultLabel = new JLabel("Result: ");

        // Create a panel to hold the text fields and label
        JPanel panel = new JPanel();
        panel.setLayout(new FlowLayout());
        panel.add(new JLabel("Enter number 1: "));
        panel.add(num1Field);
        panel.add(new JLabel("Enter number 2: "));
        panel.add(num2Field);
        panel.add(resultLabel);

        // Create a MouseListener to handle mouse pressed and released events
        num1Field.addMouseListener(new MouseAdapter() {
            @Override
            public void mousePressed(MouseEvent e) {
                try {
                    // Get the numbers from text fields
                    double num1 = Double.parseDouble(num1Field.getText());
                    double num2 = Double.parseDouble(num2Field.getText());

                    // Calculate and display the sum
                    double sum = num1 + num2;
                    resultLabel.setText("Sum: " + sum);
                } catch (NumberFormatException ex) {
                    resultLabel.setText("Invalid input!");
                }
```

```
            }

            @Override
            public void mouseReleased(MouseEvent e) {
                try {
                    // Get the numbers from text fields
                    double num1 = Double.parseDouble(num1Field.getText());
                    double num2 = Double.parseDouble(num2Field.getText());

                    // Calculate and display the difference
                    double difference = num1 - num2;
                    resultLabel.setText("Difference: " + difference);
                } catch (NumberFormatException ex) {
                    resultLabel.setText("Invalid input!");
                }
            }
        });

        // Set up the frame
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(300, 300);
        frame.setLayout(new FlowLayout());
        frame.add(panel);
        frame.setVisible(true);
    }
}
```

Output:





Lab 43:

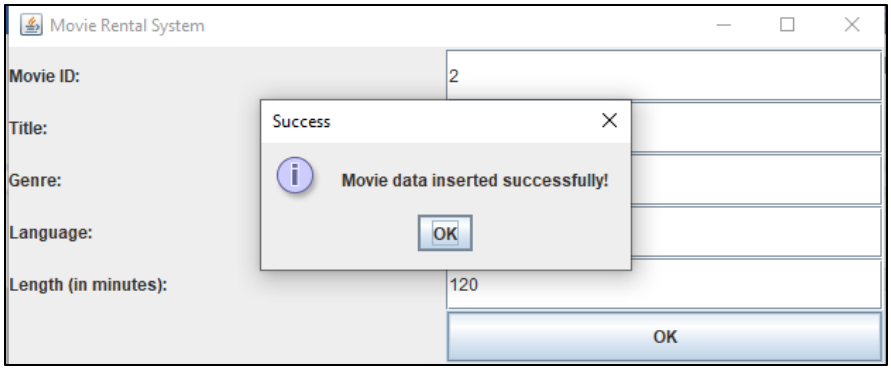
```
/*43.
You are hired by a reputed software company which is going to design an
application
for “Movie Rental System”. Your responsibility is to design a schema named MRS
and
create a table named Movie(id, Title, Genre, Language, Length). Write a program
to
design a GUI to take input for this table and insert the data into table after
clicking
OK button
 */
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.sql.*;

public class MovieRentalSystem {
    public static void main(String[] args) {
        // Set up the GUI
        JFrame frame = new JFrame("Movie Rental System");
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(400, 300);

        // Create the form labels and text fields
        JLabel idLabel = new JLabel("Movie ID:");
        JTextField idField = new JTextField(15);

        JLabel titleLabel = new JLabel("Title:");
        JTextField titleField = new JTextField(15);

        JLabel genreLabel = new JLabel("Genre:");
        JTextField genreField = new JTextField(15);

        JLabel languageLabel = new JLabel("Language:");
        JTextField languageField = new JTextField(15);

        JLabel lengthLabel = new JLabel("Length (in minutes):");
        JTextField lengthField = new JTextField(15);

        // Create the OK button
        JButton okButton = new JButton("OK");

        // Set the layout of the frame
        frame.setLayout(new GridLayout(6, 2));
```

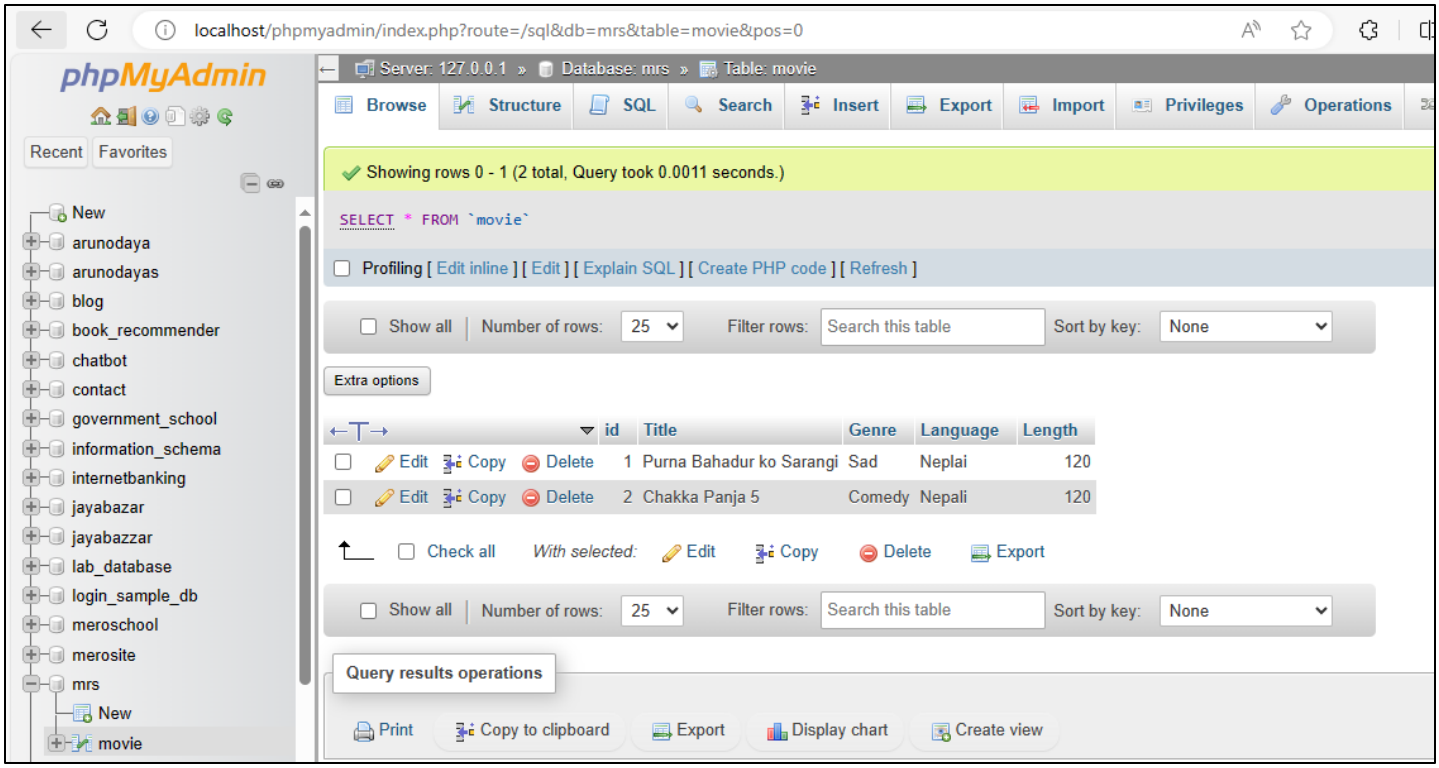
```
        // Add components to the frame
        frame.add(idLabel);
        frame.add(idField);
        frame.add(titleLabel);
        frame.add(titleField);
        frame.add(genreLabel);
        frame.add(genreField);
        frame.add(languageLabel);
        frame.add(languageField);
        frame.add(lengthLabel);
        frame.add(lengthField);
        frame.add(new JLabel());  // Empty label for spacing
        frame.add(okButton);

