# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

# Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

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in partial fulfillment for the award of the degree of BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING



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#### **B.M.S.** College of Engineering,

Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering



#### **CERTIFICATE**

This is to certify that the Lab work entitled "Object Oriented Java Programming (23CS3PCOOJ)" carried out by **Aman Vats (1BM23CS026)**, who is bonafide student of **B.M.S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of an Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

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Github Link: https://github.com/amanvats7/Java-Lab/tree/main

Program 1
Implement Quadratic Equation

Observation:

```
LAB PROGRAM-1
                                                     9-10-24
        java. util Scanner;
public class Quadratic &
     Public static void main (string[] coop) {
           Scanner scanner - new Scanner (System in);
           System out point (" Enter conficient a: ");
           double a = scarror nort boulde ();
           System out point ("Enter coefficient 5:");
           double b = Scanner. Next bould ();
           double discriminant = 6+6-4 x a x c
           if (discriminant >0) {
                  Louble Frost 1= (-6+ Math grt (discriminant))/(210);
                   double next 2 = (-6 - Math-squt(discriminard)) (2xa)
                  System out point (" Roots one real & different ");
                  System. out point (" Root 1:" + Steet 1);
                  System. out yourt (" Root 2:" + sunt 2),
          } else if (discriminant = = 0)}
                  double sost = - b(12+a).
                   System out point (" Roots are real & same .").
                   System. But paint ("Kost:" + Great);
         3 else &
                   System out point (" koots are complere");
                   double real Part = - b/(2+a);
                   Louble imaginary Part = Math squat (-durinos)
                                                             (2+a)
                   System. Oct. point (" 10011:" + 2001 part +"+"
                                               + importany Port + "i"
                   System out your ("Kool2" + such last + " - "
                                                i maginary yout + "i");
          3
scanner dass ();
```

OUTPUT a: 1 The seeds we distinct & small Kost 1 -90 FORT 7 - - 10 a: 4 5: 3 C: 1 The scools are complex Root 1: -0.375+0.330712 ROST 2: -0.375-0.32071 i a: 2 less - " too " this y his may? 5: 14 me = " Fleet ) toky his mater? C: 2 The trook are equal & deal Post + Rost : -1

#### Code:

```
import java.util.Scanner;
public class QuadraticEquationSolver {
  public static void main(String[] args) {
     Scanner scanner = new Scanner(System.in);
     System.out.print("Enter coefficient a: ");
     double a = scanner.nextDouble();
    System.out.print("Enter coefficient b: ");
     double b = scanner.nextDouble();
     System.out.print("Enter coefficient c: ");
     double c = scanner.nextDouble();
     double discriminant = b * b - 4 * a * c;
    if (discriminant > 0) {
       double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
       double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
       System.out.println("The roots are real and different:");
       System.out.println("Root 1: " + root1);
       System.out.println("Root 2: " + root2);
     \} else if (discriminant == 0) {
       double root = -b / (2 * a);
       System.out.println("The roots are real and the same:");
       System.out.println("Root: " + root);
     } else {
       System.out.println("The roots are complex:");
       double realPart = -b / (2 * a);
       double imaginaryPart = Math.sqrt(-discriminant) / (2 * a);
       System.out.println("Root 1: " + realPart + " + " + imaginaryPart + "i");
       System.out.println("Root 2: " + realPart + " - " + imaginaryPart + "i");
             System.out.print("Aman Vats 1BM23CS026");
     }
     scanner.close();
```

#### Output:

#### Command Prompt C:\Users\Admin\Desktop>javac QuadraticEquationSolver.java C:\Users\Admin\Desktop>java QuadraticEquationSolver Enter coefficient a: 1 Enter coefficient b: 3 Enter coefficient c: 2 The roots are real and different: Root 1: -1.0 Root 2: -2.0 C:\Users\Admin\Desktop>javac QuadraticEquationSolver.java C:\Users\Admin\Desktop>java QuadraticEquationSolver Enter coefficient a: 4 Enter coefficient b: 3 Enter coefficient c: 1 The roots are complex: Root 1: -0.375 + 0.33071891388307384i Root 2: -0.375 - 0.33071891388307384i Aman Vats 1BM23CS026 C:\Users\Admin\Desktop>javac QuadraticEquationSolver.java C:\Users\Admin\Desktop>java QuadraticEquationSolver Enter coefficient a: 2 Enter coefficient b: 4 Enter coefficient c: 2 The roots are real and the same: Root: -1.0 C:\Users\Admin\Desktop>Aman Vats 1BM23CS026

### Program 2 SGPA CALCULATOR

Observation:

Q-) Develop a Java peregram to execute a class student with members were, name, an assay execute and assay makes. Include methods to accept and display details and a method to calculate SGPA of a student

```
import java util Scanner;
class subject &
int subject marks;
int credit;
int oxiade;
public void calculategrade () {
 if (subject marks >= 90 & & subject marks (= 100)
 3(08 = 5 educanteridus) di esse
     ofax = 9;
else if (subject monly >= 70) {

of also if (subject monly >= 70) {

of also if (subject monly >= 60) {

of also = 7;
sex if (subject marks 7=50) {

of a de=6;
slye if (subject morths >= 40) {
      grade=Si
olse & ofrade =0;
```

```
class Student &
     storing vame;
      string was;
     Louble SCHA;
     Subject [] Subject = Now Subject [8];
     Scowner 5 = vew Scanner (System in);
     Public Student () [
          for (ind i=0; i <8; i++){
                 suggest [i] = newsypot ();
   public void getstudent details () &
           System out point (" Einter marge");
           name = S. rentline();
           System.out. poolut (" Evilon www:");
           WN = s. rendling();
 public void getmanks () {
           for (int i=0; i <8; >++) {
                System out- you'd "Enter works" + (i+1)+":");
                 Subject [x]. Subject mondy = S - wort Int ();
                  if (salipet [; ] , sabject would - S.
                  il (Subject [i] - Subject was > 100 11 subject [i] subject was
                         System set paint ( " I model marks! Rose at
                          continue;
                  System out point ("Enter creater" + (it 1)+":")
                 Subject [i]. ore dity = 5 wand Int ();
                 Subject [i] calculate graze ();
```

```
void compute SCIADS
            interfal credit = 0;
             int effective Scarce =0;
             8(++1:8>1:0=1 to)
                    effective sieve +- (regati) aposto + subject (i) crests);
                    total oredits += subject [i] oredits;
             SGRX = (2000le) affective score / total credits;
          3 (3 tower polyzib 5104
           Septem out poout ("In Student wave:"+ have);
           System - out- point ("Stubent USN :" + USN );
           System out pount (" Shex:" + SGEA);
 public class Main &
          public static void main (Strang [] orgs) {
                 Student strudent = very student ();
                  student getstudent retors ();
                  student get many ();
                  Student. Compute SCIPA();
                 Student . dysplay Result ();
           8
TUJTUO
Enter Student Marrie
Aman
Enter Student USW:
123
Enter Marks for Subject 1:
90
Evely credits for suged 1:
 4
```

