NAME : AVISHKAAR PAWAR

ROLL NO : AD-1224

Course : B.Sc(H) CS

Subject : Programming in Java

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Submitted to : Mr Mahesh Kumar Bhandari

LAB 0

```
//Practise Set Number 1

//Run this in terminal , not Code Runner
/** Pass command line arguements in form java <name> < rollno> <course> <college> */

public class Student{
   public static void main(String args[]){
      // Name,RollNo,Course,college
      Student stu1 = new Student(args);
      stu1.display();

 }

   public void display(){
      System.out.println("Name : "+this.name);
      System.out.println("Roll NO is "+this.rollno);
      System.out.println("Marks Scored : "+this.course);
      System.out.println("College : "+this.college);
   }
   public String name;
   public String course;
   public int rollno;
   public String college;
   public Student(String args[]){
      name=args[0];
      rollno=Integer.parseInt(args[1]);
      course=args[2];

      college=args[3];
   }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab0> java Student A 1 BA ANDC
Name : A
Roll NO is 1
Marks Scored : BA
College : ANDC
```

```
//Practise Set 2
import java.util.Scanner;
```

```java
public class Leap_Year {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter Year : ");
      int year = sc.nextInt();
      if ((year % 400 != 0) && (year % 100 == 0)) {
         System.out.println("Not a leap year ");
      } else if (year % 400 == 0) {
         System.out.println("Leap Year");
      } else if (year % 4 == 0) {
         System.out.println("Leap Year");
      } else {
         System.out.println("Not a leap year ");
      }
      sc.close();
   }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab0> cd "d:\ANDC\Sem-2\Java\Lab0\" ; if
($?) { javac Leap_Year.java } ; if ($?) { java Leap_Year }
Enter Year : 2003
Not a leap year
PS D:\ANDC\Sem-2\Java\Lab0> cd "d:\ANDC\Sem-2\Java\Lab0\" ; if
($?) { javac Leap_Year.java } ; if ($?) { java Leap_Year }
Enter Year : 2000
Leap Year
PS D:\ANDC\Sem-2\Java\Lab0> cd "d:\ANDC\Sem-2\Java\Lab0\" ; if
($?) { javac Leap_Year.java } ; if ($?) { java Leap_Year }
Enter Year : 2100
Not a leap year
```

```java
// Practise Set 3

// Sum of N Command Line Arguement


public class SumOfN {

   // Command Line Arguement

   public static void main(String[] args) {

      int sum = 0;

      for (int i = 0; i < args.length; i++) {

         sum += Integer.parseInt(args[i]);

      }

      System.out.println("\nThe sum is : " + sum + "\n");

   }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab0> java SumOfN 10 20 30 40

The sum is : 100
```

```
import java.util.Scanner;

//Practise Set 4
public class Factorial {
   public static void main(String [] args){
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter number to find factorial of ");
      int num=sc.nextInt();
      int fact=1;
      for(int i=1;i<=num;i++){
         fact*=i;  //fact = fact*i
      }


      System.out.println("Factorial of "+num+" : "+fact);
   }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab0> java Factorial
Enter number to find factorial of
23
Factorial of 23 : 862453760
```

```
// Practise Set 5
public class Pattern {
   public static void main(String[] args) {
      int x = 1;
      for (int i = 0; i < 4; i++) {
```

```
        for (int j = 0; j < i + 1; j++) {
            System.out.print(x + " ");
            x++;
        }
        System.out.println();
    }
  }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab0> cd "d:\ANDC\Sem-2\Java\Lab0\" ; if
($?) { javac Pattern.java } ; if ($?) { java Pattern }
1
2 3
4 5 6
7 8 9 10
```

LAB 1

```
//Lab Exercise No 1
public class ComplexNum {
  float real, imag;

  // constructors
  ComplexNum() {
    this.real = 0;
    this.imag = 0;
  }

  ComplexNum(float x, float y) {
    this.real = x;
    this.imag = y;
  }

  public ComplexNum add(ComplexNum c2) {
    ComplexNum c = new ComplexNum();
```

```
        c.real = this.real + c2.real;
        c.imag = this.imag + c2.imag;
        return c;
    }

    public ComplexNum mult(ComplexNum c2) {
        ComplexNum c = new ComplexNum();
        c.real = (this.real) * (c2.real) - (this.imag) * (c2.imag);
        c.imag = (this.real) * (c2.imag) + (this.imag) * (c2.real);
        return c;
    }

    public void ToString() {
        System.out.print("ComplexNum number is : ");
        System.out.println(this.real + " + " + this.imag + "i");
    }

    public static void main(String[] args) {
        ComplexNum c1 = new ComplexNum(3, 4);

        c1.ToString();
        ComplexNum c2 = new ComplexNum(2, 3);
        c2.ToString();
        ComplexNum sum1 = new ComplexNum();
        sum1 = c1.add(c2);
        System.out.print("Sum of ");
        sum1.ToString();
        ComplexNum prod = new ComplexNum();
        prod = c1.mult(c2);
        System.out.print("Product of ");
        prod.ToString();

    }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab1> cd "d:\ANDC\Sem-2\Java\Lab1\" ; if
($?) { javac ComplexNum.java } ; if ($?) { java ComplexNum }
ComplexNum number is : 3.0 + 4.0i
ComplexNum number is : 2.0 + 3.0i
Sum of ComplexNum number is : 5.0 + 7.0i
Product of ComplexNum number is : -6.0 + 17.0i
```

```
// Practise set 1
import java.util.Scanner;

public class ScannerExample {
	public static void main(String[] args) {
		Scanner scan = new Scanner(System.in);
		System.out.println("Enter your name: ");
		String name = scan.nextLine();

		System.out.println("Enter your gender: ");
		char gender = scan.next().charAt(0);

		System.out.println("Enter your age: ");
		int age = scan.nextInt();

		System.out.println("Enter your mobile no: : ");
		long mobileNo = scan.nextLong();

		System.out.println("Enter your CGPA: ");
		double cgpa = scan.nextDouble();

		System.out.println("Name: " + name + "\nGender:" + gender + "\nAge: " + age +
"\nCGPA: " + cgpa);
	}
}
```

```
// Practise set 1
import java.util.Scanner;

public class ScannerExample {
```

```
        public static void main(String[] args) {
                Scanner scan = new Scanner(System.in);
                System.out.println("Enter your name: ");
                String name = scan.nextLine();

                System.out.println("Enter your gender: ");
                char gender = scan.next().charAt(0);

                System.out.println("Enter your age: ");
                int age = scan.nextInt();

                System.out.println("Enter your mobile no: : ");
                long mobileNo = scan.nextLong();

                System.out.println("Enter your CGPA: ");
                double cgpa = scan.nextDouble();

                System.out.println("Name: " + name + "\nGender:" + gender + "\nAge: " + age + "\nCGPA: " + cgpa);
        }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab1> cd "d:\ANDC\Sem-2\Java\Lab1\" ; i
f ($?) { javac ScannerExample.java } ; if ($?) { java Scanner
Example }
Enter your name:
MrX
Enter your gender:
Male
Enter your age:
23
Enter your mobile no: :
65435765453
Enter your CGPA:
7.6
Name: MrX
Gender:M
Age: 23
CGPA: 7.6
```

```
//Practise Set 2
public class Nth {

   static int[] bubbleSort(int[] arr) {
```

```
        int n = arr.length;
        int temp = 0;
        for (int i = 0; i < n; i++) {
            for (int j = 1; j < (n - i); j++) {
                if (arr[j - 1] > arr[j]) {
                    // swap elements
                    temp = arr[j - 1];
                    arr[j - 1] = arr[j];
                    arr[j] = temp;
                }

            }
        }
        return arr;

    }

    public static void main(String[] args) {
        // I will use CLA as size of array

        int[] arr = { 4, 5, 1, 2, 8, 6, 7, 9, 88, 92, 3 };
        arr = bubbleSort(arr);
        int n = Integer.parseInt(args[0]);
        System.out.println("Nth smallest Element " + arr[n - 1]);
        System.out.println("Nth Largest Element " + arr[arr.length - n]);
        // Here I will print element count from 1 , not 0
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab1> java Nth 2
Nth smallest Element 2
Nth Largest Element 88
```

```
// Practise Set 3
public class SumAtOdd {
```

```
    public static void main(String [] args){
        int[] arr={2,3,7,1,86,99,22,75};
        int sum=0;
        for (int a=0;a<arr.length;a++){
            if ((a%2)==0){
                if (arr[a]%2!=0){
                    sum+=arr[a];
                }
            }
        }
        System.out.println("Sum of all odd numbers at even index is "+sum);
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab1> cd "d:\ANDC\Sem-2\Java\Lab1\" ; i
f ($?) { javac SumAtOdd.java } ; if ($?) { java SumAtOdd }
Sum of all odd numbers at even index is 7
```