        // Action listener for the OK button
        okButton.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                // Retrieve data from text fields
                String id = idField.getText();
                String title = titleField.getText();
                String genre = genreField.getText();
                String language = languageField.getText();
                String length = lengthField.getText();

                // Check if any field is empty
                if (id.isEmpty() || title.isEmpty() || genre.isEmpty() ||
language.isEmpty() || length.isEmpty()) {
                    JOptionPane.showMessageDialog(frame, "All fields must be
filled!", "Error", JOptionPane.ERROR_MESSAGE);
                    return;
                }

                // Connect to the database and insert data
                try {
                    // Load the JDBC driver
                    Class.forName("com.mysql.cj.jdbc.Driver");

                    // Connect to the database using XAMPP MySQL
                    Connection conn =
DriverManager.getConnection("jdbc:mysql://localhost:3306/MRS", "root", "");

                    // Prepare SQL query to insert the movie details
                    String sql = "INSERT INTO Movie (id, Title, Genre, Language,
Length) VALUES (?, ?, ?, ?, ?)";
```

```
                    PreparedStatement pstmt = conn.prepareStatement(sql);

                    // Set the values in the prepared statement
                    pstmt.setInt(1, Integer.parseInt(id));
                    pstmt.setString(2, title);
                    pstmt.setString(3, genre);
                    pstmt.setString(4, language);
                    pstmt.setInt(5, Integer.parseInt(length));

                    // Execute the insert statement
                    pstmt.executeUpdate();

                    // Show success message
                    JOptionPane.showMessageDialog(frame, "Movie data inserted
successfully!", "Success", JOptionPane.INFORMATION_MESSAGE);

                    // Clear the text fields
                    idField.setText("");
                    titleField.setText("");
                    genreField.setText("");
                    languageField.setText("");
                    lengthField.setText("");

                    // Close the connection
                    conn.close();
                } catch (Exception ex) {
                    JOptionPane.showMessageDialog(frame, "Error: " +
ex.getMessage(), "Error", JOptionPane.ERROR_MESSAGE);
                    ex.printStackTrace();
                }
            }
        });

        // Make the frame visible
        frame.setVisible(true);
    }
}
```

Output:


Movie Rental System
Movie ID:
2
Title:
Chakka Panja 5
Genre:
Comedy
Language:
Nepali
Length (in minutes):
120
OK


Movie Rental System
Movie ID:
2
Title:
Genre:
Language:
Length (in minutes):
120
OK
Success
Movie data inserted successfully!
OK


localhost/phpmyadmin/index.php?route=/sql&db=mrs&table=movie&pos=0
phpMyAdmin
Recent
Favorites
New
arunodaya
arunodayas
blog
book_recommender
chatbot
contact
government_school
information_schema
internetbanking
jayabazar
jayabazzar
lab_database
login_sample_db
meroschool
merosite
mrs
New
movie
Server: 127.0.0.1 » Database: mrs » Table: movie
Browse
Structure
SQL
Search
Insert
Export
Import
Privileges
Operations
Showing rows 0 - 1 (2 total, Query took 0.0011 seconds.)
SELECT * FROM `movie`
Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]
Show all
Number of rows: 25
Filter rows: Search this table
Sort by key: None
Extra options
id
Title
Genre
Language
Length
Edit Copy Delete 1 Purna Bahadur ko Sarangi Sad Neplai 120
Edit Copy Delete 2 Chakka Panja 5 Comedy Nepali 120
Check all
With selected:
Edit
Copy
Delete
Export
Query results operations
Print
Copy to clipboard
Export
Display chart
Create view

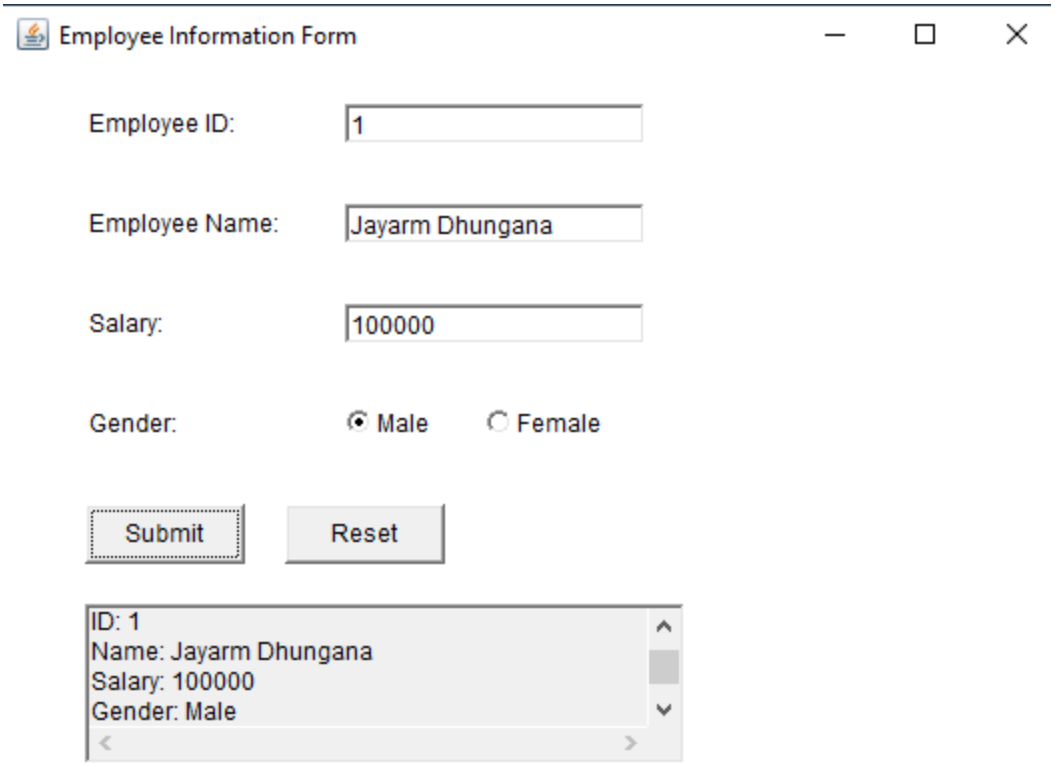
Lab 44:

```
/*44.   Write a Java program in awt to create form to enter
 employee information (eid, ename, salary, gender) */
import java.awt.*;
import java.awt.event.*;

public class EmployeeForm {
    public static void main(String[] args) {
        // Create the Frame
        Frame frame = new Frame("Employee Information Form");
        frame.setSize(400, 400);
        frame.setLayout(null);

        // Labels
        Label labelEid = new Label("Employee ID:");
        labelEid.setBounds(50, 50, 100, 20);
        frame.add(labelEid);

        Label labelEname = new Label("Employee Name:");
        labelEname.setBounds(50, 100, 100, 20);
        frame.add(labelEname);

        Label labelSalary = new Label("Salary:");
        labelSalary.setBounds(50, 150, 100, 20);
        frame.add(labelSalary);

        Label labelGender = new Label("Gender:");
        labelGender.setBounds(50, 200, 100, 20);
        frame.add(labelGender);

        // Text Fields
        TextField textEid = new TextField();
        textEid.setBounds(180, 50, 150, 20);
        frame.add(textEid);

        TextField textEname = new TextField();
        textEname.setBounds(180, 100, 150, 20);
        frame.add(textEname);

