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



B.M.S. COLLEGE OF ENGINEERING
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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled "Object Oriented Java Programming (23CS3PCOOJ)" carried out by **Likhith D(1BM23CS170)**, 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/LikhithD5206/JAVA-LAB/tree/main

Program 1

Implement Quadratic Equation

```
Late program - 1
Sevelop a Java program that prints all real solution to the quadratic equation ax + 5x +c=0.
Read in a, b, C & use the quadratic founds. I)
the discriminate b2-hac is -ve, display a message no unique sel".
Import java.util.x;
dan Quadratic
 double n1, n2, disc;
 int a,b,c;
  void get () {
  Scanner 3= new Scanner (System.in);
  System out println ("enter the coefficients of Quebratic eq"),
  a= B.nextInt();
  to s. next Ent ();
   Cognext Int();
  void compute () f
  dix = (6+6) - (h * a * c);
   ( 1) (a==0) (
   System out print ha ("It should be a quadratic egn.
      Enter values again");
     a= s. next Int; }
     b = 3. next IN();
     C = S. next Int ();
    void compute () f
    disc = (b * b) - (4+a+c);
    i) (disc== 0) }
```

```
n1 - (6)/2+a,

N2 = N1;

System out printle ("north of ear are +N1+ and +N3);

che if (dine 20) {

N1-((-4)+ (Hash, synd(dine)))/(double) (20 x a);

System out printle ("north of ear are in1+ and in2);

System out printle ("north of ear are in1+ and in2);

System out printle ("north of ear are in1+ and in2);

System, out printle ("there are no real solutions").

Clar & underatics {

public static void main (String angs)) {

Quadratic q new Quadratic();

q. act();

q. compute();

System.out printle ("NAME: Lithith D).

Sy
```

```
import java.util.*;
class Quadratic {
double r1,r2,disc;
int a,b,c;

void get() {
Scanner s=new Scanner(System.in);

System.out.println("enter the coefficients of Quadratic eqn");
a=s.nextInt();
if (a==0) {
System.out.println("It should be a quadratic eqn. Enter values again");
a=s.nextInt();
}
b=s.nextInt();
c=s.nextInt();
}
void compute()
{
disc=(b*b)-(4*a*c);
```

```
if (disc==0)
r1=(-b)/2*a;
r2=r1:
System.out.println("roots of eqn are"+r1+"and"+r2);
else if (disc>0)
r1=((-b)+(Math.sqrt(disc)))/(double)(2.0*a);
r2=((-b)-(Math.sqrt(disc)))/(double)(2.0*a);
System.out.println("roots of eqn are "+r1+ "and" +r2);
else {
System.out.println("there are no real solutions");
class Quadratic1 {
public static void main(String args[]){
Quadratic q=new Quadratic();
q.get();
q.compute();
System.out.println("NAME: Likhith D");
System.out.println("USN: 1BM23CS170");
}}
```

```
D:\1BM23CS170\00J>java Quadratic1
enter the coefficients of Quadratic eqn
It should be a quadratic eqn. Enter values again
there are no real solutions
NAME: Likhith D
USN : 1BM23CS170
D:\1BM23CS170\00J>java Quadratic1
enter the coefficients of Quadratic eqn
-7
roots of eqn are 7.405124837953327and-0.405124837953327
NAME: Likhith D
USN : 1BM23CS170
D:\1BM23CS170\00J>java Quadratic1
enter the coefficients of Quadratic eqn
there are no real solutions
NAME: Likhith D
USN : 1BM23CS170
D:\1BM23CS170\00J>java Quadratic1
enter the coefficients of Quadratic eqn
roots of eqn are2.0and2.0
NAME: Likhith D
USN : 1BM23CS170
```

Program 2 SGPA

```
Develop a Java Phogram to oceate a class student
                                                                       for (int i=0; i < 8; i++)
                                                                     of system out point in ("Enter the marks"+(j+1)+"
 with members usn, name, an array credits and
   an array marks. Include methods to accept
                                                                        subjects [i]. subject Marks = s. next Int();
    and display details and a method to
                                                                      System out print In ("Enter the credits of "t(i+1)+" subjects")
Subjects (i). credits = s. nextInt();
    calculate 36PA of a student.
Array of objects
                                                                    & Subject (i). grade = ((Subjects [i]. subject Marks/10)+1),
                                                                     if (subjects [i]. grade == 11)
   import java. util. *;
                                                                             subjects[i] grade = 10;
    class Subject &
                                                                     clse if (Subjects[:]. grade == 4)
             int subject Harles; int credits;
                                                                             subjects[i]. grade : 0;
              int grade; 3
                                                                     void compute SGPA()
                                                                    for (inta i = 0; i 28; i++) {
   class student ?
                                                                      total credits = total credits + subject [i]. credits;
           I tring name, usn;
             double SGPA, total Credits = 0; total Num = 0;
                                                                     total Num = total Num + (subjects[i]. grade * subjects[i].
            Scanner s=here Scanner (System.in);
Subject[] subjects;
                                                                         I SGIPA = (total Num /total credits);
            Student () &
                                                                    void display ()
                Subjects : new Subject(8);
                                                                       { System out privater ("Name: "+ name);
System out privater ("USN: "+ usn);
                for (int i=0; i < 8, i++)
                       Subjects (i) = new Subject ();
                                                                          System out printle ("SGPA:"+SGPA);
       void getstudentBetails ()
                                                                    Public static word main (String augs[])
             System.out. printle ("Enter name: ");
                                                                       Scanner Sc = view Scanner (Systemin);
              name = s.nextline ();
                                                                      System. out println ("Enter the number of students);
               System. out. prent h ("Enter usn: ");
                                                                        ant ni
               usn = g. nextLine ();
                                                                        n = sc. next Int ();
                                                                        Student [] &1 = new student [n];
                                                                         for (int =0; i < n; i++) {
          void getmarks ()
                                                                             SI[i] = new student ();
```

```
for (int i=0; i<1; i++) {
31[i]. get student Details ();
                                                        1Bn2365 170
                                                  USN:
                                                  SGPA
       31 [i]. get Marks ();
       31[i]. geompute SGPA();
         S1[i] display(); ?
Output:
  Enter the number of students.
 Likhith
 Enter the USN:
 Enter the marks 1 subject in 1
 Enter the credits 2 subject
  Enter the Cothedets 2 subject
  Enter the marks 3 sollipets
  Ever the oudits 3 subject
  Enter the credits & subject
   Enter the marker 5 ruliject
   Enter the credity & subjection. Hotel
   cuter the mades to subject ?
   Engli the oudits 6 hubberry has not in
         the mortes of subject I have be
     Engla the reledits possible of 1 1 months
      Enter the marks 8 indiject is
       Enter the credits 8 subject: I
```