LAB 2

```
//Practical Set 1
public class Mobile {
    String name;
    int price;
    String model;

    Mobile() {
        name = "DummyName";
        price = 0;
        model = "Alpha";
    }

    Mobile(String name, int price, String model) {
        this.name = name;
        this.price = price;
        this.model = model;
```

```
    }

    void setInfo(String name, int price, String model) {
        this.name = name;
        this.price = price;
        this.model = model;
    }

    void show() {
        System.out.println("Name : " + name + "\nPrice : " + price + "\nModel : " + model + "\n");
    }

    public static void main(String[] args) {
        Mobile m1 = new Mobile();
        // 1- Using setter method
        m1.setInfo("Vivo", 23000, "X23Pro");
        // 2- Constructor with No Arguement
        Mobile m2 = new Mobile();
        // 3- Constructor with values
        Mobile m3 = new Mobile("Samsung", 17000, "M30");
        Mobile m4 = new Mobile();
        // 4- Setting values one by one
        m4.name = "Iphone";
        m4.price = 130000;
        m4.model = "13Pro[256GB]";
        m1.show();
        m2.show();
        m3.show();
        m4.show();
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab1> cd "d:\ANDC\Sem-2\Java\Lab2\" ; i
f ($?) { javac Mobile.java } ; if ($?) { java Mobile }
Name : Vivo
Price : 23000
Model : X23Pro

Name : DummyName
Price : 0
Model : Alpha

Name : Samsung
Price : 17000
Model : M30

Name : Iphone
Price : 130000
Model : 13Pro[256GB]
```

//Practise set 2

```
public class OverloadingDemo {
   void display() {
      System.out.println("Hello ");
   }

   void display(String str) {
      System.out.println("Hello " + str);
   }

   public static void main(String[] args) {
      OverloadingDemo dem = new OverloadingDemo();
      dem.display();
      dem.display("Manish");

   }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab2> cd "d:\ANDC\Sem-2\Java\Lab2\" ; i
f ($?) { javac OverloadingDemo.java } ; if ($?) { java Overlo
adingDemo }
Hello
Hello Manish
```

```
public class TypeConversionAuto {

    void show(int a){
        System.out.println(a);

    }
    void show(double a,int b){
        System.out.println(a);

    }
    public static void main(String[] args){
        TypeConversionAuto obj=new TypeConversionAuto();
        obj.show(88);
        obj.show(20,1);//See this this int 20 converts to 20.0

    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab2> cd "d:\ANDC\Sem-2\Java\Lab2\" ; i
f ($?) { javac TypeConversionAuto.java } ; if ($?) { java Typ
eConversionAuto }
88
20.0
```

```
//Practise Set 4
public class Constructor {
    String name;
    int age;

    Constructor() {
        name = "Default";
        age = 0;
        System.out.println("Default Constructor , Name : " + name + " Age : " + age);
    }

    Constructor(String name, int age) {
```

```
        this.name = name;
        this.age = age;
        System.out.println("Parameterized Constructor , Name : " + name + " Age : " + age);
    }
    // Copy Constructor

    Constructor(Constructor obj) {
        this.name= obj.name ;
        this.age=obj.age ;
        System.out.println("Copy Constructor , Name : " + name + " Age : " + age);
    }

    public static void main(String[] args) {
        Constructor c1 = new Constructor();
        Constructor c2 = new Constructor("Rohan", 18);
        Constructor c3 = new Constructor(c2);
    }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab2> cd "d:\ANDC\Sem-2\Java\Lab2\" ; if ($
?) { javac Constructor.java } ; if ($?) { java Constructor }
Default Constructor , Name : Default Age : 0
Parameterized Constructor , Name : Rohan Age : 18
Copy Constructor , Name : Rohan Age : 18
```

```
// Practise Set 5

/* Program to demonstrate the difference between public and private
access control in java */

class PublicPrivateDemo {
    int a;
    public int b;
    private int c;

    void setc(int x) {
        c = x;
    }
```

```
    int getc() {
        return c;
    }
}

public class AccessTest {
    public static void main(String[] args) {
        Access y = new Access();
        y.a = 50;
        y.b = 10;
        y.setc(90);

        System.out.println("The value of :\na = " + y.a + "\nb = " +
y.b + "\nc = " + y.getc());
       //Comment Next Line
        System.out.println("c = "+y.c);
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab2> cd "d:\ANDC\Sem-2\Java\Lab2\" ; if ($
?) { javac AccessTest.java } ; if ($?) { java AccessTest }
The value of :
a = 50
b = 10
c = 90
PS D:\ANDC\Sem-2\Java\Lab2> cd "d:\ANDC\Sem-2\Java\Lab2\" ; if ($
?) { javac AccessTest.java } ; if ($?) { java AccessTest }
AccessTest.java:27: error: c has private access in Access
        System.out.println("c = "+y.c);
                                   ^
```

