## 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** 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 **Mahesha G S(24BECS429)**, 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/maheshags/java-lab-programs

## **PROGRAM NO-1**

## **Implement Quadratic Equation**

```
Emport Java. ulil. Scauner;
class Equation &
nt a=0, b, c;
double v1, 72, d;
void getac)?
Scamor s= new Scamor (systay. Pu);
while (a==0) {
System. out. Jornathy ("No possible solution who
                       a 93 0 1);
 system. out printer (" Outer coeffeient of 5");
 b = s. next Int (1;
 System out printly ("Enter Coefferent of c");
 C = S. nont Int ():
 d = (6 % b) - (4 x a * c);
 if (d==0)}
~1= (-b)/(2+a);
 System.out. portathy ("Roots are year and
     i.e root 1 and root 2 is 11/4 mi);
 clse it (dso) {
  m = ((-6) + ( math. sq + (a))) / (doubte) (2 ta)
  72= ((-b) - (math-sgrt (d))) / (double) (2 +a)
```

```
System.out. printly ("Roots are roal"); 4

System.out. printly ("Roots are roal");

System.out. printly ("Roots "+ ");

Gete if (a < 0) {

r1 = (-b) / (2*a);

r2 = Math.sqrt (-d) / (2*a);

System.out. printly ("Roots are real and smaginary i.e")

System.out. printly ("Roots: "+ r1);

System.out. printly ("Roots: "+ r2);

g

Public class quadratics?

Public class quadratics?

Public static void many (string args 2);

Equation el = no Equation ();

el. getd ();

System.out. printly (" malugha G.S");

g

System.out. printly (" malugha G.S");
```

tenter coefficient of a :3 011920

Enter coefficient of b:6

Enter coefficient of c:9

Roofs are real and Emaginary inglo-5-29,

Roofs: -1.0

Roofs: 1.4142130623

#### **CODE:**

```
import java.util.*;
class Equation{
int a,b,c;
double r1,r2,d;
void getd()
Scanner input=new Scanner(System.in);
while (a==0)
System.out.println("Enter coeffcient of a");
a=input.nextInt();
if (a==0){
System.out.println("Enter a non-zero value to coeffcient a");
System.out.println("Enter coeffcient of b");
b=input.nextInt();
System.out.println("Enter coeffcient of c");
c=input.nextInt();
d=(b*b)-(4*a*c);
if (d==0)
r1=(-b)/(2*a);
System.out.println("Roots are real and equal root 1 and root 2 is"+ r1);
else if (d>0)
r1=((-b) + (Math.sqrt(d)))/(double)(2*a);
r2=((-b) - (Math.sqrt(d)))/(double)(2*a);
System.out.println("Roots are real");
System.out.println("Root 1 "+r1);
System.out.println("Root 2 "+r2);
```

```
else if(d<0)
r1=(-b)/(2*a);
r2 = Math.sqrt(-d)/(2*a);
System.out.println("Roots are real and imaginary ");
System.out.println("Root 1: "+ r1);
System.out.println("Root 2: "+ r2);
public class quadratic1{
public static void main(String args[]){
Equation 1=new Equation();
equation1.getd();
System.out.println("Mahesha G S");
System.out.println("USN: 24BECS429");
OUTPUT:
Enter coeffcient of a
Enter a non-zero value to coeffcient a
Enter coeffcient of a
10
Enter coeffcient of b
20
Enter coeffcient of c
30
Roots are real and imaginary
Root 1 : -1.0
Root 2 : 1.4142135623730951
Mahesha G S
USN: 24BECS429
PS C:\Users\mahesha\Desktop\mahi>
```

### PROGRAM NO-2 Student CGPA

```
Supert Java. util. Scamor
 public class Subjects of
     Ent ments, credite, grade;
public ders student &
Subject Subject Co;
Strag name, wer; ( the transfer to the state of
double SOITED;
Scarner Engert = now Scarner (System. Pr);
Standard () 1
get i'
Subject = new Subject [9];
for (i=0; ilq) i++)
   Suborets (:) = new Subjects ():
void getstudet (1)
System out gentitu ("Enter your vane");
werne = Report, nontline ();
```

```
System out prinths (" tet or us ");
  non = Rut just . nosetline 1);
· void getworks () }
 for (int i=0 1 ikq; i++) }
     System. out. portate ("Entre ment of Subotto
                      +(1+1)":1);
     Subject [i]. musts = in put. next Int cs;
     System. out probation (" tenter creadity)
     Substat Ci], credits = Entput. west Intl);
    Subject [] J. grade (subject [i] nets /10)+1
     if (Jub jet [i]. grave >=11)
          Subject CiJ. grade=0;
     else it (subjet [: ]. grade c= 4)
          Subjet []. grade = 0.
word Computagracist
   double quits =0;
   double total searce;
   for (jut 1=0; 129; 1++) }
    Fut Sub=substili. credits & SuliJ. gran;
```

```
public class main?

public static void main (String argels)?

student si = new student ();

Si. get stockers;

Si, get mentses;

System. out. perhate (" new; " +31. vow);

System. out. perhate ("usin" + 11. usu);

Si. comput sgpx();

g
```

```
output:

Get your name: Machegha Coll

But your wan: 24 BECS 4291.

Entr Subject 1 Greekits: 49

Entr Subject 2 warhs: 60

Entr Subject 3 works: 80

Enter Subject 3 works: 80

Enter Subject 3 credit: 4

Name: Machegha Gis

USN: 24 BECS 429.

Suppa of the Student is: 85.64
```