CODE:

```
import java.util.*;

class Subject {
  int subjectMarks;
  int credits;
  int grade;

  void calculateGrade() {
   if (subjectMarks >= 90) {
      grade = 10;
   } else if (subjectMarks >= 80) {
      grade = 9;
   } else if (subjectMarks >= 70) {
```

```
grade = 8;
     } else if (subjectMarks \geq 60) {
       grade = 7;
     } else if (subjectMarks >= 50) {
       grade = 6;
     \} else if (subjectMarks >= 40) {
       grade = 5;
     } else {
       grade = 0; // Fail
class Student {
  String name;
  String usn;
  double SGPA;
  Scanner s;
  Subject subject[];
    Student() {
     subject = new Subject[8]; // Array of 9 subjects
     for (int i = 0; i < 8; i++) {
       subject[i] = new Subject(); // Create an array of Subject objects
     s = new Scanner(System.in);
  }
     void getStudentDetails() {
     System.out.print("Enter Name: ");
     name = s.nextLine();
     System.out.print("Enter USN: ");
     usn = s.nextLine();
  void getMarks() {
     for (int i = 0; i < 8; i++) {
       System.out.print("Enter marks for Subject" + (i + 1) + ":");
       subject[i].subjectMarks = s.nextInt();
       System.out.print("Enter credits for Subject " + (i + 1) + ": ");
       subject[i].credits = s.nextInt();
       subject[i].calculateGrade();
```

```
if (subject[i].subjectMarks > 100) {
       System.out.println("Invalid marks. Marks should not exceed 100.");
       subject[i].subjectMarks = 100;
     } else if (subject[i].subjectMarks < 0) {
       System.out.println("Invalid marks. Marks should not be negative.");
       subject[i].subjectMarks = 0;
}
 void computeSGPA() {
  double totalCredits = 0;
  double totalGradePoints = 0;
  for (int i = 0; i < 8; i++) {
     totalCredits += subject[i].credits;
     totalGradePoints += subject[i].credits * subject[i].grade;
  if (totalCredits > 0) {
     SGPA = totalGradePoints / totalCredits;
     SGPA = 0; // Handle case with zero credits
}
void displayResults() {
  System.out.println("Name: " + name);
  System.out.println("USN: " + usn);
  System.out.println("SGPA:"+ SGPA);
public static void main(String[] args) {
  Student s1 = new Student();
  s1.getStudentDetails();
  s1.getMarks();
  s1.computeSGPA();
  s1.displayResults();
```

Command Prompt

```
D:\1BM23CS170\00J>javac student.java
D:\1BM23CS170\00J>java student
Error: Could not find or load main class student
Caused by: java.lang.NoClassDefFoundError: Student (wrong name: student)
D:\1BM23CS170\00J>java Student
Enter Name: Likhith D
Enter USN: 1BM23CS170
Enter marks for Subject 1: 99
Enter credits for Subject 1: 4
Enter marks for Subject 2: 99
Enter credits for Subject 2: 4
Enter marks for Subject 3: 99
Enter credits for Subject 3: 3
Enter marks for Subject 4: 99
Enter credits for Subject 4: 3
Enter marks for Subject 5: 99
Enter credits for Subject 5: 3
Enter marks for Subject 6: 99
Enter credits for Subject 6: 1
Enter marks for Subject 7: 99
Enter credits for Subject 7: 1
Enter marks for Subject 8: 99
Enter credits for Subject 8: 1
Name: Likhith D
USN: 1BM23CS170
SGPA:10.0
D:\1BM23CS170\00J>
```

Book Details

Algorithm:

```
don Book &
· Recate a book which contains four members;
                                                                 public static void main (string angul) f
   marre, author, price, num. pages. Include a
                                                              Scanner 3 nas Scanner (3ystem. in);
    Constructor to set the values for the members.
                                                                 int ni String name, authori int price, numbages;
    Include methods to set & get the details of
                                                             System out print In ("Enter the no. of books");
    the Objects. Include a to String () method that
                                                               n=3.nextInt(1;
   could display the complete debits of the book.
                                                              Rooks [ b - new Books [ m];
    Develop a Java program to create in book
                                                              for (int 1=0; i(n; ;++) }
                                                               System.out. println ("Entor the name, author
     objects.
                                                                     price & number of pages of books");
    Proport java util. x;
    dan Books (
                                                               author - 3 next ()
         String name, author;
                                                               price - s. rext Ind;
                                                               numPages . S. next Int; 17 . . . . . . . . .
         int price, num Pages;
                                                               b[i] + new Books (name, author price, numbages)
    Books (String name, String author, int price, int numbered
         this name : name;
                                                                for (int 1:0; i < n; i+1) 5
          this author = author
          this price - price;
          this . num Pages - num Pages;
                                                              System out pointly ("by Likhith D");
  public String to String() {
                                                               System.out.println("USN IBM 23CE170"):
       String name, author, price, numbages;
       name - "Book name: "+ this, name + "In";
                                                            Dutput: Enter the number of broke
       outhor: "Author name: "+ this author+ "In";
                                                                  Enter the name, author, price & no. of pages of books
       price = "Price: " + this price + "In";
      num Page . "Number of Pages: I this numPages + in;
       return name + author + price + numPages;
                                                             Book name: Likhith MATH
                                                                                         Book hame : Science
                                                              Author name : Lithith
                                                                                         duther name: Shailerh
                                                              Price: 500 May Price: 200
                                                                                          No of Pages: 150
                                                             No. of Pager: 200 by Likhith D
                                                              USN 10M2368170
```

Code:

```
import java.util.*;
class Books{
    String name,author;
    int numPages,price;
```