LAB 3

```
//Practise Set 1 - Lab3
public class StaticDemo{

    public static int objCount=0;

    //Static Block
    static{System.out.println("This line is in static block");}

    StaticDemo(){
        objCount++;
```

```
    }
    static void lorem(){
        System.out.println("This is in a static method call.");
    }
    public static void main(String[] args){
        StaticDemo d1= new StaticDemo();
        StaticDemo d2= new StaticDemo();
        lorem();
        System.out.println("Number of Objects created :"+objCount);

}
```

```
PS D:\ANDC\Sem-2\Java\Lab3> java StaticDemo
This line is in static block
This is a static method
Number of Objects created :2
```

```
//Practise Set 2


public class StringDemo {


   public static int getLength(String str){
      return str.length();


   }


   public static void main (String args[]){
      String du="Delhi University";
      String andc= "Acharya Narendra Dev College" ;
      String pushpa="Pushpa";
      String kgf="KGF";
      String dev="Dev";
      String delhi="New Delhi";
      System.out.println("Length of string \"Delhi University\" is "+getLength( du));


      System.out.println("First occurence of 'U' is at index "+du.indexOf('U'));


      System.out.println("Char at index 7 is "+du.charAt(7));
```

```
        System.out.println( "\"Pushpa\" and \"KGF\" "+pushpa.compareTo(kgf));
        System.out.println( "\"Pushpa\" and \"Pushpa\" "+pushpa.compareTo(pushpa));
        System.out.println( "\"KGF\" and \"Pushpa\" "+kgf.compareTo(pushpa));
        System.out.println("'Acharya Narendra Dev College' contains 'Dev' "+ andc.contains(dev));
        System.out.println(andc.replace("Acharya Narendra Dev","AND"));
        System.out.print("Original : "+delhi+", After lowercase : "+ delhi.toLowerCase()+", UpperCase : "+delhi.toUpperCase());
    }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab3> java StrinDemo
Error: Could not find or load main class StrinDemo
Caused by: java.lang.ClassNotFoundException: StrinDemo
PS D:\ANDC\Sem-2\Java\Lab3> java StringDemo
Length of string "Delhi University" is 16
First occurence of 'U' is at index 6
Char at index 7 is n
"Pushpa" and "KGF" 5
"Pushpa" and "Pushpa" 0
"KGF" and "Pushpa" -5
'Acharya Narendra Dev College' contains 'Dev' true
AND College
Original : New Delhi, After lowercase : new delhi, UpperCase : NEW DELHI
```

```java
//Practise Set 3 -Lab3
public class VarArgs {
    static int calcSum(int ... arr){
        int sum=0;
        for(int x : arr){
            sum+=x;
        }
        return sum;
    }
    public static void main(String [] args){
        int sum=calcSum(10,20,30);
        System.out.println("Sum is "+sum);
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab3> java VarArgs
Sum is 60
```

LAB 4

```
//Program 1
class Father {
    String name;
    String surname;
}
public class SingleInheritance {
    int j;
    static void printRelation(Son son, Father dad){
        System.out.println("Child no "+son.childNO+" of
"+dad.name+dad.surname +" is "+son.name+" "+son.surname);
    }
public static void main(String [] args){
    Son child1=new Son();
    child1.name="Rahul";
    child1.surname="Sharma";
    child1.childNO=1;

    Father dad=new Father();
    dad.name="Ramprasad ";
    dad.surname="Sharma";
    printRelation(child1,dad );


}
}
class Son extends Father{
    String name;
    int childNO;
}
```

```
PS D:\ANDC\Sem-2\Java\Lab4\Program1> java SingleInheritance
Child no 1 of Ramprasad Sharma is Rahul Sharma
```

```
//Program 2
// WAP to demonstrate Member Access and Inheritance
public class MemberAccess {
```

```
    public static void main(String [] args){
        Human.main();
        Human.eatFood();

    }
}
class Human{
    public String name;
    protected static void eatFood(){
        System.out.println("Eating Food");
    }
    static void main(){
        System.out.println("This is Human:main");

    }
}
class Student extends Human{
    void study(){
        eatFood();
        System.out.println("Studying passionately ");
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab4\Program2> java MemberAccess
This is Human:main
Eating Food
```

```
//Program 3 -Lab 4
class BoxWeight extends Box {
    double weight; // weight of box
    // constructor for BoxWeight

    BoxWeight(double w, double h, double d, double wt) {
        width = w;
        height = h;
        depth = d;
        weight = wt;
    }
}

class Box {
    double width;
```

```
    double height;
    double depth;

    // construct clone of an object
    Box(Box ob) {
        width = ob.width;
        height = ob.height;
        depth = ob.depth;
    }

    // constructor used when all dimensions specified
    Box(double w, double h, double d) {
        width = w;
        height = h;
        depth = d;
    }

    Box() {
        width = -1; // use -1 to indicate
        height = -1; // an uninitialized
        depth = -1; // box
    }

    // constructor used when cube is created
    Box(double len) {
        width = height = depth = len;
    }

    // compute and return volume
    double volume() {
        return width * height * depth;
    }
}

public class DemoBoxWeight {
    public static void main(String args[]) {
        BoxWeight mybox1 = new BoxWeight(10, 20, 15, 34.3);
        BoxWeight mybox2 = new BoxWeight(2, 3, 4, 0.076);
        double vol;
        vol = mybox1.volume();
        System.out.println("Volume of mybox1 is " + vol);
        System.out.println("Weight of mybox1 is " +
```

```
                mybox1.weight);
        System.out.println();
        vol = mybox2.volume();
        System.out.println("Volume of mybox2 is " + vol);
        System.out.println("Weight of mybox2 is " +
                mybox2.weight);
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab4\Program3> java DemoBoxWeight
Volume of mybox1 is 3000.0
Weight of mybox1 is 34.3

Volume of mybox2 is 24.0
Weight of mybox2 is 0.076
```

```
//Program 4 -Lab4

public class SuperSubReference {
    int i;
    public static void main(String [] args){
        SuperSubReference obj=new SubClass();
        System.out.println(obj.getClass());
    //We can see that following line will give error as,
    // refernce type is SuperSubReference type, and it don't know
about SubClass method.
    // But still object is of type SubClass
       // System.out.println(obj.getString());
    }
}
class SubClass extends SuperSubReference{
    int x;
   String getString(){
    return "This is a demo string from SubClass.";
   }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab4\Program4> java SuperSubReference
class SubClass
```

```
//Program 5
public class SuperCallEg {
```

```
    int a;
    int b;

    SuperCallEg() {
        a = 0;
        b = 0;
    }

    SuperCallEg(int a, int b) {
        this.a = a;
        this.b = b;
    }

    public static void main(String[] args) {
        SubClass obj = new SubClass(2, 3);
        System.out.printf("a=%d b=%d x=%d y=%d", obj.a, obj.b, obj.x,
obj.y);

    }
}

class SubClass extends SuperCallEg {
    int x;
    int y;

    SubClass() {
        super(0, 0);
        x = 0;
        y = 0;
    }

    SubClass(int x, int y) {
        // Calls Super with 1 incremented
        super(x + 1, y + 1);
        this.x = x;
        this.y = y;
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab4\Program5> java SuperCallEg
a=3 b=4 x=2 y=3
```

```java
//Program 6
public class SuperAccess {
    int a;
    int b;
    int getSum(){
        return a+b;
    }
    SuperAccess(){
        a=0;
        b=0;
    }
    SuperAccess(int a,int b){
        this.a=a;
        this.b=b;
    }
    public static void main(String [] args){
        SubClass obj=new SubClass(10,5);
        obj.main();
        //Expected output 17
    }
}
class SubClass extends SuperAccess{
    int x;
    int y;
    SubClass(){
        x=0;
        y=0;
    }
    void main(){

        System.out.println( super.getSum());
    }
    SubClass(int x,int y){
        super(x+1,y+1);
        //Calls Super with 1 incremented
        this.x=x;
        this.y=y;
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab4\Program6> java SuperAccess
17
```