        TextField textSalary = new TextField();
        textSalary.setBounds(180, 150, 150, 20);
        frame.add(textSalary);

        // Gender Radio Buttons
        CheckboxGroup genderGroup = new CheckboxGroup();
```

```
        Checkbox male = new Checkbox("Male", genderGroup, true);
        male.setBounds(180, 200, 60, 20);
        frame.add(male);

        Checkbox female = new Checkbox("Female", genderGroup, false);
        female.setBounds(250, 200, 70, 20);
        frame.add(female);

        // Submit Button
        Button submitButton = new Button("Submit");
        submitButton.setBounds(50, 250, 80, 30);
        frame.add(submitButton);

        // Reset Button
        Button resetButton = new Button("Reset");
        resetButton.setBounds(150, 250, 80, 30);
        frame.add(resetButton);

        // TextArea to Display Output
        TextArea outputArea = new TextArea();
        outputArea.setBounds(50, 300, 300, 80);
        outputArea.setEditable(false);
        frame.add(outputArea);

        // Action Listener for Submit Button
        submitButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                String eid = textEid.getText();
                String ename = textEname.getText();
                String salary = textSalary.getText();
                String gender = genderGroup.getSelectedCheckbox().getLabel();

                if (eid.isEmpty() || ename.isEmpty() || salary.isEmpty()) {
                    outputArea.setText("Please fill out all fields.");
                } else {
                    outputArea.setText("Employee Details:\n");
                    outputArea.append("ID: " + eid + "\n");
                    outputArea.append("Name: " + ename + "\n");
                    outputArea.append("Salary: " + salary + "\n");
                    outputArea.append("Gender: " + gender + "\n");
                }
            }
        });

        // Action Listener for Reset Button
        resetButton.addActionListener(new ActionListener() {
```

```
            public void actionPerformed(ActionEvent e) {
                textEid.setText("");
                textEname.setText("");
                textSalary.setText("");
                genderGroup.setSelectedCheckbox(male);
                outputArea.setText("");
            }
        });

        // Window Closing Event
        frame.addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
                frame.dispose();
            }
        });

        // Set Frame Visible
        frame.setVisible(true);
    }
}
```

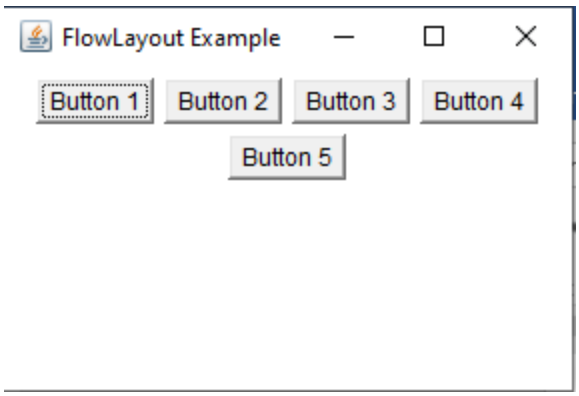
Output:



Lab 45:

```java
/*
 *45. Demonstration of FlowLayout in Java

 */

 import java.awt.*;
 import java.awt.event.*;

 public class FlowLayoutDemo {
     public static void main(String[] args) {
         // Create a Frame
         Frame frame = new Frame("FlowLayout Example");

         // Set FlowLayout as the layout manager
         frame.setLayout(new FlowLayout());

         // Add some buttons to demonstrate FlowLayout
         for (int i = 1; i <= 5; i++) {
             Button button = new Button("Button " + i);
             frame.add(button);
         }

         // Add a WindowListener to handle window closing
         frame.addWindowListener(new WindowAdapter() {
             public void windowClosing(WindowEvent e) {
                 frame.dispose();
             }
         });

         // Set frame properties
         frame.setSize(300, 200);
         frame.setVisible(true);
     }
 }
```

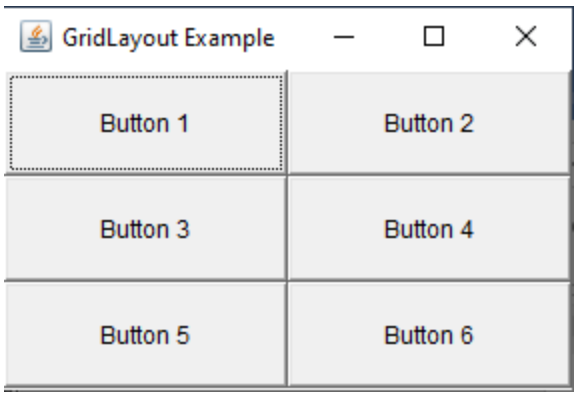
Output:



Lab 46:

```java
/*
 46:Program: Demonstration of GridLayout in Java
 */

 import java.awt.*;
 import java.awt.event.*;

 public class GridLayoutDemo {
     public static void main(String[] args) {
         // Create a Frame
         Frame frame = new Frame("GridLayout Example");

         // Set GridLayout with 3 rows and 2 columns
         frame.setLayout(new GridLayout(3, 2));

         // Add some buttons to demonstrate GridLayout
         for (int i = 1; i <= 6; i++) {
             Button button = new Button("Button " + i);
             frame.add(button);
         }

         // Add a WindowListener to handle window closing
         frame.addWindowListener(new WindowAdapter() {
             public void windowClosing(WindowEvent e) {
                 frame.dispose();
             }
         });

         // Set frame properties
         frame.setSize(300, 200);
         frame.setVisible(true);
     }
 }
```

Output:

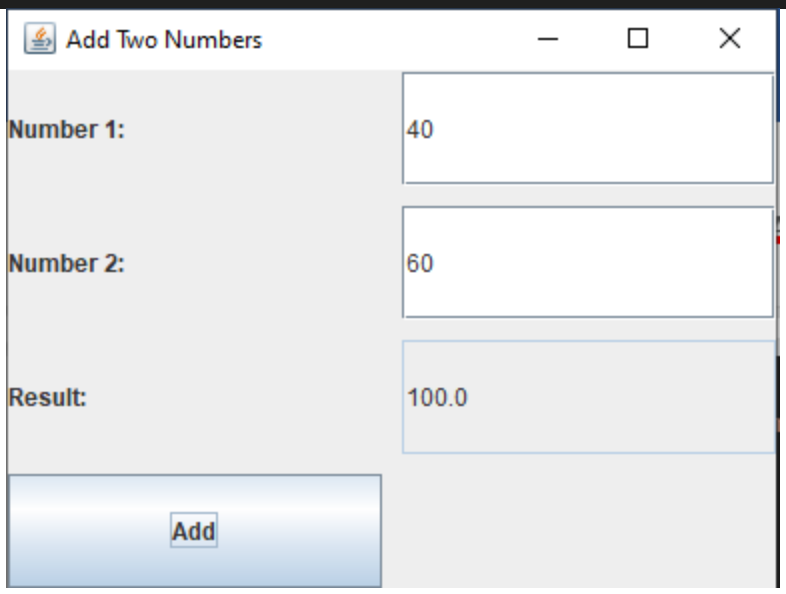


Lab 47:

```
/*
 * 47.Adding Two Numbers Using Swing Components

 */

 import javax.swing.*;
 import java.awt.*;
 import java.awt.event.ActionEvent;
 import java.awt.event.ActionListener;

 public class AddTwoNumbers {
     public static void main(String[] args) {
         // Create a JFrame
         JFrame frame = new JFrame("Add Two Numbers");
         frame.setSize(400, 300);
         frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
         frame.setLayout(new GridLayout(4, 2, 10, 10)); // 4 rows, 2 columns,
with gaps

