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

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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 **Sai Krishna Girish Hallikeri (1BF24CS264**), 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.

The Lab report has been approved as it satisfies the academic requirements in respect of an Object-Oriented Java Programming (23CS3PCOOJ) work prescribed for the said degree.

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Github Link : https://github.com/saikrishna1006/1BF24CS264_JAVA

Program 1: Implementing Quadratic Equation

CODE :

```
import java.util.Scanner;
import java.lang.Math;
class quadratic
{
   public static void main(String []args)
   {
      int a,b,c;
      Scanner in = new Scanner(System.in);
      System.out.println("Enter the coefficinets of eaquation");
      a = in.nextInt();
      b = in.nextInt();
      c = in.nextInt();
      if(a==0)
      {
         System.out.println("Not a quadratic equation");
      }
      else
      {
         double d,r1,r2;
         d = (b*b)-(4*a*c);
       if(d==0)
         {
            r1 = -b/(2*a);
            System.out.println("Roots are equal and real:"+r1+"and"+r1);
         }
         if(d<0)
```

```
            {
               System.out.println("Roots are imaginary");
            }
            if(d>0)
            {
               r1 = -b/(2*a);
               r2 = Math.sqrt(d/(2*a));
               System.out.println("Roots are R1="+r1+"+"+r2+" and R2="+r1+"-"+r2);
            }
         }
      }
}
```

OUTPUT :

```
PS C:\Users\Admin> cd "c:\Users\Admin\Documents\Sai Krishna_1BF24CS264\" ; if ($?) { javac quadratic.java } ; if ($?) { java quadratic }
Enter the coefficinets of eaquation
1 -5 6
Roots are R1=2.0+0.7071067811865476 and R2=2.0-0.7071067811865476
PS C:\Users\Admin\Documents\Sai Krishna_1BF24CS264> cd "c:\Users\Admin\Documents\Sai Krishna_1BF24CS264\" ; if ($?) { javac quadratic.java } ; if ($?) { java quadratic }
Enter the coefficinets of eaquation
1 -4 4
Roots are equal and real:2.0and2.0
PS C:\Users\Admin\Documents\Sai Krishna_1BF24CS264> cd "c:\Users\Admin\Documents\Sai Krishna_1BF24CS264\" ; if ($?) { javac quadratic.java } ; if ($?) { java quadratic }
Enter the coefficinets of eaquation
1 2 3
Roots are imaginary
PS C:\Users\Admin\Documents\Sai Krishna_1BF24CS264>
```

Program 2 : Calculating SGPA of a student

CODE :

```
import java.util.Scanner;
class Subject {
    int grade;
    int subjectmarks;
    int credits;
}
class Student {
    int totalpoints = 0, totalcredits = 0;
    String USN, Name;
    Subject[] subjects;
    double SGPA;
    Student() {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter student's name:");
        Name = s.nextLine();
        System.out.println("Enter student's USN:");
        USN = s.nextLine();
        System.out.println("Enter number of subjects:");
        int n = s.nextInt();
        subjects = new Subject[n];
        for (int i = 0; i < n; i++) {
            subjects[i] = new Subject();
            System.out.println("Enter subject " + (i + 1) + " marks:");
            subjects[i].subjectmarks = s.nextInt();
```

```
            System.out.println("Enter subject " + (i + 1) + " credits:");
            subjects[i].credits = s.nextInt();
            if (subjects[i].subjectmarks >= 90)
                subjects[i].grade = 10;
            else if (subjects[i].subjectmarks >= 80)
                subjects[i].grade = 9;
            else if (subjects[i].subjectmarks >= 70)
                subjects[i].grade = 8;
            else if (subjects[i].subjectmarks >= 60)
                subjects[i].grade = 7;
            else if (subjects[i].subjectmarks >= 50)
                subjects[i].grade = 6;
            else
                subjects[i].grade = 0;
        }
    }

    void GPA() {
        for (Subject sub : subjects) {
            totalcredits += sub.credits;
            totalpoints += sub.grade * sub.credits;
        }
        SGPA = (double) totalpoints / totalcredits;
        System.out.println("SGPA: " + SGPA);
    }
}
```

```
public class SGPA_calculater {
    public static void main(String[] args) {
        Student s = new Student();
        s.GPA();}
}
```