Enter made for subject 2: Enter redits for subject 2: Enter marks for subject 3: Enter credits for stated 3: Enter marks for subject 4: Evilor credity for subject 5: Enter marks for subject S: Enter credits for subjects: Enter anouble for subject 6: Enter credity for subject 6: Enter marks for subject 7: Exter budits for subject 7: Enter marks for subject 8: Enter credity for subjectiz &8 Student Name: Aman Student USN: 128 SapA: 9.090909092

#### Code:

```
import java.util.Scanner;
class Subject {
  int subjectMarks;
  int credits;
  int grade;
  public void calculateGrade() {
     if (subjectMarks >= 90 && subjectMarks <= 100) {
       grade = 10;
     } else if (subjectMarks >= 80) {
       grade = 9;
     } else if (subjectMarks >= 70) {
       grade = 8;
     } else if (subjectMarks >= 60) {
       grade = 7;
     } else if (subjectMarks >= 50) {
       grade = 6;
     } else if (subjectMarks >= 40) {
       grade = 5;
     } else {
       grade = 0;
class Student {
  String name;
  String usn;
  double SGPA;
  Subject[] subject = new Subject[8];
  Scanner s = new Scanner(System.in);
  public Student() {
     for (int i = 0; i < 8; i++) {
       subject[i] = new Subject();
  }
  public void getStudentDetails() {
     System.out.println("Enter Student Name: ");
     name = s.nextLine();
```

```
System.out.println("Enter Student USN: ");
     usn = s.nextLine();
  }
  public void getMarks() {
     for (int i = 0; i < 8; i++) {
       System.out.println("Enter Marks for Subject " + (i + 1) + ": ");
       subject[i].subjectMarks = s.nextInt();
       if (subject[i].subjectMarks > 100 || subject[i].subjectMarks < 0) {
          System.out.println("Invalid marks! Please enter again.");
          i--;
          continue;
        }
       System.out.println("Enter Credits for Subject " + (i + 1) + ": ");
       subject[i].credits = s.nextInt();
       subject[i].calculateGrade();
     }
  }
  public void computeSGPA() {
     int totalCredits = 0;
     int effectiveScore = 0;
     for (int i = 0; i < 8; i++) {
       effectiveScore += (subject[i].grade * subject[i].credits);
       totalCredits += subject[i].credits;
     SGPA = (double) effectiveScore / totalCredits;
  }
  public void displayResult() {
     System.out.println("\nStudent Name: " + name);
     System.out.println("Student USN: " + usn);
     System.out.println("SGPA: " + SGPA);
  }
public class Main {
  public static void main(String[] args) {
```

}

```
Scanner \ s = new \ Scanner(System.in); Student[] \ students = new \ Student[3]; for \ (int \ i = 0; \ i < 3; \ i++) \ \{ System.out.println("\nEnter \ details \ for \ Student" + (i+1) + ": "); students[i] = new \ Student(); students[i].getStudentDetails(); students[i].getMarks(); students[i].computeSGPA(); \} System.out.println("\n\nResults \ for \ all \ students:"); for \ (int \ i = 0; \ i < 3; \ i++) \ \{ students[i].displayResult(); \} \}
```

#### Output:

```
Command Prompt
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Admin>cd desktop
C:\Users\Admin\Desktop>javac Main.java
C:\Users\Admin\Desktop>java Main
Enter details for Student 1:
Enter Student Name:
aman
Enter Student USN:
123
Enter Marks for Subject 1:
90
Enter Credits for Subject 1:
Enter Marks for Subject 2:
Enter Credits for Subject 2:
Enter Marks for Subject 3:
Enter Credits for Subject 3:
Enter Marks for Subject 4:
Enter Credits for Subject 4:
Enter Marks for Subject 5:
80
Enter Credits for Subject 5:
Enter Marks for Subject 6:
Enter Credits for Subject 6:
Enter Marks for Subject 7:
80
Enter Credits for Subject 7:
Enter Marks for Subject 8:
Enter Credits for Subject 8:
Enter details for Student 2:
Enter Student Name:
ayush
Enter Student USN:
122
Enter Marks for Subject 1:
Enter Credits for Subject 1:
Enter Marks for Subject 2:
84
Enter Credits for Subject 2:
Enter Marks for Subject 3:
76
Enter Credits for Subject 3:
```

```
Command Prompt
Enter Credits for Subject 3:
Enter Marks for Subject 4:
80
Enter Credits for Subject 4:
Enter Marks for Subject 5:
Enter Credits for Subject 5:
Enter Marks for Subject 6:
85
Enter Credits for Subject 6:
Enter Marks for Subject 7:
Enter Credits for Subject 7:
Enter Marks for Subject 8:
Enter Credits for Subject 8:
Enter details for Student 2:
Enter Student Name:
ayush
Enter Student USN:
122
Enter Marks for Subject 1:
Enter Credits for Subject 1:
Enter Marks for Subject 2:
84
Enter Credits for Subject 2:
Enter Marks for Subject 3:
Enter Credits for Subject 3:
Enter Marks for Subject 4:
Enter Credits for Subject 4:
Enter Marks for Subject 5:
Enter Credits for Subject 5:
Enter Marks for Subject 6:
Enter Credits for Subject 6:
Enter Marks for Subject 7:
Enter Credits for Subject 7:
Enter Marks for Subject 8:
90
Enter Credits for Subject 8:
Enter details for Student 3:
Enter Student Name:
```

```
Command Prompt
Enter details for Student 3:
Enter Student Name:
raghav
Enter Student USN:
121
Enter Marks for Subject 1:
Enter Credits for Subject 1:
Enter Marks for Subject 2:
Enter Credits for Subject 2:
Enter Marks for Subject 3:
Enter Credits for Subject 3:
Enter Marks for Subject 4:
Enter Credits for Subject 4:
Enter Marks for Subject 5:
Enter Credits for Subject 5:
Enter Marks for Subject 6:
Enter Credits for Subject 6:
Enter Marks for Subject 7:
90
Enter Credits for Subject 7:
Enter Marks for Subject 8:
Enter Credits for Subject 8:
Results for all students:
Student Name: aman
Student USN: 123
SGPA: 9.545454545454545
Student Name: ayush
Student USN: 122
SGPA: 8.909090909090908
Student Name: raghav
Student USN: 121
SGPA: 7.409090909090909
C:\Users\Admin\Desktop>^S_
```

