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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(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 **Anjana Manoj (1BM23CS038)**, 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.

Sheetal V.A Assistant Professor Department of CSE, BMSCE Dr. Jyothi S Nayak Professor & HOD Department of CSE, BMSCE

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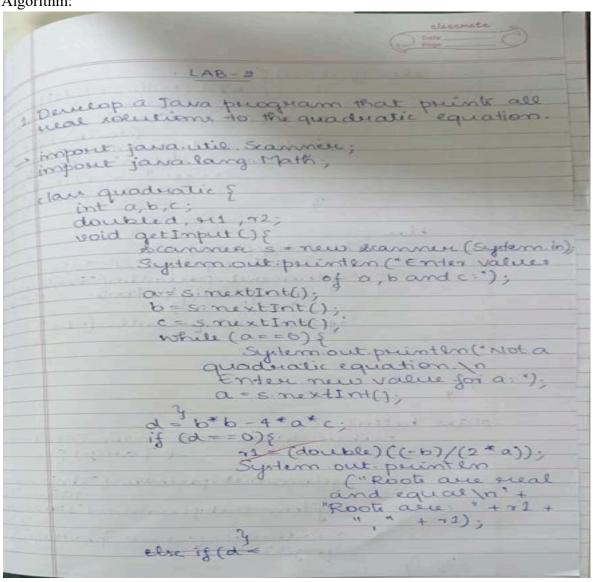
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Github Link:

https://github.com/AnjanaManoj-05/Java-lab

Program 1

Implement Quadratic Equation



else if (d >0) { 11 = ((-b) + (Hath sqrt(d))) (double) (2 ta) 72 = ((-b) - (Hath sqn +(d) (double) (2+ System out print en ("Rook are real n' + "Root 72) else ? 12 = (-b)/(2+a); 12 = Math sqrt(-d)/(2*a); System out pountin (* Roots auc System out printer (al + "-i"+ claus hellof public static void main (String f) augi) { System out printen (Anjana System out println ("18423656 quadratic q= new quadratich

```
Output:
Enter values of a, b and c:
Not a quadratic equation
Enter new value for a
Roots: 0.0 + 11.3228356555954
0.0 - 11.3228756555954
Enter value of a, b and c
1
9
1
Roots are real and equal
Roote are: - 1.0, -1.0
Enter value of a, b and c:
- 5
6
Roots are real
Roote asu: 3.0,2.0
```

```
Code:
import java.util.Scanner;
import java.lang.Math;
class quadratic{
int a,b,c;
double d,r1,r2;
void getInput(){
Scanner s = new Scanner(System.in);
System.out.println("Enter values of a,b and c:");
a=s.nextInt();
b=s.nextInt();
c=s.nextInt();
while(a==0){
System.out.println("Not a quadratic equation.\nEnter new value for a:");
a=s.nextInt();
d=b*b-4*a*c;
```

```
if(d==0)
 r1=(double)((-b)/(2*a));
 System.out.println("Roots are real and equal\n" + "Roots are: " + r1 +","+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\n" + "Roots are: " + r1 +","+r2 );
}
else{
r1=(-b)/(2*a);
r2 = Math.sqrt(-d)/(2*a);
System.out.println("Roots are imaginary\nRoots: " + r1 + "+ i" +r2 );
System.out.println(r1 +"- i"+r2);
}
}}
class hello{
public static void main(String [] args){
System.out.println("Anjana Manoj");
System.out.println("1BM23CS038");
quadratic q=new quadratic();
q.getInput();
```

}}

Calculation of Student SGPA

16 10 24	Cherrida Cherrida
	LAB-3
	Develop a Java program to execute a class student with members um, name, an array credit and an array man Include method to accept and dipplay details and a method to coessiste SGE
\rightarrow	impout java-util scanner;
	clau student & f String um, name; int m() = new int(&); int () = new int(&); double g, es, te, sgpa, Scanner s = new scanner (System in);
	System out println ("Enter
	System out pountin("Enter
	System out pounten("Enter
	for (int i=0; i<8; i++){
	System out printen ("Ente endite for 8 subjects,");
	Subjects 1;

```
-for (int 1=0, 1=8, 1++); c(1)
  world diplay () & System out printer ( um "+
          System out println ("Mark".

-for (int 1-0, i < 8; i++);

System out println (
"Mark"+
                                         (i+1)+
                                               m(i));
word sapatalely
             System out printled was
           -for (int i = 0; i < 8; i++){ if (m(i)++) 

ing = (m[i]/10)+1;} is (m(i)++);

est = g * c(i);

+C+= c[i);
            Sapa = (double)es/(double)tc;
           System out printen (sgpa);
```

clan tellos public static void main (string () Student of] = new student(3 -for (int i-0; i<3; i++) ; S[i] - new student(); -for (int j=0, j <3; j++); Sydem out printer ("Enter details (j+1)+ studenti) for (int k=0, k=2; k++) & System-out printers (" Details of " + " Student) is[k]. du play(); for (int i=0, i=8; i++) { System out printen " students ") S[i] sapacauce);

```
Enter details of 1 student
Enter un 1
ETHER TOWNE a
Enter mark
100
Enter credite for 8' subjects.
Details of 1 student:
Nome a
Marke:
Maux 1 98
Mank 2:100
Make 8 199
Mark 4 : 99
Mark 5:96
Mark 6 2 93
Mask 9 , 92 , 100
Mourk 8 = 95
SGPA of I student:
```