OUTPUT :

```
Enter student's name:
Sai Krishna
Enter student's USN:
1BF24CS264
Enter number of subjects:
8
Enter subject 1 marks:
90
Enter subject 1 credits:
4
Enter subject 2 marks:
87
Enter subject 2 credits:
4
Enter subject 3 marks:
95
Enter subject 3 credits:
3
Enter subject 4 marks:
87
Enter subject 4 credits:
3
Enter subject 5 marks:
93
Enter subject 5 credits:
3
Enter subject 6 marks:
76
Enter subject 6 credits:
1
Enter subject 7 marks:
87
Enter subject 7 credits:
1
Enter subject 8 marks:
90
Enter subject 8 credits:
1
Name : Sai Krishna Usn : 1BF24CS264 SGPA : 9.5
```

Program 3 : Library Management using class

CODE :

```
import java.util.Scanner;
class Books{
   String name;
   String author;
   int price;
   int pages;

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

   public String toString(){
      String name, author, price, pages;

      name = "\nBook name: " + this.name + "\n";
      author = "Author name: " + this.author + "\n";
      price = "Price: " + this.price + "\n";
      pages = "Number of pages: " + this.pages + "\n";

      return name + author + price + pages; }
}
```

```
class BookDetails{
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n;
        String name;
        String author;
        int price;
        int pages;

        System.out.println("Number of books to enter: ");
        n=sc.nextInt();

        Books[] b = new Books[n];

        for (int i=0; i<n; i++){
            System.out.println("Enter book name: ");
            name=sc.nextLine();
            sc.nextLine();
            System.out.println("Enter author name: ");
            author=sc.nextLine();
            sc.nextLine();
            System.out.println("Enter book price: ");
            price=sc.nextInt();
            sc.nextLine();
            System.out.println("Enter total number of pages: ");
            pages=sc.nextInt();
            sc.nextLine();
```

```
            b[i]= new Books(name,author,price,pages);
        }

        for (int i=0; i<n; i++){
            String s="Book "+(i+1)+" details are :"+b[i];
            System.out.println(s);
        }
    }
}
```

OUTPUT :

```
PS C:\SaiKrishna_1BF24CS264> & 'C:\Program Files\Eclipse Adoptium\jdk-17.0.16.8-hotspot\bin\java.exe' '-XX:+ShowCodeDetailsInE
de\User\workspaceStorage\f092da74bbd9371926a0f0d1167ffaac\redhat.java\jdt_ws\SaiKrishna_1BF24CS264_8e299641\bin' 'BookDetails'
Number of books to enter:
2
Enter book name:
5AM Club
Enter author name:
Robin

Enter book price:
400
Enter total number of pages:
207
Enter book name:
Rich Dad Poor Dad

Enter author name:
Robert

Enter book price:
300
Enter total number of pages:
400
Book 1 details are :
Book name:
Author name: Robin
Price: 400
Number of pages: 207

Book 2 details are :
Book name: Rich Dad Poor Dad
Author name: Robert
Price: 300
Number of pages: 400
```

Program 3 : Calculating area using inheritance concept

CODE :

```
import java.util.Scanner;
abstract class Shape {
   int a, b;
   Shape(int a, int b) {
      this.a = a;
      this.b = b;
   }
   abstract void printArea();
}

class Rectangle extends Shape {
   Rectangle(int length, int breadth) {
      super(length, breadth);
   }

   void printArea() {
      int area = a * b;
      System.out.println("Area of rectangle is : " + area);
   }
}

class Triangle extends Shape {
   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 {
    Circle(int radius) {
        super(radius,0);
    }

    void printArea() {
        double area = 3.14 * a * a;
        System.out.println("Area of rectangle : " + area);
    }
}

public class Area {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter dimension of rectangle(length,breadth)");
        int len = s.nextInt();
        int bre = s.nextInt();
        Rectangle ob = new Rectangle(len, bre);

        System.out.println("Enter dimension of triangle(base,height)");
        int bas = s.nextInt();
```

```
        int hei = s.nextInt();
        Triangle ob1 = new Triangle(bas, hei);

        System.out.println("Enter dimension of circle(radius)");
        int r = s.nextInt();
        Circle ob2 = new Circle(r);

        ob.printArea();
        ob1.printArea();
        ob2.printArea();
    }
}
```

OUTPUT :

```
PS C:\Users\BMSCECSE\Desktop\Saikrishna_1BF24CS264> cd "c:\Users\BMSCECSE\Desktop\Saikrishna_1BF24CS264\"
Enter dimension of rectangle(length,breadth)
1
20
Enter dimension of triangle(base,height)
7
8
Enter dimension of circle(radius)
1
Area of rectangle is : 20
Area of triangle : 28.0
Area of rectangle : 3.14
```