Books(String name, String author, int price, int numPages){ this.name = name;

```
this.author = author;
this.price = price;
this.numPages = numPages;
public String toString()
       String name, author, price, numPages;
       name = "Book name: " + this.name + "\n";
       author = "Author name: " + this.author + "\n";
       price = "Price: " + this.price + "\n";
       numPages = "Number of pages: " + this.numPages + "\n";
       return name + author + price + numPages;
class book
       public static void main(String args[])
{
       Scanner s = new Scanner(System.in);
       int n; String name; String author; int price; int numPages;
System.out.println(" enter the number of books");
n = s.nextInt();
Books[] b = new Books[n];
for ( int i=0;i< n;i++)
System.out.println(" enter the name, author, price and number of pages of books");
name=s.next();
author=s.next();
price=s.nextInt();
numPages=s.nextInt();
b[i]=new Books(name,author,price,numPages);
for(int i=0;i< n;i++){
System.out.println(b[i]);
System.out.println("by Likhith D");
```

```
System.out.println("USN 1BM23CS170");
  }
D:\1BM23CS170\00J>javac book.java
D:\1BM23CS170\00J>java book
 enter the number of books
 enter the name, author, price and number of pages of books
Likhith
500
250
 enter the name, author, price and number of pages of books
chemistry
Shailesh
200
150
Book name: MATH
Author name: Likhith
Price: 500
Number of pages: 250
Book name: chemistry
Author name: Shailesh
Price: 200
Number of pages: 150
by Likhith D
USN 1BM23CS170
```

Shape Area

Algorithm:

```
Lab Priog - 4
                                                              der sincle extends shape ?
· Develop a Java program to create an abstract
                                                                 void print Area () {
  class mamed shape that contains two
  print Area O. Provide 3 claves haved Rectangle
                                                                   area = 3.14 * x * y;
                                                                System out pointly ("area of circle is"+ area);
  Triangle and circle such that each one of
   the classes eatends the class shape . Each
                                                                public static void main (String args[])?
nuctaugle n= new grectaugle();
   one of the classes contain only the method
   print/thea () that prints the area of given
                                                                System out point he ( - Enter the light & breath of
                                                                                  Hectargle");
-> import java. util. +;
                                                                   n-accept ();
     abstract clan shape h
                                                                 n. printArea ();
                                                                triangle to new triangle ();
             double x, y, Wiea; , I +
                                                                  Sout In (" Enter base & height of triangle");
    Sout in ("Enter the values 9:");
                                                                    t.accept();
                                                                    t. printAmea ();
            Scanner 5= new Scanner (System in);
                                                                  cincle c= new circle();
             & x = 8 next Datitle () They too.
                                                                  Souln ("Enter the radius of circle (same value enter
               4 = 8. next Detable ();}
              abstract void printhea():
                                                                     c.accepter;
                                                                    C. printArcea();
South ("Name: Likhth D")
South ("USN: ABM23(S170"); 3 ?
      class Rectangle extends 3 hage
            Void printArea () {
                                                                     Exter high & breadth of nectangle
                                                                    Area of suctough in 25.0 Enter base & height of triangle
                                                                     Atrea of triangle in 6.0 Enter the nadius of circle (same value enter it two
      class thrange extends shape &
                                                                      Area of circle in 78.5
Name: Lithith D
USN: 115M23(5170.
                           ( Area of triangle is + triangle)
```

```
import java.util.*;
abstract class shape {
  double x,y,area;

void accept() {
  Scanner s=new Scanner(System.in);
  x=s.nextDouble();
  y=s.nextDouble();
```

```
abstract void printArea();
class rectangle extends shape {
void printArea(){
area = x*y;
System.out.println(" area of rectangle is"+ area);
}}
class triangle extends shape{
void printArea(){
area=0.5*x*y;
System.out.println(" area of triangle is"+ area);
}}
class circle extends shape {
void printArea(){
area = 3.14*x*y;
System.out.println(" area of circle is"+ area);
}}
class Area{
public static void main(String args[]){
rectangle r= new rectangle();
System.out.println(" \n enter the length and breadth of rectangle\n ");
r.accept();
r.printArea();
triangle t= new triangle();
System.out.println("\n enter the base and height of triangle \n");
t.accept();
t.printArea();
circle c= new circle();
System.out.println("\n enter the radius of circle(enter the same value twice)");
c.accept();
c.printArea();
System.out.println("Name: Likhith D");
System.out.println("USN: 1BM23CS170");
}
```

```
D:\1BM23CS170\00J>javac Area.java
D:\1BM23CS170\00J>java Area
enter the length and breadth of rectangle
area of rectangle is25.0
enter the base and height of triangle
 area of triangle is6.0
enter the radius of circle(enter the same value twice)
 area of circle is78.5
Name: Likhith D
USN : 1BM23CS170
D:\1BM23CS170\00J>java Area
enter the length and breadth of rectangle
area of rectangle is4.0
enter the base and height of triangle
 area of triangle is10.0
enter the radius of circle(enter the same value twice)
area of circle is169.56
Name: Likhith D
USN : 1BM23CS170
D:\1BM23CS170\00J>
```