Program-3 BOOK CLASS

Observation:

authore, police, num-pages Include a constructor to set the values for the members. Include a constructor to set get the details of the exploits. Include a testing () method that could display the complete details of the book levelop a Java pocogram to create in back exploits.

impost java util Scannon; class Book &

String name, author; int num- pages; double poice;

void setdetails () {

Scarros SC = new Scarros (System.in);

System. Out. point ("Enter name:");

this. name = Sc. newt ();

System. Out. point ("Enter author:");

this. author = Sc. nent ();

System. out. point ("Enter pages:");

this. num. pages = Sc. nent Int ();

System. out. point ("Enter poice:");

this. youce = Sc. nent Double ();

outhorn;

vol getbetails () {

Sugtam. out point ("Name: "+ name +" \n Author: " + author +" \n Pages: " + num-pages + "\n Voice: " + poice ); outurn;

s public storing to Storing () {

Trestarin "Name:" + norme + "In Author: "+ author + "In Page: "
T num-pago + "In Police: "+ page;

clars Brok Demo & Public static void moin (Siring oughts) & Scanner SC = YOU Scanner ( System in); (": Wad poor usus") truly two motions.") nut book Mun = SC - MANN IND (); Book book Assay[] = new Book [book Num]. for ( int i = 0 , x < book Naw; x++) } mak Away [x] = New Book (); () vinted to = . = [57 porch stood System out point (); for (int 1=0; i < book Num; i++){ () Slip & Assay [i] get Details (); DUTPUT Eviter the number of books: & 1 Enter hame: Marry Potter Enter author: john Enter pages: 333 Enter Paice: 900 Name: Natury Potter helpe: john Yagg: 333 Prices: 900

#### Code:

```
import java.util.Scanner;
class Book{
  String name, author;
  int num_pages;
  double price;
  void setDetails(){
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter Name:");
    this.name = sc.next();
     System.out.print("Enter Author:");
    this.author = sc.next();
     System.out.print("Enter Pages:");
    this.num_pages = sc.nextInt();
     System.out.print("Enter Price:");
    this.price = sc.nextDouble();
    return;
  }
  void getDetails(){
    System.out.println("Name: "+name+"\nAuthor: "+author+"\nPages: "+num_pages+"\nPrice:
"+price);
    return;
  public String toString(){
    return "Name: "+name+"\nAuthor: "+author+"\nPages: "+num_pages+"\nPrice: "+price;
  }
}
class BookDemo{
  public static void main(String args[]){
     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the number of books: ");
    int bookNum = sc.nextInt();
    Book bookArray[] = new Book[bookNum];
    for(int i = 0; i < bookNum; i++){
    bookArray[i] = new Book();
    bookArray[i].setDetails();
     System.out.println();
```

```
for (int i = 0; i<bookNum; i++){
   bookArray[i].getDetails();
   }
}</pre>
```

Output:

```
Command Prompt
Enter the number of books: 3
Enter Name: HarryPotter
Enter Author: john
Enter Pages:333
Enter Price:900
Enter Name: Gatsby
Enter Author: Fitzgerald
Enter Pages:333
Enter Price: 1000
Enter Name: Godaan
Enter Author:premchand
Enter Pages: 200
Enter Price:300
Name: HarryPotter
Author: john
Pages: 333
Price: 900.0
Name: Gatsby
Author: Fitzgerald
Pages: 333
Price: 1000.0
Name: Godaan
Author: premchand
Pages: 200
Price: 300.0
C:\Users\bmsce\Desktop>Aman Vats
```

Program-4
Abstract Class Shape

Observation:

R-) Develop a Java pologram to create an obstance class naves shaps that contains 2 integer and an empty method named yount Asia (). Potovids 3 class mand kestangle, tracked such that each one of the class subsubs method point Asia () that want the class contain only the shape. Each one of the class contain only the shape.

import java.util. +;
abstract clars shape {
 int dimension ?;
 int dimension ?;

public Shape () { this, dimension 1 = 0;

this. dimension 2=0;

3

rublic Shape (int dimangion), just dimansion) & this dimension) - dimension;

this - dimension 2 - dimension 2;

public abstract vois point Adia ();

Claus Kectangle entends shake {

public Kectaryle (int length, int width);

Lineusian 1= length; Lineusian 2= width;

3

public void yourd Asia (18

3 System out point (" Adrea of Kodangle:" - alea);

```
class Tolianger entends Sharper &
            public Tourangle (int box, int height ) {
                   dimensioni = base:
                dimension 2 = neight;
             RI) word knieg Lier siding
                   Louble area = 0.5 * Limensian 1 + Linasian
                   System out point (" Area of triangle" + 100
   3
         Crarcle entends Shape &
  class
           public Cidole Cint sudius &
                 dimension 2 = 0;
           Jublic void wint Asoa () &
                    double also + Iq. Atost = pala allues
                    System - out - print (" Arica of conde: " + ara)
class Shape toreas
       public static roid main (string[] args) }
              Scanner scanner = now scanner ( System in)
              System - Out point (" Enter conglad winter : ");
              int length = Scanner. neut Int ();
              int width = scanny . next Int ();
              shorre suchangle = now kectangle (Sungth, with
              Cost A tury - spea toor
              System - out- point (" Enter box & horight")
              int tought = Scarus
              int base = Scame. new Int ();
              just height - scann nout Just ();
               shape to langle = now Tricargle (bur, raight)
             () with thirty . Down is
              System. Out : putent (" Enter Vadius:")
```

int stadius = Scannar - news Int (); Shape citale = new Civicle ( radius); ciacle. plant Ascot (); Scanner - close (); DUTPUT Enter length & with of suctargle; Adrea of dectargle: 12 Enter box & height of triangle: 30 8 Aprea of triangle: 120.0

Enter tradices of cidade:

34

Adrea of citale: 3631-6811 IN SUDENTA WILLIES THE METER

#### Code:

```
import java.util.*;
abstract class Shape {
  int dimension1;
  int dimension2;
  public Shape() {
    this.dimension1 = 0;
    this.dimension2 = 0;
  }
  public Shape(int dimension1, int dimension2) {
    this.dimension1 = dimension1;
    this.dimension2 = dimension2;
  public abstract void printArea();
}
class Rectangle extends Shape {
  public Rectangle(int length, int width) {
    dimension1 = length;
    dimension2 = width;
  }
  public void printArea() {
    int area = dimension1 * dimension2;
    System.out.println("Area of Rectangle: " + area);
class Triangle extends Shape {
  public Triangle(int base, int height) {
    dimension1 = base;
    dimension2 = height;
  public void printArea() {
```

```
double area = 0.5 * dimension1 * dimension2;
     System.out.println("Area of Triangle: " + area);
  }
class Circle extends Shape {
  public Circle(int radius) {
     dimension1 = radius;
     dimension2 = 0;
  }
  public void printArea() {
     double area = Math.PI * dimension1 * dimension1;
     System.out.println("Area of Circle: " + area);
}
class shapearea {
  public static void main(String[] args) {
     Scanner scanner = new Scanner(System.in);
     System.out.println("Enter length and width for Rectangle:");
     int length = scanner.nextInt();
     int width = scanner.nextInt();
     Shape rectangle = new Rectangle(length, width);
     rectangle.printArea();
     System.out.println("Enter base and height for Triangle:");
     int base = scanner.nextInt();
     int height = scanner.nextInt();
     Shape triangle = new Triangle(base, height);
     triangle.printArea();
     System.out.println("Enter radius for Circle:");
     int radius = scanner.nextInt();
     Shape circle = new Circle(radius);
     circle.printArea();
     scanner.close();
```

```
}
```

Output:

```
Command Prompt
                        ×
C:\Users\bmsce\Desktop>javac shapearea.java
C:\Users\bmsce\Desktop>java shapearea
Enter length and width for Rectangle:
Area of Rectangle: 12
Enter base and height for Triangle:
Area of Triangle: 120.0
Enter radius for Circle:
Area of Circle: 3631.6811075498013
C:\Users\bmsce\Desktop>javac shapearea.java
C:\Users\bmsce\Desktop>java shapearea
Enter length and width for Rectangle:
4
Area of Rectangle: 360
Enter base and height for Triangle:
55 33
Area of Triangle: 907.5
Enter radius for Circle:
Area of Circle: 6082.123377349839
C:\Users\bmsce\Desktop>javac shapearea.java
C:\Users\bmsce\Desktop>java shapearea
Enter length and width for Rectangle:
44 55
Area of Rectangle: 2420
Enter base and height for Triangle:
45
Area of Triangle: 517.5
Enter radius for Circle:
Area of Circle: 24884.555409084755
C:\Users\bmsce\Desktop>Aman Vats
```

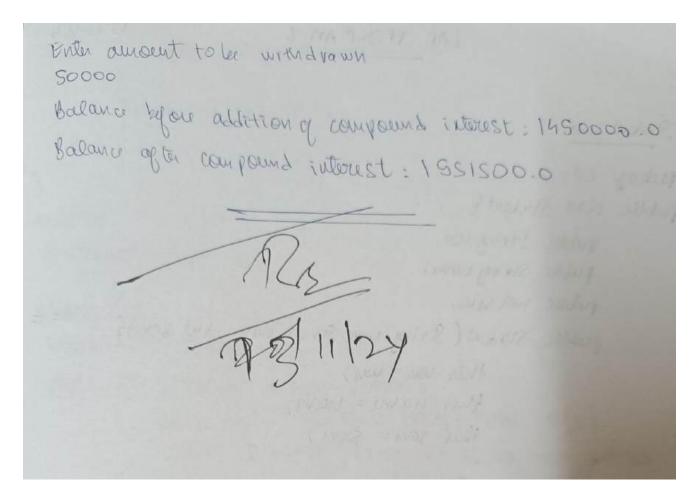
Program-5 BANK CLASS

Observation:

```
LAB PROGRAM -S
       import java util Scarrer;
       clare Accounts
                  String cust Namo,
                  string authum;
                  double deposit;
                  double balance;
                  doubt withdrawas Amt,
                 Void getd () {
                         Scanner sc = ren Scarra (System in);
                         System. out. println ("Enter customer vans:");
                         cust Name = sc. nextline();
                        System out, print In (" Enter customer account number of
                        acchium = sc. newdlino();
                        System. out pointln (" Enter deposit amount");
                         deposit = Sc. NewWorld ();
                        balance = devosit;
                         System. out point (n ();
               ? () buy biev
               System. out. pointen ("Customer vamo: " + cust Namo);
               System out pointly (" Account number:" + acc Num)
               () while g. tuo well
class Currect outeness Account &
             void balana Chack (18
                       if (rational (= 10000)}
                              System out point in " You have cere than minimus"
                                                               balance ! " )
                              balang - = 10000;
             vois case Display Bolon a () {
```

```
Sylin oid yourdin (" Gusset account details").
                 System and pounder ( - Enter amount to be withdrawn).
                 Scarner SC = NEW Scanner (System 141);
                MILLY GRAMME VINT = 26- MONG DONGER () >
                 balance - = wimdrawal Ant;
                 balance check ():
                System. Out yourself ( " bosono (you checking with previous
                                      balanci): " + balance);
                System. out yountly ();
      clas SanAcct entends Accounts
                Void interest ealer) {
                balance = balance + (0-07 + balance);
           void cale bisplay balance () {
                Scanner SC = Yew Scanner ( Supar. in);
               System out pointly (" Savings account details")
               1(16th)
                System out poort on [" Enter amount to be withdrawn"];
               withdrawal Amt = sc vent Double ();
               balana = with Lowal Aunt;
               System-out point on (" balance before addition of
                                     compound interest: "+ balana);
               interest Colc();
               Soften out position (" Salance after a compound
                                       interest: " + balance);
               System out pointly ();
class Barrie &
             Public static void main (String asay []) ?
                            Scanner Sc = new Scannor (System.in);
                             String acting
```

System out pointly ("Ends type of account (Soming account or Current remains) "); if (acc Type, equals (" Savings account "))? San Acet Sacc = Now Son Acet (); sacc-getal); Sace calcopylay belance (); when ( are type . ogress (" without account " )) } CHARCE care = now consect(); cacc. geld (), eace. coole Display Balance () System - out pointly (" Enter valid act type OUTPUT Enter type of account (Savings on Current) Savings Enter austoner name amoun enter account no 9226 33589 Enter deposit amount 1500000 Savings oceant delails Customer name: aman Account no: 422683589