#### Code:

```
import java.util.Scanner;
public class Subjects{
     int marks, credits, grade;
public class student {
          Subjects subject[];
          String name, usn;
          double SGPA;
          Scanner input=new Scanner(System.in);
          student()
          int i;
          subject= new Subjects[9];
          for(i=0;i<9;i++)
          subject[i] = new Subjects();
          void getstudet() {
                System.out.print("ENTER YOUR NAME:");
                name=input.nextLine();
                System.out.print("ENTER YOUR USN NUMBER");
                usn=input.nextLine();
          void getmarks() {
                for(int i=0;i<9;i++) {
                     System.out.println("Enter marks of subject
"+(i+1)+":");
                     subject[i].marks=input.nextInt();
                     System.out.println("Enter credits of subject
"+(i+1)+":");
                     subject[i].credits=input.nextInt();
                     subject[i].grade=(subject[i].marks/10)+1;
                     if (subject[i].grade>=11)
```

```
subject[i].grade=10;
                      else if(subject[i].grade<=4)
                            subject[i].grade=0;
                 }
           void computeSGPA(){
                double points=0;
                double totalcredits=0;
                for (int i=0;i<9;i++) {
                      int sub=subject[i].credits*subject[i].grade;
                      points=points+sub;
                      totalcredits=totalcredits+subject[i].credits;
                 SGPA=points/totalcredits;
                System.out.println("SGPA of the student is: "+SGPA);
}
public class main{
     public static void main(String args[]) {
           student s1 = new student();
           s1.getstudet();
           s1.getmarks();
           System.out.println("Name:"+s1.name);
           System.out.println("USN:"+s1.usn);
           s1.computeSGPA()}}
```

#### **OUTPUT:**

```
PS C:\Users\mahesha\desktop\mahi> javac Subjects.java
PS C:\Users\mahesha\desktop\mahi> javac student.java
PS C:\Users\mahesha\desktop\mahi> javac main.java
PS C:\Users\mahesha\desktop\mahi> java main
ENTER YOUR NAME: Mahesha G S
ENTER YOUR USN NUMBER 24BECS429
Enter marks of subject 1:
80
Enter credits of subject 1:
Enter marks of subject 2:
60
Enter credits of subject 2:
Enter marks of subject 3:
50
Enter credits of subject 3:
Enter marks of subject 4:
Enter credits of subject 4:
Enter marks of subject 5:
Enter credits of subject 5:
Enter marks of subject 6:
Enter credits of subject 6:
Enter marks of subject 7:
Enter credits of subject 7:
Enter marks of subject 8:
Enter credits of subject 8:
Enter marks of subject 9:
Enter credits of subject 9:
Name: Mahesha G S
USN: 24BECS429
SGPA of the student is : 8.125
PS C:\Users\mahesha\desktop\mahi>
```

# PROGRAM NO-3: Book Class

```
Purport Java. util. *;
clas Books of
String name, author;
 At price, mentage;
 Books ( String name, String author,
      ent numplige)
  this author = author;
  this . price = price;
   this. numbergs = numperges;
```

```
story name, author, price, munipages;
  name = " Book nome: " + this name + " ) ";
  author = " Author name : "+ this author + " 'lu";
 price = " Parice; "+ this porte + " lu";
 numpergros = " Number of pages: "+ this countrige + "his
 redurm name + anthor + price + murgueges;
 Class during
public static void main (string [7 angs) ?
 Scamer Enjurt = new Scamer (Systm. Pr);
 Put ";
 Str Sy name;
 String outher:
 But price;
System. out. gerseles (" Enter the number
 n= forful, nent Int ();
 Books b [];
 b = uno Books Cud;
```

```
for ( Part i=0; 124; 1+1) {

System.out, opriletter (" Entertle book nour:");

name: input. next();

System.out. perintler (" Enter the author");

author = input. next();

System.out. perintle (" Enter the oprile:");

Torice = input. nextInte();

System.out. perintle (" Enter the newtor of pass);

numpages = input. nextInt();

b [i] = new Books (name, author, price, numpages;

for ( int J=0; J(u; J+1)?

System.out. out. perintler ( b[J]. tostriber ( ).
```

output:

The the mular of books

I the Book rome: paral.

Enter the author: Mahaha

Enter the price: 1080

Enter the no.of pages: 500

Book rome: Jang

author: Mahaha

price: 1080

No.poges: 1000

#### **Code:**

```
import java.util.*;
class Books{
String name, author;
int price, numpages;
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 Main{
public static void main(String[] args){
Scanner input= new Scanner(System.in);
int n;
```

```
String name;
String author;
int price;
int numpages;
System.out.println("Enter the number of books");
n=input.nextInt();
Books b[];
b=new Books[n];
for (int i=0; i< n; i++){
System.out.println("Enter the book name:");
name=input.next();
System.out.println("Enter the author:");
author=input.next();
System.out.println("Enter the price:");
price=input.nextInt();
System.out.println("Enter the number of pages:");
numpages=input.nextInt();
b[i]=new Books(name,author,price,numpages);
for (int j=0; j< n; j++){
System.out.println(b[j].toString());
System.out.println("name:mahesha G S");
System.out.println("usn:24becs429");
```

#### **OUTPUT:**

```
PS C:\Users\STUDENT\Desktop\24becs429> java Main
Enter the number of books
Enter the book name:
java
Enter the author:
suresh
Enter the price:
10000
Enter the number of pages:
Enter the book name:
python
Enter the author:
nagesga
Enter the price:
20000
Enter the number of pages:
500
Book name: java
Author name: suresh
Price: 10000
Number of pages: 500
name:mahesha G S
usn:24becs429
Book name: python
Author name: nagesga
Price: 20000
Number of pages: 500
name:mahesha G S
usn: 24becs429
PS C:\Users\STUDENT\Desktop\24becs429>
```

#### **PROGRAM NO-4:**

#### **Abstraction**

```
Purport Java. util. +;
abstract class shape &
     Scauner Enput = new Scauner (System. En);
    double dint;
    double dim 2;
   abstract double areall;
Class Rectargle extenses shape of
     Class Rectangle () {
     System out printly (" Entor the leggth and
      breadth for the rectargle ");
      clim1 = Fuput. next Double (1;
       dim 2 = Fugut. nent Pouble ():
```

```
double area () {
             return dim & dime;
 Class Triangle cretends shape of
     Toubling Fricingles &
     System. out. gorintlu ("Enter the height
      base for the triengle );
      d'un = Pu put. ment Mouble ();
       dime = Supert. neat Pouble (1,
      double area () of
           return dis # demi + dem 2;
class Circle extends shape of
    Publicy Circle111
    System out probably ( " Enter the radis for the
                            arch ");
     dem 1= Exput. nent Toulde ();
     double areas)
          retari 3.14 dimi +dimi ,
```

```
Class Main [

Public static void main (String[] args);

Shape rectangle = new Rectangle ();

Shape triangle = new Triangle ();

Shape Circle = new Circle ();

System. out. printin ("Area of Rectangle:" +

rectangle. area());

System. out. printin ("Are of Tringle:" +

triangle. area());

System. out. println ("Area of Circle:" +

circle. area());

3
```

out put:

Enter the length and brackt offer the rectangle.