         // Create Labels
         JLabel labelNum1 = new JLabel("Number 1:");
         JLabel labelNum2 = new JLabel("Number 2:");
         JLabel labelResult = new JLabel("Result:");

         // Create Text Fields
         JTextField textNum1 = new JTextField();
         JTextField textNum2 = new JTextField();
         JTextField textResult = new JTextField();
         textResult.setEditable(false); // Output field should not be editable

         // Create Button
         JButton addButton = new JButton("Add");

         // Add Action Listener to the Button
         addButton.addActionListener(new ActionListener() {
             public void actionPerformed(ActionEvent e) {
                 try {
                     // Parse numbers from the text fields
                     double num1 = Double.parseDouble(textNum1.getText());
                     double num2 = Double.parseDouble(textNum2.getText());

                     // Calculate sum
                     double sum = num1 + num2;
```

```
                    // Display the result
                    textResult.setText(String.valueOf(sum));
                } catch (NumberFormatException ex) {
                    // Handle invalid input
                    JOptionPane.showMessageDialog(frame, "Please enter valid
numbers", "Error", JOptionPane.ERROR_MESSAGE);
                }
            }
        });

        // Add components to the frame
        frame.add(labelNum1);
        frame.add(textNum1);
        frame.add(labelNum2);
        frame.add(textNum2);
        frame.add(labelResult);
        frame.add(textResult);
        frame.add(addButton);

        // Set frame visibility
        frame.setVisible(true);
    }
}
```

Output:

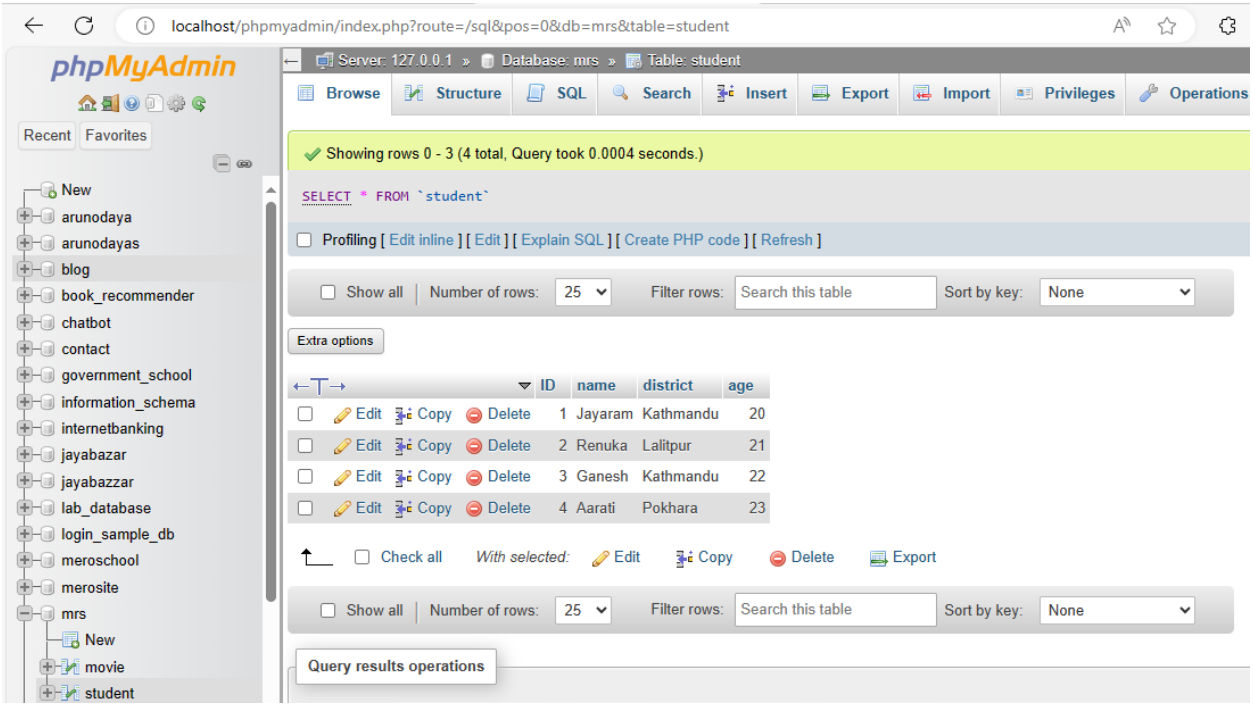


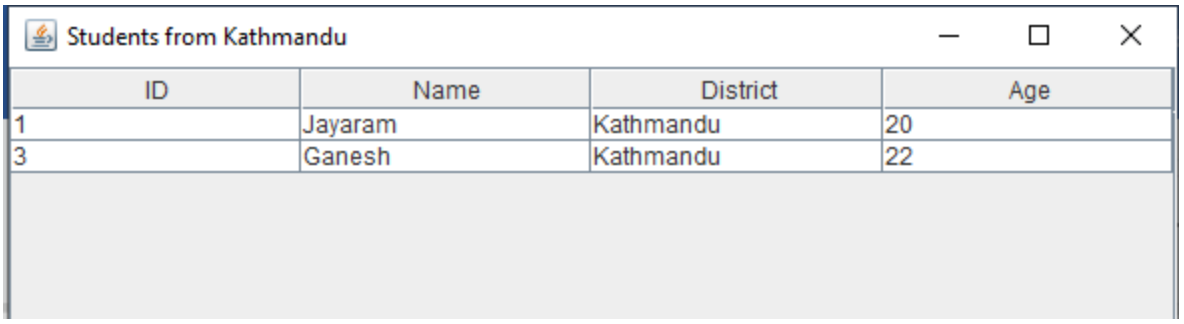
Lab 48:

```
/*
 * 48.Write a Java program to retrieve and display the records of students who
live
 * in the Kathmandu district. Assume the student table in the database has four
 *  attributes: ID, name, district,
 *  and age. Use GUI components to display the data in tabular format.
 */

 import javax.swing.*;
 import javax.swing.table.DefaultTableModel;
 import java.sql.*;

 public class FetchKathmanduStudentsGUI {
     public static void main(String[] args) {
         // Database credentials
         String url = "jdbc:mysql://localhost:3306/mrs"; // Replace with your
database name
         String user = "root"; // Replace with your database username
         String password = ""; // Replace with your database password

         // SQL query to fetch students from Kathmandu district
         String query = "SELECT * FROM student WHERE district = 'Kathmandu'";

         // Initialize JFrame
         JFrame frame = new JFrame("Students from Kathmandu");
         frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
         frame.setSize(600, 400);

         // Table to display data
         String[] columnNames = {"ID", "Name", "District", "Age"};
         DefaultTableModel tableModel = new DefaultTableModel(columnNames, 0);
         JTable table = new JTable(tableModel);
         JScrollPane scrollPane = new JScrollPane(table);

         frame.add(scrollPane);

         // JDBC objects
         Connection connection = null;
         Statement statement = null;
         ResultSet resultSet = null;

         try {
             // Load the MySQL JDBC driver
             Class.forName("com.mysql.cj.jdbc.Driver");
```

```
            // Establish connection
            connection = DriverManager.getConnection(url, user, password);

            // Create a statement object to execute the query
            statement = connection.createStatement();

            // Execute the query
            resultSet = statement.executeQuery(query);

            // Populate table model with data from the ResultSet
            while (resultSet.next()) {
                int id = resultSet.getInt("ID");
                String name = resultSet.getString("name");
                String district = resultSet.getString("district");
                int age = resultSet.getInt("age");

