# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.



LAB REPORT on

# Object Oriented Java Programming (23CS3PCOOJ)

Submitted by

ATHARV BORIKAR(1BM23IC015)

in partial fulfillment for the award of the degree of BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING



### BENGALURU-560019 Sep-2024 to Jan-2025

#### **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 **ATHARV BORIKAR** (1BM23IC015), 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: <a href="https://github.com/Ath007-dev/Lab-Programs">https://github.com/Ath007-dev/Lab-Programs</a>

Program 1
Implement Quadratic Equation

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	Lab Program 1
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	Classmate Date Page
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	System out printly ("No real exculsions);
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8	Les coefficient 6:-3 Les coefficient C: 2
	we test solutions $x_1 = 2.0$ , $x_2 = 1.0$
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C:\Users\borik>cd C:\Users\borik\Documents
C:\Users\borik\Documents>javac QuadraticMain.java
C:\Users\borik\Documents>java QuadraticMain
Enter the coefficients of a, b, c:
1
-1 2
There are no real solutions.
ATHARV
1BM23IC015
C:\Users\borik\Documents>S
```

```
import java.util.Scanner;
class Quadratic
{ int a, b, c;
  double r1, r2, d;
  void getd()
     Scanner s = new Scanner(System.in);
     System.out.println("Enter the coefficients of a,b,c");
     a = s.nextInt(); b = s.nextInt(); c = s.nextInt();
  void compute()
     while(a==0)
       System.out.println("Not a quadratic equation");
       System.out.println("Enter a non zero value for a:");
       Scanner s = new Scanner(System.in);
       a = s.nextInt();
     d = b*b-4*a*c;
     if(d==0)
       r1 = (-b)/(2*a);
       System.out.println("Roots are real and equal");
       System.out.println("Root1 = Root2 = " + 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 and distinct");
       System.out.println("Roo1 = " + r1 + "Root2 = " + r2);
```

SGPA Calculation

	Classific Tour
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	members use hame, an array with a
	Cusay marks
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1	trafts jour solone,
-	class student &
-	Decivate algeria user :
-	puvate int [] credit;
	Prevate int [3] credit;
1	Januare int [7 marks;
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	name: Soanner nentline ();
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	System and prime ("Enter number of subjects");
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	anacket - new ent [ enem subjects ];
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	1 ( magle >= 70 ) sepan 8;
-	of menke > 60 ) Cution 7;
	4 ( marke 7=50 ) yetum 6;
-	retion 0; 11 Yail
	blic Mars Broke & Stold of
	public class Student Styll ?  District Status word now (Strang 17 args) &
	Suchet student: New Indent ()
	shidut acaptavails ();
	moleur display carails ();

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Guler Vicinia & Marka for each Puppel:

Credit for Bubyert 1: 4

Uprate for Bubyert 2: 3

Marks for Subyert 2: 75

Credit for Subyert 2: 75

Credit for Subyert 2: 75

Credit for Subyert 3: 92

CGPA: 8.78
```

#### C:\Users\borik\Documents>javac Main.java

```
C:\Users\borik\Documents>java Main
Enter your Name: ATHARV
Enter your USN: 1BM23IC015
Enter marks for subject 1: 45
Enter credits for subject 1: 3
Enter marks for subject 2: 67
Enter credits for subject 2: 3
Enter marks for subject 3: 78
Enter credits for subject 3: 4
Enter marks for subject 4: 89
Enter credits for subject 4: 4
Enter marks for subject 5: 76
Enter credits for subject 5: 3
Enter marks for subject 6: 78
Enter credits for subject 6: 4
Enter marks for subject 7: 98
Enter credits for subject 7: 4
Enter marks for subject 8: 87
Enter credits for subject 8: 3
Enter marks for subject 9: 67
Enter credits for subject 9: 2
Name: ATHARV
USN: 1BM23IC015
SGPA: 8.0333333333333333
1BM23IC015 - ATHARV
```