#### Code:

```
import java.util.Scanner;
class Account {
       String custName;
       String accNum;
       double deposit;
       double balance;
       double withdrawalAmt:
       void getd() {
       Scanner sc = new Scanner(System.in);
       System.out.println("Enter the customer name");
       custName = sc.nextLine();
       System.out.println("Enter the customer account number");
       accNum = sc.nextLine();
       System.out.println("Enter the deposit amount");
       deposit = sc.nextDouble();
       balance=deposit;
       System.out.println();
```

```
void putd() {
       System.out.println("Customer name: "+custName);
      System.out.println("Account number: "+accNum);
       System.out.println();
}
class CurAcct extends Account {
       void balanceCheck() {
              if (balance<=10000) {
                     System.out.println("You have less than minimum balance!");
                     balance=1000;
              }
       void calcDisplayBalance() {
              System.out.println("Current account details");
              putd();
              System.out.println("Enter amount to be withdrawn");
              Scanner sc = new Scanner(System.in);
              withdrawalAmt = sc.nextDouble();
              balance-=withdrawalAmt;
              balanceCheck();
              System.out.println("Balance (after checking with minimum balance): "+balance);
              System.out.println();
       }
class SavAcct extends Account {
       void interestCalc() {
       balance=balance+(0.07*balance);
       void calcDisplayBalance() {
       Scanner sc = new Scanner(System.in);
       System.out.println("Savings account details");
       putd();
       System.out.println("Enter amount to be withdrawn");
       withdrawalAmt = sc.nextDouble();
       balance-=withdrawalAmt;
       System.out.println("Balance before addition of compound interest: "+balance);
       interestCalc();
       System.out.println("Balance after compound interest addition: "+balance);
       System.out.println();
}
class Bank {
```

```
public static void main(String args[]) {
              Scanner sc = new Scanner(System.in);
              String accType;
              System.out.println("Enter the type of account (Savings account or Current account)");
              accType = sc.nextLine();
              if (accType.equals("Savings account")) {
                      SavAcct sacc = new SavAcct();
                      sacc.getd();
                      sacc.calcDisplayBalance();
              else if (accType.equals("Current account")) {
                      CurAcct cacc = new CurAcct();
                      cacc.getd();
                      cacc.calcDisplayBalance();
              else {
                      System.out.println("Enter a valid account type");
              }
}
```

```
Command Prompt
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.
C:\Users\aDMIN>cd desktop
C:\Users\aDMIN\Desktop>javac Bank.java
C:\Users\aDMIN\Desktop>java Bank
Enter the type of account (Savings account or Current account)
Savings account
Enter the customer name
aman
Enter the customer account number
42336078
Enter the deposit amount
1500000
Savings account details
Customer name: aman
Account number: 42336078
Enter amount to be withdrawn
50000
Balance before addition of compound interest: 1450000.0
Balance after compound interest addition: 1551500.0
C:\Users\aDMIN\Desktop>javac Bank.java
C:\Users\aDMIN\Desktop>java Bank
Enter the type of account (Savings account or Current account)
Current account
Enter the customer name
ayush
Enter the customer account number
42335632
Enter the deposit amount
230000
Current account details
Customer name: ayush
Account number: 42335632
Enter amount to be withdrawn
30000
Balance (after checking with minimum balance): 200000.0
```

#### Command Prompt

```
C:\Users\aDMIN\Desktop>java Bank
Enter the type of account (Savings account or Current account)
Savings account
Enter the customer name
raghav
Enter the customer account number
42345629
Enter the deposit amount
15000

Savings account details
Customer name: raghav
Account number: 42345629

Enter amount to be withdrawn
2000
Balance before addition of compound interest: 13000.0
Balance after compound interest addition: 13910.0

C:\Users\aDMIN\Desktop>1BM23CS026
```

Program-6
Packages

LAB PROGRAM-6 Student java tookage cie; Public day Student & public String was; public serves name; public int sour; public student ( String wor, String name, jut som) & this um = um; this - name = hame; this som = sem; Public vois display And Info ( ) & - System. out. privater (" USN: 1 + USN) System. out - grintly (" peame: " + name) soptim out print 1 " Semoster:" + sem) Internals java padkage cie; Public class Intervals entlints Students Jublic internal norty = new tut [s] public Intervaly (string usu, string varue, just sen, suls) internations is super (www, name, sear); this - Internal Hardy = internal transs; Public void static main display Int trans () & System. out. printh (" Internaltrail : ") for (ut washs: internal franks)?

```
System out you'ld ( mark + " ");
       System -out youth ();
tackage
 Enterval java
Yackage cie;
import cie stubent;
public class Enternal enternal student &
           public int[] outprince branky = row int[s];
            public Enternal (String usu, string none jut see
                               int [ ] outernal Modes) &
                       super (ush, nam, sem);
                      this enternal marky = outernal Haules;
           Public void display Enterval trady () &
                      System. out. youth (" Enlived orans: ")
               3/ was : show this) if
                        System. out-yout (man + "")
                       System. Deit youthen ();
```

Main java import are Intervals; import see. Eulerval; public class mains static void main (String [] orgy) ? jut = 27 14417 juta val Marked = \$20,30,25,28,223; tint [] and mar marks = { (0,70,5),65,50}; Indival stubul / Indival = You Intrvals ("VINIES" My Enternal studenti Enternal = new Enternal ("USNIZ3" Alice ? System pet printly (" Student 1 Info: "); Student I Inderval. Listing Student Info (); Students Internet. display Internations (); student 1 andernal - display External macho (); int[] (inal narks) = calculate Final marks (studentinating internal tranks, student ( thereas enternal tracks 1. display Final tranks ( Kinal Marks 1); public static int [] calculate Fingel newly (int [] internal hand INTE ] enternal rada) & int [] final branks = now I int[S] for (int i=0; ils; i++){ final Marky [i] = juternal tranky [i] + enternal marks [i] retion lang menter static void man display Final Tranks (INTEZ final Part) System.out-pointh ("Final grants (Internal + gratural): for lint mark : frat trails) { in set point by ();