20
20
Enter the height and base for the triangle

21
60
Enter the radius for circle

50
Enter the radius for circle

50
Area of rectangle: 600.00
Area of circle: 2500.00

Area of circle: 2500.00

#### **Code:**

```
import java.util.*;
abstract class Shape {
  Scanner input=new Scanner(System.in);
  double dim1;
  double dim2;
  abstract double area();
}
class Rectangle extends Shape {
  Rectangle() {
  System.out.println("Enter the length and breadth for the rectangle");
   dim1=input.nextDouble();
   dim2=input.nextDouble();
  @Override
  double area() {
    return dim1 * dim2;
class Triangle extends Shape {
   Triangle() {
  System.out.println("Enter the height and base for the triangle");
  dim1=input.nextDouble();
   dim2=input.nextDouble();
```

```
@Override
  double area() {
    return 0.5 * dim2 * dim2;
}
class Circle extends Shape {
  Circle() {
  System.out.println("Enter the radius for the circle");
   dim1=input.nextDouble();
  }
  @Override
  double area() {
    return 3.5*dim1*dim1;
public class Main3 {
  public static void main(String[] args) {
     Shape rectangle = new Rectangle();
     Shape triangle = new Triangle();
     Shape circle = new Circle();
     System.out.println("Area of Rectangle: " + rectangle.area());
     System.out.println("Area of Triangle: " + triangle.area());
     System.out.println("Area of Circle: " + circle.area());
```

#### **OUTPUT:**

```
PS D:\24CSBE426> javac Main3.java
PS D:\24CSBE426> java Main3
Enter the length and breadth for the rectangle
20
10
Enter the height and base for the triangle
30
60
Enter the radius for the circle
5
Area of Rectangle: 200.0
Area of Triangle: 1800.0
Area of Circle: 87.5
PS D:\24CSBE426>
```

## PROGRAM NO-5: Inheritance

```
Suport Java. util. *;
Class Banky
  String name;
  Storing cocono;
  storing accity pe;
  double balance = 0;
  Bank ( String name, Storing aceno, storing acctype) ?
this name = name;
      this. accno = aceno;
     this acctype = acctype;
       begins out privileg " poilhebrow al
  void degros? I (double amount) (
     balance t = amont,
     System out forthe (" The amount " + amount +" ")
                 Succesfully deposited u);
   void dis bal (1)
    System out prisably (" To alouse for account"
        t ace no + ";" + balance ");
    void diployer
     Systemout forinten ("Account muss;" - from
     Systemeout gerille (" Account Holdri" tece uo ").
```

Class currace entends touch? double wintmentSalane=1000; double penalty = 80; Curraec (string name, string aceno)? super (nane, acceso, " durrent"); void withdraw (double amount) ? it (balance - amont to )? System.out. porenthe (" Influeient: Lands "); 3 else L balance = amount; System. och printly (" withdrawal Successful gehecken ni nutsalance (; void checkulmentsularence) } it (balone & minimum Balonee) of balance = balance - penalty; systaxoutiperiallul" Bolone below minhum. Ingo penalty of t paidly +" New Balane is" + balance Class saveace extends Bank double EnterseRate = 0.04;

```
saveace (String name, String accus) of
    Super (name, accus, "sanings");
void computerntercost (1)
    double interest = balance Futerest Route;
     balane & = intract;
     System out printly "Intrees of "+ interest + deposity
      m no Bolane is: " + bolame);
void wilhdraw (double cure it) &
 if Chalcine-amont 20)
       Systemont, periathe ("Influeint funds");
     & else &
         balance = = anow,
         System. out printly (" the anost " + amoust"
         willidraval successfull by no balone is " + balone);
                (Nether Hope of which
Class bourhace of
   public static void menin (string orgs [])?
    Scamor input = no Scamor (system. in);
    boolean unit - fatie;
   System out printle ( " cureront Account -
    Systy, out printer (" Enter a name");
     Storing 4 = Puput. westinels;
                     " Enter a account no ");
```