Bank Class

```
word withdraw (double amount) &
                          Lab Prog-5
                                                                                                          if (amount & balance)
System. out pointly ("Insufficient funds");
Develop a Java program to create a class Back that maintain 2 leints of account for its construction, one called Swings account previous complete interest & withdraws facility but no cheque book facility. The Courtest Account provides check book but no interest.
                                                                                                               System out penille Balance after withren : " + baland;
    Current Account holder should also maintain a
would Account holders should also maintain a ordinarium balance of and if the balance fall below this level a service charge is imposed.

Cheal a class account that stores sourtonner. Name account rumber and type of account From this claim the class Curricular & day for to make them more specific to their requirement include the recessary methods in order to achieve the following task is it of second in order to achieve the following task is it of second alposit from customer & update balance.

3) Display the Balance.
                                                                                                           void get Balance() {
    System. out privid In("Balance = "+ Balance),
                                                                                                           class savingAccount extends Account &
                                                                                                                   double interest Rale;
                                                                                                            saving Account (String customer Name, int account Mumber,
                                                                                                                                  double balance, double interest Rate) 4
                                                                                                                super (customerNoom, account Number, balance);
this interest Rale interest Rak;
       3) Compute & diposit Interest
       w) Permit withdrand & update balance
       5) Check for minimum balance, impose penalty of mecessary and update the balance.
                                                                                                           void calcInterest() &
                                                                                                              double interest = (Euper. balance * interest Rate)/100;
System. out. periutin ("Interest is "+ interest);
  - import jova util. * .
                                                                                                               System. out . println ("Your new Balance is" +
        class secount 4
                                                                                                                                                        (balance + interest)); }
           String customer Name; int account Num;
            int account Nam; double balance,
                                                                                                            clan currentAccount entends Account?
double MIN-BALANCE-5000;
double SERVICE_CHARGE=500;
          Account (String customer Name, int account Num, double balon
              this customer Name - customer Name;
                                                                                                             Current Account (String customer Name, in account Number
                                                                                                                                           double balance) 5
              this. account Num = account Num;
                                                                                                                    up super (Customer Name, account Number, balance);
              this balance = balance
                                                                                                             void withdraw (double amount) h
      void deposit (double amount) &
                                                                                                              if (amount > balance)
System.out. Petendlon("Insufficient junde");
           balance = balance + amount;
           System out printly ("Balance After Deposit =" + balance);
```

```
int choice = s. next Int();
chail ( lalence - durpunt
the if (Balance - camount) < MIN-BALANCE) {
       System out println ("Service charge will be imposed).
                                                                        System out point ha ("Enter the amount:").
       balance = balance - SERVICE_CHARGE - amount,
                                                                         double amount = 3. next Double(1; 1] (type == 1)
Sa deposit (amount);
      System out prouter ("Ralonce after dervice change
                                                                          ca. deposit (amount);
     balance = balance - amount;
     System out printle ("Balance after withdraw: "I belance)
                                                                           break;
                                                                    case 2: 4
                                                                         System out pointly (Enter the amount: 1);
                                                                         double amount = S. next Double();
    public static void main (String args [1) &
                                                                          if (type = /1)
       Scanner 3- new Scanner (System. in);
                                                                           ga withdraw (amount);
    System. out. printin ("Enter the Name, Account Number
                                                                          else (a. withdraw (amount);
         and Balance, Interest Rate")
                                                                         bruale;
     String customerName = s. nextline();
int account Num = s. next Double();
      double interestRate : 5;
                                                                         Sa. cale Interest();
   Saving Account Sa= new Saving Account (customer Name, account Num, balance, interest Rate)
                                                                         System.out. printly ("not possible for current second break,
   Current Account ca= new Cow Chyberil Account (customer Name
                           accountivum, balance)
   System out printly (" Which type of account do you have! In
                                                                       System and printly l'Customer Name" + customer Mand
                        3) Curvent Account");
                                                                       System, out - printh ( Account Number " + account Number"
                                                                       System out privatly ("Account Type" + type);
    int type = 5. Mext [w1);
                                                                       if (-type == 1)
      Bystem out printin ( -- MENU -- In 1 Deposit In s. Northdoods In a Subrest Calculation in
                                                                        (a.get Balance ();
               4. Account Details In 5. Exit ");
```

```
Interest is 60.0
YOUR NEW BALANCE IS 1260.0
                breet;
                                                                                                                                                                                                                                                                        Eustomer Name Likhith D.
Account Number 21.
Account Type 1
Output 1: Enter the Name and Account Number and
       Balance, Infect Rate
                                                                                                                                                                                                                                                                           Balance = 1260.0
-- MENU
     231
1007
1000 type of account do you have ?
1) Saving Account
2) Carrier Account
2) Carrier Account
                                                                                                                                                                                                                                                                           3. Interest Calculation
                                                                                                                                                                                                                                                                         4. Account Details
5. Exit.
   3. Poposit Accounts of the Notation of the Not
                                                                                                                                                                                                                                                                          Invalid choice
                                                                                                                                                                                                                                                                   Output 2:
                                                                                                                                                                                                                                                                         Exter the Name Account Number and Balance, Rikloth D
      Enter the amount.
    500
Balance after Deposit = 1500.0
                                                                                                                                                                                                                                                                           Which type of account do you have?
I Saving Account
I Current Account.
   1 Deposit
3. Distribus
3. Interest Calculation
4. Account Details
7. Exit
                                                                                                                                                                                                                                                                    1. Deposit
2 Withdran
                                                                                                                                                                                                                                                                     3. Interest calculation

1. Account Details

5. Exit
    enter the amount?
       Balance after withdraw = 1200.0
                                                                                                                                                                                                                                                                        Enter the amount
                                                                                                                                                                                                                                                                        Balance after Depost = $900.0
             1. Deposit
2. Withdraw
3 Interest Calculation 4. Account Details
```

```
Code:
                                                  import java.util.*;
  1. Deposit
                                                  class Account
  3 Interest Calculation
  4. Account Dotails
                                                  String customerName;
  s. Exit.
                                                  int accountNum;
  Enter the amount:
                                                  double balance;
  Service charge will be imposed = 350.0
                                                  Account(String customerName,int
                                                  accountNum,double balance)
  2. Withdraw
  3. Interest calculation
                                                  this.customerName=customerName;
  4. Account Details /
                                                  this.accountNum=accountNum;
   s. Exit.
                                                  this.balance=balance;
   not persible for wevent account
                                                  }
            MENU-
   1. Deposit
                                                  void deposit(double amount)
   2. Withdrawl
   3. Interest calculation
   4. Account Details
                                                  balance=balance+amount;
                                                  System.out.println("Balance after Deposit =
   Customer Name: Likhith D
                                                  "+balance);
    Account Number 22
    Account Type 2
    Balance = 350.0
                                                  void withdraw(double amount)
  1. Deposit
  2. Withdraw
                                                  if(amount > balance)
  3. Interest Calculation
  4. Account Details
                                                  System.out.println("Insufficient Balance in
                                                  Account");
                                                  else
   Trivated choice
                                                  balance=balance-amount:
                                                  System.out.println("Balance after Withdraw =
"+balance);
void getBalance()
```