                // Add row to table model
                tableModel.addRow(new Object[]{id, name, district, age});
            }
        } catch (ClassNotFoundException e) {
            JOptionPane.showMessageDialog(frame, "JDBC Driver not found. Add the
JDBC driver to the classpath.", "Error", JOptionPane.ERROR_MESSAGE);
        } catch (SQLException e) {
            JOptionPane.showMessageDialog(frame, "SQL Exception: " +
e.getMessage(), "Error", JOptionPane.ERROR_MESSAGE);
        } finally {
            // Close resources
            try {
                if (resultSet != null) resultSet.close();
                if (statement != null) statement.close();
                if (connection != null) connection.close();
            } catch (SQLException e) {
                JOptionPane.showMessageDialog(frame, "Error closing resources: "
+ e.getMessage(), "Error", JOptionPane.ERROR_MESSAGE);
            }
        }

        // Make the frame visible
        frame.setVisible(true);
    }
}
```

Databse Table and output are:





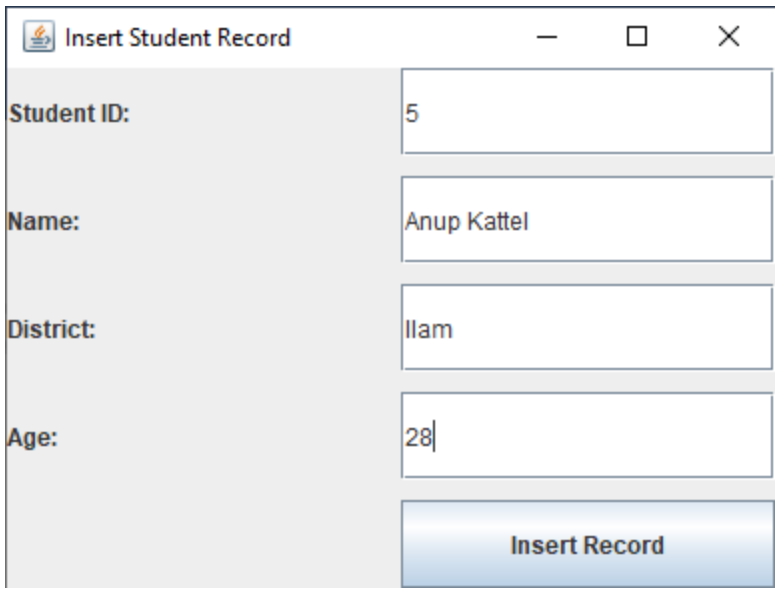
Lab 49:

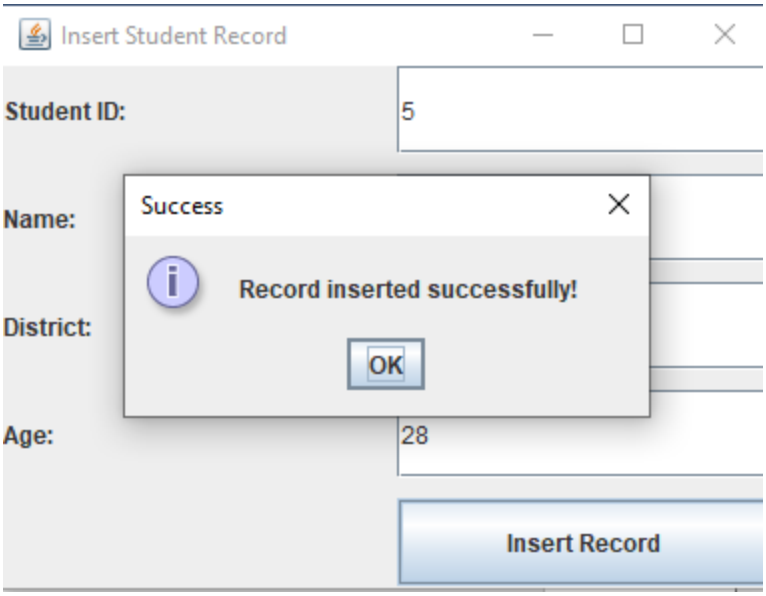
```
/*
 * 49.  Write a Java program to insert one record to database.
 * Assume your own database and table

 */

 import javax.swing.*;
 import java.awt.*;
 import java.awt.event.ActionEvent;
 import java.awt.event.ActionListener;
 import java.sql.*;

 public class InsertRecordGUI {
     public static void main(String[] args) {
         // Database credentials
         String url = "jdbc:mysql://localhost:3306/mrs"; // Replace with your
database name
         String user = "root"; // Replace with your database username
         String password = ""; // Replace with your database password

         // Create the JFrame
         JFrame frame = new JFrame("Insert Student Record");
         frame.setSize(400, 300);
         frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
         frame.setLayout(new GridLayout(5, 2, 10, 10)); // 5 rows, 2 columns with
spacing

         // Create Labels and Text Fields
         JLabel labelID = new JLabel("Student ID:");
         JLabel labelName = new JLabel("Name:");
         JLabel labelDistrict = new JLabel("District:");
         JLabel labelAge = new JLabel("Age:");

         JTextField textID = new JTextField();
         JTextField textName = new JTextField();
         JTextField textDistrict = new JTextField();
         JTextField textAge = new JTextField();

         // Create Insert Button
         JButton insertButton = new JButton("Insert Record");

         // Add Action Listener to the Button
```

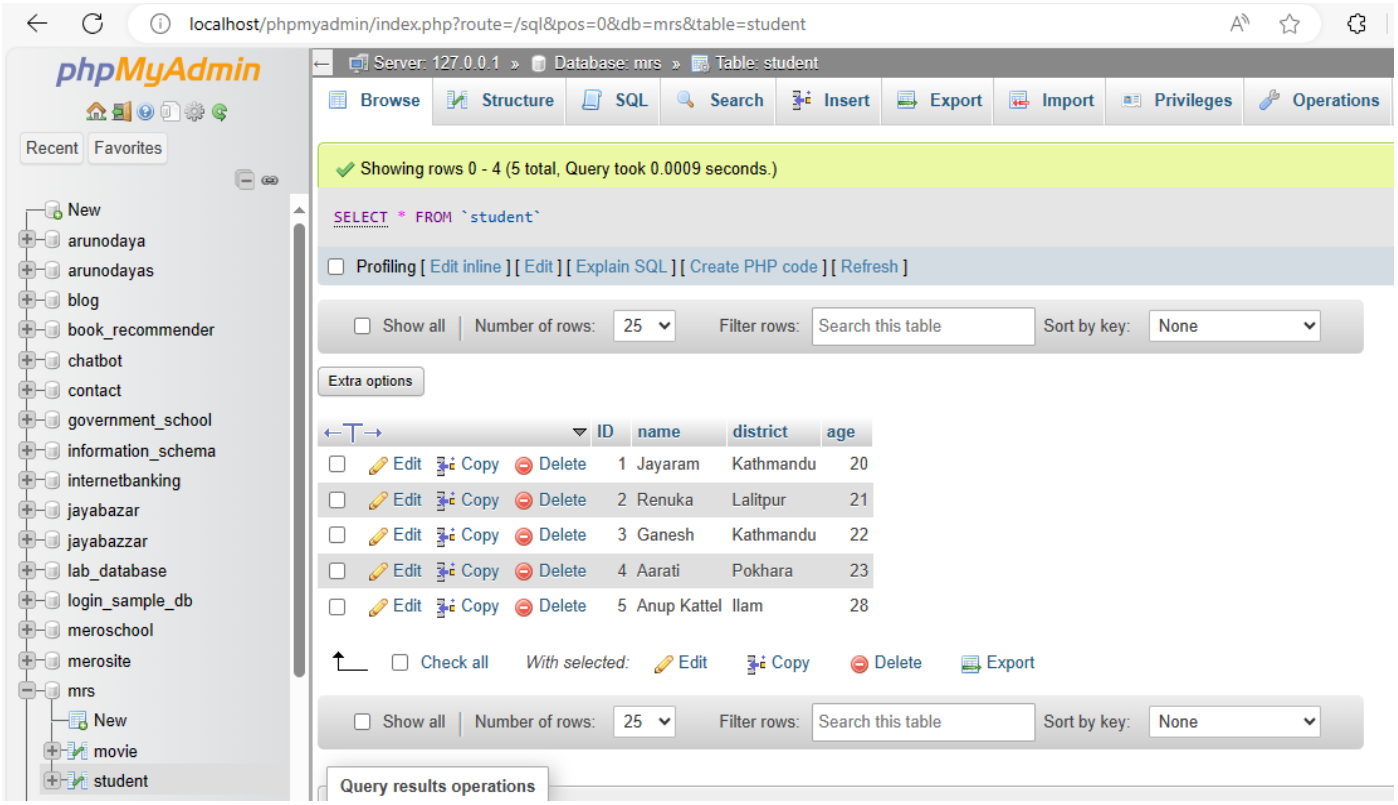
```
        insertButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                // Read input values
                int id = 0;
                String name = textName.getText();
                String district = textDistrict.getText();
                int age = 0;