stem.out. quit ( " Enter tring ug = fugut. nestliner; bring ac= input. restinec); boolean emite = false; Someace si = now someace (ciz, ai); shile (! emite)? Systemeonteporintle (" la tester le operation System.out. printle ["], deposit the anout"); System.oute porister ( a q, compute interesta); 1414.out, prish (23, willedow amount"); systemious grotull "4, disjoley un debaits "); Int cul= input, wort Int(); Switch (du) L couse 1: Systemont, prile ( u textor double amont 1 = Puput, visit Si. deposit (amo unti); break; Cuse 2 System.out. goristly (" (1. Camputeraturest(); break; Systemout. printle (

```
cum acc s= un cumace (u,a);
While (! exit) 2
System. out. parently (" ther the operation lu");
systemout, parintly (11, deposit the amount");
 Systemiont, printly ("2, withdrawal" amont "?;
Systemout printle (43, display the details ");
 Int de= Propert. vent Int (1;
 Switch (ch) {
                     (diamo dando amonto)
      Cosel:
           System. But govint ("Enter the deposit anon
        double anio + I Inpet. next to whole (1:
            S. deposit (amout);
            breat!
      Coise 2: + and sult 1 white how were
       System out, printh ( the withdrawd am
           double w= Engut. worthoulder;
            S. willedreder);
           breat;
       Cose 3 in
         . S. display (1);
           break:
         System out printer (" Invalo Clos #);
         enit = true ;
```

```
system.out. probable ("-- saving Account
systme.out. qu'et ( ' Enter au nouve and account courter ");
String uq = frout. next inex;
Storing a c= in put, westlineci;
 boolear exite = false;
 Saveace si = now poweace (c12, a1);
 while (! exite)}
 Systemeonteprintle (" la teter le operation");
 System. out, printle ["1, deposit the amount");
 Systemioute priedle (12, computs intersola);
 systmont, gride ("3, willedow anome");
 System, out gordel "4, display be debails ");
  fut cul = input, wont Int();
 Switch (che) L
                                     Cester the openation
        corsel:
             System.out. prile ( " tutor the deposit amenti);
             double amont 1 = Ruput, west Rouble (1,
              31. deposit (amounts);
              break;
        Cust 2!
               System. out goristly ("counte Extorat");
               SI. Camputeraturest();
               break;
        Cuse 3:
               System.out. printly ( "Enter the withdre come");
              do whe we = input . nest trouble (1;
               SI - 10: Walversal (101);
            break;
```

Enter a vane makeshe Enter account no. AC 501 Enter the operation i, deporit the amount withdrawal curent 3, display the details Enter the deposit amont The amount 20000 is sucusfull deposited, current balance is 20000 Enter the operation Enter the with drawal amont The anont 500 was with drawal; current balan

Outer the operation Enter the withdrawal amount the anout 14600 willnessed success fully, uns balance is; 400,0 Balanc below wining, Impose purally of 50.0. No balance is 350.0 Outer the operation wome ; makeshy Quant No : ACSOI Account type: current Balence : 350.0 Sawing Account Enter a Name and account no Mahegha Acros outer the operation 1, deposite the amount 2, compute Enterest 3. withdrawd amount L. display the defails Outer the deposit amont 60000 successfull deposited current balance is 50000 outer the operation 2, genterge of 2000 deprovided, now bulse \$2000

Enter the operation

3:

Enter the willdraval anount

20000

the anout 20000 is will alread Successful

new balone: 32000.0

Enter the operation

4,

Name: Mahyla

account no: Ac 201

Account Type: Sawings

Balonee: 32000

#### **Code:**

```
import java.util.*;
class Bank{
    String name;
    String accno;
    String acctype;
    double balance=0;
Bank(String name, String accno, String acctype){
    this.name=name;
    this.accno=accno;
    this.acctype=acctype;
}
```

```
void deposit(double amount){
     balance=amount:
     System.out.println("the amount "+amount+" is successfully
deposited");
     System.out.println("current balance is:"+balance);
void display(){
     System.out.println("NAME:"+name);
     System.out.println("ACCONT NUMBER:"+accno);
     System.out.println("ACCOUNT TYPE:"+acctype);
     System.out.println("BALANCE:"+balance);
}
class curracc extends Bank{
     double minimumBalance = 1000;
     double penalty = 50;
curracc(String name, String accno){
     super(name, accno, "Current");
void withdraw(double amount){
     if (balance-amount < 0){
          System.out.println("influcient funds");
      }else{
          balance-=amount;
          System.out.println("the amount"+amount+" withdrawal
successfully /n new balance is:"+balance);
checkMinimumBalance();
void checkMinimumBalance() {
     if (balance < minimumBalance) {
       balance -= penalty;
       System.out.println("Balance below minimum. Imposed penalty of "
+ penalty + ". New balance is " + balance);
```

```
}
class saveacc extends Bank{
     double interestRate = 0.04:
saveacc(String name, String accno){
     super(name, accno, "savings");
void camputeintereast(){
     double interest=balance*interestRate;
     balance+=interest;
     System.out.println("Interest of " + interest + " deposited. \n New
balance is " + balance);
void withdraw(double amount){
     if (balance-amount < 0){
          System.out.println("influcient funds");
     }else{
          balance-=amount;
          System.out.println("the amount"+amount+" withdrawal
succesfully \n new balance is:"+balance);
class bankacc{
public static void main(String args[]){
Scanner input=new Scanner(System.in);
boolean exit=false;
System.out.println("-----");
System.out.println("enter a name:");
String n=input.nextLine();
System.out.println("enter account number");
String a=input.nextLine();
curracc s=new curracc(n,a);
```

```
while(!exit){
System.out.println("\nEnter the operation \n");
System.out.println("1,deposit the amount");
System.out.println("2,withdrawal amount");
System.out.println("3,display the details");
int ch=input.nextInt();
switch(ch){
     case 1:
          System.out.println("enter the deposit amount");
          double amount=input.nextDouble();
          s.deposit(amount);
          break;
     case 2:
          System.out.println("enter the withdrawal amount");
          double w=input.nextDouble();
          s.withdraw(w);
          break:
     case 3:
          s.display();
          break;
     case 4:
          System.out.println("invalid choice");
          exit=true;
System.out.println("-----SAVING ACCOUNT-----");
System.out.println("Enter a name and account number");
String n1=input.nextLine();
String n2=input.nextLine();
String a1=input.nextLine();
boolean exit1=false;
```

```
saveacc s1=new saveacc(n2,a1);
while(!exit1){
System.out.println("\nEnter the operation");
System.out.println("1,deposit the amount");
System.out.println("2,compute interest");
System.out.println("3,withdrawal ammount");
System.out.println("4display the details");
int ch1=input.nextInt();
switch(ch1){
     case 1:
           System.out.println("enter the deposit amount");
           double amount1=input.nextDouble();
           s1.deposit(amount1);
           break;
     case 2:
           System.out.println("comput interest");
           s1.camputeintereast();
           break;
     case 3:
           System.out.println("enter the withdrawal amount");
           double w1=input.nextDouble();
           s1.withdraw(w1);
           break:
     case 4:
           s1.display();
           break;
     case 5:
           System.out.println("invalid choice");
           exit1=true;
```

```
-----CURRENT ACCOUNT--
enter a name:
mahesha
enter account number
AC201
Enter the the operation
1,deposit the amount
2, withdrawal amount
3, display the details
enter the deposit amount
the amount 20000.0 is successfully deposited
current balance is:20000.0
Enter the the operation
1,deposit the amount
2, withdrawal amount
3, display the details
enter the withdrawal amount
5000
the amount5000.0 withdrawal succesfully /n new balance is:15000.0
Enter the the operation
1,deposit the amount
2, withdrawal amount
3, display the details
enter the withdrawal amount
the amount14600.0 withdrawal succesfully /n new balance is:400.0
Balance below minimum. Imposed penalty of 50.0. New balance is 350.0
Enter the the operation
1,deposit the amount
2, withdrawal amount
3, display the details
NAME: mahesha
ACCONT NUMBER: AC201
ACCOUNT TYPE:Current
BALANCE: 350.0
```

```
-SAVING ACCOUNT--
Enter a name and account number
mahesha
AC202
Enter the the operation
1, deposit the amount
2, compute interest
3, withdrawal ammount
4display the details
enter the deposit amount
the amount 50000.0 is successfully deposited
current balance is:50000.0
Enter the the operation
1, deposit the amount
2,compute interest
3, withdrawal ammount
4display the details
comput interest
Interest of 2000.0 deposited.
 New balance is 52000.0
Enter the the operation
1,deposit the amount
2, compute interest
3, withdrawal ammount
4display the details
enter the withdrawal amount
the amount20000.0 withdrawal succesfully
 new balance is:32000.0
Enter the the operation
1,deposit the amount
2,compute interest
3, withdrawal ammount
4display the details
NAME: mahesha
ACCONT NUMBER: AC202
ACCOUNT TYPE:savings
BALANCE: 32000.0
```