#### Code:

```
//Student.java
package cie;
public class Student {
  public String usn;
  public String name;
  public int sem;
  public Student(String usn, String name, int sem) {
     this.usn = usn;
     this.name = name;
     this.sem = sem;
  }
  public void displayStudentInfo() {
     System.out.println("USN: " + usn);
     System.out.println("Name: " + name);
     System.out.println("Semester: " + sem);
  }
//Internals.java
package cie;
public class Internals extends Student {
  public int[] internalMarks = new int[5];
  public Internals(String usn, String name, int sem, int[] internalMarks) {
     super(usn, name, sem);
     this.internalMarks = internalMarks;
  }
  public void displayInternalMarks() {
     System.out.println("Internal Marks: ");
     for (int mark : internalMarks) {
       System.out.print(mark + " ");
     System.out.println();
  }
//Externals.java
package see;
import cie.Student;
public class External extends Student {
```

```
public int[] externalMarks = new int[5];
  public External(String usn, String name, int sem, int[] externalMarks) {
     super(usn, name, sem);
    this.externalMarks = externalMarks:
  }
  public void displayExternalMarks() {
     System.out.println("External Marks: ");
     for (int mark : externalMarks) {
       System.out.print(mark + " ");
    System.out.println();
//Main.java
import cie. Internals;
import see.External;
public class Main {
  public static void main(String[] args) {
    int n = 2;
    int[] internalMarks1 = \{20, 30, 25, 28, 22\};
    int[] externalMarks1 = {60, 70, 55, 65, 50};
    Internals student1Internal = new Internals("USN123", "Alice", 3, internalMarks1);
    External student1External = new External("USN123", "Alice", 3, externalMarks1);
    int[] internalMarks2 = \{18, 25, 20, 23, 28\};
    int[] externalMarks2 = \{50, 65, 60, 58, 45\};
    Internals student2Internal = new Internals("USN124", "Bob", 3, internalMarks2);
     External student2External = new External("USN124", "Bob", 3, externalMarks2);
     System.out.println("Student 1 Info: ");
     student1Internal.displayStudentInfo();
     student1Internal.displayInternalMarks();
     student1External.displayExternalMarks();
                  finalMarks1
                                                 calculateFinalMarks(student1Internal.internalMarks,
    int∏
student1External.externalMarks);
     displayFinalMarks(finalMarks1);
     System.out.println("\nStudent 2 Info: ");
     student2Internal.displayStudentInfo();
     student2Internal.displayInternalMarks();
     student2External.displayExternalMarks();
```

```
finalMarks2
                                                 calculateFinalMarks(student2Internal.internalMarks,
    int∏
student2External.externalMarks);
     displayFinalMarks(finalMarks2);
  public static int[] calculateFinalMarks(int[] internalMarks, int[] externalMarks) {
    int[] finalMarks = new int[5];
    for (int i = 0; i < 5; i++) {
       finalMarks[i] = internalMarks[i] + externalMarks[i];
    return finalMarks;
  public static void displayFinalMarks(int[] finalMarks) {
    System.out.println("Final Marks (Internal + External): ");
    for (int mark : finalMarks) {
       System.out.print(mark + " ");
    System.out.println();
}
```

```
Student 1 Info:
USN: USN123
Name: Alice
Semester: 3
Internal Marks:
20 30 25 28 22
External Marks:
60 70 55 65 50
Final Marks (Internal + External):
80 100 80 93 72
Student 2 Info:
USN: USN124
Name: Bob
Semester: 3
Internal Marks:
18 25 20 23 28
External Marks:
50 65 60 58 45
Final Marks (Internal + External):
68 90 80 81 73
```

Program-7 Exceptions

Q=> Waite a paragram and Lemonstantes handling of enception in inhabitance tree. Create a base clark called "father" & Lower clark as "son" which entends base clark 3n father's clark improved a constanction which takes the age and throws the enception " wrong age" when input age < 0. In son's clark, implement a constanctor that uses flather & son's age and throws the sucception is constanctor that uses flather & son's age ound throws an enception if son's age >= father's age.

import java. util. Scaura 4;

class Wolong Age Enception (Storing message) & entends enception & public Wolong Age Enception (Storing message) & Super (message);

3

class Son Age Enception entires Enception & public Son Age Enception (Storing message) {

Super (message);

clous Forther &

polivate int age;

public Fectivor (int age) thorows Wording Age Enception {

if (age < 0) {

where Age Enception ("Whom a

thosen new words Age Enception (" wrong age").

this age = oxyle;

S Public int set Age () {

realizer age;

```
clay Son entery & Father {
               poivale int surge?
               publy son ( wh father ASY, it's year ASY) that my
                - Wang Age Enception, Son Age Enceptions
                        Super (father has);
                         11 ( son Age >= (ather Age) }
                               strow new Son Age Enception (" Soil.
                                      age council be ofically than or
                                       equal to father's age
                        this son Age = son Age ?
       public wit get Sov Age (){
                  grotwar son Age;
public class Father Son {
            public static vois worm (stoing [] angs) &
                    While (Das) &
                         Scanner se = new Scanner (System in)
                         5 yetem - out - pourt (" Enter Father's age !")
                         int father Agg = Sc-new Int ()
                         (" spea sind (" voter son's age.")
                        (1) tot Sever- 12 = golines tris
                        Dy?
                         Son son = new Son (fatherty, Sonty)
                             System out pocation (" Accepted")
                         catch (wrong by Enception e){
                                  System out pourtly (a getnown)
                        couch ( sonage Enception e) {
                                  System. out-parish (R-gethersel)
```

Suptrim out pointly (" Would you like to me enter string input = sc. nent(); details (Y/n)"); if (input equals Ignor Cose ("n")) & boreak;

TUPTUO

Enter Foother's Age: 85 22

Eviter son's Age: 33

Sois any cannot be greather than or equal to father's age Would you like to ore-outer Leterils (Y/n) Xx Y

Enter Father's Age: 42

Enter sois top: 15

Accepted

would you like to the enter details (Y/n)

N

#### Code:

```
import java.util.Scanner;
class WrongAgeException extends Exception {
  public WrongAgeException(String message) {
    super(message);
  }
class SonAgeException extends Exception {
  public SonAgeException(String message) {
    super(message);
}
class Father {
  private int age;
  public Father(int age) throws WrongAgeException {
    if (age < 0) {
       throw new WrongAgeException("Wrong age");
    this.age = age;
  public int getAge() {
    return age;
}
class Son extends Father {
  private int sonAge;
  public Son(int fatherAge, int sonAge) throws WrongAgeException, SonAgeException {
    super(fatherAge);
    if (sonAge >= fatherAge) {
       throw new SonAgeException("Son's age cannot be greater than or equal to father's age");
    this.sonAge = sonAge;
  public int getSonAge() {
    return sonAge;
  }
public class FatherSon{
  public static void main(String[] args) {
     while(true){
       Scanner sc = new Scanner(System.in);
       System.out.print("Enter Father's Age: ");
       int fatherAge = sc.nextInt();
```

```
System.out.print("Enter Son's Age: ");
int sonAge = sc.nextInt();
try {
    Son son = new Son(fatherAge, sonAge);
    System.out.println("Accepted Succesfully");
} catch (WrongAgeException e) {
    System.out.println(e.getMessage());
} catch (SonAgeException e) {
    System.out.println(e.getMessage());
}
System.out.println("Would you like to re-enter details (Y/n)");
String input = sc.next();
if (input.equalsIgnoreCase("n")) {
    break;
}
}
}
```

```
Command Prompt
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Admin>cd desktop
C:\Users\Admin\Desktop>javac FatherSon.java
C:\Users\Admin\Desktop>java FatherSon
Enter Father's Age: 42
Enter Son's Age: 15
Accepted Succesfully
Would you like to re-enter details (Y/n)
Enter Father's Age: 55
Enter Son's Age: 19
Accepted Succesfully
Would you like to re-enter details (Y/n)
Enter Father's Age: 44
Enter Son's Age: 16
Accepted Succesfully
Would you like to re-enter details (Y/n)
Enter Father's Age: 22
Enter Son's Age: 33
Son's age cannot be greater than or equal to father's age
Would you like to re-enter details (Y/n)
C:\Users\Admin\Desktop>1BM23CS026 Aman Vats_
```