Code:

import java.util.Scanner;
class Student{
String usn,name;
int m[]=new int[8];
int c[]=new int[8];
int g,eS,tC;
double sgpa;
Scanner s=new Scanner(System.in);
void details(){

```
System.out.print("Enter usn:");
usn=s.next();
System.out.print("Enter name:");
name=s.next();
System.out.println("Enter marks:");
for(int i=0;i<8;i++){}
m[i]=s.nextInt();
}
System.out.println("Enter credits for 8 subjects:");
for(int i=0;i<8;i++){
c[i]=s.nextInt();
}
}
void display(){
System.out.println("usn:" +" "+usn);
System.out.println("Name:" +" "+name);
System.out.println("Marks:");
for(int i=0;i<8;i++){}
System.out.println("Mark " + (i+1) +":" +m[i]);
}
void sgpaCalc(){
System.out.println("usn:" +" "+usn);
for(int i=0;i<8;i++){}
if(m[i]==100){
g=10;
}
else{
g=(m[i]/10)+1;
}
eS+=g*c[i];
tC+=c[i];
}
sgpa=(double)eS/(double)tC;
System.out.println(sgpa);
if(sgpa <= 4.0)
System.out.println("Student has failed");
}
class hello{
public static void main(String [] args){
```

```
System.out.println("Anjana Manoj");
System.out.println("1BM23CS038");
Student s[]=new Student[3];
for(int i=0;i<3;i++){}
s[i]=new Student();
for(int j=0; j<3; j++){
System.out.println("Enter details of "+""+(j+1)+" student:");
s[j].details();
}
for(int k=0; k<3; k++){
System.out.println("Details of "+""+(k+1)+" student:");
s[k].display();
for(int i=0; i<3; i++){
System.out.println("SGPA of "+" "+(i+1)+" student:");
s[i].sgpaCalc();
}
}
}
```

```
C:\Ubers\Admin\Desktop>java helio
Anjana Manoj
18925C5838
Enter details of 1 student:
Enter usn:1
Enter mane:a
Enter manks:
95
Enter credits for 8 subjects:
  1
Enter details of 2 student:
Enter usn:2
Enter name:b
Enter marks:
  65
Enter credits for 8 subjects:
   1
Enter details of 3 student:
Enter usn:3
Enter name:c
Enter marks:
23
   39
Enter credits for 8 subjects:
```

```
Details of 1 student:
usn: 1
Name: a
Marks:
Mark 1:98
Mark 2:100
Mark 3:99
Mark 4:97
Mark 5:96
Mark 6:93
Mark 7:92
Mark 8:95
Details of 2 student:
usn: 2
Name: b
Mark 1:78
Mark 5:67
Mark 3:89
Mark 2:67
Mark 3:89
Mark 4:66
Mark 5:69
Mark 7:65
Details of 3 student:
usn: 3
Name: C
Marks:
Mark 1:23
Mark 1:25
Mark 1:25
Mark 1:25
Mark 1:26
Mark 1:27
Mark 1:28
Mark 1:29
Mark 1:29
Mark 3:35
Mark 5:25
Mark 6:37
Mark 7:38
Mark 5:39
SGPA of 1 student:
usn: 2
7.5
SGPA of 3 student:
usn: 3
3.65
Student has failed
```

Demonstration of array of objects of each book type

LAB - 4 3. (sceate a class Book which compains four members name, author, price, num-page Include a constructor to set the values for the members Include methods to set and get the details of the objects. Include a Hostrung() method that could duplay the complete details of the book. Develop a Java perogram to create in book objects imposit java util scanner; clair Book ? String name, author; Book (struing name, Struing author int price, int numbages) ; this name = name; this author author, this price = pruce; this numpage = numpages; public storing tastering () { Strung name, author, price, numpager, name = Bookname + this name + author = "Author name this author + : January 10 AT 35

posice : "Price" + this point + mumpage - Number of page + this rumlage 9 1/2, return name + author + price + mumbagu; claus Runs public static vid main (Strung aug []) \$ Stammen 5 - new Scammen (Zystem in) int on price, numbages; System out print (Enter number of detaile 1; n=smextint() Book b[]: new Book[n]; for (int beo, ien; itt); System out perintling. Entire details of 4 (1+1)+ System out-parinten Enter name smext() System out printers Emler author) author = 5 next(); System out printen ("Enter price ");

```
whem outprinten ("Enter
                       number of page
         b[i] a new Book Grame, author
        System out prum em ()
        for (intieo, ich; itt) ;
               System out printer (
                         . 1/2, 4
Enter number of details 1
Enter details of 1 "
Enter name Mathe
Enter author: RSA
Enter price 120
Enter number of pages 110
Record 1:
Book manne Mathe
Author noune RSA
Price 1120
Marober of page 110
```

```
Code:
import java.util.Scanner;
class Book{
String name,author;
int price,numPages;
Book(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 Run{
public static void main(String args[]){
Scanner s=new Scanner(System.in);
int n,price,numPages;
String name, author;
System.out.println("Anjana Manoj");
System.out.println("1BM23CS038");
System.out.print("Enter number of details:");
n=s.nextInt();
Book b[]=new Book[n];
for(int i=0;i< n;i++){
System.out.println("Enter details of " +(i+1)+":");
System.out.print("Enter name:");
name=s.next();
System.out.print("Enter author:");
author=s.next();
System.out.print("Enter price:");
price=s.nextInt();
System.out.print("Enter number of pages:");
numPages=s.nextInt();
b[i]=new Book(name,author,price,numPages);
System.out.println();
for(int i=0;i<n;i++){
System.out.println("Record "+(i+1)+" :\n"+b[i].toString());
}
}
```

```
Anjana Manoj

18M23CS038
Enter number of details:3
Enter details of 1:
Enter name:Maths
Enter author:RSA
Enter price:120
Enter number of pages:23
Enter details of 2:
Enter name:Science
Enter author:Pearson
Enter price:130
Enter number of pages:45
Enter name:Maths
Enter details of 3:
Enter name:Maths
Enter author:RDS
Enter author:RDS
Enter price:145
Enter number of pages:67

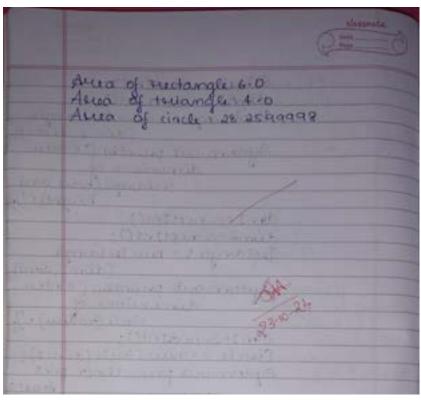
Record 1:
Book name: Maths
Author name: RSA
Price: 120
Number of pages: 23
Record 2:
Book name: Science
Author name: Pearson
Price: 130
Number of pages: 45
Record 3:
Book name: Maths
Author name: Pearson
Price: 138
Number of pages: 45
Record 3:
Book name: Maths
Author name: RDS
Price: 145
Number of pages: 67
```