Program 5 : Banking System using concepts of Inheritance

CODE :

```
import java.util.Scanner;
class Account {
   String Name;
   int accno;
   String acctype;
   double balance;
   Account(String Name, int accno, String acctype, double balance) {
      this.Name = Name;
      this.accno = accno;
      this.acctype = acctype;
      this.balance = balance;
   }
   void deposit(double amount) {
      if (amount > 0) {
         balance += amount;
         System.out.println("Deposited amount: Rs." + amount);
      } else {
         System.out.println("Invalid deposit amount!");
      }
   }
   void withdraw(double amount) {
      if (amount <= 0) {
         System.out.println("Invalid withdrawal amount!");
      } else if (amount > balance) {
```

```
            System.out.println("Insufficient balance!");
        } else {
            balance -= amount;
            System.out.println("Withdrawn amount: Rs." + amount);
        }
    }
    void displayBalance() {
        System.out.println("\nAccount Holder: " + Name);
        System.out.println("Account Number: " + accno);
        System.out.println("Account Type: " + acctype);
        System.out.println("Current Balance: Rs." + balance);
    }
}

class Savings extends Account {
    double rate = 0.05;
    Savings(String Name, int accno, double balance) {
        super(Name, accno, "savings", balance);
    }
    void computeInterest() {
        Scanner s = new Scanner(System.in);
        System.out.print("Enter number of years: ");
        int years = s.nextInt();
        double interest = balance * Math.pow((1 + rate), years) - balance;
        balance += interest;
        System.out.println("Compound Interest added: Rs." + interest);
    }
}
```

```
class Current extends Account {
    double minbalance = 1000;
    double sercharge = 100;
    Current(String Name, int accno, double balance) {
        super(Name, accno, "current", balance);
    }
    @Override   void withdraw(double amount) {
        super.withdraw(amount);
        if (balance < minbalance) {
            balance -= sercharge;
            System.out.println("Service charge of Rs." + sercharge + " applied.");
            System.out.println("New Balance: Rs." + balance);
        }
    }
}

public class Bank {
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);

        System.out.print("Enter customer name: ");
        String name = s.nextLine();

        System.out.print("Enter account number: ");
        int accno = s.nextInt();
        s.nextLine();
```

```
System.out.print("Enter account type (saving/current): ");
String type = s.nextLine().toLowerCase();

System.out.print("Enter initial balance: ");
double balance = s.nextDouble();
Savings sv = new Savings(name, accno, balance);
Current ct = new Current(name, accno, balance);
int choice;
do {
   System.out.println("\n--- Menu ---");
   System.out.println("1. Deposit");
   System.out.println("2. Withdraw");
   System.out.println("3. Compute Interest");
   System.out.println("4. Show Balance");
   System.out.println("5. Exit");
   System.out.print("Enter your choice: ");
   choice = s.nextInt();
   switch (choice) {
      case 1:
         System.out.print("Enter deposit amount: ");
         double d = s.nextDouble();
         if(type.equals("savings")){
            sv.deposit(d);
         }
         else{
            ct.deposit(d);
         }
         break;
```

```
case 2:
   System.out.print("Enter withdrawal amount: ");
   double w = s.nextDouble();
   if(type.equals("savings")){
      sv.withdraw(w);
   }
   else{
      ct.withdraw(w);
   }
   break;

case 3:
   if(type.equals("savings")){
      sv.computeInterest();
   }
   else{
      System.out.println("Intrest cant be computed for acc type");
   }
   break;

case 4: if(type.equals("savings")){
      sv.displayBalance(); }
   else{ ct.displayBalance();}
   break;

case 5:  System.out.println("Thank you for banking with us!");
   break;
```

```
                default:
                    System.out.println("Invalid choice. Please try again.");
                }
            } while (choice != 5);
            s.close(); }
        }
```