# Program-8 Threads

```
LAB PROGRAM - 8
        Q-) Write a program which creates 2 thouasts, one thouast
            displaying "BHS cooling of Engineering" once every to
            Seconds and another displaying "CSE" once evolu-
            2 socionals
        class BMS entends Trough &
              public void our () {
                  July &
                       P(suct) shirty
                           System out pointly (" Bris Carley of Engineering of
                           TIOSON , SIRRY (10000)
                 3 catch ( Interocupted Enception e) {}
      clars est entires Thread &
              public void run () ?
                    g gut
                       White ( bus ) }
                           System. out. point In ("CSE");
                           Thread sleep (2000);
                  3 cotton (Interrupted Euception e) {3'
public class Multitrasading &
          public static void main (Aving [] angs) {
                    BUS PMS NEM BUS ()!
                    CSE OSE = NOW CSE ();
                    buy start ();
                     cs. start();
```

```
DUTPUT
      Coolege of Engineering
CSE
 CSE
CSE
 CSE
 CSE
CSE
CSE
 CSE
 CSE
 USE
```

### Code:

```
class CSE extends Thread {
    public void run() {
        try {
            while (true) {
                 System.out.println("CSE");
                 Thread.sleep(2000); // Sleep for 2 seconds
            }
        } catch (InterruptedException e) {}

public class Multithreading {
    public static void main(String[] args) {
        BMS bms = new BMS();
        CSE cse = new CSE();
        bms.start();
        cse.start();
    }
}
```

```
Command Prompt - java Mul X + v
Microsoft Windows [Version 10.0.22631.4460]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Admin>cd desktop
C:\Users\Admin\Desktop>javac Multithreading.java
C:\Users\Admin\Desktop>java Multithreading
Aman Vats 1BM23CS026
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
Aman Vats 1BM23CS026
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
Aman Vats 1BM23CS026
BMS College of Engineering
CSE
CSE
CSE
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Aman Vats 1BM23CS026
BMS College of Engineering
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BMS College of Engineering
CSE
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CSE
CSE
CSE
Aman Vats 1BM23CS026
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
Aman Vats 1BM23CS026
```

Program-9
User interface to perform integer division

```
# Code for Lab Rogram -9
   import javan swing.
   import java ant tien +,
  class Swing Demof
      Sving Damo () {
            J Forano jezu = new JForano (" sivider Ap");
            jpm- set 826 (275, 156);
            j from set Layout (new FlowLayout ());
            j Kin - Set Refaret Clax Operation (JEDION . EXIT-ON _ CLOSE)
            Thabel j'ab = new Trabel (" Entry divident & divident :")
            Jentfield afth = now J Tent field(8);
            Treatrield bit = now I Tent Field (8);
            I button button = now I Button (" Laborate").
            () ledel wer = see ledel ()
           That alab = now Thatel ();
           I Label blab = New Mabel ()
           Itabel anslog = new Itabel ();
           9 (Dr.M. 099 (ONS);
           i fru - a2 (j (a6);
           ipin-022 ( 0) tp);
           ifrm add (Vite);
           (hutton),
          apm and calabol;
          j Mm - add (HOD);
re/ Jenn- add (arglab);
         Action Listerion 1 = new Action Listerioly
                public voil action Performed (Action Event ext) &
                      System and printly (" Action event from
                                  a text gield";
```

```
aits a 22 Action listora (1);
        bit add Action Listeria (1);
        button add Action Listerer (new Adjointistense () §
            Public void action Regional (Action Event art) &
                trys
                    int a = Inliger parxInt (ajty get Tent());
                    jud b = Integer . parx Int (bill : get Tent()),
                    alab. set Text ("In A = "+ a);
                    blab setTent ("In B="+b);
                    anylab set tent ("In Any "+ any);
           catch (Number forwar Enception ) ?
                   alab. set rent ("");
                    blab set Tent (" ");
                    austob. Set Tent ("");
                    en. Set Tent (" Enter andy Ivelogers!");
         catch ( Avidhmetic Enception e) {
                  alab set text (" ");
                  blab set tent (" ");
                  andab set Text (" ");
                  en set Tent ( & should not so be non zon!).
3);
                    AND ADDRESS OF ME TO STORY CERTS AND
public static void main (string arge [])}
        Swing Whitities. invoke Later (new Rumable () }
               public void own () }
                     ven Sving Demo ();
```

# LAB PROGRAM-9

2-) White a pringram that orienter a user interface to perform indiger divisions. The user enterior 2 most in the tent field, num! I mim? I me division of num! I mim? is displayed in the scenet field when divide button is clicked of num! I so num! I were not an integer, program would throw a number Format Enception. If him? were zono priogram would throw an Arithmetic Enception Display, enception in dialogue bon.