#### **PROGRAM NO-6:**

# **Packages**

```
package CIE;
Emport Java. util. Scauner;
public class student 5 ?
   protected string usu = new stringe);
protected string name = new stringe);
protected int sour;
   public void inputstudentdetails ()
       Scauler s= new scauner (system. in);
       System.out. printly ("Entor Student us N: ");
        usu=s. nest();
        System. out. printlu (" Entor studet vame: ");
        name = s. nentc);
        Systam.out. porintlu ("Entor student sem!")
        Sem = S. nontext();
    public void displaystudetails ()
       system.out. porintly ("usu; "+usn);
       System. out. portatlu (" Name; "+ venne);
       System. och gorintle (" sem! " + sour)
```

Emport Java. util sœurer; public class intervals extends student? public Int marks []= now Int [5]; public void Enput CIE nortes CS Seamer s= non scourer (systam. in); System. out. printly (" Enter the works the following sub out of so: ); for (int-i=0; iks; itt) Systamout. gorizthy ("Course" + (it) + menter (i)=s. went tales; pakage SEE; Suport. CLO. Intervols; Emport Java util A! public class entervols entered seturals & protected Ist enternalpurls [] govo tuted get finalments EDpublic entervals () ? exeternalments = no 9x C5J. f. Malaunds = nes if [T]; public void Input soo weeks C) & Scanner 1 = ne somer (systerita); S.O.p ("Conter Guterual works for 5 course for Loo 1),

```
tor ( Put i =0; PLT; P++) 2
         System.out poristler ( " outer marks for course
         entimediahs [i] = s. west Int ();
public void calculate finalments C1 {
    for (intio; int; it) {
          Finalwarty [i] = marry [i] + entomalments Ci]/2;
public void display finalments (12
     display Studeth D table ();
      S.o.p ("I snal marks:");
      for (int == ); (x+; i++)?
         S.O.P ("cours"+ Ci+1)+1+ Frealments Ci);
Impurt SOG. external;
Inport fava. util-samur;
public class main ?
     public static void warm (string a) orge) {
         scanner s = new scanner (systamism);
          s.p.p (" outer number of studets; ");
          ist u = s. nesterto);
          Caternals CJ studets = now emberrals Cu ];
          for (int i=0; ikn; i+1){
              studentsli]= nos exteriors();
              Students [i] = Priputstelt Defail ();
              Students (i) = Puper ( to make (1)
```

Exter number of student; 1 Entr stude usu; 429 Outr Student Name; Mahyles Outor Studet sen: 2 The Internal mosts for the following Subjects 60 mgc 1:23 Course 3; 26 wise 4: 19 Center: 40. Entr the embrial months for 5 courses wayel: 67 Curse 2: 69 av Cent 3: Corse 4; burses; USU = 9480 429 Name = Markeylor [ Fral works ! sem = 3 concli 56 Cars(2: 60 Con 13: 47 one 4: 19