Demonstration of Abstract class

4. Develop a Java pregnam to weate an abstract you named shape that contains two integers and an empty method named printheua () Provide three claves named Rudange, Truange and little with that each one of the clause extends the class shape. Each one of the clauses contain only the method pluinthua () that printe the area imposet java will scarmer; abstract class shape ? double direct, direct, Shape (double x, double 4) { dimi1 = x; dim2 = 4, abstract double printhrua (), clau Rectarge extends shape } Rectangle (Double a Double b) Super (a, b), double printherally ystem out printen ("Area" of rectangle return dim1 dim2 class Triangle extends Shape ! Truangle (Double a, Double b) 5 super (a,b);

double printasua () {
System out printen "Asiea of return 0.5 " dims" dimzclass Clarke extends snape f Circle (double a) ; double pseintAsua (); · Systemout printer "Asua of re' return 3.14 dim1! dimi class necekt public static void main (string augic3) ? double dims, dims, (Systemin) Systemout privates of suctarryle (herngth and breadth): ");

clima 1 = 5. rextInt() dimes nextint(); Kectangle + - new Ristangle (dim1, dim2); System out printing Enter diminien of triangle (bour and height): dim1 = s nextInt() dima-s-nextInt(); Triangle t = new Triangle (dirn1, dim2) System but printer ("Enter dimensions of Circle (rodius). dim 1=3. nextInt(); Circle c - new Circle (dim 1); System out prumtln (1. print System out println(+ println) System out println(c. printAreal Output: Enter dimensions of sustange (length and bruadth): Enter dimensions of towards (box and Enter dimensions of circle (radius):



```
Code:
import java.util.Scanner;
abstract class Shape{
double dim1,dim2;
Shape(double x,double y){
dim1=x;
dim2=y;
}
abstract double printArea();
class Rectangle extends Shape{
Rectangle(double a,double b){
super(a,b);
}
double printArea(){
System.out.print("Area of rectangle:");
return dim1*dim2;
class Triangle extends Shape{
Triangle(double a,double b){
super(a,b);
double printArea(){
System.out.print("Area of triangle:");
```

```
return 0.5*dim1*dim2;
}
}
class Circle extends Shape{
Circle(double a){
super(a,1);
}
double printArea(){
System.out.print("Area of Circle:");
return 3.14*dim1*dim1;
}
class week{
public static void main(String args[]){
double dim1,dim2;
System.out.println("Anjana Manoj");
System.out.println("1BM23CS038");
Scanner s=new Scanner(System.in);
System.out.println("Enter dimensions of rectangle(length and breadth):");
dim1=s.nextInt();
dim2=s.nextInt();
Rectangle r=new Rectangle(dim1,dim2);
System.out.println("Enter dimensions of triangle(base and height):");
dim1=s.nextInt();
dim2=s.nextInt();
Triangle t=new Triangle(dim1,dim2);
System.out.println("Enter dimensions of circle(radius):");
dim1=s.nextInt();
Circle c=new Circle(dim1);
System.out.println(r.printArea());
System.out.println(t.printArea());
System.out.println(c.printArea());
}
```

```
C:\Users\Admin\Desktop>java week
Anjana Manoj

1BM23CS038
Enter dimensions of rectangle(length and breadth):
2 3
Enter dimensions of triangle(base and height):
2 4
Enter dimensions of circle(radius):
3
Area of rectangle:6.0
Area of triangle:4.0
Area of Circle:28.2599999999998

C:\Users\Admin\Desktop>
```

Demonstration of Bank

```
LAB T
5 Develop a Java program to weate a clave
 Bank that maintains two kinds of account
 for its sudomers, one called sowings
 account and the other current account.
 the saving account provide compound interest & withdrawood facilities but no theque book facility the current account
 provides chique took facility but no
  interest.
 imposet java util scarmer,
 tlam - Account ?
     Shing automobilines
         string account lipe
         double balance;
         Account (string name, string
            Occ Neumber,
                 String autipe);
                custome Name name
                 accountNumber -accNumber
                  committype = occtype;
                   balance - 0.
          word deposit (double arround)
                  basance, - amount.
                   Sydemout painting
                      "Deposited" + amount
                          . . . updated
                       balance "+ balance
```

void displayBalance() { System out printen ("Acce Balance" + balance) soid withdraw (double amount); System out printen ("The operation is specific to accom-1-lype "); class sourcount extends Account , SanAccount (String name, struing accolumbe super (manu, acc Numb 'Savinge'); compute void computationerus () ? double interest = balama * 0.08 System out printing interest + " balance with interest "+ Chalance + interest)); word withdrawy double arrows