LAB 5

```
// Lab Exercise 2
package P1;
import java.util.Formatter;
public class TwoDim {
   int x;
   int y;
   public TwoDim(){
      x=0;
      y=0;
   }
   public TwoDim(int x,int y){
      this.x=x;
      this.y=y;
   }
   public String toString(){
      Formatter f=new Formatter();
      String res =f.format(("%dx +%dy"),x,y).toString();
      return res;
   }
}
-----------------------------------------------------------
package P2;
import P1.TwoDim;
public class ThreeDim extends TwoDim{
   int z;
   public ThreeDim(){
```

```
      z=0;
   }
   public ThreeDim(int x, int y,int z){
      super(x, y);
      this.z=z;
   }

   public String toString(){

      String res =super.toString()+"+"+z+"z";
      return res;
   }
}
```

```
package P;
import P1.TwoDim;
import P2.ThreeDim;

public class Driver {
   public static void main(String [] args){
      TwoDim obj2d=new TwoDim(3,4);
      ThreeDim obj3d=new ThreeDim(3,4,5);

      TwoDim obj;
      obj=obj3d;
    System.out.println( obj.toString());
      obj=obj2d;
     System.out.println(  obj.toString());
   }
}
```

OUTPUT

```
3x +4y
3x +4y+5z
```

```java
//Practise Set 1 -Lab5
public class Multilevel {
    public static void main(String[] args) {
        XUV500 xuv500 = new XUV500();
        xuv500.model = " EX 1.5 ";
        xuv500.name = "XUV 500";
        System.out.println("You ordered " + xuv500.name + xuv500.model
+ "\nPrice = " + xuv500.price);
    }
}

class Vehicle {
    String name;
    String model;
}

class SUV extends Vehicle {
    int minWeight = 2000;
}

class XUV500 extends SUV {
    int price = 1_400_000;

}
```

```
PS D:\ANDC\Sem-2\Java\Lab5> java Multilevel
You ordered XUV 500 EX 1.5
Price = 1400000
```

```java
//Practise 2
import java.util.Formatter;
class TwoDim {
    int x;
    int y;
    public TwoDim(){
        x=0;
        y=0;

    }
    public TwoDim(int x,int y){
```

```
        this.x=x;
        this.y=y;

    }
    public String toString(){
        Formatter f=new Formatter();
        String res =f.format(("%dx +%dy"),x,y).toString();
        return res;
    }

}


class ThreeDim extends TwoDim{
    int z;
    public ThreeDim(){
        z=0;
    }
    public ThreeDim(int x, int y,int z){
        super(x, y);
        this.z=z;
    }

    public String toString(){

        String res =super.toString()+"+"+z+"z";
        return res;
    }
}

public class DynamicDispatch {
    public static void main(String [] args){
        TwoDim obj ;
        obj=new TwoDim(3,4);
        System.out.println(obj.toString());
        obj=new ThreeDim(3,4,5);
        System.out.println(obj.toString());
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab5\Program2> java DynamicDispatch
3x +4y
3x +4y+5z
```

```java
//Practise 3

abstract class AbstractDemo {
    int x;
    int y;
   abstract void doFun();
}
public class AbstractRun extends AbstractDemo{
    public AbstractRun(){
        x=0;
        y=0;
    }
    public AbstractRun(int x , int y){
        this.x=x;
        this.y=y;
    }
    void doFun(){
        System.out.println("Doing fun ");
    }
    public String toString(){
        String res=x+"x+"+y+"y";
        return res;
       }
    public static void main(String[] args) {
        AbstractRun obj=new AbstractRun() ;
        obj.doFun();
        System.out.println( obj.toString());
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab5\Program3> java AbstractRun
Doing fun
0x+0y
```

LAB 6

//Lab Exercise 3

```
package P1;
abstract public class Shape{
    public String shape;
    public String getShape(){
        return "";
    }
    abstract public double getArea();
}
```

```
package P2;
import P1.Shape;
import java.util.Scanner;
public class Rectangle extends Shape{
    double length;
    double breadth;

    public Rectangle(){
        Scanner sc =new Scanner(System.in);
        System.out.println("Enter Length");
        length=sc.nextDouble();
        System.out.println("Enter Breadth");
        breadth=sc.nextDouble();
        shape="Rectangle";
    }
    public Rectangle(int length,int breadth){
        this.length=length;
        this.breadth=breadth;
        shape="Rectangle";
    }
    public String getShape(){
        return shape;
    }
    public double getArea(){
        return length*breadth;
    }
}
```

```
package P3;
import java.util.Scanner;
import P1.Shape;
public class Circle extends Shape{
    double radius;
```

```
    public Circle(){
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter Radius of circle");
        radius = sc.nextDouble();

    }


    public Circle(double radius){
        this.radius=radius;
    }
    public double getArea(){
        return (3.14159*radius*radius);
    }
     public String getShape(){
        return shape;
    }


}
```

```
import P1.Shape;
import P2.Rectangle;
import P3.Circle;
import java.util.Scanner;
public class Driver1{
    public static void main(String [] args){
        Shape s1;

        Scanner scan=new Scanner(System.in);
        System.out.println("1: Rectangle , 2 Circle");
        int op= scan.nextInt();
        choice:{
            switch (op){
                case 1:{
                    s1=new Rectangle();
                    System.out.println(s1.getArea());
                    break;
                }
                case 2:{
                    s1=new Circle();
                    System.out.println(s1.getArea());
```

```
                    break;
                }
            }
        }

    }
}
```

OUTPUT

```
1: Rectangle , 2 Circle
1
Enter Length
10
Enter Breadth
12
120.0
```

```
1: Rectangle , 2 Circle
2
Enter Radius of circle
100
31415.899999999998
```