# **CODE: CIE FILE** package CIE; import java.util.Scanner; public class internals extends student5{ public int marks[] = new int[5]; public void inputCIEmarks() Scanner s=new Scanner(System.in); System.out.println("Enter the Internal Marks for the following Subjects out of 50:"); for (int i=0; i<5; i++) System.out.println("Course "+(i+1)+":"); marks[i]=s.nextInt(); } package CIE; import java.util.Scanner; public class student5{ protected String usn = new String(); protected String name = new String(); protected int sem; public void inputStudentDetails() Scanner s=new Scanner(System.in); System.out.println("Enter Student USN :"); usn=s.next(); System.out.println("Enter Student Name :"); name=s.next(); System.out.println("Enter Student Semester :"); sem=s.nextInt(); }

```
public void displayStudentDetails()
           System.out.println("USN of the Student: "+ usn);
           System.out.println("Name of the Student : "+ name);
           System.out.println("Semester of the Student: "+ sem);
      }
}
SEE FILE
package SEE;
import CIE.internals;
import java.util.Scanner;
public class externals extends internals {
     protected int externalmarks[];
     protected int finalMarks[];
     public externals(){
           externalmarks=new int[5];
           finalMarks = new int[5];
     public void inputSEEmarks() {
     Scanner s = new Scanner(System.in);
     System.out.println("Enter External marks for 5 courses for 100: ");
     for (int i = 0; i < 5; i++) {
       System.out.print("Enter marks for course " + (i + 1) + ": ");
       externalmarks[i] = s.nextInt();
     }
     public void calculateFinalMarks(){
           for (int i = 0; i < 5; i++) {
                finalMarks[i] = marks[i] + externalmarks[i]/2;
           }
     public void displayFinalMarks(){
           displayStudentDetails();
```

```
System.out.println("Final Marks: ");
     for (int i = 0; i < 5; i++) {
                 System.out.println("Course "+(i+1)+":"+finalMarks[i]);
     }
}
import SEE.externals;
import java.util.Scanner;
public class Main5{
  public static void main(String[] args) {
     Scanner s = new Scanner(System.in);
     System.out.println("Enter number of students: ");
     int n = s.nextInt();
     externals[] students = new externals[n];
     for (int i = 0; i < n; i++) {
       students[i] = new externals();
       students[i].inputStudentDetails();
       students[i].inputCIEmarks();
       students[i].inputSEEmarks();
       students[i].calculateFinalMarks();
     for (int i = 0; i < n; i++) {
       students[i].displayFinalMarks();
     System.out.println("Kushal Naidu N \n24BECS408");
```

```
Enter number of students:
Enter Student USN :
CS408
Enter Student Name :
Kushal
Enter Student Semester :
Enter the Internal Marks for the following Subjects out of 50 :
Course 1:
24
Course 2:
37
Course 3:
39
Course 4:
41
Course 5:
37
Enter External marks for 5 courses for 100:
Enter marks for course 1: 87
Enter marks for course 2: 74
Enter marks for course 3: 68
Enter marks for course 4: 62
Enter marks for course 5: 80
Enter Student USN :
CS420
Enter Student Name :
Sachit
Enter Student Semester :
Enter the Internal Marks for the following Subjects out of 50 :
Course 1:
31
Course 2:
37
Course 3:
30
Course 4:
44
Course 5:
42
Enter External marks for 5 courses for 100:
Enter marks for course 1: 87
Enter marks for course 2: 81
Enter marks for course 3: 76
Enter marks for course 4: 68
```

```
USN of the Student : CS408
Name of the Student : Kushal
Semester of the Student : 3
Final Marks:
Course 1:67
Course 2:74
Course 3:73
Course 4:72
Course 5:77
USN of the Student : CS420
Name of the Student : Sachit
Semester of the Student : 3
Final Marks:
Course 1:74
Course 2:77
Course 3:68
Course 4:78
Course 5:89
```

# PROGRAM NO-7: Exception Handling

```
suport Java util. Scanner;
class wrongage entends treception?
   public wrong AgeC12
       Super ( Age troo! ");
  public Wrong Age (String messege)?
         Sugor (message);
class fathor &
      protected Int fathorage;
       public father() throws wrong Age ?
       Scauner 5= non Seamor (system in);
        S.O.P ("Enter father's age");
        fatherAge = s. new + Int (2,
        it (tather Age Co) 2
               throw new wrongstel ("Age
                be negative [1]
```

```
World display (12
 S. D. P ( Jather Age! 4 + fatherage
Class son extends father ?
    private int Southge;
    public souch throws wrong Agel
        Suger ():
         Scanner S=now Scanner (systemin);
          S.O.P ("Gutr Sou!s Age: ");
          Sou Age = s. nort Info;
          if (Son Age Ko) 1
             Throw un wrongresel" Age canibb
          if (son Age > = fathorAge) 2
              throw were wrong Ag (" fou's age co
              be greater or equal to fathor's
     void display(){
         Super, display ()?
        Sio. p ( "Sony Age; " + Son Age);
```

public static void masu (string E) orgs);

try i

Sou don = new Sou ();

Sou display ();

3 catch Livrorg Age, e) ?

So. p (" or pretion: " + e, getmessege());

9

Enter Sour Age: 20

Enter Sour Age: 20

Enter Sour Age: 20

Enter Cather Ogl.

Enter Cather Age: 60

Enter Sour Age: 60

Father Age: 80

Sour Ag: 40.

### **CODE:**

```
import java.util.Scanner;
class WrongAge extends Exception {
  public WrongAge() {
    super("Age Error!");
  public WrongAge(String message) {
    super(message);
class Father {
  protected int fatherAge;
  public Father() throws WrongAge {
    Scanner s = new Scanner(System.in);
    System.out.print("Enter Father's Age: ");
    fatherAge = s.nextInt();
    if (fatherAge < 0) {
       throw new WrongAge("Age cannot be negative!");
  }
  public void display() {
    System.out.println("Father's Age: " + fatherAge);
}
class Son extends Father {
  private int sonAge;
  public Son() throws WrongAge {
```

```
super();
     Scanner s = new Scanner(System.in);
     System.out.print("Enter Son's Age: ");
     sonAge = s.nextInt();
    if (sonAge < 0) {
       throw new WrongAge("Age cannot be negative!");
    if (sonAge >= fatherAge) {
       throw new WrongAge("Son's age cannot be greater than or equal to
father's age!");
  public void display() {
     super.display();
    System.out.println("Son's Age: " + sonAge);
public class Main {
  public static void main(String[] args) {
    try {
       Son son = new Son();
       son.display();
     } catch (WrongAge e) {
       System.out.println("Exception: " + e.getMessage());
```

```
Enter Father's Age: 60
Enter Son's Age: 70
Exception: Son's age cannot be greater than or equal to father's age!
PS C:\Users\mahesha\Desktop\mahi> java Main
Enter Father's Age: 60
Enter Son's Age: 32
Father's Age: 60
Son's Age: 32
PS C:\Users\mahesha\Desktop\mahi>
```