C:\Users\borik\Documents>

```
Code:
import java.util.Scanner;
class Subject
int subjectMarks;
  int credits;
  int grade;
class Student
  Subject subject[];
  String name;
  String usn;
  double SGPA;
  Scanner s;
  Student()
     int i;
     subject = new Subject[9];
     for(i=0;i<9;i++)
       subject[i] = new Subject();
     s = new Scanner(System.in);
  void getStudentDetails()
     System.out.print("Enter your Name: ");
     name = s.next();
     System.out.print("Enter your USN: ");
     usn = s.next();
  void getMarks()
     for(int i=0; i<9; i++)
       System.out.print("Enter marks for subject "+(i+1)+" :");
       subject[i].subjectMarks = s.nextInt();
       System.out.print("Enter credits for subject "+(i+1)+" :");
       subject[i].credits = s.nextInt();
       subject[i].grade = (subject[i].subjectMarks/10) + 1;
       if(subject[i].grade==11)
          subject[i].grade = 10;
       if(subject[i].grade<=4)</pre>
          subject[i].grade = 0;
```

```
void computeSGPA()
    int effectiveScore = 0;
    int totalCredits = 0;
     for(int i=0; i<9; i++)
       effectiveScore += (subject[i].grade*subject[i].credits);
       totalCredits += subject[i].credits;
     }
    SGPA = (double)effectiveScore/(double)totalCredits;
class Student_SGPA
{
 public static void main(String args[])
     Student s1 = new Student();
    s1.getStudentDetails();
    s1.getMarks();
     s1.computeSGPA();
    System.out.println("Name: "+s1.name);
    System.out.println("USN: "+s1.usn);
 System.out.println("SGPA: "+s1.SGPA);
}
}
```

Display Book Details

Lat Person I
Lab Program3
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private double price;
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(nt n: scours, new Int ();
System and print ("Enter we of propers:");  (put n: scourmer, resistant();  Screener, was hime ();
Book [] books = new Book []

	Page U
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	for (ind i=0; icn; i+t)?
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1	System and penela ("Enles name")
	System and pentelle ("Enter name"); strong name = scanna mathem ();
1	
	String author = scanner worther ();
1	
1	System out pains ("Ender runnless of pages:");
1	books [i]: new Book (name, withour spice, numbers);
-	2
	Samos close ();
	1
1	
1	Output:
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	quell name : The Great Rodday
	Enter author F Scott 1-17 graled
	Carter piece: 10.09
	Enter neuvloir 9 pages 180
	3 Not white 1/10 PM
	Dolady:
	(Rook 1:
	Box Details
	Name - Year Consol Portator
	Author F. Scott Filewood
	Name: The Great Golden Author: F. Scott Filzwald Pulce: \$10.99
	No g Pages = 180

```
C:\Users\borik\Documents>javac BookDemo.java
C:\Users\borik\Documents>java BookDemo
Enter the number of books: 3
Enter details for Book 1:
Name: atharv
Author: s.naarayan
Price: 540
Pages: 78
Enter details for Book 2:
Name: wings of fire
Author: kalam APJ
Price: 780
Pages: 104
Enter details for Book 3:
Name: HARRY POTTER
Author: R.kipling
Price: 657
Pages: 940
Books Entered:
Book Details:
Name: atharv
Author: s.naarayan
Price: $540.0
Pages: 78
Book Details:
Name: wings of fire
Author: kalam APJ
Price: $780.0
Pages: 104
Book Details:
Name: HARRY POTTER
Author: R.kipling
Price: $657.0
Pages: 940
ATHARV 1BM23IC015
```

C:\Users\borik\Documents>

```
import java.util.Scanner;
class Main{
  public static void main(String args[]){
     int n;
     System.out.print("Enter the number of books:");
     Scanner sc = new Scanner(System.in); n = sc.nextInt();
     sc.nextLine():
     Book books[] = new Book[n];
     for(int i = 0; i < n; i++){
       System.out.print("Enter the book name: ");
       String name = sc.nextLine();
       System.out.print("Enter the author name: ");
       String author = sc.nextLine();
       System.out.print("Enter the price of the book: ");
       int price = sc.nextInt();
       System.out.print("Enter the number of pages in the book: ");
       int numPages = sc.nextInt();
       sc.nextLine();
       books[i] = new Book(name,author,price,numPages);
     }
     System.out.println("");
     for(int i = 0; i < n; i++)
       System.out.println(books[i].toString());
     System.out.println("ATHARV BORIKAR") ;
     System.out.print("1BM23IC015");
    sc.close();
  }
}
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 ;
}
```