//PRACTISE SET 1

```
public class InterfaceDemo implements MyMath{

   public void doFun(){
        System.out.println("Doing fun");
    }
    public static void main(String[] args){
        System.out.println(MyMath.PI);
        InterfaceDemo obj=new InterfaceDemo();
        obj.doFun();
    }
}
interface MyMath{
    double PI=3.14159;
    double e=2.71828;
    void doFun();
    default double sq(double x){
        return x*x;
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab6\Program2> java InterfaceDemo
3.14159
Doing fun
```

```
//Practise Set 2 - Lab6

public class MultInterface {
    public static void main(String[] args) {
        College ref;
        ref=new CS();
        ref.show();
        ref=new Physics();
        ref.show();

    }

}
interface College{
    String name="ANDC";
    String address="Govindpuri,Delhi";
    void show();

}
class CS extends MultInterface implements College{
    String department="CS";
    public void show(){
        System.out.println("Department :"+department +" ,College
:"+name);
    }
}
class Physics extends MultInterface implements College{
    String department="Physics";
    public void show(){
        System.out.println("Department :"+department +" ,College
:"+name);
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab6\Program3> java MultInterface
Department :CS ,College :ANDC
Department :Physics ,College :ANDC
```

```java
//Practise Set 3
public class ExtendInterfaceDemo implements Car {
    public static void main(String [] args){
        Car obj=new ExtendInterfaceDemo();
        System.out.println( obj.getColor());
        System.out.println(obj.getcc());
        System.out.println(obj.getTyreCount());
    };
}

interface Body {
    String paint_color="Black";
    default String getColor(){
        return paint_color;
    }
}
interface Engine{
    int cc=1200;
    default int getcc(){
        return cc;
    }
}

interface Car extends Body,Engine{
 int tyre_count=4;
 default int getTyreCount(){
    return tyre_count;
 }

}
```

```
PS D:\ANDC\Sem-2\Java\Lab6\Program4> java ExtendInterfaceDemo
Black
1200
4
```

```java
//Practise 4 -Lab6

public class DefaultInterfaceDemo implements Engine{

    public static void main(String [] args){
        Engine obj=new DefaultInterfaceDemo();
```

```
        System.out.println(obj.getcc());
    }
}
interface Engine{
    int cc=1200;
    default int getcc(){
        return cc;
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab6\Program5> java DefaultInterfaceDemo

1200
```

```
//Practise 5
public class MultipleInheritance {
    public static void main(String [] args){
    Marksheet obj=new Marksheet("Mohan Das");
        System.out.println(obj.name+" have opted following subjects in
10th ");
        for (String string : obj.subjects10) {
            System.out.print(" "+string+" ");
        }
    }
}

interface Class10{
    String[]
subjects10={"Hindi","English","Science","Mathematics","Social
Science"};
}
interface Class12 {
    String stream="Science";
    String[] subjects12={"Physics","Chemistry","Mathematics
","English","CS"};
}

class Marksheet implements Class10,Class12{
    String name;
    Marksheet(String name){
        this.name=name;
    }
```

```
}
```

```
PS D:\ANDC\Sem-2\Java\Lab6\Program6> java MultipleInheritance
Mohan Das have opted following subjects in 10th
 Hindi  English  Science  Mathematics_ Social Science
```

LAB 7

```
//Lab7 -Practise Set 1
import java.io.*;
public class CatchExample {
    public static void main(String [] args){
        try{

            FileReader f=new FileReader("myFile.txt");

            //Un-comment next line to see a file not found exception
block
            // f=new FileReader("text.txt");
            BufferedReader br=new BufferedReader(f);
            int temp=br.read();
            while(temp!=-1){
                System.out.print((char)temp);
                temp=br.read();
            }
            f.close();
        }


        catch(IndexOutOfBoundsException e){
            System.out.println("Index Out of Bound Exception block ");
        }
        catch(FileNotFoundException e){
            System.out.println("File not found Exception");
        }
        catch(Exception e){
            System.out.println("This is general exception ");
        }
        // Uncomment next lines to see unreachable error
        // catch(IOException e){
        //     System.out.println("This line won't be reached ");
```

```
        // }

    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab7\MultipleCatch> java CatchExample
This is my text file.
```

```
//Lab 7 - Practise 2

public class Try {
    public static void main(String [] args){
        try{
            int salary=100_000;
            System.out.println(salary);
            try {
                int arr[]={10,20,30};
                System.out.println(arr[4]);
            }
            /*This catch statement will be skipped as wrong Exception
is there,
             the outer catch will be reached */
            catch(EventException e){
                System.out.println("Inner catch");
            }
        }
        catch(IndexOutOfBoundsException e){
            System.out.println("Outer catch");
        }
    }
}
```

```
PS D:\ANDC\Sem-2\Java\Lab7\NestedTry> java Try
100000
Outer catch
```

```
//Lab Exercise No 5
```

import java.util.Scanner;
import java.lang.Exception;

```
class stackException extends Exception{
	public String overflow()
	{
		return ("Stack Overflow:Could not add more");
	}
	public String empty()
	{
		return ("Stack Underflow:No element in stack");
	}
}

class StackD{
	int arr[];
	int t=-1;
	int size;
	Scanner sc=new Scanner(System.in);
	public StackD(int size){
		this.size=size;
		arr=new int[size];
	}

	public void push(int x) throws stackException{
		if(t==size-1){
			throw new stackException();
		}
		else
		{
			t++;
			arr[t]=x;
		}
	}

	public int pop() throws stackException{
		if(t==-1)
		{
			throw new stackException();
		}
		else
		{
			return t--;
		}
	}
	public void Display(){
		int i;
		if(t==-1)
			System.out.println("Stack is Empty");
		for(i=t;i>=0;i--){
			System.out.println("Stack [" +i+"] = "+arr[i]+" ");
		}
	}
}
public class StackExample{
	public static void main(String[] args){
		Scanner sc=new Scanner(System.in);
		int e, size;
		System.out.print("Enter the size of the Stack : ");
		size=sc.nextInt();
		StackD s=new StackD(size);
		int opt;
```

```
		do{
			System.out.print("\n1.Push\t2.Pop\t3.Display\nEnter The Choice : ");
			opt=sc.nextInt();
			switch(opt){
				case 1:
					try{
						System.out.print("\nEnter the Elements : ");
						e=sc.nextInt();
						s.push(e);
					}
					catch(stackException x){
						System.out.println(x.overflow());
					}
					break;
				case 2:
					try{
						s.pop();
					}
					catch(stackException x){
						System.out.println(x.empty());
					}
					break;
				case 3:
					s.Display();
					break;
				default:
					System.out.print("Wrong Choice");
					break;
			}

		}while(true );
	}
}
```

```
PS D:\ANDC\Sem-2\Java\Lab7> cd .\StackFlow\
Enter the Elements : 1

1.Push  2.Pop   3.Display
Enter The Choice : 1

Enter the Elements : 20

1.Push  2.Pop   3.Display
Enter The Choice : 1

Enter the Elements : 30

1.Push  2.Pop   3.Display
Enter The Choice : 1

Enter the Elements : 44
Stack Overflow:Could not add more

1.Push  2.Pop   3.Display
Enter The Choice : 3
Stack [2] = 30
Stack [1] = 20
Stack [0] = 1

1.Push  2.Pop   3.Display
Enter The Choice : 2

1.Push  2.Pop   3.Display
Enter The Choice : 2

1.Push  2.Pop   3.Display
Enter The Choice : 2

1.Push  2.Pop   3.Display
Enter The Choice : 2
Stack Underflow:No element in stack
```

//Lab Exercise No 4

```java
import java.util.Scanner;
class UnderAge extends Exception{
    int age;
    UnderAge(int age){
        this.age=age;
    }
    public String toString(){
        String temp="Under Age: "+age;
        return temp;
    }
}
public class UnderAgeDemo{
    static void test(int age){
        try {
            if (age<18){
```

```
                    throw new UnderAge(age);
                }
            else{
                System.out.println("age is above 18");
                }
        }
        catch (UnderAge a){
                System.out.println(a.toString());
        }
        }
    public static void main(String []args ){
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the age: ");
        int age=sc.nextInt();
        test(age);
    }
}
```