                try {
                    id = Integer.parseInt(textID.getText());
                    age = Integer.parseInt(textAge.getText());
                } catch (NumberFormatException ex) {
                    JOptionPane.showMessageDialog(frame, "ID and Age must be
numbers.", "Input Error", JOptionPane.ERROR_MESSAGE);
                    return;
                }

                // Database insertion
                String query = "INSERT INTO student (ID, name, district, age)
VALUES (?, ?, ?, ?)";
                try (Connection connection = DriverManager.getConnection(url,
user, password);
                     PreparedStatement preparedStatement =
connection.prepareStatement(query)) {

                    // Set query parameters
                    preparedStatement.setInt(1, id);
                    preparedStatement.setString(2, name);
                    preparedStatement.setString(3, district);
                    preparedStatement.setInt(4, age);

                    // Execute the query
                    int rowsInserted = preparedStatement.executeUpdate();
                    if (rowsInserted > 0) {
                        JOptionPane.showMessageDialog(frame, "Record inserted
successfully!", "Success", JOptionPane.INFORMATION_MESSAGE);
                        // Clear input fields
                        textID.setText("");
                        textName.setText("");
                        textDistrict.setText("");
                        textAge.setText("");
                    }
                } catch (SQLException ex) {
                    JOptionPane.showMessageDialog(frame, "Database Error: " +
ex.getMessage(), "Error", JOptionPane.ERROR_MESSAGE);
                }
```

```
            }
        });

        // Add components to the frame
        frame.add(labelID);
        frame.add(textID);
        frame.add(labelName);
        frame.add(textName);
        frame.add(labelDistrict);
        frame.add(textDistrict);
        frame.add(labelAge);
        frame.add(textAge);
        frame.add(new JLabel()); // Empty space
        frame.add(insertButton);

        // Make the frame visible
        frame.setVisible(true);
    }
}
```

Output:




Insert Student Record
Student ID:
5
Name:
Success
Record inserted successfully!
OK
District:
Age:
28
Insert Record


localhost/phpmyadmin/index.php?route=/sql&pos=0&db=mrs&table=student
phpMyAdmin
Recent
Favorites
New
arunodaya
arunodayas
blog
book_recommender
chatbot
contact
government_school
information_schema
internetbanking
jayabazar
jayabazzar
lab_database
login_sample_db
meroschool
merosite
mrs
New
movie
student
Server: 127.0.0.1 » Database: mrs » Table: student
Browse
Structure
SQL
Search
Insert
Export
Import
Privileges
Operations
Showing rows 0 - 4 (5 total, Query took 0.0009 seconds.)
SELECT * FROM `student`
Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]
Show all
Number of rows: 25
Filter rows: Search this table
Sort by key: None
Extra options
ID
name
district
age
Edit Copy Delete 1 Jayaram Kathmandu 20
Edit Copy Delete 2 Renuka Lalitpur 21
Edit Copy Delete 3 Ganesh Kathmandu 22
Edit Copy Delete 4 Aarati Pokhara 23
Edit Copy Delete 5 Anup Kattel Ilam 28
Check all
With selected:
Edit
Copy
Delete
Export
Query results operations

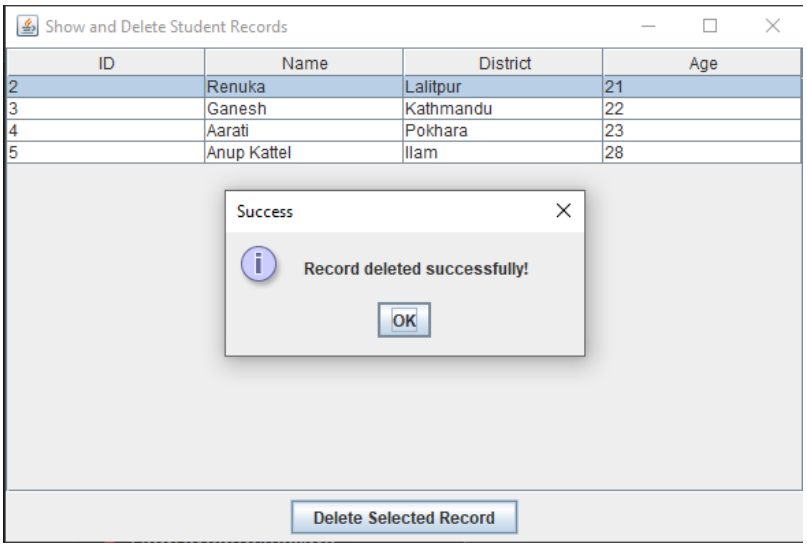
Lab 50:

```
/*
 *  50.  Write a Java Program to delete a record from database.
 *  Assume your own database and table

 */

 import javax.swing.*;
 import javax.swing.table.DefaultTableModel;
 import java.awt.*;
 import java.awt.event.ActionEvent;
 import java.awt.event.ActionListener;
 import java.sql.*;

 public class ShowAndDeleteRecords {
     public static void main(String[] args) {
         // Database credentials
         String url = "jdbc:mysql://localhost:3306/mrs"; // Replace with your
database name
         String user = "root"; // Replace with your database username
         String password = ""; // Replace with your database password

         // Create the JFrame
         JFrame frame = new JFrame("Show and Delete Student Records");
         frame.setSize(600, 400);
         frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
         frame.setLayout(new BorderLayout());

         // Create table model and JTable
         DefaultTableModel tableModel = new DefaultTableModel(new String[]{"ID",
"Name", "District", "Age"}, 0);
         JTable table = new JTable(tableModel);
         JScrollPane scrollPane = new JScrollPane(table);

         // Create Delete Button
         JButton deleteButton = new JButton("Delete Selected Record");

         // Panel for Delete Button
         JPanel buttonPanel = new JPanel();
         buttonPanel.add(deleteButton);

         // Add components to the frame
         frame.add(scrollPane, BorderLayout.CENTER);
         frame.add(buttonPanel, BorderLayout.SOUTH);
```

```
        // Load data from the database
        try (Connection connection = DriverManager.getConnection(url, user,
password);
             Statement statement = connection.createStatement()) {

            // Execute query to fetch all student records
            String query = "SELECT * FROM student";
            ResultSet resultSet = statement.executeQuery(query);