## **PROGRAM NO-8: Multi-Threading**

```
class college Timesel Freture Timead 2.
public void run C/L
       try & while Lfraell
               S.O.P (" Tous college of Engineering")
               Throad. sleep (10000);
       & catch ( Interrupted Faception e) &
             system out print (" College Three Enterrupts
     US Throad entends Thread?
     public void runcos
         bry 2 while Ctrue? (
                 50.p ("(50");
               Thread. sleep (2000);
        3 cathed Interrupted trapplication ell
S.O.P ("C86 Throad in terrupte")
```

public class needly 2

public static void main (string E) args) 2

College Thread collegethread = new collegethread();

College Thread . start();

College Thread . start();

### **CODE:**

```
class CollegeThread extends Thread {
  public void run() {
    try {
       while (true) {
          System.out.println("BMS College of Engineering");
         Thread.sleep(10000);
     } catch (InterruptedException e) {
       System.out.println("CollegeThread interrupted.");
  }
class CSEThread extends Thread {
  public void run() {
    try {
       while (true) {
          System.out.println("CSE");
         Thread.sleep(2000);
     } catch (InterruptedException e) {
       System.out.println("CSEThread interrupted.");
public class Main {
  public static void main(String[] args) {
     CollegeThread collegeThread = new CollegeThread();
    CSEThread cseThread = new CSEThread();
    collegeThread.start();
    cseThread.start();
  }
```

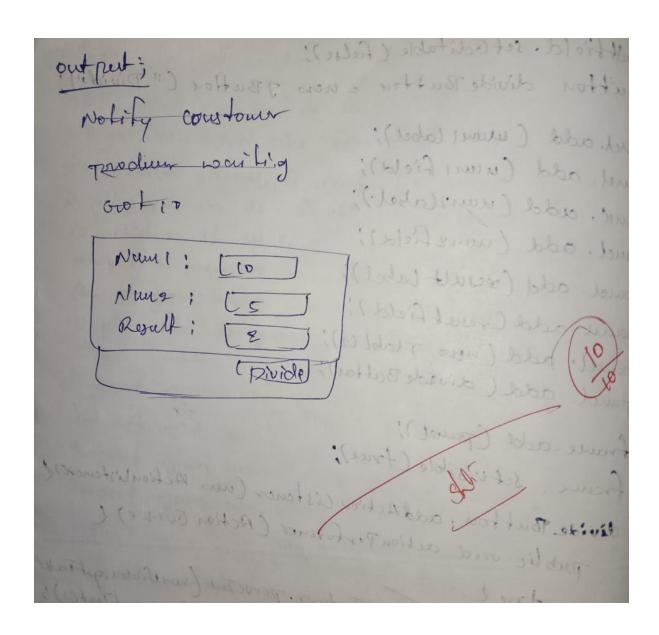
```
PS C:\Users\mahesha\Desktop\mahi> java Main1
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
CSE
CSE
CSE
CSE
BMS College of Engineering
CSE
```

# **PROGRAM NO-9: Graphical User Interface**

**Algorithm:** 

import Javan swing. "; suport Jav. aust, or; Purport Java. aust, event, Action Event; fuport Java. cust. event, Actionlis tener; public class Division Calculator L public static void maren (stringed angs){ Thrame france = new Thrame (" Privision Ca franc. setsize (400,200); France. Jet Pefault Close Oper L'on (TRaine, Bl JPanel panel = no Jnavel 1); pourel. set (ayout ( no Gorid Coyout ( 4,2, 10,10 Flabel murlaled = new Trabel (" Nams 1;"); Tentfield munifield = was Trontweld (1) Jeabel numelabel = no Habel ("num 2:") I traffield webidel = new I find fidel (1) Jarl roulf (abol = mes table ("Resalt") J butheld result field = un Joshald (1,"

```
ultield. set oditable (false)!
TButton divide Button = new JButton (" Divida)
parel add ( muni (abel);
pound, add (num, field);
pand, add (nurslabel!);
pand. add (nurefield);
pound. add (result Label);
 pould add Cresul field?
 pende add ( new Tabl (1);
 punel. add (divide Button);
 frame add (pound);
  frame, set visible (true);
  divide Poutton. add Action Listener Cuas Action Listener()
     public void action Porformed (Action Guerte) {
         try L
              Ent muy = Indegr. porsetut (nur efical get Toute
              it news = Tropor. porretent (news field. get Touter);
            if (mm 2 = = 0) {
              I have new Airthemetic Brephion (" Tivision by zer
                               is not allowed, a);
          But resul = num/nume;
          resultiveld. SetText (Storing, value of (resul));
        & certile ( Number format oxegodion en)?
            Tophion Pane. Storomer extictore (Fran, " please
               enter valid integra, Tophion Pone. TRaon Meril
       Carda (Airthonalutregolisa en) &
            To phisn Pane. Show messaget iaby (France, est. get mess)
             " Airthudre Groon", Toptial . ORRO-MENGE)
```

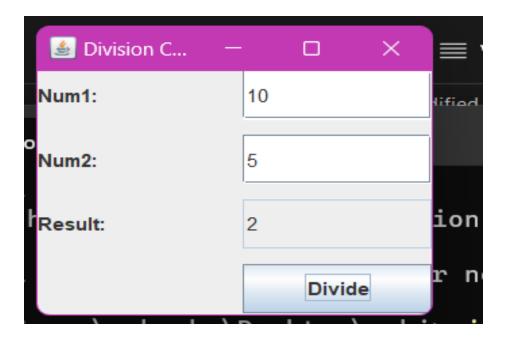


### **CODE:**

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

public class DivisionCalculator {
   public static void main(String[] args) {
      JFrame frame = new JFrame("Division Calculator");
}
```