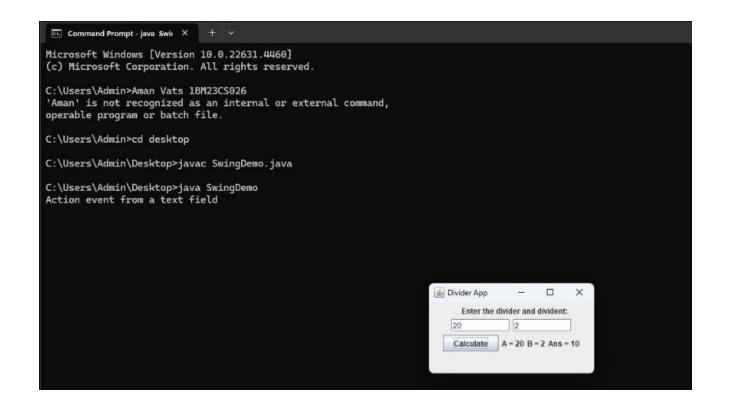
201100

| Divider App    | - SD X         |
|----------------|----------------|
| Enter Livid    | er & divident. |
|                | 2              |
| [Calculate ] A | 1=20 B=2 Aw=10 |
|                |                |
|                |                |
|                | 158            |
|                |                |
|                |                |

#### Code:

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo{
SwingDemo(){
// create jframe container
JFrame ifrm = new JFrame("Divider App");
ifrm.setSize(275, 150);
ifrm.setLayout(new FlowLayout());
// to terminate on close
jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
// text label
JLabel jlab = new JLabel("Enter the divider and divident:");
// add text field for both numbers
JTextField aitf = new JTextField(8);
JTextField bjtf = new JTextField(8);
// calc button
JButton button = new JButton("Calculate");
// labels
JLabel err = new JLabel();
JLabel alab = new JLabel();
JLabel blab = new JLabel();
JLabel anslab = new JLabel();
// add in order :)
ifrm.add(err); // to display error bois
ifrm.add(jlab);
jfrm.add(ajtf);
ifrm.add(bjtf);
ifrm.add(button);
jfrm.add(alab);
ifrm.add(blab);
jfrm.add(anslab);
ActionListener l = new ActionListener() {
public void actionPerformed(ActionEvent evt) {
System.out.println("Action event from a text field");
};
ajtf.addActionListener(l);
bitf.addActionListener(1);
button.addActionListener(new ActionListener() {
public void actionPerformed(ActionEvent evt) {
int a = Integer.parseInt(ajtf.getText());
int b = Integer.parseInt(bitf.getText());
```

```
int ans = a/b;
alab.setText("\nA = " + a);
blab.setText("\nB = " + b);
anslab.setText("\nAns = "+ ans);
catch(NumberFormatException e){
alab.setText("");
blab.setText("");
anslab.setText("");
err.setText("Enter Only Integers!");
catch(ArithmeticException e){
alab.setText("");
blab.setText("");
anslab.setText("");
err.setText("B should be NON zero!");
}
}
});
// display frame
jfrm.setVisible(true);
public static void main(String args[]){
// create frame on event dispatching thread
SwingUtilities.invokeLater(new Runnable(){
public void run(){
new SwingDemo();
});
```



Program-10 IPC, DEADLOCK

```
# Codo for Lab exogram -10
      IPC
    class Q &
     why;
     Roslan value Set = fally;
     synchronized at get() {
    while ( ! ralus Set)
    trys
     System-out-printly ("In Consumer watting In");
    weit ()
     3 catch (Interrupted Enception e){
    Sylam out prut in ("Interrupt de nextern caught");
    System - But. yrivilly ("Got: "+ n);
    value Set = Ralk in the tenders as
    Spt in out printly (" In Intimal Wadua I');
   notifue();
   ad wer hi
 Synchronized noil put (rut n) ?
  while (value Set)
  tras
  System out proof (" In Posoderan Waiting (");
 wait()
 I catch ( Intervented Enception 0) {
Syste mand - yourd (" Interpupted Encythan caught");
this N= N;
Value Set = true;
Sopran - out - print 1 (" fat :" + 4);
 System and growth (" by Fod invate Consuma ("")"
```

```
notify();
clas taduar implements Kurvalle &
Qq;
 Paroduan (20)
this q = q; / and A declare were full they be with
new Track (this, " Walua") start ();
  public void sum (){
:0=5 Wi
 while ( i LIS) &
9. put (itt);
class (cfine) &
public state void main (String avgs[])}
                     ("has! A ship ") Httery bus
Qq = newQ();
new Vacture (a)
new Congumor (a);
System-out- yvindly ("Your Control - C to stop");
                             110 1) and sear 200
```

```
Dodlock
      class As
      synchronized void for (86) &
      String name = Thread-autout Thread (1-get Name (1)
       System out - privatu (name + " entred A (80 ");
      tras
      (1000) qual- Good)
      Scatch (ouception e) E
     System and - product " A intercupted");
     System - out - printly ( name + " fry troy to coul B. last (14)?
    (s.lout();
    void (art (){
    System-out printy (" Firside A. look");
  Synchronized void bon (A a) {
  String vane= Though though (). got Name ();
 System - out- grinth ( name +" entered & Lan")
 trys
 Traca L - sleep (1000),
3 catch (Evaytion e){
Syste in Out youther (" B I Tolernyted").
System out publich (nous + " trying to call A. (axt ()")
```

```
voil (ast () &
   System out printing (" I wolde that").
   Class leastock imprements kunnalle ?
   A a = new A();
   B b= now &();
   Vea2(ock [ 1/2
   Twood-current Thread () set Name (" Main Thread");
  Thought = how Throat (this, "kacing Throat");
  1. Start ();
  a- (00 (6);
   System-out. printh (" back in main showed");
 flumble Lier sides
 5-bon (a);
System 2-out - private (" back in other throad");
 public static void main (String avoys []) {
now head book ();
```

Q-) lementivale inter process communication I deadlack

IPC output

Recoducer meeting

Put :12

Intimate Consumer

ruoduces waiting

Cot : 12

Consumo 2:12

Put: 13

Intimate Carrimo

Brodua weating

Crost: 13

Cowsume 7:13

lut:14

Justimos Consumer

Cot - 14

Consume: 14

## Deadlock Quitput

Racing Thread entend B. barz Main Thread entend A. Ro

hain Thread trying to call Blogt ()

Racing Thread trying to call A lost ()

Inside Allegt

Back in other Tweat

Inside B. lost

Back in Main Thread

71

```
C:\Windows\System32\cmd.e X
Producer waiting
Got: 11
Consumed: 11
Put: 12
Intimate Consumer
Producer waiting
Got: 12
Consumed: 12
Put: 13
Intimate Consumer
Producer waiting
Got: 13
Consumed: 13
Put: 14
Intimate Consumer
Got: 14
Consumed: 14
```

C:\Windows\System32\cmd.e × + v

Microsoft Windows [Version 10.0.22631.4460]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin\Desktop\java>javac Deadlock.java

C:\Users\Admin\Desktop\java>java Deadlock
RacingThread entered B.bar
MainThread entered A.foo
MainThread trying to call B.last()
RacingThread trying to call A.last()
Inside A.last
Back in other thread
Inside B.last
Back in main thread