}

void getBalance()
{
System.out.println("Balance = "+balance);
}
class savingAccount extends Account
{
double interestRate;
savingAccount(String customerName, int accountNumber, double balance, double interestRate)
{

```
super(customerName, accountNumber, balance);
    this.interestRate = interestRate;
void calcInterest()
double interest = (super.balance*interestRate)/100;
System.out.println("Interest is "+interest);
System.out.println("YOUR NEW BALANCE IS " + (balance+interest));
class currentAccount extends Account
double MIN BALANCE = 500.0;
double SERVICE CHARGE = 50.0;
currentAccount(String customerName, int accountNumber, double balance)
    super(customerName, accountNumber, balance);
void withdraw(double amount)
if(amount > balance)
System.out.println("Insufficient Balance in Account");
else if(balance-amount<MIN BALANCE)
System.out.println("Service charge will be imposed");
balance=balance-SERVICE CHARGE-amount;
System.out.println("Balance after Service charge imposed = "+balance);}
else
balance=balance-amount;
System.out.println("Balance after Withdraw = "+balance);}
}}
class Bank1 {
public static void main(String args[]){
Scanner s=new Scanner(System.in);
System.out.println("Enter the Name and Account Number And Balance, Interest Rate");
String customerName=s.nextLine();
int accountNum=s.nextInt();
double balance=s.nextDouble();
double interestRate=5;
savingAccount sa=new savingAccount(customerName,accountNum,balance,interestRate);
currentAccount ca=new currentAccount(customerName,accountNum,balance);
```

```
System.out.println("Which type of account do you have?\n 1.Saving Account\n 2.Current Account");
int type=s.nextInt();
while(true){
System.out.println("
                                         \n1.Deposit\n 2.withdraw\n3.Interest
                           MENU
Calculation\n4.Account Details\n5.Exit");
int choice=s.nextInt();
int count=0:
switch(choice){
case 1:{
System.out.println("Enter the amount: ");
double amount=s.nextDouble();
if(type==1)
sa.deposit(amount);
else
ca.deposit(amount);
break;}
case 2:{
System.out.println("Enter the amount: ");
double amount=s.nextDouble();
if(type==1)
sa.withdraw(amount);
else
ca.withdraw(amount);
break;}
case 3:{
if(type==1)
sa.calcInterest();
else
System.out.println("not possible for current account");
break;}
case 4: {
System.out.println("Customer Name "+customerName);
System.out.println("Account Number "+accountNum);
System.out.println("Account Type "+type);
if(type==1)
sa.getBalance();
else
ca.getBalance();
break;}
default:System.out.println("Invalid choice");
count=1;
break;}
if(count==1)
break;}
System.out.println("Name: Likhith D");
System.out.println("USN: 1BM23CS170");
}}
```

Current Account:

Savings account:

```
C:\BMSCE\00J>javac Bank1.java
C:\BMSCE\00J>java Bank1
Enter the Name and Account Number And Balance, Interest Rate
Likhith D
22
700
Which type of account do you have?
1.Saving Account
 2.Current Account
                                                                       Likhith D
              MENU
1.Deposit
                                                                       1000
 2.withdraw
3.Interest Calculation
4.Account Details
5.Exit
Enter the amount :
200
Balance after Deposit = 900.0
              MENU
                                                                       5.Exit
1.Deposit
 2.withdraw
3.Interest Calculation
4.Account Details
5.Exit
                                                                       1.Deposit
Enter the amount :
500
Service charge will be imposed
Balance after Service charge imposed = 350.0
                                                                       5.Exit
                                                                       300
1.Deposit
2.withdraw
3.Interest Calculation
                                                                       1.Deposit
4.Account Details
                                                                       2.withdraw
5.Exit
                                                                       5.Exit
not possible for current account
              MENU
1.Deposit
 2.withdraw
                                                                       1.Deposit
2.withdraw
3.Interest Calculation
4.Account Details
5.Exit
                                                                       5.Exit
Customer Name Likhith D
Account Number 22
Account Type 2
Balance = 350.0
              MENU
1.Deposit
                                                                       1.Deposit
2.withdraw
3.Interest Calculation
4.Account Details
5.Exit
                                                                       5.Exit
Invalid choice
```

```
C:\BMSCE\00J>javac Bank1.java
C:\BMSCE\00J>java Bank1
Enter the Name and Account Number And Balance, Interest Rate
Which type of account do you have?
1.Saving Account
2.Current Account
                  MENU
1.Deposit
2.withdraw
3.Interest Calculation
4.Account Details
Enter the amount :
500
Balance after Deposit = 1500.0
MENU
2.withdraw
3.Interest Calculation
4.Account Details
2
Enter the amount :
Balance after Withdraw = 1200.0
                  MENU
3.Interest Calculation
4.Account Details
Interest is 60.0
YOUR NEW BALANCE IS 1260.0
                 MENU
3.Interest Calculation
4.Account Details
Customer Name Likhith D
Account Number 21
Account Type 1
Balance = 1200.0
2.withdraw
3.Interest Calculation
4.Account Details
Invalid choice
```