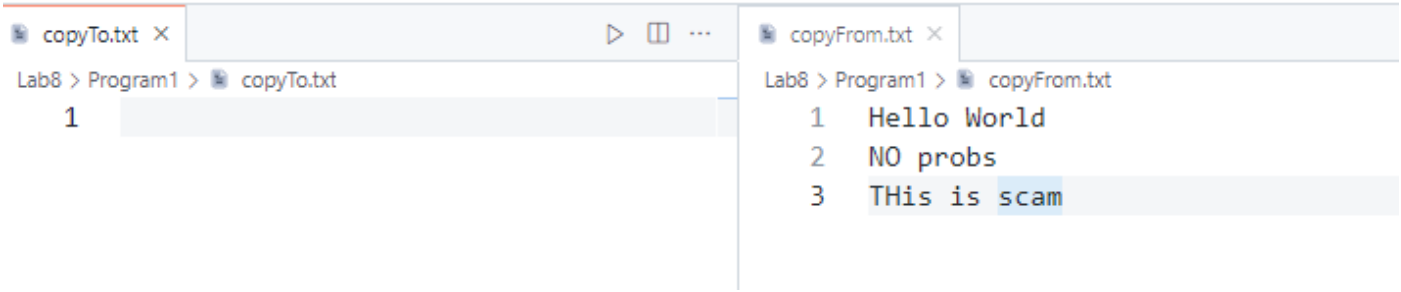
```
PS D:\ANDC\Sem-2\Java\Lab7\UnderAge> java UnderAgeDemo
Enter the age:
9
Under Age: 9
PS D:\ANDC\Sem-2\Java\Lab7\UnderAge> java UnderAgeDemo
Enter the age:
19
age is above 18
```

LAB 8

```
import java.io.*;
public class CopyFileExample {
   public static void main(String [] args){
      int i;
      FileInputStream fin;
      FileOutputStream fout;
      if(args.length==2){
         System.out.println("Input Filename: "+args[0]);
         System.out.println("Output Filename: "+args[1]);
      }
      try {
         fin=new FileInputStream(args[0]);
         fout=new FileOutputStream(args[1]);
         do{
            i=fin.read();
            if(i!=-1){
            fout.write(i);
            }
         }while(i!=-1);

      }
      catch(FileNotFoundException e){
```

```
        System.out.println("File Not Found");
      }
      catch(IOException e){
        System.out.println("Reading or Writing not possible");
      }
      System.out.println("File Copy Successful");
   }
}
```

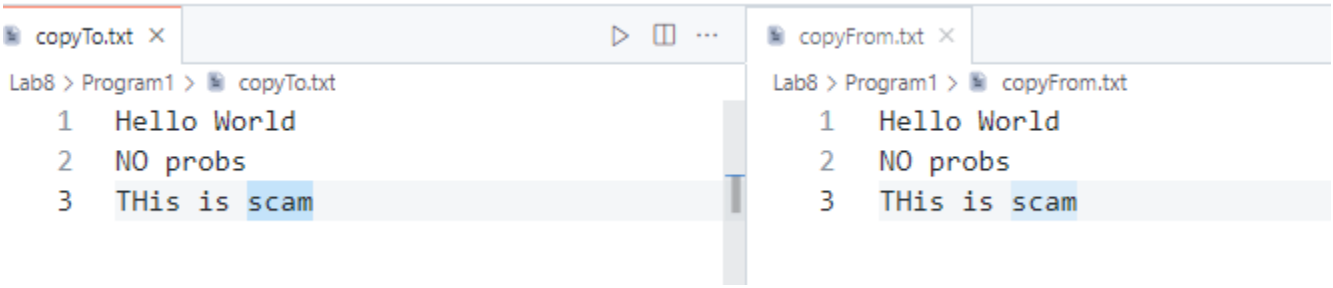
BEFORE



OUTPUT

```
PS D:\ANDC\Sem-2\Java\Lab8\Program1> java CopyFileExample .\copy
rom.txt .\copyTo.txt
Input Filename: .\copyFrom.txt
Output Filename: .\copyTo.txt
File Copy Successfull
```

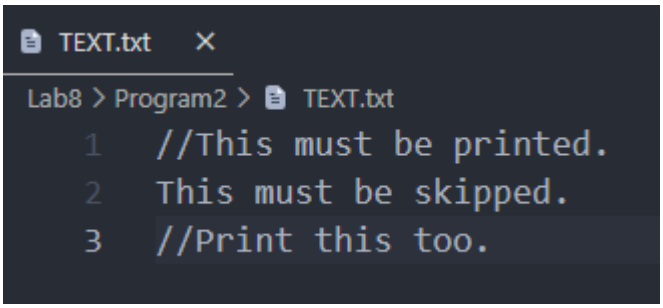
AFTER



LAB EXERCISE 7

```
import java.io.*;

public class SpecificLine {
   public static void main(String[] args) {
      String str;

      int i;
      if (args.length == 1) {
         System.out.println("Input Filename: " + "Text.txt");
      }
      try {
         FileReader fr = new FileReader("Text.txt");

         BufferedReader br = new BufferedReader(fr);
```

```
        str = br.readLine();
        while (str != null) {

           if ((str.charAt(0) == '/') && (str.charAt(1) == '/')) {
              System.out.println(str.substring(2,str.length()));
           }
           str = br.readLine();
        }
     } catch (FileNotFoundException e) {
        System.out.println("File Not Found");
     } catch (IOException e) {
        System.out.println("Reading not possible");
     }

  }
}
```



OUTPUT

```
PS D:\ANDC\Sem-2\Java\Lab8\Program2> cd "d:\ANDC\Sem-2\Java\Lab8\Program2
\" ; if ($?) { javac SpecificLine.java } ; if ($?) { java SpecificLine }
This must be printed.
Print this too.
```

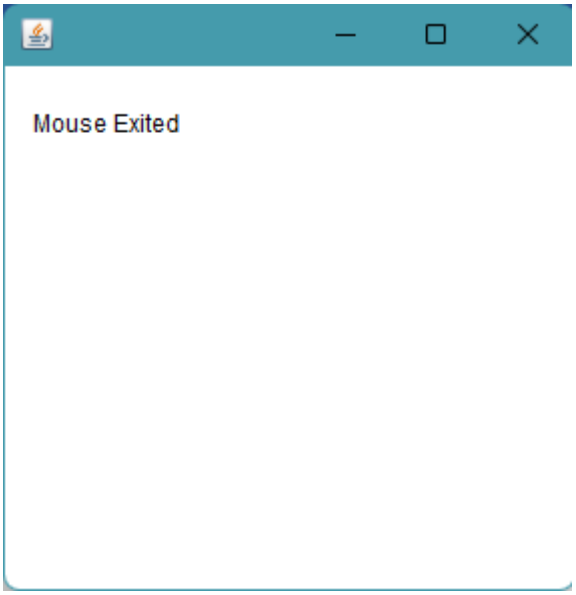
Lab EXERCISE 8

// Write a program to handle mouse events(Clicked, Entered, Exited, Presses, and Released).

```
// Lab Exercise 8
import java.awt.*;
import java.awt.event.*;
public class MouseExample extends Frame implements MouseListener{
   Label l;
   MouseExample(){
      addMouseListener(this);
      l=new Label();
      l.setBounds(20,50,100,20);
      add(l);
      setSize(300,300);
      setLayout(null);
      setVisible(true);
   }
   public void mouseClicked(MouseEvent e) {
      l.setText("Mouse Clicked");
   }
   public void mouseEntered(MouseEvent e) {
      l.setText("Mouse Entered");
   }
   public void mouseExited(MouseEvent e) {
      l.setText("Mouse Exited");
```

```
    }
    public void mousePressed(MouseEvent e) {
        l.setText("Mouse Pressed");
    }
    public void mouseReleased(MouseEvent e) {
        l.setText("Mouse Released");
    }
public static void main(String[] args) {
    new MouseExample();
}
}
```