Void chesk tin Balance () (balance (5000) } change impound 300" Updated balan + balance); Void withdraw (double amount) ((balance >= amount) balance = amount System out print in (withdrawm amount + ", Updated balana - (balance), thrikMinealanu (System out privally f"Innigiaint balance"); class Account bemo [public static wold main (stering [] augs) ? while Herry Scarner or - run scarrer (system Eightern and Territal But (" Enter 2" for sensings to

```
account upe - ac must not 1)
   of (accountings > 3) break;
    "upterm out presisten (" Enter the roung"
   returns rooms - a writherth
   System out printing the the Account Number
   sturing action of mattenact;
   experienced printer (Finise 1 to deposit ")
   System out printen ("Enter & to Expect")
    System out printer ("Entir's to deposit")
                                       · diptay
    (accountable = = 1) {
        System out pounten ( Erder + for interest).
         volule ( trum ) ?
                int put - se notantly
                 If ( price - 0) system out puinten ("Enter the
                                       amount ).
-- 3/6
                         double amount sis methodis
demitted cutes
4 for Minbalanti);
in Account s - Turn clear if ( great == 2) }
cus A acount (nonu,
                      System out printen ("Enter the
DLIVO),
                        double arround st netbouber();
( ( same ) started
int pour a restant
 if ( pool - - 1) ?
                  elu it (prige = 3)
   system out
  pountin ("Enter"
                              o dupla y Balance ();
the amounts;
double amount -
                    elu if (paul == 4) {
  Si-Mirk Doublets ();
                            5 computationescate);
 5-deposit (amount)
                     elia if (yend == 5) [ a corrigoriant nterest (a 05 15)
the floors - (1) }
 Syllen amount
                       the meak
   = St. restbacks ()
& sideposit (arresid)
```

```
Enter I for savings
Enter of for wount
Enteu noume
Exter account number
Enter 1 to deposit
Evaler a to weithdrass
Enter 3 to display
Exiter 4 for interest
Exiter 5 for compound interest
Enter amount
Deposited 9000 updated balance 900 0
Enter amount 100
Account Balance = 800 0
Interest added 290
Balance with interest $24.0
compound interest is
1693.5130039
Updated balance
34935130834
```

```
Code:
import java.util.Scanner;

class Account {
    String customerName;
    String accountNumber;
    String accountType;
    double balance;

Account(String name, String accNumber, String accType) {
        customerName = name;
        accountNumber = accNumber;
        accountType = accType;
        balance = 0;
    }
}
```

```
void deposit(double amount) {
     balance += amount;
     System.out.println("Deposited: " + amount + ". Updated balance: " + balance);
  }
  void displayBalance() {
     System.out.println("Account Balance: " + balance);
  }
  void withdraw(double amount) {
     System.out.println("This operation is specific to account type.");
  }
}
class SavAccount extends Account {
  SavAccount(String name, String accNumber) {
     super(name, accNumber, "Savings");
  }
  void computeInterest() {
     double interest = balance * 0.03;
     System.out.println("Interest added: " + interest + ". balance with interest: " +
(balance+interest));
  }
  void withdraw(double amount) {
     if (balance >= amount) {
       balance -= amount;
       System.out.println("Withdrawn: " + amount + ". Updated balance: " + balance);
    } else {
       System.out.println("Insufficient balance.");
    }
  }
   void compoundInterest(double rate, int time) {
   // Formula for compound interest
     double ci = balance * Math.pow(1 + (rate / 365), 365 * time);
     System.out.println("Compound Interest is: " + ci + ". Updated balance: " + (balance+ci));
  }
}
class CurAccount extends Account {
  CurAccount(String name, String accNumber) {
```

```
super(name, accNumber, "Current");
  }
  void checkMinBalance() {
     if (balance < 5000) {
       balance -= 300;
       System.out.println("Balance below minimum. Service charge imposed: 300" + ". Updated
balance: " + balance);
  }
  void withdraw(double amount) {
     if (balance >= amount) {
       balance -= amount;
       System.out.println("Withdrawn: " + amount + ". Updated balance: " + balance);
       checkMinBalance();
    } else {
       System.out.println("Insufficient balance.");
    }
  }
}
class AccountDemo {
  public static void main(String[] args) {
     Scanner sc = new Scanner(System.in);
while(true){
System.out.println("enter 1 for savings \n enter 2 for Current ");
int accountType = sc.nextInt();
if(accountType>=3) break;
String bank = sc.nextLine();
System.out.println("Enter the name: ");
String name = sc.nextLine();
System.out.println("Enter the Accout Number: ");
String accno = sc.nextLine();
System.out.println("Enter 1 to deposit");
System.out.println("Enter 2 to withdraw");
System.out.println("Enter 3 to Display");
if(accountType==1){
System.out.println("Enter 4 for Interest");
System.out.println("Enter 5 for Compound interest");
SavAccount s = new SavAccount(name,accno);
while(true){
int pref = sc.nextInt();
if(pref==1){
System.out.println("Enter the amount ");
```

```
double amount = sc.nextDouble();
s.deposit(amount);
}
else if(pref==2){
System.out.println("Enter the amount ");
double amount = sc.nextDouble();
s.withdraw(amount);
}
else if(pref==3){
s.displayBalance();
else if(pref==4){
s.computeInterest();
else if(pref==5){
s.compoundInterest(0.05,15);
else break;
}
else if(accountType==2){
System.out.println("Enter 4 for checkMinBalance");
CurAccount s = new CurAccount(name,accno);
while(true){
int pref = sc.nextInt();
if(pref==1){
System.out.println("Enter the amount ");
double amount = sc.nextDouble();
s.deposit(amount);
else if(pref==2){
System.out.println("Enter the amount ");
double amount = sc.nextDouble();
s.withdraw(amount);
else if(pref==3){
s.displayBalance();
else if(pref==4){
s.checkMinBalance();
else break;
else break;
```

```
}
}
C:\Users\Admin\Desktop>java AccountDemo
Anjana Manoj
1BM23CS038
enter 1 for savings
 enter 2 for Current
Enter the name :
Enter the Accout Number :
2345
Enter 1 to deposite
Enter 2 to withdraw
Enter 3 to Display
Enter 4 for Interest
Enter 5 for Compound interest
Enter the amount
Deposited: 900.0. Updated balance: 900.0
Enter the amount
100
Withdrawn: 100.0. Updated balance: 800.0
Interest added: 24.0. balance with interest: 824.0
Compound Interest is: 1693.5130234676237. Updated balance: 2493.5130234676235
```

Demonstration of Package

LAB-G 6. Chiale a package CIE which has two clarke - student and Internal - The class Student has memberalike um, nam bens. The claw interenals desired from Student has an armay that store the internal marks scooled in five course of the current remeder of the student Cheate another package see which has the class External which is a desired class of student. This class has an array that storms the see marks scored in five conven of the current semestr of the student. Import two package in a full that declare the final marks of m students in all five conven. CIE Student Java package CIE; imposit java util Scanner, public class students preotected string um - new strungs preplected Street name - new street preotected int rem; public void inputstudent Debuter Scanney SC = new Scanney (Sydem in) System out print ("Enter um -advine wm=sc-next()