Packages

```
21/11/ah
"Creat a parkage CIE which has two classes-
 student and Internals. The class student has
 members like us, name, sem, The class Internets
 derived from student has an array that
 stores the internal marks scored in 5 courses of
 the convert semester of the student. Create
another package SEE which has the class
External which is a derived from student. This
 clan has an array that stores the SEE marks
scored in five courses of the current semister
 the student. Import the 2 packages in a file that
 delarus the final marks of a students in all
 fire courses.
-> package cie;
    import java util. Scanner;
     class student &
      public String usn = new String();
      public String name = rew String();
      public int sem;
     Beanner 8 = new Scanner (System. in)
    public vad input Student Details () {
        win · sinextLine ();
       name = 8. heat Line ()
        Sem = S.next Line ();
    Public void displayStudentDetails() }
    System. out. println ("Student name: "+ name);
    System.out. println ("Student usn: "+ vsn);
    Bystem. out. printly ("Student sem: "+ sem);
```

```
public class internals extends Student (
                                                                import see. *
                                                                import cie. x;
    protected int marker [] = new int [5],
       public void input (1 Emartis () }
                                                                     public static void main (string arys[])}
     Scanner 8 - new Scanner (System. in)
                                                                   externals e= new externals ();
                                                                   System. out. printly ("Enter your name, us and gemester"
        System.out. println ("Enter the CONSOLIDATED CIE
                                                                   c. input Student Details ();
                marks for "+(+1)+"th subject: ").
                                                                   c. display Student Details ();
                                                                   e. input CIE marker ();
        marker [i] = S. next Int ();
                                                                    C. input SEE morks ();
                                                                    C. calculate Final Marks ();
                                                                    e. display Final Marker ();
 package see;
  import cie.x;
                                                               Dutput Enter your name, usn and semester William D
  import java util. . ;
  public clan externals extends internals of
                                                                        1BM2365170
   protected int see modes []= new Int [5],
                                                                        Student wane: Liklith D
Student won: 1BM23CS170
Student sem: 3
     priotected in final Marks[]=new int[5];
                                                                         Enter the ConsolidaTED CIE Marks of Ith subject
     Scanner 8= new Scanner (System in);
     public void input SEE marks () {
                                                                          45
       System out printly ("Enter SEE marker");
            Scemarks [i] = 8. next Int ();
                                                                          Enter see marks
        public void calculate Final Marks () {
            lor(=0;1<5;1+1) {
           [inal Marter [i] = (marter [i] + (see marks [i]/2));
                                                                          Final marker in 86
                                                                          Final marker in 88
                                                                          Final marks in 89 Final marker in 91
         public void displayfinal Marter () &
                                                                          Final marks is 92
           Bout-print in ("Final marker is" + final Marker (1)),
```

```
Code:
Externals code:
package see;
import cie.*;
import java.util.Scanner;
public class externals extends internals {
int i;
protected int seemarks[]=new int[5];
protected int finalMarks[]=new int[5];
Scanner s=new Scanner(System.in);
public void inputSEEmarks()
for(i=0;i<5;i++)
System.out.println("Enter see marks");
seemarks[i]=s.nextInt();
```

```
public void calculateFinalMarks() {
for(i=0;i<5;i++)
finalMarks[i]=(marks[i]+(seemarks[i]/2));
}
}
public void displayFinalMarks() {
for (i=0;i<5;i++)
System.out.println("Final marks is"+finalMarks[i]);
}}}
Internals:
package cie;
import java.util.Scanner;
class Student {
public String usn = new String();
public String name = new String();
public int sem;
Scanner s=new Scanner(System.in);
public void inputStudentDetails() {
usn=s.nextLine();
name=s.nextLine();
sem=s.nextInt();
public void displayStudentDetails() {
System.out.println("student name: " + name);
System.out.println("student usn: " + usn);
System.out.println("student semester: " + sem);
public class internals extends Student {
protected int marks[] = new int[5];
public void inputCIEmarks()
Scanner s = new Scanner(System.in);
for(int i=0; i<5; i++){
System.out.println("enter the CONSOLIDATED CIE marks of "+(i+1)+"th subject");
marks[i]=s.nextInt(); } }}
```

```
Main Code:
import see.*;
import cie.*;
class main{
  public static void main(String args[]){
  externals e=new externals();
  System.out.println(" enter your name, usn and semester");
  e.inputStudentDetails();
  e.displayStudentDetails();
  e.inputCIEmarks();
  e.inputSEEmarks();
  e.calculateFinalMarks();
  e.displayFinalMarks();
}

D:\\1BM23CS170\\000J>javac cie/internals.java

D:\\1BM23CS170\\000J>javac see/externals.java
```

```
D:\1BM23CS170\00J>javac main.java
D:\1BM23CS170\00J>java main
enter your name , usn and semester
Likhith D
1BM23CS170
student name: 1BM23CS170
student usn: Likhith D
student semester: 3
enter the CONSOLIDATED CIE marks of 1th subject
44
enter the CONSOLIDATED CIE marks of 2th subject
45
enter the CONSOLIDATED CIE marks of 3th subject
enter the CONSOLIDATED CIE marks of 4th
                                          subject
enter the CONSOLIDATED CIE marks of 5th
                                          subject
48
Enter see marks
85
Enter see marks
86
Enter see marks
87
Enter see marks
88
Enter see marks
Final marks is86
Final marks is88
Final marks is89
Final marks is91
 inal marks is92
```

PROGRAM 7

User Defined EXCEPTIONS

Algorithm:

```
Prieg - 7
                                                                                               super ();
white a program that demonstrates handling of exception in inheritance tree create a base class
                                                                                                  try
  called Father and derived clan called "son" which
                                                                                                      Sout ("Enter son's age");
istends base class. In father class implement a constructor which takes the age is throws the exception when the input age < 0. The Son class. Implement a constructor that uses both father is son's age & throws an exception if son's age > father's age.

import java.util.*;
                                                                                                      Sontge = S. next Int ();
                                                                                                        ( fatherAge ( Son Aze) throw new
                                                                                                               Wrong Age ("father Age is Age Earnot
    class Wrongage extends Exception of public Wrongage (String Str)
                                                                                                       catch (William Age E)
                                                                                                          { Sout (e); }
                  1 super (str); }
                                                                                                     void display ()
        class jather ?
              Scanner 8- new Scanner (System. in);
               Ent father Age,
               father ()
                                                                                                    public static void main (string args[])
                      fout ("Enter father's Age");
                       father Age - S. next Int();
                   il (Jather Age (0) throw new
                       Wrong-tge ("Age cannot be negative");
                                                                                        Output
                                                                                                                              Enter the father's Age
               catch (Wrongtge e) & Sout (e);
                                                                                                                               40
               void display ()
                                                                                          50
                                                                                       Wrong Age: fathers age cannot be less than
                                                                                          son's Age
                  son extende father of
                    Scanner so new Scanner (System in);
                    int son Age;
```

```
import java.util.*;
class wrongAge extends Exception
{
        public wrongAge(String str){
        super(str);
}
class father
{
```

```
Scanner s=new Scanner(System.in);
       int fatherAge;
       father()
        {
                try
                        System.out.println("enter the father's age");
                        fatherAge=s.nextInt();
                        if(fatherAge<0) throw new wrongAge("Age cannot be negative");
        catch(wrongAge e){System.out.println(e);}
       void display()
                System.out.println("father's age is "+fatherAge);
class son extends father
        Scanner s=new Scanner(System.in);
       int sonAge;
       son()
        {
                super();
                try
                        System.out.println("enter the son's age");
                        sonAge=s.nextInt();
                        if(sonAge<0) throw new wrongAge("Age cannot be negative");
                        if(fatherAge<sonAge)
                        throw new wrongAge("father's age cannot be less than son's age");
                catch(wrongAge e){System.out.println(e);}
        void display()
                System.out.println("son's age is "+sonAge);
class main
       public static void main(String args[])
                son so=new son();
```

```
PS C:\BMSCE> cd ooj
PS C:\BMSCE\ooj> javac main.java
PS C:\BMSCE\ooj> java main
enter the father's age
55
enter the son's age
PS C:\BMSCE\ooj> javac main.java
PS C:\BMSCE\ooj> java main
enter the father's age
22
enter the son's age
55
wrongAge: father's age cannot be less than son's age
PS C:\BMSCE\ooj> java main
enter the father's age
22
enter the son's age
-1
wrongAge: Age cannot be negative
```