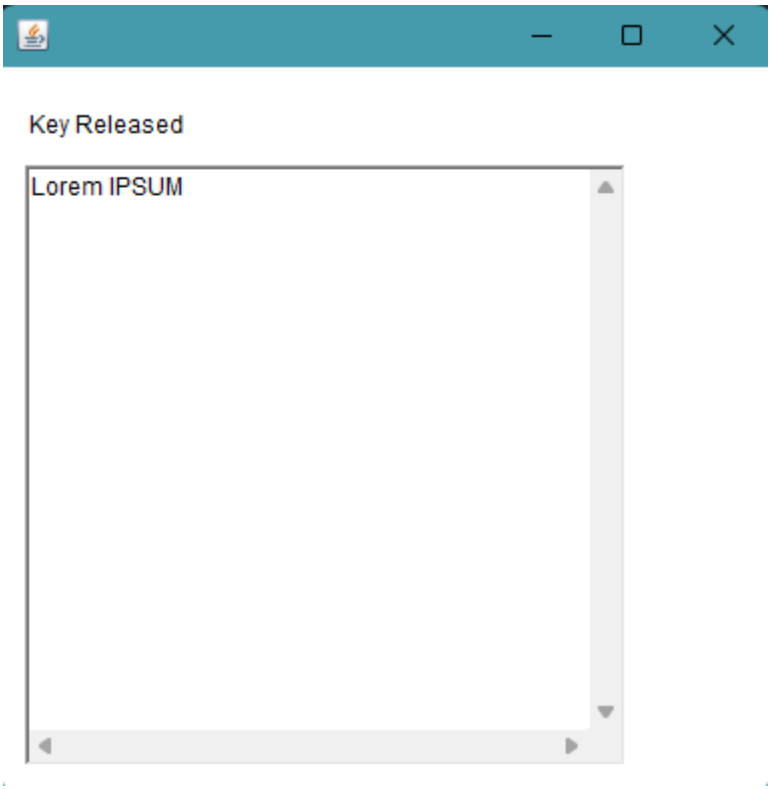
OUTPUT



LAB EXERCISE 9

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

public class KeyExample extends Frame implements KeyListener {
    Label l;
    TextArea area;

    KeyExample() {
        l = new Label();
        l.setBounds(20, 50, 100, 20);

        area = new TextArea();

        area.setBounds(20, 80, 300, 300);

        area.addKeyListener(this);

        add(l);
        add(area);
        setSize(400, 400);
        setLayout(null);
        setVisible(true);
    }
```

```
    public void keyPressed(KeyEvent e) {
      l.setText("Key Pressed");
    }

    public void keyReleased(KeyEvent e) {
      l.setText("Key Released");
    }

    public void keyTyped(KeyEvent e) {
      l.setText("Key Typed");
    }

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



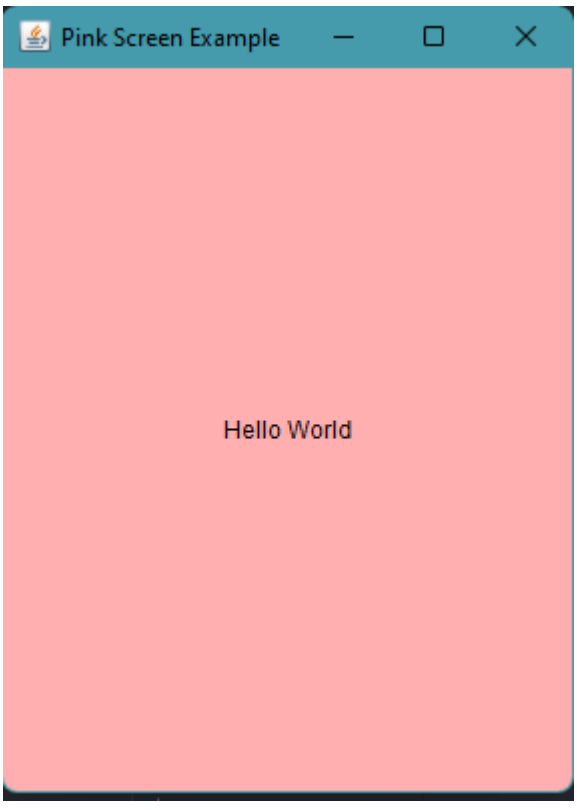
LAB 9

LAB EXERCISE 10

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

public class Pink extends Frame {
    Label l;
```

```
    Pink() {
        super("Pink Screen Example");
        l = new Label("Hello World");
        l.setBounds(25, 50, 250, 30);
        l.setAlignment(Label.CENTER);
        this.setBackground(Color.PINK);
        this.add(l);

        this.setSize(300, 400);
        this.setVisible(true);
    }

    public static void main(String[] args) {
        new Pink();

    }
}
```

OUTPUT

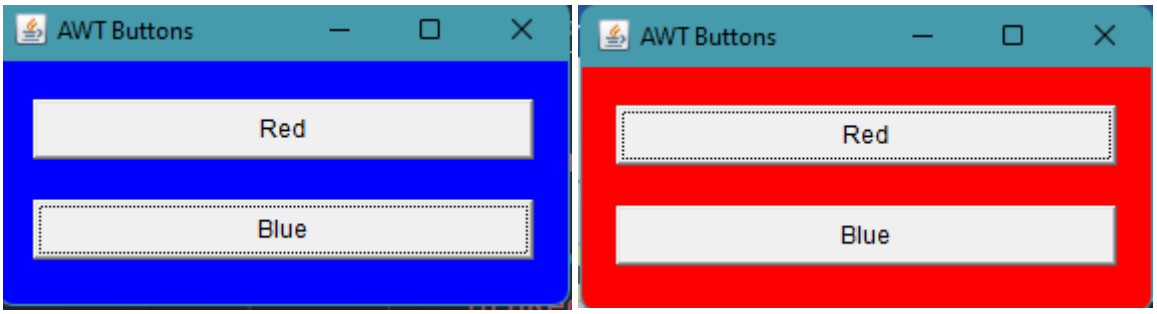


LAB EXERCISE 11

```
import java.awt.*;
```

```
import java.awt.event.*;
public class Main extends Frame implements ActionListener {
    Button btnRed, btnBlue;
    Main() {
        super("AWT Buttons");
        btnRed = new Button("Red");
        btnRed.setBounds(25, 50, 250, 30);
        btnRed.addActionListener(this);
        this.add(btnRed);
        btnBlue = new Button("Blue");
        btnBlue.setBounds(25, 100, 250, 30);
        btnBlue.addActionListener(this);
        this.add(btnBlue);
        this.setSize(300, 160);
        this.setLayout(null);
        this.setVisible(true);
        this.addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
                dispose();
            }
        });