Eydern out primter ("Enter rume"). name or Test () System out printing Enter semula ? sem = se nectint() public void duplaystudent Details (); System out printing student detoule 1) System-out printen ("usis) System out printer (Name System out printer ("sem Irdunal java parkage CIE, inoposit java will scanney public day Internal extend student protected int marce () new int(s); public void inputationarches (system in) System out print log Enter cie marter"); for (int i= 0; ix 5; l+ +) \$ thought [1] . st. freel Intl

External java package se e; Imposet cre Internal; import javanche scarmer; public clay external external Internal; predected int marke(); predected int foralmoute(); predice external () { marke = new int(s); finalmoute = new int(s); foralmoute = new int(s); Scarmer ser new scarmer (Sydem's sydem of sydem out predicting Enter see marke for (int i = 0; i < 5; i + t); public word calculate final flanke(); public word calculate final flanke(); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t); public word calculate final flanke(); super marke [i] + super marke [i] +
package SE & import com Intermale import javandil Scarmer; public class Exterioral external Intermale protected int market); prestected int foralmoute []; public External () [marke = new int(s); finalmoute = new int(s); public word inputsEE market () { Scarmer ser new Scarmer (Sydem of Ayrtem out printling (Enter SEE market) Jor (int i=0, i=5, i+t); marketi) = screetInt(); public word calculate final flanket() { for (int i=0; i=5; i+t) { for (int i=0; i=5; i+t) { public word calculate final flanket() { for (int i=0; i=5; i+t) { protected int market(i) }
package SE & import com Intermale import javandil Scarmer; public class Exterioral external Intermale protected int market); prestected int foralmoute []; public External () [marke = new int(s); finalmoute = new int(s); public word inputsEE market () { Scarmer ser new Scarmer (Sydem of Ayrtem out printling (Enter SEE market) Jor (int i=0, i=5, i+t); marketi) = screetInt(); public word calculate final flanket() { for (int i=0; i=5; i+t) { for (int i=0; i=5; i+t) { public word calculate final flanket() { for (int i=0; i=5; i+t) { protected int market(i) }
package SE & ; Import CIE Internal ; import javandil Scarmer; public clare External external Internal ; predected int markel); predected int fivalmores []; public External () [marke - new int(s); finalmores - new int(s); scarmer ser new scarmer [Sydem of Ayrtem out printlen (Enter SEE marker) Jor (int i=0, i<5, i+t); marke(i) - se restInt(); public void calculate [inalt] areas for (int i=0; i<5; i+t); public void calculate [inalt] areas for (int i=0; i<5; i+t); public void calculate [inalt] areas for (int i=0; i<5; i+t);
package SE & import com Intermale import javandil Scarmer; public class Exterioral external Intermale protected int market); prestected int foralmoute []; public External () [marke = new int(s); finalmoute = new int(s); public word inputsEE market () { Scarmer ser new Scarmer (Sydem of Ayrtem out printling (Enter SEE market) Jor (int i=0, i=5, i+t); marketi) = screetInt(); public word calculate final flanket() { for (int i=0; i=5; i+t) { for (int i=0; i=5; i+t) { public word calculate final flanket() { for (int i=0; i=5; i+t) { protected int market(i) }
Import javandis scarmer; public class Exterent externed Interent; protected int marke(); protected int finalmarke(); public External () { marke - new int(s); finalmarke - new int(s); Scarmer so: The Scarmer (Sydem of Ayrkmout printlin(Enter SEE marke) for (int i = 0; i < 5; i + t) { marke(i) = ScaretInt(); public word calculate final Marke(); for (int i = 0; i < 5; i + t) { public word calculate final Marke(); for (int i = 0; i < 5; i + t) { protected int marke(i) + marke(i) +
public class exterioral external Interioral protected int marker(); protected int finalmarke(); public External () { marke = new int(s); finalmarke = new int(s); Scanner so: new scanner(sydem exprisement so: new scanner see marker) Scanner so: new scanner sydem exprisement principle (int i=0; i<5; i+t); marke(i) = screetint(); public word calculate final Marke(); for (int i=0; i<5; i+t); for (int i=0; i<5; i+t);
public class exterent external Interent protected int marke(); protected int foralmarke(); public external () { marke = new int(s); finalmarke = new int(s); public word inputseemarke(); Scanner so: new scanner (Sydem of Ayrkem out println(Enter see marke); for (int i = 0; i < 5; i + t); marke(i) = screetInt(); public word calculate final Marke(); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t);
predected int finalmoute[]; predected int finalmoute[]; public External () { marks - new int(s); finalmoute - new int(s); public word inputsee marks(); Scanner so: new scanner (Sydem of Ayrkmout printlen (Enter see monte) for (int i=0; i<5; i+t); marks[i] = screetInt(); public word calculate final flanks(); for (int i=0; i<5; i+t); for (int i=0; i<5; i+t);
prestected int finalments[]; public External () { marks = new int(s); finalments = new int(s); Scanner so: new scanner (Sydem of Ayrkm out printlen ("Enter see mants) for (int i = 0; i < 5; i + t) { marks(i) = sc next Int(); y public word calculate final () are for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i + t) { for (int i = 0; i < 5; i
public External () { marks = new int(s); finalmarks = new int(s); public word inputseemarks(); Stammer so: new scanner (sydem of a sydem out printling Enter see marks for (int i = 0; i < 5; i + t); marks(i) = screetInt(); y public word calculate final Marks(); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t); for (int i = 0; i < 5; i + t);
public void inputseemantal); Scanner son new scanner (Sydem of Expression of Express
public soid inputsee marche(); Scanner son the scanner (Sydem of Ayrkmout printlen (Enter see mark) Jor (int i=0; i<5; i+t); marke(i) = screet Int() public soid calculate final flanks(); for (int i=0; i<5; i+t); final marks [i] = marks [i] +
public soid calculate final flanks () for (int i=0; i<5; i++); marke(i) = screet Int(); public soid calculate final flanks (); for (int i=0; i<5; i++); final marks (i) = marks [i] +
public soid calculate final flanks () for (int i=0; i<5; i++); marke(i) = screet Int(); public soid calculate final flanks (); for (int i=0; i<5; i++); final marks (i) = marks [i] +
public soid calculate final flanks () for (int i=0; i<5; i++); marks(i) = 5; restIm(); public soid calculate final flanks (); for (int i=0; i<5; i++); final marks [i] = marks [i] +
public void calculate [inalt] aske() for (int i=0; i<5; i++) { firstmarks [i] = masks [i] +
public void calculate [inst] public void calculate [inst] anke() for (int i=0; i<5; i++) { for (int i=0; i<5; i++) {
public void calculate final Marke (1) for (int i-0; i<5; i++) { for firstmarks [i] + marks [i] +
for (int i=0; i<5; i++) { iralmanus [i] +
for (int i=0; i<5; i++) { iralmanus [i] +
firalmante (i) + mante [i] +
The state of the s
traction of the distance of
public word displayFinalManki(){
diplaystudentdetaile();
Systemout printer ("Final
makke for 5 wetjech)
{ox(int i=0, i=5, i+t);
Eightemout printle
("Subject "+(i+1)+":"+

```
finalmank(1)),
main java
imposed SEE External,
inflowed (1E. +;
imposet java util Scamus;
clau Main &
     public static vold main (string argil)
         Scanner SC- new Scanner (System
         bytem out point ( Enter the
         int ness next int ?
         Exterinal student (1 - new
                              Externally
         -for (int 1=0; i=n; i++);
               student[i] - new External()
               Student [i] inputs whent
                            Detaile();
               Etudent (i) input clemante
                student[i] inputseemobil
                Hudent [i]. calculate Final
                 Marchel);
               Student[i]. display Final
```