            // Populate the table model with data
            while (resultSet.next()) {
                int id = resultSet.getInt("ID");
                String name = resultSet.getString("name");
                String district = resultSet.getString("district");
                int age = resultSet.getInt("age");
                tableModel.addRow(new Object[]{id, name, district, age});
            }
        } catch (SQLException ex) {
            JOptionPane.showMessageDialog(frame, "Database Error: " +
ex.getMessage(), "Error", JOptionPane.ERROR_MESSAGE);
        }

        // Add Action Listener to the Delete Button
        deleteButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                // Get selected row
                int selectedRow = table.getSelectedRow();
                if (selectedRow == -1) {
                    JOptionPane.showMessageDialog(frame, "Please select a record
to delete.", "No Selection", JOptionPane.WARNING_MESSAGE);
                    return;
                }

                // Get ID of the selected record
                int id = (int) tableModel.getValueAt(selectedRow, 0);

                // Delete the record from the database
                String deleteQuery = "DELETE FROM student WHERE ID = ?";
                try (Connection connection = DriverManager.getConnection(url,
user, password);
                     PreparedStatement preparedStatement =
connection.prepareStatement(deleteQuery)) {

                    // Set query parameter
                    preparedStatement.setInt(1, id);
```

```
                    // Execute the query
                    int rowsDeleted = preparedStatement.executeUpdate();
                    if (rowsDeleted > 0) {
                        JOptionPane.showMessageDialog(frame, "Record deleted
successfully!", "Success", JOptionPane.INFORMATION_MESSAGE);
                        tableModel.removeRow(selectedRow); // Remove the row
from the table
                    }
                } catch (SQLException ex) {
                    JOptionPane.showMessageDialog(frame, "Database Error: " +
ex.getMessage(), "Error", JOptionPane.ERROR_MESSAGE);
                }
            }
        });

        // Make the frame visible
        frame.setVisible(true);
    }
 }
```

Output:



51. Create a servlet that displays two text boxes in web browser, reads number entered in first text box, calculates factorial and displays it in second text field.

Source code

```
import java.io.IOException;

import java.io.PrintWriter;

import javax.servlet.ServletException;

import javax.servlet.annotation.WebServlet;

import javax.servlet.http.HttpServlet;

import javax.servlet.http.HttpServletRequest;

import javax.servlet.http.HttpServletResponse;



@WebServlet({"/FactorialServlet"})
public class FactorialServletDemo extends HttpServlet {
   public FactorialServletDemo() {
   }

   protected void doPost(HttpServletRequest var1, HttpServletResponse
var2) throws ServletException, IOException {
      int var3 = Integer.parseInt(var1.getParameter("number"));
      int var4 = this.calculateFactorial(var3);
      var2.setContentType("text/html");
      PrintWriter var5 = var2.getWriter();
      var5.println("<html><body>");
      var5.println("<form method='post' action='FactorialServlet'>");
      var5.println("Enter a number: <input type='text' name='number'
value='" + var3 + "'><br>");
      var5.println("Factorial: <input type='text' name='factorial'
value='" + var4 + "' readonly><br>");
      var5.println("<input type='submit' value='Calculate'>");
      var5.println("</form>");
      var5.println("</body></html>");
   }

   private int calculateFactorial(int var1) {
      int var2 = 1;

      for(int var3 = 1; var3 <= var1; ++var3) {
```

```
            var2 *= var3;
        }

        return var2;
    }
}
```

Factorial.html

```
<!DOCTYPE html>
<html>

<head>
    <title>Factorial Calculator</title>
</head>

<body>
    <form action="FactorialServlet" method="post">
        Enter a number: <input type="text" name="number"><br>
        Factorial: <input type="text" name="factorial" readonly><br>
        <input type="submit" value="Calculate">
    </form>
</body>

</html>
```

Web.xml

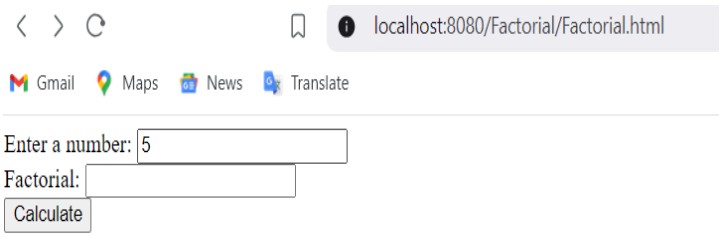
/webapps/Factorial/WEB-INF/classes

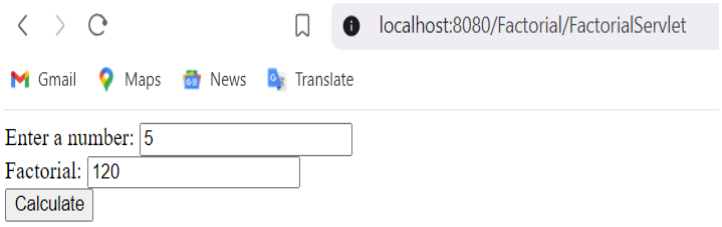
Copy compiled class file inside it

Accesss: http://localhost:8080/Factorial/FactorialServlet

```
<web-app>
    <servlet>
        <servlet-name>FactorialServletDemo</servlet-name>
        <servlet-class>FactorialServletDemo</servlet-class>
    </servlet>
    <servlet-mapping>
        <servlet-name>FactorialServletDemo</servlet-name>
        <url-pattern>/FactorialServlet</url-pattern>
    </servlet-mapping>
</web-app>
```

Output:





52. Write a servlet program that reads two numbers from web browser and finds sum of these two numbers.

Source code

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

@WebServlet("/SumServlet")
public class SumServlet extends HttpServlet {
    protected void doPost(HttpServletRequest request, HttpServletResponse
response)throws ServletException, IOException {

        int number1 = Integer.parseInt(request.getParameter("number1"));
        int number2 = Integer.parseInt(request.getParameter("number2"));
        int sum = number1 + number2;
        response.setContentType("text/html");
        PrintWriter out = response.getWriter();
        out.println("<html><body>");
        out.println("<form method='post' action='SumServlet'>");

        out.println("Enter first number: <input type='text' name='number1'
value='" + number1 + "'><br>");

        out.println("Enter second number: <input type='text'
name='number2' value='" + number2 + "'><br>");

        out.println("Sum: <input type='text' name='sum' value='" + sum +
"' readonly><br>");
        out.println("<input type='submit' value='Calculate'>");
        out.println("</form>");
        out.println("</body></html>");
    }
}
```

Sum.html

```
<!DOCTYPE html>
<html>

<head>
    <title>Sum Calculator</title>
</head>

<body>
    <form action="SumServlet" method="post">
        Enter first number: <input type="text" name="number1"><br>
        Enter second number: <input type="text" name="number2"><br>
        Sum: <input type="text" name="sum" readonly><br>
        <input type="submit" value="Calculate">
    </form>
</body>

</html>
```

Web.xml

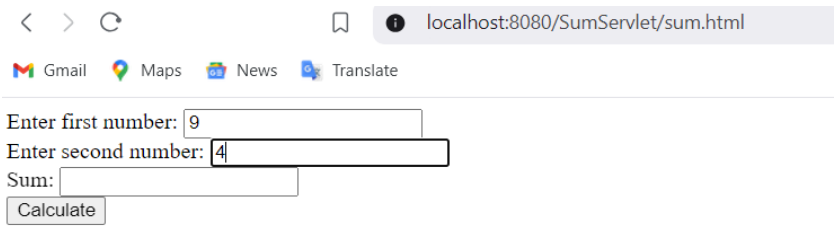
/webapps/SumServlet/WEB-INF/classes

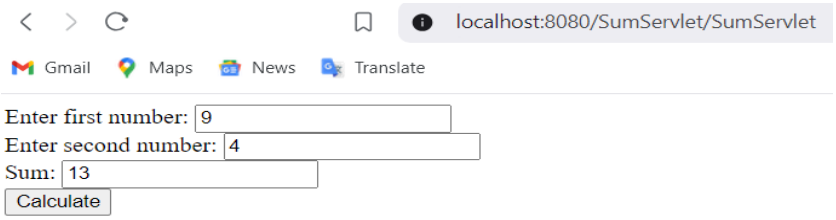
Copy compiled class file inside it

Accesss: http://localhost:8080/SumServlet/FactorialServlet

```
<web-app>
    <servlet>
        <servlet-name>SumServlet</servlet-name>
        <servlet-class>SumServlet</servlet-class>
    </servlet>
    <servlet-mapping>
        <servlet-name>SumServlet</servlet-name>
        <url-pattern>/SumServlet</url-pattern>
    </servlet-mapping>
</web-app>
```