Using Abstract Class Shape

	61 8 - 1
	Lab Program 4
9]	Develo a trava Procuram to wate an abbreast
-	das nound Rage und contains two integer
-	and an empty method named peneleteal).
	Develop a Town Program to exacte an about door nound shape that contains two useges and an empty wellod named penel teal of Provide their dassy named herangle Through & arch
4-	
	respose jour well samuer;
	abstract class thape &
	Wellerton int Automa arms 1
	protected int dimension 2;
	3 public aboract void pent trea ();
-	olar Para di sa con di
10	Stars Revangle extends Dage &
	public Belongle (me longely ut breadth) {
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	thu rochus = tadins;
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```
C:\Users\borik\Documents>javac ShapeDemo.java
C:\Users\borik\Documents>java ShapeDemo
Enter length and breadth of the rectangle: 56
87
Enter base and height of the triangle: 24 50
Enter radius of the circle: 67
Area of Rectangle: 4872
Area of Triangle: 600.0
Area of Circle: 14102.60942196458
ATHARV 1BM23IC015
```

```
import java.util.Scanner;
class Main{
  public static void main(String[] args){
    Rectangle ob2 = new Rectangle():
    Triangle ob1 = new Triangle();
    Circle ob3 = new Circle();
    ob2.printArea();
    ob1.printArea();
    ob3.printArea();
    System.out.println("ATHARV BORIKAR") ;
    System.out.print("1BM23IC015");
}
abstract class Shape{
  Scanner sc = new Scanner(System.in);
  int dimension1, dimension2;
  abstract void printArea();
}
class Rectangle extends Shape{
  Rectangle(){
    System.out.println("Enter the dimensions of the rectangle(Length and Breadth): ");
    dimension1 = sc.nextInt();
    dimension2 = sc.nextInt();
  }
```

```
void printArea(){
    System.out.print("The area of the rectangle is = ");
    System.out.println(dimension1*dimension2);
  }
}
class Triangle extends Shape{
  Triangle(){
     System.out.println("Enter the dimensions of the triangle(base and height): ");
     dimension1 = sc.nextInt();
     dimension2 = sc.nextInt();
  void printArea(){
     System.out.print("The area of the Triangle is = ");
     System.out.println(0.5*dimension1*dimension2);
  }
class Circle extends Shape{
  Circle(){
     System.out.println("Enter the dimension of the circle(radius): ");
     dimension1 = sc.nextInt();
  }
  void printArea(){
     System.out.print("The area of the Circle is = ");
     System.out.println(3.1415926535897*dimension1*dimension1);
  }
}
```

Bank Account Storage

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4	Develop a Taxo Program to visuto u class Brunk was manteum that burds of accounts for its
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Page (
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Enough of Create Carried Secount");
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Samu & will de word (PD).
System and penular ("Lawning Account Operat""),  lawning the deforat (1000);  saving the will decimal (500);
System and print by ("Current AC operations");  current to deposit (1000);  current to witholeanal (600);
current de denovit (1000);
cussed be withdrawne (600);
Sommer Close ();
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Output:
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Ender name : Alece
Ender name : Alece
Enter de numbrer - SAV123
Man as finding to a Madazant section for
Create current A/o:
Euty warm Bob
Enter AJK NUMBER CUR546
C - C
Savy Operations:
Deforit Successful Redounce \$ 2000
Defosit Successful Redonce \$ 2000  Therest of \$ 1025 for 2 years  Current Balance = \$ 1102.5
Current Balance = \$ 1102.5
Ditestana Successful Updated Halance \$602.5

```
C:\Users\borik\Documents>java Bank
Enter name and balance for Savings Account: ATHARV 5600
Enter name and balance for Current Account: ADITYA 4566
Savings Account Operations:
Deposited: $500.0
Interest added.
Balance: $6105.0
Current Account Operations:
Deposited: $200.0
Balance: $3166.0
ATHARV BORIKAR
C:\Users\borik\Documents>
```

```
import java.util.Scanner;

public class Bank {
    static Scanner sc = new Scanner(System.in);
    Account ob1;

void createAccount() {
        String customer;
        int account;
        String type;
        int initBal;

        System.out.print("Enter the customer name: ");
        customer = sc.nextLine();
        System.out.print("Enter account Number: ");
        account = sc.nextInt();
```

```
sc.nextLine(); // Consume the newline
  System.out.print("Enter Account type (Savings or Current): ");
  type = sc.nextLine();
  System.out.print("Enter the initial Balance: ");
  initBal = sc.nextInt();
  if (type.equals("Savings")) {
    ob1 = new Savings(customer, account, initBal);
  } else {
    ob1 = new Current(customer, account, initBal);
}
public static void main(String[] args) {
  Bank bank = new Bank();
  bank.createAccount();
  while (true) {
    System.out.println("-----");
     System.out.println("1. Deposit 2. Withdraw");
     System.out.println("3. Compute interest");
     System.out.println("4. Display account details");
     System.out.println("5. exit ");
    int choice = sc.nextInt();
    switch (choice) {
       case 1:
         bank.ob1.deposit();
         break:
       case 2:
         bank.ob1.withdraw();
         break;
       case 3:
         if (bank.ob1 instanceof Savings) {
            ((Savings) bank.ob1).computeInterest();
            System.out.println("Interest computation is only available for Savings accounts.");
         break:
       case 4:
         bank.ob1.display();
         break;
       case 5:
         break;
       default:
         System.out.println("Invalid choice. Please try again.");
     }
```

```
if(choice == 5) break;
     }
  }
class Account {
  String customerName;
  int accountNumber;
  int balance:
  Account(String customer, int accountNum, int bal) {
     customerName = customer:
     accountNumber = accountNum;
    balance = bal;
  }
  void deposit() {
     System.out.print("Enter the amount to deposit: ");
     int amt = Bank.sc.nextInt();
    balance += amt;
    System.out.println("Deposited: " + amt + ", New Balance: " + balance);
  }
  void withdraw() {
     System.out.print("Enter the amount to withdraw: ");
     int amt = Bank.sc.nextInt();
     if (balance - amt < 0) {
       System.out.println("Insufficient Balance to withdraw the given amount.");
     } else {
       balance -= amt;
       System.out.println("Amount of " + amt + " withdrawn successfully. Current Balance is " +
balance);
     }
  }
  void display() {
     System.out.println("The Balance in the account is " + balance);
  }
}
class Savings extends Account {
  double interestPercent;
  Savings(String customer, int accountNum, int bal) {
     super(customer, accountNum, bal);
     System.out.print("Enter the interest percentage on the account: ");
     interestPercent = Bank.sc.nextDouble();
```

```
}
  void computeInterest() {
    balance += balance * (interestPercent / 100);
     System.out.println("Amount after applying interest is: " + balance);
  }
}
class Current extends Account {
  int minBalance = 1000;
  Current(String customer, int accountNum, int bal) {
    super(customer, accountNum, bal);
  }
  void withdraw() {
    System.out.print("Enter the amount to withdraw: ");
     int amt = Bank.sc.nextInt();
    if (balance - amt < minBalance) {
       System.out.println("Insufficient Balance to maintain the minimum required.");
     } else {
       balance -= amt;
    System.out.println("Amount of " + amt + " withdrawn successfully. Current Balance is " +
balance);
     }
```

Creating Packages CIE and SEE

	hap Program 6
Q]	Creat Portage CIF which has 2 classes - for soval &
	LEGORIAN UN AINS PORTION WAS FOREET
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	an array broate another gackage SEK ntuch
	an away broate another gackage SEE robuch
-	Class of Personal.
, 1	,
7	package CIF;
	public class Personal i
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	public string name;
	public ent len;
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	this. un - un;
	the name = name;
	Um. sem = sem;
	4
	package SEE;
	unpost cit pusonal;
	public class External extends Personal L
	unpost cit. zuernal;  public class External cytende Personal L  public int [7] see ogasks;
	public Esternal ( Steine user, Steine name)
	public Expersal (Steing were, String name)  hipe ( usn , name, sery;  see Marks = ( new ) int [57 )
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_	hochu
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	System out prat ("Enter un number y nowlents"),
	Scauer questine ();
1	
-	External [] modern - new External (1);
+	- William I VIII MAN MAN MAN MAN TOUT.
	for ( uil 0=0 ; 1<4 ; 1++) {
	gysell out- Printle ("Student" + (i+1) + "3");
+	system and painter ("USA" + students (i) now)
	gysell out frutle ("Student" + (i+1) + ":");  nysell out paule ("USA" + student [i] now)  hysell out paule ("Nouse" + student [i] name)
	for ( mt i=0; j(5)j+t)?
	" und fruid Mark: internal Marks [i]. Mucmal Marks [j]+  8 Endere [i] Kergosts [j]
	Student (1) Kerpats (3)
	System out print ( proce llasse);
7	all an time ( then const)
3	

```
Output

Such which of students 1

Color details for sucher's 1

USN 123

Name Jan Doc

Suestor 5

Onter Internal marks:

15 18 20 19 17

Onler SEE nacks:

80 90 70 85 95

Frial Marks of Students:

Suester: John Doc

Timal marks course wise

55 63 55 61 54
```

```
package CIE;
```

```
import java.util.Scanner;
```

```
public class Student {
   protected String usn;
   protected String name;
   protected int sem;
```

```
// Method to input student details
public void inputStudentDetails() {
    Scanner s = new Scanner(System.in);
    System.out.print("Enter USN: ");
    usn = s.nextLine();
    System.out.print("Enter Name: ");
    name = s.nextLine();
    System.out.print("Enter Semester: ");
```

```
sem = s.nextInt();
  // Method to display student details
  public void displayStudentDetails() {
     System.out.println("USN: " + usn);
     System.out.println("Name: " + name);
     System.out.println("Semester: " + sem);
  }
}
package CIE;
import java.util.Scanner;
public class Internals extends Student {
  protected int[] marks = new int[5];
  // Method to input internal marks
  public void inputCIEmarks() {
     Scanner s = new Scanner(System.in);
     System.out.println("Enter internal marks for 5 subjects:");
     for (int i = 0; i < 5; i++) {
       System.out.print("Enter marks for subject " + (i + 1) + ": ");
       marks[i] = s.nextInt();
  }
package SEE;
import CIE.Internals;
import java.util.Scanner;
public class Externals extends Internals {
  protected int[] marks = new int[5];
                                        // SEE marks
  protected int[] finalMarks = new int[5]; // Final marks
  // Constructor to initialize the marks arrays
  public Externals() {
     marks = new int[5];
     finalMarks = new int[5];
  }
```

```
// Method to input SEE marks
  public void inputSEEmarks() {
     Scanner s = new Scanner(System.in);
     System.out.println("Enter SEE marks for 5 subjects:");
     for (int i = 0; i < 5; i++) {
       System.out.print("Enter SEE marks for subject " + (i + 1) + ": ");
       marks[i] = s.nextInt();
  }
  // Method to calculate final marks (internal + external)
  public void calculateFinalMarks() {
     for (int i = 0; i < 5; i++) {
       finalMarks[i] = marks[i] + this.marks[i]; // Final marks = internal + external
     }
  }
  // Method to display final marks
  public void displayFinalMarks() {
     displayStudentDetails(); // Display student details (inherited from Student)
     System.out.println("Final Marks:");
     for (int i = 0; i < 5; i++) {
       System.out.println("Subject " + (i + 1) + ": " + finalMarks[i]);
  }
}
import SEE.Externals;
import java.util.Scanner;
class Main {
  public static void main(String args[]) {
     Scanner s = new Scanner(System.in);
    // Input number of students
     System.out.print("Enter number of students: ");
     int n = s.nextInt();
    s.nextLine(); // Consume newline
    Externals[] students = new Externals[n];
    // Input details for each student
    for (int i = 0; i < n; i++) {
       students[i] = new Externals();
       System.out.println("\nEnter details for student " + (i + 1) + ":");
```

```
students[i].inputCIEmarks();
students[i].inputSEEmarks();
students[i].calculateFinalMarks();
}

// Display final marks for each student
System.out.println("\nDisplaying final marks for all students:");
for (int i = 0; i < n; i++) {
    students[i].displayFinalMarks();
}

s.close();
}</pre>
```

Handling Exceptions in Inheritance Tree

	( ) to	The Control of the Co
1	Lat Program 7	
<i>a</i> )	White a gregican list demonstrate houding of consequence in inheritance the Cueste a harden extract extension and the cueste as the street extension and the construction are construction that we bear fallow & some fallow as the construction that we bear the construction that we can be a construction to the construction of th	rax eou
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	OLINS FALMON É	
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	System out puniter ( Falue Age is + live oge)	
	Clan Son entends Father &	- 3
	grinds int Son Age  if (no <) !  The man were returned to Execution ("Son's age	cannot be re
	if (sign (")) the whom so exception ("Smis of the consistent of the a consistent of the a consistent of the a filter");	g cance
4	giller");	

public dass Exception Inheritance Demo l public statu word man (8144 17 cugs) s System set puntle ("Craty Falling & Son Syste"); Falles Jalher - new fallier (40); Son son - new Son (40, 15); catch (whose exception c) ! By sen Bid printle ( "Exception cought " +e get resinger) Scanner Close () Oregut Creating Faller & Son depeter fallors age is set to 40 Son's age is set to 15 Tisting invalid inputs

Attempting to be fallows ago carmet be -ve a equal to father Ago. C:\Users\borik\Documents>javac ExceptionDemo.java C:\Users\borik\Documents>java ExceptionDemo ATHARV 1BM23IC015 Father's Age: 40, Son's Age: 20 Exception: Son's age cannot be greater than or equal to father's age. C:\Users\borik\Documents>

```
import java.util.Scanner;
class WrongAge extends Exception {
  public WrongAge() {
    super("Age Error");
  public WrongAge(String message) {
    super(message);
}
class InputScanner {
  Scanner s = new Scanner(System.in);
class Father extends InputScanner {
  int fatherAge;
  public Father() throws WrongAge {
     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 {
  int sonAge;
  public Son() throws WrongAge {
     super();
     System.out.print("Enter Son's age: ");
     sonAge = s.nextInt();
    if (sonAge >= fatherAge) {
       throw new WrongAge("Son's age cannot be greater than or equal to father's age");
     \} else if (sonAge < 0) {
       throw new WrongAge("Age cannot be negative");
```

```
public void display() {
    System.out.println("Son's age: " + sonAge);
    super.display(); // This calls the Father's display method
}

public class Exception_Handling {
    public static void main(String[] args) {
        try {
            System.out.println("ATHARV BORIKAR 1BM23IC015");
            Son son = new Son();
            son.display();
        } catch (WrongAge e) {
                System.out.println("Exception: " + e.getMessage());
        }
    }
}
```

**Threads Creation** 

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Thread of public ("CSE");
```

```
C:\Users\borik\Documents>java MultiThreadDemo
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BMS College of Engineering -ATHARV
CSE -ATHARV
^C
C:\Users\borik\Documents>
```

```
Code:
public class Threads {
  static class BMSDisplayThread extends Thread {
    public void run() {
       try {
         while (true) {
           System.out.println("BMS College of Engineering");
            Thread.sleep(10000); // Sleep for 10 seconds
       } catch (InterruptedException e) {
         System.out.println(e);
    }
  }
  static class CSEDisplayThread extends Thread {
    public void run() {
       try {
         while (true) {
           System.out.println("CSE");
            Thread.sleep(2000);
       } catch (InterruptedException e) {
         System.out.println(e);
    }
  }
  public static void main(String[] args) {
    BMSDisplayThread bmsThread = new BMSDisplayThread();
    CSEDisplayThread cseThread = new CSEDisplayThread();
    System.out.println("ATHARV BORIKAR");
    System.out.println("1BM23IC015");
    bmsThread.start();
    cseThread.start();
  }
}
```

## Program 9

User Interface Creation

Algorithm:

(Dane Raps
Rap Region 9
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lu ce d'am la viente a une viente
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News 2 The News of fields, New 8
& displayed on correct bold min & Num2
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	DIVIDED APP					
Ento	or the divisor and dividend: 60					
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	7. 00 D 12 7.110 0					
	ATHARV 1BM23IC015 Calculate					
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## Code:

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo {
  SwingDemo() {
     JFrame ifrm = new JFrame("Divider App");
    jfrm.setSize(275, 200);
    jfrm.setLayout(new FlowLayout());
    jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    JLabel ilab = new JLabel("Enter the divisor and dividend:");
    JTextField aitf = new JTextField(8);
     JTextField bitf = new JTextField(8);
    JButton button = new JButton("Calculate");
    JLabel err = new JLabel();
    JLabel alab = new JLabel();
     JLabel blab = new JLabel();
    JLabel anslab = new JLabel();
    ifrm.add(err);
    jfrm.add(jlab);
    jfrm.add(ajtf);
    jfrm.add(bjtf);
    ifrm.add(button);
    jfrm.add(alab);
    ifrm.add(blab);
    jfrm.add(anslab);
    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("A = " + a);
            blab.setText("B = " + b);
```

```
anslab.setText("Ans = " + ans);
            err.setText("");
          } 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!");
     });
    ifrm.setVisible(true);
  public static void main(String args[]) {
     SwingUtilities.invokeLater(new Runnable() {
       public void run() {
         new SwingDemo();
     });
} import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class SwingDemo {
  SwingDemo() {
     JFrame ifrm = new JFrame("Divider App");
    jfrm.setSize(275, 200);
    ifrm.setLayout(new FlowLayout());
    jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    JLabel jlab = new JLabel("Enter the divisor and dividend:");
     JTextField ajtf = new JTextField(8);
     JTextField bitf = new JTextField(8);
     JButton button = new JButton("Calculate");
     JLabel err = new JLabel();
    JLabel alab = new JLabel();
```

```
JLabel blab = new JLabel();
  JLabel anslab = new JLabel();
  jfrm.add(err);
  jfrm.add(jlab);
  jfrm.add(ajtf);
  ifrm.add(bitf);
  jfrm.add(button);
  jfrm.add(alab);
  jfrm.add(blab);
  ifrm.add(anslab);
  button.addActionListener(new ActionListener() {
    public void actionPerformed(ActionEvent evt) {
         int a = Integer.parseInt(ajtf.getText());
         int b = Integer.parseInt(bjtf.getText());
         int ans = a / b;
         alab.setText("A = " + a);
         blab.setText("B = " + b);
         anslab.setText("Ans = " + ans);
         err.setText("");
       } 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!");
       }
     }
  });
  jfrm.setVisible(true);
public static void main(String args[]) {
  SwingUtilities.invokeLater(new Runnable() {
    public void run() {
       new SwingDemo();
  });
```

```
Program 10 a)
Demonstrating IPC
```

Algorithm:

	Page
	Law Pregram 10
07	Demonstrale Indu Process Communication & Deadbloom
4	class Stand Pour. I
	Synchrossyca roud northood A ( Starol lemme other lemme) L  Agreem out pendla ( Thurad current Thread () get Nam  try f  Thread steep (1000);
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Shark	Orsput: (Dead Lock Kendred)
4	Thread 1 is executing welled A Thread 2 is executing welled A Thread 2 is executing welled A Thread 2 is executing welled 8 on other leave

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public vod aun OF  int i=0.  utile (i=15) E
while ( i= 15) {
3 & pullitt);
dax Consumes implemente Eumake E
De G;  Osmanner (Q g)  Aline g-q;  now Hisead (Mill, "Congresses") Austl)
now Thread ( Will, "Congresses") A. sel 5
public void kun () 2
public void xun () 2  un i = 0  vaule ()<19) {
in 4 = 9, get 0;
ift;
3

Output:	2.	
put:1		
fut :1		
got 2		
fut :3		
 Put 4		
Pat :5		
got · 5		

C:\Users\borik\Documents>java Deadlock
ATHARV 1BM23IC015
MainThread entered A.foo
RacingThread entered B.bar
MainThread trying to call B.last()
RacingThread trying to call A.last()

C:\Users\borik\Documents>javac PCFixed.java C:\Users\borik\Documents>java PCFixed ATHARV 1BM23IC015 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 Producer waiting Got: 4 Intimate Producer Consumed: 4 Put: 5 Intimate Consumer

Producer waiting

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

C:\Users\borik\Documents>

```
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("\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);
       i++;
    }
class IPC {
  public static void main(String args[]) {
    Q q = new Q();
    System.out.println("ATHARV BORIKAR 1BM23IC015");
    new Producer(q);
    new Consumer(q);
    System.out.println("Press Control-C to stop.");
  }
}
Program 10 b)
Demonstrating Deadlock
Algorithm:
Code:
import java.util.*;
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();
  }
  synchronized 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();
  }
  synchronized void last() {
     System.out.println("Inside B.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);
    System.out.println("Back in main thread");
}

public void run() {
    b.bar(a);
    System.out.println("Back in other thread");
}

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