Multi threading

Algorithm:

```
Prog 8
8) White a program which weater two threads
    one thread displaying "BMSCE" and another displaying "SE" once two seconds.
       class BMSCE extends threads
            Public void run()
                  for (int,0; i C5; i+1)

1 Sout print ("BMSCE");
                 try & Iwread . sleep(10000); }
                 catch (Interrupted Exception e) { }
     class Main program
           public static void main (String args!)
               BMSCE & b = new BMSCE();
                          c = new (SE();
                 b. start();
                 c. start();
  output:
   BMSCE
  BMSCE
  BMSCE
  BMSCE
  BMSCE
```

```
class BMSCE extends Thread {
    public void run()
```

```
for(int i=0; i<5; i++)
                      System.out.println("BMSCE");
                     try{Thread.sleep(10000);}
                     catch(InterruptedException e){}
class CSE extends Thread
       public void run()
              for(int i=0; i<5; i++)
                     System.out.println("CSE");
                      try{Thread.sleep(2000);}
                     catch(InterruptedException e){}
class mainProgram
       public static void main(String args[])
              BMSCE b=new BMSCE();
              CSE c=new CSE();
              b.start();
              c.start();
              try{Thread.sleep(50000);}
                     catch(InterruptedException e){}
              System.out.println("Name: M S Shailesh");
              System.out.println("USN: 1BM23CS172");
 PS D:\1BM23CS170\00J> javac mainProgram.java
 PS D:\1BM23CS170\00J> java mainProgram
 BMSCE
 CSE
 CSE
 CSE
 CSE
 CSE
 BMSCE
 BMSCE
 BMSCE
 Name: LIKHITH D
 USN: 1BM23CS170
```

User Interface of Division

```
I South a program that creates a user interface to
perform integer divisions. The user enters two
numbers in the text fields, Num 1 & Num 2.

The division of Num 1 & Num 2 is displayed in
the Result field when the Divide button is
 clicked of Num & Num 2 were not an integer
the program would throw a Number former
Exception. if Num 2 were zero, the program
would throw an Aprilhuntic Exception
 Display the exception in a message dialog box
- import java. suring. *
   import java. and . +;
   import jova and event . *;
   class Swing Items &
      I Frame Jours new JFrame ("Divider App");
     jpm. set Size (275,150);
spm. set Default Close Operation (Jnan Exist-on - close
  I label jlab new Ilabel ("Enter the Divider and
                         divident");
   JText field out = new JText Field (8);
   J Testfield bifts = new J Textfield(8);
   J Button boutton: new J button ("calculate");
    Thatel err = new Thatel ();
    Thatel alab: new Thatelli;
    Jeabel blab = new Jeabell);
    Natel anslab : new Thabel(1;
     jlam. add (err);
     ifrm. add (ajtf);
     , frm. add (bjft);
      your add (button);
      iften. add/alab);
      jøm add (blab);
      ; bun add Comstab);
```

```
Action Listerner (= new Action Listerner()
  | public void action Performed (Action Event est)
        Syrout point ("Action event from a tot freld);
   ajtf-addActionListener(L);
biff add AdionListener(L)
   button. add Action Luterner (new Action Listerner (s)
   ( public void action performed (+ction (vent evt)
          int a : Integer . parce Int (a ; ft . get Text ());
          int b= Integer. parse Int (b) pt. get Text (1);
     int ans = a/b;
alab. set Text ("In B="+ a);
blab. set Text ("In B="+b);
    anslab. set Text ("In Ans=" + ans);
     catch (Number Format Exception e) {
    alab.set Text("");
    blab.set Text("");
           anselab set Text ("");
          err. set Text (" Enter only Integers");
    catch (Anithmetic Exception e)
          dab . set Text("");
          blab set Text ("")",
         anslab. set Text ("");
         err. setText (" B should be non Zero! ");
       jfrm. set visible (bue);
  public static void main (storing args [])
     statio swing utilities in voke later (new Runnelle 1)
          Public void run () f
               ner swing Demo(1; 33);
```

```
Divider App

Behald be Non-zero!

Enter dividen and divident!

56 | 0 |

[calculate]

Divider App

Enter the divider and divident:

[56 | 2 |

(calculate) A-56 B-7 Ans. 8

3) Proider App

Enter only Integers!

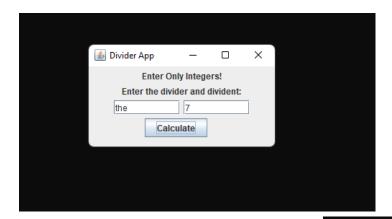
Enter the divider and divident:

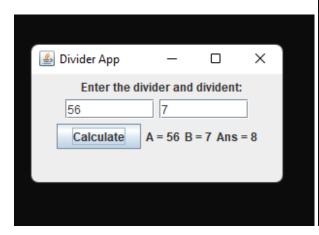
[the ### (Calculate) A-56 B-56 B-56 B-76 Ans. 8
```

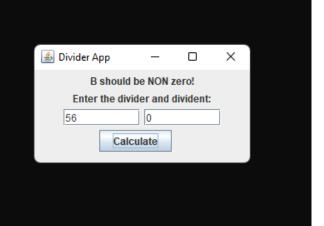
```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo{
   SwingDemo(){
    // create jframe container
        JFrame jfrm = new JFrame("Divider App");
        jfrm.setSize(275, 150);
        jfrm.setLayout(new FlowLayout());
   // to terminate on close
```

```
ifrm.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 bitf = 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 :)
       jfrm.add(err); // to display error bois
       jfrm.add(jlab);
       ifrm.add(ajtf);
       jfrm.add(bjtf);
       ifrm.add(button);
       ifrm.add(alab);
       ifrm.add(blab);
       ifrm.add(anslab);
ActionListener 1 = 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) { try {
int a = Integer.parseInt(ajtf.getText());
int b = Integer.parseInt(bjtf.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();
}
});
}}
```