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Tin Tin
The state of the s
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O/P
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Enter um (D)
Enter name abo
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Enter see manks:
24
34
45
50
50
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USNI+ (0)
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Final manks for 5 subjects:
Subject 1:49
Subject 1:58
Subject 3:39
Subject 4: 95
Suffect 5:96
Enter cum: 102.
Enter name: xyz
Enter semulen 3
Enter CIE marks:
12
10
19
34

```
Student details:

USN 102

Name: 149

Lem: 3

Final manks for 5 Miljerts:

Subject 1:36

Subject 2:45

Luffect 3:65

Subject 4:84

Subject 5:99
```

Code:

1. CIE:

Internals.java

```
package CIE;
import java.util.Scanner;
public class Internals extends Student {
  protected int marks[]=new int[5];
  public void inputCIEmarks(){
    Scanner sc=new Scanner(System.in);
    System.out.println("Enter CIE marks:");
  for(int i=0;i<5;i++){
    marks[i]=sc.nextInt();
  }
}}
```

Student.java

```
package CIE;
import java.util.Scanner;
public class Student{
  protected String usn=new String();
  protected String name=new String();
  protected int sem;
  public void inputStudentDetails(){
```

```
Scanner sc=new Scanner(System.in);
           System.out.print("Enter usn:");
           usn=sc.next();
           System.out.print("Enter name:");
           name=sc.next();
           System.out.print("Enter semester:");
           sem=sc.nextInt();
           }
           public void displayStudentDetails(){
           System.out.println("Student details:");
           System.out.println("USN: "+usn);
           System.out.println("Name: "+name);
           System.out.println("Sem: "+sem);
           }
           }
2. SEE:
           External.java
           package SEE;
           import CIE.Internals;
           import java.util.Scanner;
           public class External extends Internals{
           protected int marks[];
           protected int finalmarks[];
           public External(){
           marks=new int[5];
           finalmarks=new int[5];
           public void inputSEEmarks() {
           Scanner sc = new Scanner(System.in);
           System.out.println("Enter SEE marks:");
           for(int i=0; i<5; i++){
           marks[i]=sc.nextInt();
           }
           public void calculateFinalMarks() {
           for(int i=0; i<5; i++){
           finalmarks[i]=marks[i]+super.marks[i];
           }
```

```
}
               public void displayFinalMarks() {
               displayStudentDetails();
               System.out.println("Final marks for 5 subjects:");
               for(int i=0; i<5; i++){
               System.out.println("Subject "+(i+1)+":"+finalmarks[i]);
               }
               }}
3 .Main.java
       import SEE.External;
       import CIE.*;
       import java.util.Scanner;
       class Main{
       public static void main(String args[]){
       System.out.println("Anjana Manoj\n1BM23CS038");
       Scanner sc=new Scanner(System.in);
       System.out.print("Enter the number of students:");
       int n=sc.nextInt();
       External student[]=new External[n];
       for(int i=0;i<n;i++){
       student[i]=new External();
       student[i].inputStudentDetails();
       student[i].inputCIEmarks();
       student[i].inputSEEmarks();
       student[i].calculateFinalMarks();
       student[i].displayFinalMarks();
       }
       }}
```

Program 7

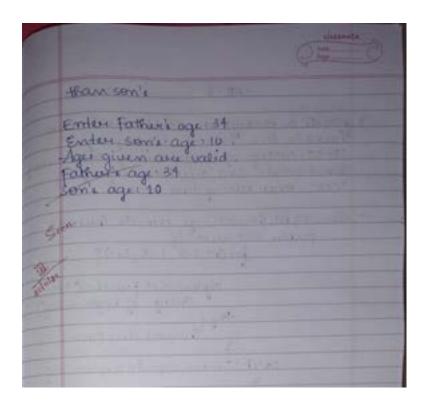
Demonstration of Exception Handling

Algorithm:

	And a
	LAB-7
7,	white a program that dimondrate handling of druptions in inheritance to Cheate a have due called "Father" and a described day called "Son", which every the base class. In father's class impleme a constructor which takes the age and through the exception whong the () when input age < 0. In Son's class implement constructor that was 2 father and son's age and through the exception of son's or pather's age
-	imposet java util Scanner. class mytruption 1 extends Exception { public streing tostering()}
	cannot be equal to or less than zono",
	clan myException 2 extends Exception (public String tostnings) (return Father's age whould be greater than y
	claw Father (int Jage ; Father (int age) [Jage = age;

cood insuring Age () throws my exceptions; if (fage 200) { clau son extende Fathers wint suge; Sem (int fage, intage) [Super (toge); word checkage () thrown my Exceptions if (fage = sage) {
throw new myExceptions class System out printer (Age age + fage + \n son's 44 clau Main & public static void main (String aug (7) { Scanner se - new Scanner System out print ("Enter Father's age ");

int x = se meetInt(); System out print (Enter son age int you so next int (); father 11 = new father(x); Son al nun son (2,4); 1. Wrong Age (), couch (my exceptions e)? System out println ("Exception 51 . checkAge(); catch (my Exception 2 e) {
System out primiler (Exception autput: Enter Fatheric age: 0 Enter some age 23 to one lan than zero Exception Father's age should be quater than son's Enter Father's age 34 Enter some age 54 Exception: Father's age should be greater



Code: import java.util.Scanner; class myException1 extends Exception{ public String toString(){ return "Father's age cannot be equal to or less than zero"; class myException2 extends Exception{ public String toString(){ return "Father's age should be greater than son's"; class Father{ int fage; Father(int age){ fage=age; } void WrongAge() throws myException1 { if(fage<=0){ throw new myException1(); } }}

```
class Son extends Father{
int sage;
Son(int fage,int age){
super(fage);
sage=age;
void checkAge() throws myException2{
if(fage<=sage){
throw new myException2();
}
else{
System.out.println("Ages given are valid.\nFather's age :" +fage+"\nson's age :" +sage);
}}
class main{
public static void main(String args[]){
Scanner sc=new Scanner(System.in);
System.out.println("Anjana Manoj\n1BM23CS038");
System.out.print("Enter father's age:");
int x=sc.nextInt();
System.out.print("Enter son's age:");
int y=sc.nextInt();
Father f1=new Father(x);
Son s1=new Son(x,y);
try{
f1.WrongAge();
catch(myException1 e){
System.out.println("Exception: "+e);
}
try{
s1.checkAge();
}
catch(myException2 e){
System.out.println("Exception: "+e);
}
}}
```

```
C:\Users\Admin\Desktop>java main
Anjana Manoj
1BM23CS038
Enter father's age:0
Enter son's age:23
Exception: Father's age cannot be equal to or less than zero
Exception: Father's age should be greater than son's
C:\Users\Admin\Desktop>java main
Anjana Manoj
1BM23CS038
Enter father's age:34
Enter son's age:35
Exception: Father's age should be greater than son's
C:\Users\Admin\Desktop>java main
Anjana Manoj
1BM23CS038
Enter father's age:34
Enter son's age:10
Ages given are valid.
Father's age :34
son's age :10
```

Program 8

Demonstration of Threads

Algorithm:

100	
	LAB-8
8	Write a preogram which create the threads, one thread displaying once every ten seconds and another displaying of cost once every two seconds.
->	clan Mullithreadings extends Thread { public void sum () { for (int i=0, i=5, i+1) {
	System and privalen ("BMS College of Engineering"); Theread eleep (10000).
	tatch (Interumpted Exception e) {
	3 3 3
	clan Multithreadings extend Thread & public void num ()
	forfint (=0, i <5; i++) 5 System out, println("CSE") truy i
	Theread map(2000),
	catch (Interrupted Exception e) {
	3

```
class Ma main ?
0/1:
CSE
CSE .
CSE
CSE
CSE
```

Code:

```
class Multithreading1 implements Runnable{
public void run(){
for(int i=0;i<5;i++){
   System.out.println("BMS College of Engineering");
   try{
   Thread.sleep(10000);
}
catch(InterruptedException e){
}
}}</pre>
```

```
class Multithreading2 implements Runnable{
public void run(){
for(int i=0; i<5; i++){
 System.out.println("CSE");
 try{
Thread.sleep(2000);
catch(InterruptedException e){
}}
class implementsthreads{
public static void main(String args[]){
System.out.println("Anjana Manoj\n1BM23CS038");
Multithreading1 m1=new Multithreading1();
Thread mt1=new Thread(m1);
mt1.start();
Multithreading2 m2=new Multithreading2();
Thread mt2=new Thread(m2);
mt2.start();
}
```

Program 9

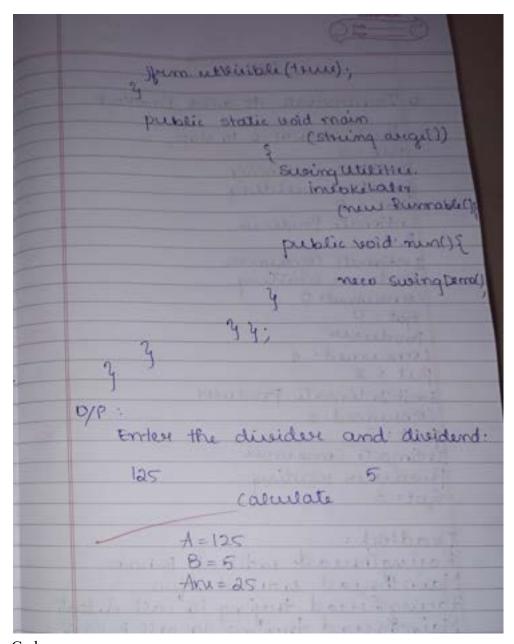
User interface for division of numbers

Algorithm:

L-AB-9 9. White a program that create a were interface to physican integer distinctions fields Num and Nums? The division Numal and Numeria displayed in the Renet field when the Divide button a clicked import javarewing. impout java aut "; imposet java aut event. +; clau Swing Demo [Swing Demal) & Horanie John & new Terranie J.Frank ("Disider to Shurn retsige (295, 190); Flow Layou (1) ifrom set Default close Operation / I frame EX (T_ON)_CLOS Tabel flab - new Jlabel ("Enter the divider and dividend: ") Textfield aft - new Textfield bjef - new Jextfield() I fextfield (8)

```
Button button - now Button
                   (" (alculate");
Itabel wer = new Itabel();
Itabel alab - new Itabell);
Itabel blab - new Itabelli,
Ilabel amelab - new Itabell;
 ifum add (m);
   um add ( flat)
   from add (ajt);
from add (bill);
from add (bullen);
   jum add (alab);
   jfum add(bab);
   form add (anelat);
  -Attionlistenin 1 = new
                     ActionLuterrent)5
          public void actionfundament
              (Action Event wiff
                Systemout println
                    ( Action event
                       from a text
                            field")
 ait add Adlenkir enwell;
  bit add Action Luterum (1) how
             Actionly () {
```

public soid action Performed CALLIAM EVEN (Action Event ent) int at Integer parent int b - Integer parent int ani a/o, alab set Text (" \n A blab kittert('InB - "+ bl anulab. uttext ("Indra. Catch (Number Form at Except) alab ed Text (" ") blab setText("); en setjext (Ender Duly Integeral) catch (withmitic Exception e); ialab ecttext(1) blab set Text (* en set [ext enter 333



```
Code:
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
   jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
   // text label
```

```
JLabel jlab = new JLabel("Enter the divider and divident:");
// add text field for both numbers
JTextField aitf = new JTextField(8);
JTextField 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 :)
ifrm.add(err); // to display error bois
jfrm.add(jlab);
jfrm.add(ajtf);
jfrm.add(bjtf);
jfrm.add(button);
ifrm.add(alab);
ifrm.add(blab);
jfrm.add(anslab);
ActionListener I = new ActionListener() {
public void actionPerformed(ActionEvent evt) {
System.out.println("Action event from a text field");
}
};
ajtf.addActionListener(I);
bitf.addActionListener(I);
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();
});
}
}
```



Program 10

IPC and Deadlock

Algorithm:

Code for IPC int no boolean valueset falu; synchronized int gel(); while (!value sit) try 5 System out puintles catch (Interrupted Exception e) { Systemout puinten ("Interrupted Execution caught 1; Systema and println("got "+n) System out fruit to ("In Intimate producer \n') notify(); Synchronized void put (let in) & while (value set) Sydemout privation (In producer waiting to wait(); 4 colch (Irrhampted Exception e) { Systemical printer (Interrupt

Exception caught"); the n=n; Egylern out printen ("fed "4")
Sylem out printen ("/n inter
Consumer (a) Community (1) notify(1) clan Producer implement Rumables 09; Producen (4 4) 5! new Thread (the , " produces") story public upid mun() } int is 0 while (icts) }_ g.pu(i+1) class Consumer implements Rumable (9 9) (commun (9 9)) new Trace of (this , "cornemor") stort() public upid www(); int i=0 while (icic)

if Contance - amount of basance - arrount , System but print in (withdrawn amount t ". Updated Balance balancely else } System out privat lon (Trueffice balance); soid compound Interest (double trate, int time) {
 double ci = balance * Mark. pow(1+ (1011/365)} 365 * time) System out pount en ("compoun Interest is "+ ci+ ". Updated balance" (balance +ci)). class constituent extends the ount ! Coursesount (stowing name, string accountable); Superi rarry, accommon "Current").

Sydem out printers ("A Inter System out printer frame + free to call B. Past Co. b. Last (); word tout(); Sylemout printen ("Inc. clau By String name Thread aurent hour System put printer (marie) In thrust seep (1000); (atch (Exception v) | System (act price to ("B System out printer (name + trying to case sulaitt), word last();

the Deadlock implement Rumable A a - new A(), B b = new B(), Deodlock() { Thread current Thread () at Name Thread + new Thread (thu Rowing Thread); Listant(), cu-loo(b); System out printle ('Back in main thread'), public soid nuncly b ban(a); System out pounting Back in public static wold main (strong new Deadloct ();

```
LAB - 10
10. Demondant IPC and Deadlock
    Peren contrat-c to stop
    intimale consumer
    subducer waiting
    Intimate Producer
    Intimate Conjumer
    Producer waiting
    concumid: 0
    Got : 0
     Produces
    concurred: 1
    Put: 2
    Init Intimate Producer
    Consumed: 2
    Put: 3
    Intimate Conumer
    Broducer waiting
    Got: 3
    Deadlock:
    Racingtheread evoluted Brown
   Main thread entered Afor
Racingtheread trujing to case A last
Main thread trujing to call B last
```

```
Code:
IPC:
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("\nIntimate 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("\nIntimate 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);
j++;
}
}
}
class PCFixed {
public static void main(String args[]) {
Qq = new Q();
new Producer(q);
new Consumer(q);
System.out.println("Press Control-C to stop.");
}
}
```

Anjana Manoj 1BM23CS038 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 Put: 5 Intimate Consumer Producer waiting

Got: 5 Intimate Producer consumed:5 Put: 6 Intimate Consumer Producer waiting Got: 6 Intimate Producer consumed:6 Put: 7 Intimate Consumer Producer waiting Got: 7 Intimate Producer consumed: 7 Put: 8 Intimate Consumer Producer waiting Got: 8 Intimate Producer consumed:8 Put: 9 Intimate Consumer Producer waiting Got: 9 Intimate Producer consumed:9 Put: 10 Intimate Consumer Producer waiting Got: 10

Intimate Producer

consumed:10 Put: 11 Intimate Consumer Producer waiting Got: 11 Intimate Producer consumed:11 Put: 12 Intimate Consumer Producer waiting Got: 12 Intimate Producer consumed:12 Put: 13 Intimate Consumer Producer waiting Got: 13 Intimate Producer consumed:13 Put: 14 Intimate Consumer Got: 14 Intimate Producer consumed:14

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();
Bb = new B();
Deadlock() {
Thread.currentThread().setName("M
ainThread");
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();
}

Anjana Manoj
1BM23CS038

MainThread entered A.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