    }
    public static void main(String[] args) {
                new Main();
    }
    @Override public void actionPerformed(ActionEvent e) {
        if (e.getSource() == btnRed) { this.setBackground(Color.RED); }
                    else    if    (e.getSource()    ==    btnBlue)    {
this.setBackground(Color.BLUE); }
    }
}
```

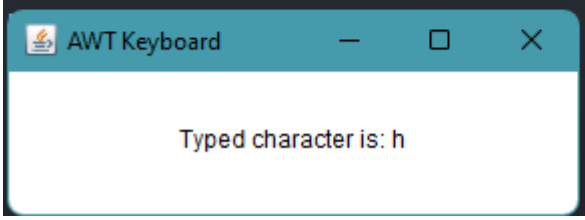
OUTPUT



LAB EXERCISE 12

```
import java.awt.*;
import java.awt.event.*;
class KbdAdapter extends KeyAdapter {
    Label l;
    KbdAdapter(Label l) {
         this.l = l;
    }
    @Override public void keyTyped(KeyEvent e) {
        l.setText("Typed character is: " + e.getKeyChar());
    }
    @Override public void keyPressed(KeyEvent e) {
        System.out.println("Pressed character is: " + e.getKeyChar());
    } @Override public void keyReleased(KeyEvent e) {
        System.out.println("Released character is: " + e.getKeyChar());
    }
}
public class Main extends Frame {
        Label l;
        Main() {
        super("AWT Keyboard"); l = new Label("");
        l.setBounds(25, 50, 250, 30);
        l.setAlignment(Label.CENTER);
        this.addKeyListener(new KbdAdapter(l));
        this.add(l); this.setSize(300, 110);
        this.setLayout(null);
        this.setVisible(true);
        this.addWindowListener(new WindowAdapter() {
        public void windowClosing(WindowEvent e) {
            dispose(); }
        }
        );

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

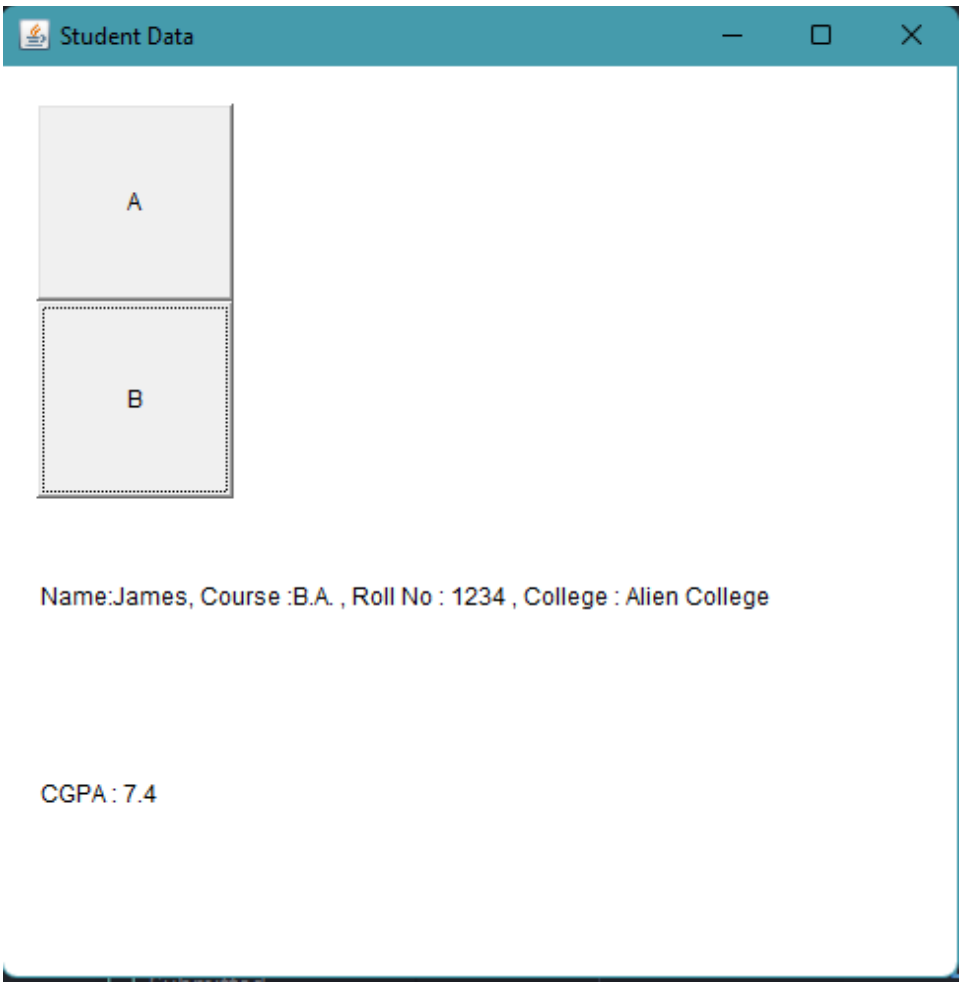
```
PS D:\ANDC\Sem-2\Java\Lab9\Program3> cd "d:\ANDC\Sem-2\Jav
a\Lab9\Program3\" ; if ($?) { javac Main.java } ; if ($?)
{ java Main }
Pressed character is: v
Pressed character is: t
Released character is: t
Released character is: v
Pressed character is: h
Released character is: h
```



LAB EXERCISE 13

```
import java.awt.*;
import java.awt.event.*;
 public class Main extends Frame implements ActionListener {
    Button btnA, btnB;
    Label la,lb;
    Main() {
        super("Student Data");
       la=new Label("Name:James, Course :B.A. , Roll No : 1234 , College
: Alien College ");
        lb= new Label("CGPA : 7.4");
        la.setBounds(25,250 ,1000,100);
        lb.setBounds(25,350,100,100);

        btnA = new Button("A");
        btnA.setBounds(25, 50, 100, 100);
        btnA.addActionListener(this);
        this.add(btnA);

        btnB = new Button("B");
        btnB.setBounds(25, 150, 100, 100);
        btnB.addActionListener(this);
        this.add(btnB);

        this.setSize(500, 500);
        this.setLayout(null);

        this.addWindowListener(new WindowAdapter() {
```

```
            public void windowClosing(WindowEvent e) {
                dispose();
            }
        });
        this.setVisible(true);
    }
    public static void main(String[] args) {
                new Main();
    }
    @Override public void actionPerformed(ActionEvent e) {
        if (e.getSource() == btnA) { this.add(la); }
        else if (e.getSource() == btnB) {
            this.add(lb);
            //this.setVisible(true);
        }
    }
}
```



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