```
frame.setSize(400, 200);
frame.setDefaultCloseOperation(JFrame.EXIT ON CLOSE);
JPanel panel = new JPanel();
panel.setLayout(new GridLayout(4, 2, 10, 10));
JLabel num1Label = new JLabel("Num1:");
JTextField num1Field = new JTextField();
JLabel num2Label = new JLabel("Num2:");
JTextField num2Field = new JTextField();
JLabel resultLabel = new JLabel("Result:");
JTextField resultField = new JTextField();
resultField.setEditable(false);
JButton divideButton = new JButton("Divide");
panel.add(num1Label);
panel.add(num1Field);
panel.add(num2Label);
panel.add(num2Field);
panel.add(resultLabel);
panel.add(resultField);
panel.add(new JLabel());
panel.add(divideButton);
frame.add(panel);
frame.setVisible(true);
divideButton.addActionListener(new ActionListener() {
  @Override
  public void actionPerformed(ActionEvent e) {
    try {
       int num1 = Integer.parseInt(num1Field.getText());
       int num2 = Integer.parseInt(num2Field.getText());
       if (num2 == 0) {
         throw new ArithmeticException("Division by zero is not
```



#### **PROGRAM NO-10A:**

### **Demonstrate Inter Process Communication**

```
Clasi Q &
Ent u;
 boolean valueset = false;
 Squelinouszed Int get () ?
 while (! valuese+ ?
 try 1
  Systemout jorintly (" (4 consumer waiting");
 3 catch & Interrupted Ereception e) ?
   System. och . por sutter ("Interrupted Exception cought");
   system. out. printlu ("Grot; "+");
   values of = false;
    System. out. govintes (" lu In Almost peroceoline lu");
     no tity ();
     redurn;
    Synchronized void put (Fut n) {
     while (valueset)
     try 1
     System.out. porintly ("procedure waiting"),
     wait ();
     3 catch (Interrupted Breception caught");
    this. u=n;
     values it = true;
     system. out portella ("pat"+");
state out pritting (consierner");
     vootify ()
```

```
Class produced suplemen
 producer (Rq) E
  new Thread (This, 'producer') . Stard ();
  this . q = 9;
  public void run () 1
   Put 1=0;
   while (izis) 1
   q. put (; ff);
Class Consumer Englands Runalote (
@9;
conjuna (Qq){
 this. 9=9;
 new Thread (This, " Cowmer"). (Lart ():
public void run() {
9xt =0;
while (ils) 1
it == q. get ();
 S.O.P (" Consumed "+1).
 clas pc fixed 1
 public static void mais (String args (3))?
  a 9 = now RC);
       Procedore (9);
  no co agua (Q).
                  couptool cato satop ");
```

put; 1 2 2 put; 4 put; 5 out; 5

### **CODE:**

```
class Q {
  int n;
  boolean valueSet = false;
  synchronized int get() {
     while (!valueSet) {
       try {
          System.out.println("\nConsumer waiting\n");
          wait();
       } catch (InterruptedException e) {
          System.out.println("InterruptedException caught");
     System.out.println("Got: " + n);
     valueSet = false;
     System.out.println("\nNotify Producer\n");
     notify();
    return n;
  }
  synchronized void put(int n) {
     while (valueSet) {
       try {
          System.out.println("\nProducer waiting\n");
          wait();
       } catch (InterruptedException e) {
          System.out.println("InterruptedException caught");
     this.n = n;
     valueSet = true;
     System.out.println("Put: " + n);
     System.out.println("\nNotify 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 < 15) {
       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 < 15) {
       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 C:\Users\STUDENT\Documents\418> javac PCFixed.java
PS C:\Users\STUDENT\Documents\418> java PCFixed
Press Control-C to stop.
Put: 0
Notify Consumer
Producer waiting
Got: 0
Notify Producer
Put: 1
Notify Consumer
Producer waiting
Consumed: 0
Got: 1
Notify Producer
Consumed: 1
Put: 2
Notify Consumer
Producer waiting
Got: 2
Notify Producer
Consumed: 2
```

### **PROGRAM NO-10B:**

### **Demonstrate Deadlock in Java**

```
class A &
 synchonized void fool (Bb) ?
 string name = Thread current Thread (). get Name ();
 System.out. printlu (name + " entercol A. foo");
 try 1
  Thread Sleep (1000);
  3 catch (Exception e) (
    System.out. printlu (" A Shterrup decl");
   system.out. porsittu [ name + " + ryin to call 13, las ti"
   b. loy+();
    void lout (12
    S.O.P ("Inside A. Cost");
Cleys B &
 syneronized void bor(Aa) &
  String name = Thread, arrent Thread cr. get orcure cr:
 Stop ( home + " Endor B, borr");
   Thread. Sleep (coo):
  3 catch (Greception e) 2
   5.0.P ("B Interrupted");
   & System out goodly
   5.05 ( name + " trying to call A. laster");
```

```
soop (" Inside A.last");
Lytur out , trally
class Deadlock Employet Runalole
Ad= new A();
13 b = now B();
Deadlock () 2
Thread. curret Tirread (). Set Name (" Main Thread");
Thread += un Thread (this, "Rackey Thread");
  testant(1;
  thread. System . o. poristlu ("Bed Su nomis throat");
  a. Foo (b):
 public void run () }
  6. bar(a);
  thread. Systm.out. printly ("Bouk est Other Thread");
 public static void wary (string args []) <
  no Dead God ();
```

Mediathrad entired to book
Mediathrad entired to book
Mainthread trying to call 13, lasts

The id A-last
Thread in main thread.

Racing thread freely to call A. (est o)

Inside A-last
Total in offer thread.

# **CODE:** class A { synchronized void foo(B b) { String name = Thread.currentThread().getName(); System.out.println(name + " enteredA.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 a = new A();
B b = new B();
Deadlock() {
Thread.currentThread().setName("MainThread");
Thread t = new Thread(this, "RacingThread");
t.start();
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();
```

```
PS C:\Users\STUDENT\Documents\418> javac Deadlock.java
PS C:\Users\STUDENT\Documents\418> java Deadlock
MainThread enteredA.foo
RacingThread entered B.bar
MainThread trying to call B.last()
Inside A.last
Back in main thread
RacingThread trying to call A.last()
Inside A.last
Back in other thread
PS C:\Users\STUDENT\Documents\418>
```