Output:


localhost:8080/SumServlet/sum.html
Gmail
Maps
News
Translate
Enter first number: 9
Enter second number: 4
Sum:
Calculate


localhost:8080/SumServlet/SumServlet
Gmail
Maps
News
Translate
Enter first number: 9
Enter second number: 4
Sum: 13
Calculate

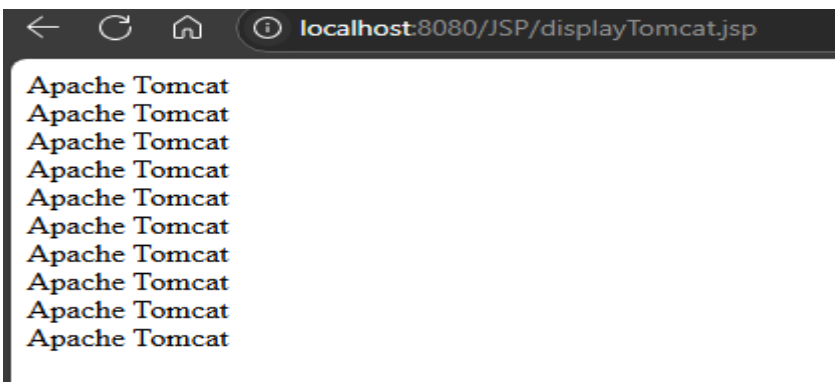
53. Write a JSP program display text "Apache Tomcat" 10 times.

Source code

#webapp/JSP/displayTomcat.jsp#

```
<%@ page language="java" contentType="text/html; charset=UTF-8" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
<head>
  <title>Display Text</title>
</head>
<body>
<%
  for (int i = 0; i < 10; i++) {
    out.println("Apache  Tomcat<br>");
  }
%>
</body>
</html>
```

Output



54. How exceptions can be handled in JSP scripts? Explain with suitable JSP script

Ans:>In JSP (JavaServer Pages), exceptions can be handled using the `try-catch` block within the JSP scriptlets. Additionally, you can use the `<error-page>` element in the `web.xml` file to define error pages for specific exceptions or error codes.

web.xml

```
<web-app>
    <error-page>
        <exception-type>java.lang.Exception</exception-type>
        <location>/errorPage.jsp</location>
    </error-page>
</web-app>
```

Source code

HandleException.jsp

```
<%@ page contentType="text/html;charset=UTF-8" language="java" %>
    <!DOCTYPE html>
    <html>

    <head>
        <title>Exception Handling in JSP</title>
    </head>

    <body>
        <h1>Exception Handling Example</h1>
        <% try { int
number=Integer.parseInt(request.getParameter("number"));
         int result=10 / number; // This may throw an ArithmeticException
            out.println("Result: " + result);
        } catch (NumberFormatException e) {
            throw new ServletException(" Error: Please enter a valid
number.", e); }
```

```
            catch (ArithmeticException e) {
            throw new ServletException("Error: Division by zero is not
allowed.", e); }
             catch (Exception e) { throw new ServletException("Error: An
unexpected error occurred.", e); }
             %>
    </body>

    </html>
```

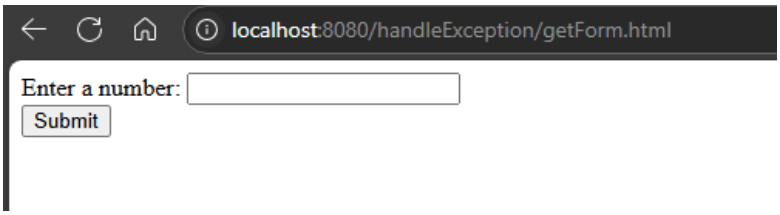
errorPage.jsp

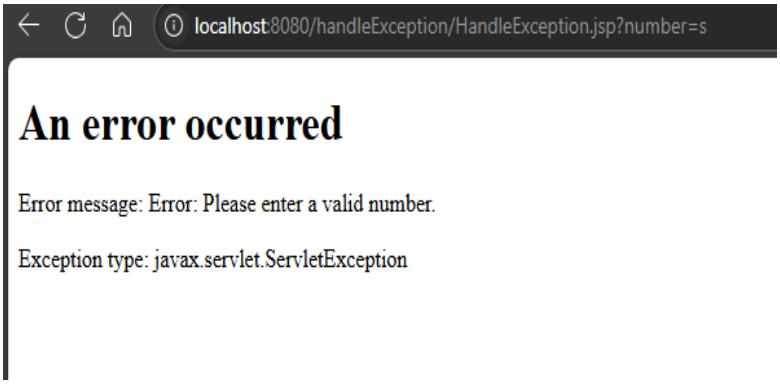
```
<%@ page contentType="text/html;charset=UTF-8" language="java" isErrorPage="true"%>
<!DOCTYPE html>
<html>
<head>
  <title>Error Page</title>
</head>
<body>
  <h1>An error occurred</h1>
  <p>Error message: <%= exception.getMessage() %></p>
  <p>Exception type: <%= exception.getClass().getName() %></p>
</body>
</html>
```

Web.xml

```
<web-app>
    <error-page>
        <exception-type>java.lang.Exception</exception-type>
        <location>/errorPage.jsp</location>
    </error-page>
</web-app>
```

Output





55.Write a server and client program by using RMI such that the program finds factorial of a positive number 'n'.

Source code

FactorialInterfece.java

```
import java.rmi.Remote;

import java.rmi.RemoteException;


public interface FactorialInterface extends Remote {

   int calculateFactorial(int n) throws RemoteException;

}
```

FactorialImpl.java

```
import java.rmi.RemoteException;

import java.rmi.server.UnicastRemoteObject;


public class FactorialImpl extends UnicastRemoteObject implements Factorial {

   protected FactorialImpl() throws RemoteException {

      super();

   }
```

```
    @Override
    public int calculateFactorial(int n) throws RemoteException {
        int result = 1;
        for (int i = 1; i <= n; i++) {
            result *= i;
        }
        return result;
    }
}
```

FactorialServer.java

```
import java.rmi.Naming;
import java.rmi.registry.LocateRegistry;

public class FactorialServer {
    public static void main(String[] args) {
        try {
            LocateRegistry.createRegistry(1099);
            FactorialImpl factorial = new FactorialImpl();
            Naming.rebind("rmi://localhost:1099/FactorialService", factorial);
            System.out.println("Factorial Server is ready.");
        } catch (Exception e) {
            e.printStackTrace();
        }
```

```
    }
}
```

Factorialclient.java

```
import java.rmi.Naming;


public class FactorialClient {
    public static void main(String[] args) {
        try {
            Factorial factorial = (Factorial) Naming.lookup("rmi://localhost:1099/FactorialService");
            int number = 5; // Example number
            int result = factorial.calculateFactorial(number);
            System.out.println("Factorial of " + number + " is " + result);
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

Output: