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
(Autonomous Institution under VTU)
BENGALURU-560019
October-2022 to Feb-2023

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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled "Database Management Systems (22CS3PCDBM)" carried out by **NAVANEETH V N(1BM22CS171)**, who is bonafide student of **B. M. S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a Object Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

Dr. Nandhini Vineeth

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Quadratic Equation

Develop a Java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula. If the discriminate b2-4ac is negative, display a message stating that there are no real solutions.

```
import java.util.*;
import java.math.*;
class Quadratic
{
        int a,b,c;
        double r1,r2,d;
        void coeff(){
                Scanner s=new Scanner(System.in);
                System.out.println("Enter coeeficients a,b,c");
                a = s.nextInt();
                b = s.nextInt();
                c = s.nextInt();
                d = (b*b) - (4*a*c);
        void evalu(){
                while(a==0){
                        System.out.println("Not a QE.");
                        System.out.println("Enter non zero coefficient");
                        Scanner s = new Scanner(System.in);
                        a = s.nextInt();
                }
                if(d==0){
                        System.out.println("Roots are real and equal.");
                        r1 = (-b)/(2*a);
                        System.out.println("Root1=Root2="+r1);
                else if(d<0){
                        System.out.println("Roots are imaginary");
                        r1 = (-b)/(2*a);
                        r2 = Math.sqrt(-d)/(2*a);
                        System.out.println("Root1="+r1+"+i"+r2);
                        System.out.println("Root2="+r1+"-i"+r2);
                }
                else{
                        System.out.println("Roots are real and distinct");
                        r1 = (-b+(Math.sqrt(d)))/(2*a);
                        r2 = (-b-(Math.sqrt(d)))/(2*a);
```

```
System.out.println("root1="+r1+"root2="+r2); \\ \} \\ \} \\ class QuadraticEq\{ \\ public static void main(String sx[]) \{ \\ Quadratic q = new Quadratic(); \\ q.coeff(); \\ q.evalu(); \} \\ \end{cases}
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STUDENT SGPA CALCULATOR

Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

```
import java.util.Scanner;
class StudentDetails{
        Scanner s1 = new Scanner(System.in);
        int credits[] = new int[5];
        double marks[] = new double[5];
        String name; String usn; double sgpa=0;
        void setDetails(){
                 System.out.println("Enter the name of the student:");
                 name = s1.next();
                 System.out.println("Enter the usn of the student:");
                 usn = s1.next();
                 System.out.println("Enter the credits and the respective marks chosen by the
                 student ");
                 for(int i=0; i<5; i++){
                         System.out.println("The credits of subject "+(i+1)+": ");
                         credits[i] = s1.nextInt();
                         System.out.println("The marks obtained for subject "+(i+1)+": ");
                         marks[i] = s1.nextDouble();
                         System.out.println();
                 }
        }
        void displayDetails(){
                 System.out.println("Enter the details of the student with name "+name);
                 System.out.println("USN: "+usn);
                 System.out.println("The credits and markks");
                 for(int i = 0; i < 5; i++){
                         System.out.println("Subject "+(i+1));
                         System.out.println("Credits "+credits[i]);
                         System.out.println("Marks "+marks[i]);
                 this.calcSgpa();
        void calcSgpa(){
                 int cg = 0;
                 for(int i = 0; i < 5; i++){
                         if(marks[i] \ge 90 \&\& marks[i] < 100) \{ sgpa = sgpa + (10*credits[i]); \}
                         if(marks[i] > = 80 \&\& marks[i] < 90) \{ sgpa = sgpa + (9*credits[i]); \}
                         if(marks[i] \ge 70 \&\& marks[i] < 80) \{ sgpa = sgpa + (8*credits[i]); \}
                         if(marks[i] \ge 60 \&\& marks[i] < 70) \{ sgpa = sgpa + (7*credits[i]); \}
                         if(marks[i] >= 50 \&\& marks[i] < 60) \{ sgpa = sgpa + (5*credits[i]); \}
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Book Problem

Create a class Book which contains four members: name, author, price, num_pages.Include a constructor to set the values for the members. Include methods to set andget the details of the objects. Include a toString() method that could display thecomplete details of the book. Develop a Java program to create n book objects.

```
Code:
import java.util.Scanner;
class Book {
        String name;
        String author;
        double price;
        int numPages;
        public Book(String name, String author, double price, int numPages) {
                this.name = name;
                this.author = author:
                this.price = price;
                this.numPages = numPages;
        public void setDetails() {
                Scanner scanner = new Scanner(System.in);
                System.out.print("Enter book name: ");
                this.name = scanner.nextLine();
                System.out.print("Enter author name: ");
                this.author = scanner.nextLine();
                System.out.print("Enter price: ");
                this.price = scanner.nextDouble();
                System.out.print("Enter number of pages: ");
                this.numPages = scanner.nextInt();
        public void getDetails() {
                System.out.println("Book Name: " + name);
                System.out.println("Author: " + author);
                System.out.println("Price: $" + price);
                System.out.println("Number of Pages: " + numPages);
        public String toString() {
                return "Book Details:\n" +
                "Name: " + name + "\n" +
                "Author: " + author + "\setminusn" +
                "Price: $" + price + "\n" +
                "Number of Pages: " + numPages;
        }
}
public class Books {
        public static void main(String[] args) {
```

```
Scanner scanner = new Scanner(System.in);
                System.out.print("Enter the number of books: ");
                int n = scanner.nextInt();
                Book[] books = new Book[n];
                for (int i = 0; i < n; i++) {
                         System.out.println("\nEnter details for Book " + (i + 1) + ":");
                        books[i] = new Book("", "", 0.0, 0);
                         books[i].setDetails();
                System.out.println("\nDetails of all books:");
                for (int i = 0; i < n; i++) {
                        System.out.println("\nBook " + (i + 1) + ":");
                         books[i].getDetails();
                System.out.println("\nComplete details of all books:");
                for (int i = 0; i < n; i++) {
                         System.out.println("\nBook " + (i + 1) + ":\n" + books[i].toString());
                }
        }
}
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Shape Problem

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape.

```
abstract class Shape {
  int a:
  int b;
  abstract void printArea();
class Rectangle extends Shape {
  public Rectangle(int length, int width) {
     super(length, width);
  }
     void printArea() {
     int area = a * b;
     System.out.println("Area of Rectangle: " + area);
  }
}
class Triangle extends Shape {
  public Triangle(int base, int height) {
     super(base, height);
  void printArea() {
     double area = 0.5 * a * b;
     System.out.println("Area of Triangle: " + area);
  }
}
class Circle extends Shape {
  public Circle(int radius) {
     super(radius, radius);
  }
     void printArea() {
     double area = 3.14* a * a;
     System.out.println("Area of Circle: " + area);
  }
}
public class Main {
        public static void main(String[] args) {
                 Rectangle rectangle = new Rectangle(5, 10);
                 Triangle triangle = new Triangle(4, 6);
                 Circle circle = new Circle(7);
                 rectangle.printArea();triangle.printArea();circle.printArea();
        }
```

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Bank Problem

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Cur-acct and Savacct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks:

- a) Accept deposit from customer and update the balance.
- b) Display the balance.
- c) Compute and deposit interest
- d) Permit withdrawal and update the balance

Check for the minimum balance, impose penalty if necessary and update the balance

```
import java.util.Scanner;
class CanaraBank{
       String customername;
       String accountnumber;
       String type;
       double balance;
       CanaraBank(String customername, String accountnumber, String type){
               this.customername=customername;
               this.accountnumber=accountnumber;
               this.type=type;
       void minimumBalance(){
               if (this.balance<1000){
                       System.out.println("You do not fllow rules of minimum balance so 20 rupees
                       is deducted");
                       balance=balance-20;
               }
       }
}
class SavingsAccount extends CanaraBank{
       double moneyin;
       double interest;
       double depositperiod;
       SavingsAccount(String customername,String accountnumber,String type,double
       moneyin,double interest,doubledepositperiod){
               super(customername,accountnumber,type);
               this.moneyin=moneyin;
               this.interest=interest:
               this.depositperiod=depositperiod;
       void displayBalance(){
```

```
balance = moneyin*(1+depositperiod*interest);
               System.out.println("The amount in bank after "+ depositperiod + "is "+ balance);
       void withdraw(Double with){
               balance = balance-with;
               this.minimumBalance();
               System.out.println("The amounit left in bank savings account is "+balance);
        }
       void deposit(){
               System.out.println("ENter the amount you waant to deposit");
               double deposit; Scanner s1 =new Scanner(System.in);
               deposit=s1.nextDouble(); balance = balance + deposit; this.minimumBalance();
               System.out.println("The amount in bank savings account is "+balance);
       }
}
class CurrentAccount extends CanaraBank{
       double moneyin;
       CurrentAccount(String customername, String accountnumber, String type, double moneyin){
               super(customername,accountnumber,type);
               this.moneyin=moneyin;
               balance=moneyin;
               this.minimumBalance();
       void CheckFacilities(){
               System.out.println("This account has Check facilities");
       void depositThroughCheck(int money){
               balance = balance+money;
               this.minimumBalance();
               System.out.println("The new balance is "+balance);
       void displayBalance(){
               System.out.println("The amount in bank in"+this.type +" account after " + "is "+
               this.balance);
       }
}
class Bank {
       public static void main(String args[]){
               SavingsAccount A = new SavingsAccount("Navaneeth","1000","Savings",900,0.1,1);
               A.displayBalance();
               A.withdraw(20.000);
               A.deposit();
               CurrentAccount B = new CurrentAccount("Monish","1001","Current",1700);
               B.CheckFacilities();
               B.depositThroughCheck(500);
               B.displayBalance();
       }
}
```

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papergrid void depoil-Through Checic (int money) 5 balance = balance + money; this minimum Balance (1) Tylen and private (" The New balance " " too void display Balance C. J. Tyctem one printer c" The amount in current appoint is 1 + this balance; class Banks public stable void main (String angs []) Saving Account A - New Janing Account C'alavanum VN", "1000", Savings 90001 A dil Klay Balance; A. withdray (20.00); A deposit Dayres A. A. Curring Account D= New Curring Account Curring 1, 1200); B. cheucfailibles (); · (OO) John Monoral Thingles. & B. dispay Bolone (); ! Suffer ! The amnount in bands after 10 is 950.000001 Enter the amount you want to apposit 10 You dont - follow minimu balance, so 7 20 deduct-The amount in cavings arount 940,0000001 The account has chill failifice.

Student Internals And Externals Problem

Create a package CIE which has two classes- Student and Internals. The class Personal has members like usn, name, sem. The class internals has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class External which is a derived class of Student. This class has an array that stores the SEE marks scored in five courses of the current semester of the student. Import the two packages in a file that declares the final marks of n students in all five courses.

```
Code:
package CIE;
public class Student{
        public String USN;
        public String Name;
        public int sem;
        public Student(String a,String b,int s){
                USN = a;
                Name = b;
                sem = s;
        }
}
package CIE;
import CIE.Student;
public class Internals extends CIE.Student{
        public int marks[] = new int[5];
        public Internals(String s,String n,int x, int m[]){
                super(s,n,x);
                marks = m:
        }
}
package SEE;
import CIE.Student;
public class External extends CIE.Student{
        public int fy[] = new int[5];
        public External(String s,String n,int sw,int fy[]){
                super(s,n,sw);
                this.fy = fy;
        }
}
import java.util.*;
import java.lang.*;
import CIE.Student;
import CIE.Internals;
import SEE.*;
```

```
public class MainClass{
                    public static void main(String args[]){
                                        int fm = 0;
                                        Scanner s = new Scanner(System.in);
                                        System.out.println("Enter the number of students:");
                                        int n = s.nextInt();
                                        Internals[] im = new Internals[n];
                                        External [] em = new External[n];
                                        Student[] stu = new Student[n];
                                        for(int i = 0; i < n; i++){
                                                            System.out.println("enter the sdetails of the student "+(i+1));
                                                            System.out.println("ENter the name:");
                                                             String name = s.next();
                                                             System.out.println("Enter usn");
                                                             String usn = s.next();
                                                             System.out.println("Enter the sem");
                                                             int sq = s.nextInt();
                                                             int imarks[] = new int[5];
                                                             int emarks[] = new int[5];
                                                             System.out.println("ENter the internal markks:");
                                                             for(int j = 0; j < 5; j++){
                                                                                 System.out.println("Enter the internal marks of "+(j+1));
                                                                                 imarks[j] = s.nextInt();
                                                            for(int j = 0; j < 5; j++){
                                                                                 System.out.print("Enter the external marks of "+(j+1));
                                                                                 emarks[j] = s.nextInt();
                                                             System.out.println();
                                                             stu[i] = new Student(usn,name,sq);
                                                             im[i] = new Internals(usn,name,sq,imarks);
                                                             em[i] = new External(usn,name,sq,emarks);
                                         }
                                        System.out.println("Final marks obtained");
                                        for(int i = 0; i < n; i++){
                                                             System.out.println("Student"+(i+1)+":");
                                                             System.out.println("Name"+stu[i].Name+"\n"+"USN:"+stu[i].USN+"\n"+"Sender and the context of t
                                                             m"+stu[i].sem);
                                                             for(int j = 0; j < 5; j++){
                                                                                 fm = fm + im[i].marks[j] + em[i].fy[j];
                                                                                 System.out.println("Final marks of course:"+(j+1)+":"+fm);
                                                                                 fm = 0;
                                                             }
                                         }
                    }
}
```

papergrid 22/0/12024 LAB 5 public class Etudente Dublic string ven, Name; Sublic Student Etringwew, Jetring Name, this. Nam = Nanu; this sem a sem; Paucage CIE; Dublic Clay Internals extends Student < public int marks []= musint [5]; public Internous (Thring USN, String Name, intsum
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        Em [i] = new Externall UIN, Nam, com, emarks
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Exception Handling(Father and son)

Write a program that demonstrates handling of exceptions in inheritance tree. Create a base class called "Father" and derived class called "Son" which extends the base class. In Father class, implement a constructor which takes the age and throws the exception WrongAge() when the input age<0. In Son class, implement a constructor that cases both father and son's age and throws an exception if son's age is >= father's age

Code: import java.util.*; class WrongAgeException extends Exception{ WrongAgeException(String msg){ System.out.println(msg); } class Father{ int age; Father(int age) throws WrongAgeException { this.age=age; if(age < 0){ throw new WrongAgeException("Age Can't be less than zero!"); } else{ System.out.println(" Father's Age Verified!!"); } } } class Son extends Father{ int sonage; Son(int age,int sonage)throws WrongAgeException{ super(age); this.sonage=sonage; $if(sonage < 0 \parallel sonage > = age)$ throw new WrongAgeException("Son's age is Invalid!"); } else{ System.out.println("Son's age verified!"); } } } class Age{ public static void main(String args[]){ Scanner in=new Scanner(System.in); Int age, sonage;

}

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        class Son extends Father 1
              int sonage;
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Threads

Write a program which creates two threads, one thread displaying "BMS College of Engineering" once every ten seconds and another displaying "CSE" once every two seconds

```
Code:
class newThread implements Runnable{
       Thread t;
       newThread(){
              t = new Thread(this,"NThread");
              System.out.println("CT: "+t);
              t.start();
       public void run(){
       try{
              for(int i=0; i<5; i++){
                     System.out.println("CSE");
                     Thread.sleep(100);
              }
       catch(InterruptedException ie){
              System.out.println("Child thread interrupted");
       System.out.println("Child thread quitting");
}
class ThreadsMain3{
       public static void main(String args[]){
              new newThread();
              System.out.println("Back in main");
              try{
                     for(int i=0; i<5; i++){
                             System.out.println("BMS COLLEGE OF ENGINEERING");
                             Thread.sleep(100);
                      }
              catch(InterruptedException ie){
                      System.out.println("Main Thread Interrupted");
              System.out.println("Main thread quitting");
       }
}
```

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AWT

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

```
import java.awt.*;
import java.awt.event.*;
public class DivisionMain extends Frame implements ActionListener
       TextField num1,num2;
       Button dResult;
       Label outResult;
       String out="";
       double resultNum;
       int flag=0;
       public DivisionMain()
               setLayout(new FlowLayout());
               dResult = new Button("RESULT");
               Label number1 = new Label("Number 1:",Label.RIGHT);
               Label number2 = new Label("Number 2:",Label.RIGHT);
               num1=new TextField(5);
               num2=new TextField(5);
               outResult = new Label("Result:",Label.RIGHT);
               add(number1);
               add(num1);
               add(number2);
               add(num2);
               add(dResult);
               add(outResult);
               num1.addActionListener(this);
               num2.addActionListener(this);
               dResult.addActionListener(this);
               addWindowListener(new WindowAdapter()
                      public void windowClosing(WindowEvent we){System.exit(0);}
               });
       }
       public void actionPerformed(ActionEvent ae)
               double n1,n2;
               try{
                      if (ae.getSource() == dResult){
```

```
n1=Double.parseDouble(num1.getText());
                                                                                     n2=Double.parseDouble(num2.getText());
                                                                                     /*if(n2==0)
                                                                                                                  throw new ArithmeticException();*/
                                                                                      out=n1+" "+n2;
                                                                                      resultNum=n1/n2;
                                                                                     out+=String.valueOf(resultNum);
                                                                                     repaint();
                                                          }
                             }
                            catch(ArithmeticException e2)
                                                        flag=1;
                                                        out="Divide by 0 Exception! "+e2;
                                                        repaint();
                             }
                            catch(NumberFormatException e1)
                            {
                                                        flag=1;
                                                        out="Number Format Exception! "+e1;
                                                        repaint();
                             }
public void paint(Graphics g){
                            if(flag==0)
                                                        g.drawString(out,outResult.getX() + outResult.getWidth(), outResult.getY() + outResult.getX() + outResult.
                                                        utResult.getHeight()-8);
                            else
                            g.drawString(out,100,200);
                            flag=0;
public static void main(String[] args){
                            DivisionMain dm=new DivisionMain();
                            dm.setSize(new Dimension(800,400));
                            dm.setTitle("DivionOfIntegers");
                            dm.setVisible(true);
}
```

}

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14 - 118	num1 = num Text Field (5);	
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