Demonstrating Deadlock and IPC

```
Lab - prog 10 as 4 106)
18) D
12) Demonstrate Interprocess communication
   and dead wit.
 - dans a
   fint ni
      boolean value set false;
       Synchronised int get()
       & while (!value set)
        try & sout (" consumer waiting
       catch (Interrupted Exception e 43
      Sout printh ("Got: "+n);
       colveset : false;
       Sout printly ("Intimate producer (");
     Synchronised void put (int n)
        while (value set)
            Sout println ("Producer waiting (n");
       · catch (Exception e) } }
          this n=n;
         values et = true;
         S. ow. pridle ("put: "+ n);
          Sout printle ("Intimet Goisumer In");
        notify();
  class producer implements Runnable &
     Producer (Q q)
   9 this. 9, = 91
        new thread (This, "producer"). Start (1;
```

```
Public void run ()
                                                A synchronised void for (B 6)
   9 int 1= 0;
                                                  & String name Thread current Thread get Name ();
      while (ics)
                                                     System.out. println (name + "entered Afor");
        9 . put (i++); 3
                                                   try & Twead. Sleep(1000); }
                                                  catch (Exception c) { $.00 ("A Interrupted"); }
 class consumer implements Runnable
  h Qqi
                                                    3.0. Plname + "trying to call B. last()"
     Consumer (Q q)
                                                     b. last();
   f this . q = q;
    new thread (this, "consumer"). start ();
                                                    void last () &
                                                        System out prouth ("Insist of last");
  public void run ()
     int 1=0;
        while (ics)
                                                     Synchronized void bar (A a)
                                                   clan 39
        first n=q.get();
5. out perith ("consumed:"+n);
                                                     Y String name - Thread current Thread () get Nume();
                                                     System out. perith [name + "entered B. bar");
                                                     try & Thread sleep(1000); }
                                                    catch (Exception c) & S. O. P ("B interrupted"); {
class PC Fixed
                                                    System out pecial (name + "trying to call + last()),
    public static word main (String args[])
                                                      a. last (); 3
    h a g new Q();
                                                      void last () {
                                                      System. out. perinth ("Inside A. last");
      new producer (q);
      new consumer (q);
     System out printer ("Pren control c to
                 Amp");
```

```
Class Deadlock implements Runnable
                                                     Press controll- L to stop
1 A a = new A();
     B b= new B();
                                                      Intimate Consumer
    Deadlock()
                                                      Producer waiting
 Thread . current(). sct Name ("Hain Thread ).
                                                      Cost: 0
Intimate producer
    Thread t= new Thread (this, "Racing Thread").
                                                       Put: 1
Intimate Consum.
    t start ();
    a. 600 (b);
    System. out. printhn (" Back in main thread").
 public void sum ()
                                                        consumed in 2 For Azar Latalista
    4 b. bar(a);
       System. out println ("Back in other thread")
                                                        Intimate consumer
                                                         Producer waiting , 19th miles ?
  pullic static void main (String args (1))
                                                        Cost: 2
    I new Deadlockers;
                                                        consumed 2
                                                         Producer waiting
                                                          Got: 3
Intimate Consumer
Main Thread entored A.foo
Rocing Thread entered B. bar
                                                          Producer waiting
Main Thread trying to call Blast ()
Inside A. last
Back in main thread
Racing Troread trying to call A. last()
                                                          Intimate Product
                                                          consumed: 3
                                                          Put: 4 Intimate consumer
Inside A. last
 Back in other thread
                                                          Got: h
Intimat Produces
```

Code:

DEADLOCK class A { synchronized void foo(B b) { String name =Thread.currentThread().getName(); System.out.println(name + " entered A.foo"); try { Thread.sleep(1000); } catch(Exception e) { System.out.println("A Interrupted"); System.out.println(name + " trying to call B.last()"); b.last(); void last() { System.out.println("Inside A.last"); class B { synchronized void bar(A a) { String name =Thread.currentThread().getName(); System.out.println(name + " entered B.bar"); try { Thread.sleep(1000); } catch(Exception e) { System.out.println("B Interrupted"); System.out.println(name + " trying to call A.last()"); a.last(); void last() { System.out.println("Inside A.last"); class Deadlock implements Runnable A = new A();B b = new B(); Deadlock() { Thread.currentThread().setName("MainThread"); Thread t = new Thread(this, "RacingThread"); a.foo(b); // get lock on a in this thread. System.out.println("Back in main thread"); public void run() { b.bar(a); // get lock on b in other thread. System.out.println("Back in other thread");

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

O/P:

PS D:\1BM23CS170\00J> javac Deadlock.java
PS D:\1BM23CS170\00J> java Deadlock
MainThread entered A.foo
RacingThread entered B.bar
RacingThread trying to call A.last()
Inside A.last
Back in other thread
MainThread trying to call B.last()
Inside A.last
Back in main thread
```

```
IPC
class Q {
       int n;
       boolean valueSet = false;
       synchronized int get() {
               while(!valueSet)
               try {
                      System.out.println("Consumer waiting\n");
                      wait();
               } catch(InterruptedException e) {
       System.out.println("InterruptedExceptioncaught");
       System.out.println("Got: " + n);
       valueSet = false;
       System.out.println("Intimate Producer\n");
       notify();
       return n;
synchronized void put(int n) {
while(valueSet)
try {
System.out.println("Producer waiting\n");
} catch(InterruptedException e) {
System.out.println("InterruptedException caught");
this.n = n;
```

```
valueSet = true;
System.out.println("Put: " + n);
System.out.println("Intimate Consumer\n");
notify();
class Producer implements Runnable {
Qq;
Producer(Q q) {
this.q = q;
new Thread(this, "Producer").start();
public void run() {
int i = 0;
while(i < 5) {
q.put(i++);
class Consumer implements Runnable {
Qq;
Consumer(Q q) {
this.q = q;
new Thread(this, "Consumer").start();
public void run() {
int i=0;
while(i<5) {
int r=q.get();
System.out.println("consumed:"+r);
i++;
class PCFixed {
public static void main(String args[]) {
Q q = new Q();
new Producer(q);
new Consumer(q);
System.out.println("Press Control-C to stop.");
```

PS D:\1BM23CS170\00J> javac PCFixed.java PS D:\1BM23CS170\00J> java PCFixed Press Control-C to stop. Put: 0 Intimate Consumer Producer waiting Got: 0 Intimate Producer Put: 1 Intimate Consumer Producer waiting consumed:0 Got: 1 Intimate Producer consumed:1 Put: 2 Intimate Consumer Producer waiting Got: 2 Intimate Producer consumed:2 Put: 3 Intimate Consumer Producer waiting Got: 3 Intimate Producer consumed:3 Put: 4 Intimate Consumer Got: 4 Intimate Producer consumed:4

-----THE END-----