OUTPUT :

```
PS C:\Users\Admin\Desktop\1WN24CS224> cd "c:\Users\Admin\Desktop\1BF24CS264\" ; if ($?) { javac Bank.java } ; if ($?) { java Bank }
Enter customer name: Sai
Enter account number: 2
Enter account type (saving/current): current
Enter initial balance: 900

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 2
Enter withdrawal amount: 20
Withdrawn amount: Rs.20.0
Service charge of Rs.100.0 applied.
New Balance: Rs.780.0

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 3
Intrest cant be computed for acc type

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 1
Enter deposit amount: 3000
Deposited amount: Rs.3000.0

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 4

Account Holder: Sai
Account Number: 2
Account Type: current
Current Balance: Rs.3780.0
```

```
PS C:\Users\Admin\Desktop\1BF24CS264> cd "c:\Users\Admin\Desktop\1BF24CS264\" ; if ($?) { javac Bank.java } ; if ($?) { java Bank }
Enter customer name: Sai Krishna
Enter account number: 1
Enter account type (saving/current): savings
Enter initial balance: 1000

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 1
Enter deposit amount: 30
Deposited amount: Rs.30.0

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 3
Enter number of years: 2
Compound Interest added: Rs.105.57500000000005

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 4

Account Holder: Sai Krishna
Account Number: 1
Account Type: savings
Current Balance: Rs.1135.575

--- Menu ---
1. Deposit
2. Withdraw
3. Compute Interest
4. Show Balance
5. Exit
Enter your choice: 5
Thank you for banking with us!
PS C:\Users\Admin\Desktop\1BF24CS264>
```

Program 6 : Calculating total marks of student using Packages

CODE :

```
package CIE;
import java.util.Scanner;
public class Student {
   public String name;
   public String USN;
   public int sem;
   public void inputdetails() {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter USN: ");
      USN = sc.nextLine();
      System.out.println("Enter Name: ");
      name = sc.nextLine();
      System.out.println("Enter Semester: ");
      sem = sc.nextInt();
   }
   public void displaydetails() {
      System.out.println("USN: " + USN);
      System.out.println("Name: " + name);
      System.out.println("Semester: " + sem);  } }
```

```
package CIE;
import java.util.Scanner;
public class Internal extends Student {
   public int internalmarks[] = new int[5];
   public void CIEmarks() {
      Scanner sc = new Scanner(System.in);
      for (int i = 0; i < 5; i++) {
         System.out.println("Enter internal marks for subject " + (i+1));
         internalmarks[i] = sc.nextInt();}  } }
```

```
package SEE;
import CIE.Internal;
import java.util.Scanner;
public class Externals extends Internal {
   public int marks[] = new int[5];
   public int finalmarks[] = new int[5];
   public void SEEmarks() {
      Scanner sc = new Scanner(System.in);
      for (int i = 0; i < 5; i++) {
         System.out.println("Enter SEE marks for subject " + (i+1));
         marks[i] = sc.nextInt();  }
   }
   public void Totalmarks() {
      for (int i = 0; i < 5; i++) {
         finalmarks[i] = (int)(marks[i] / 2.0) + internalmarks[i];
      }
   }
```

```
}
import SEE.Externals;
import java.util.Scanner;
public class Final{
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.println("Enter number of students: ");
      int n = sc.nextInt();
      Externals see[] = new Externals[n];
      for (int i = 0; i < n; i++) {
         System.out.println("Enter details for Student " + (i+1));
         see[i] = new Externals();
         see[i].inputdetails();
         see[i].CIEmarks();
         see[i].SEEmarks();
         see[i].Totalmarks();
      }
      System.out.println("Final marks of students ");
      for (int i = 0; i < n; i++) {
         System.out.println("Student " + (i+1));
         see[i].displaydetails();
         System.out.println("Final marks:");
         for (int j = 0; j < 5; j++) {
            System.out.println("Subject " + (j+1) + ": " + see[i].finalmarks[j]);
         }
      }
   }
}
```

```
PS C:\Users\Admin\Desktop\1BF24CS264> cd "c:\Users\Admin\Desktop\1BF24CS264\" ; if ($?) { javac Final.java } ; if ($?) { java Final }
Enter number of students:
1
Enter details for Student 1
Enter USN:
1BF24CS264
Enter Name:
Sai
Enter Semester:
3
Enter internal marks for subject 1
35
Enter internal marks for subject 2
40
Enter internal marks for subject 3
35
Enter internal marks for subject 4
35
Enter internal marks for subject 5
36
Enter SEE marks for subject 1
80
Enter SEE marks for subject 2
90
Enter SEE marks for subject 3
75
Enter SEE marks for subject 4
90
Enter SEE marks for subject 5
100
Final marks of students
Student 1
USN: 1BF24CS264
Name: Sai
Semester: 3
Final marks:
Subject 1: 75
Subject 2: 85
Subject 3: 72
Subject 4: 80
Subject 5: 86
PS C:\Users\Admin\Desktop\1BF24CS264>
```

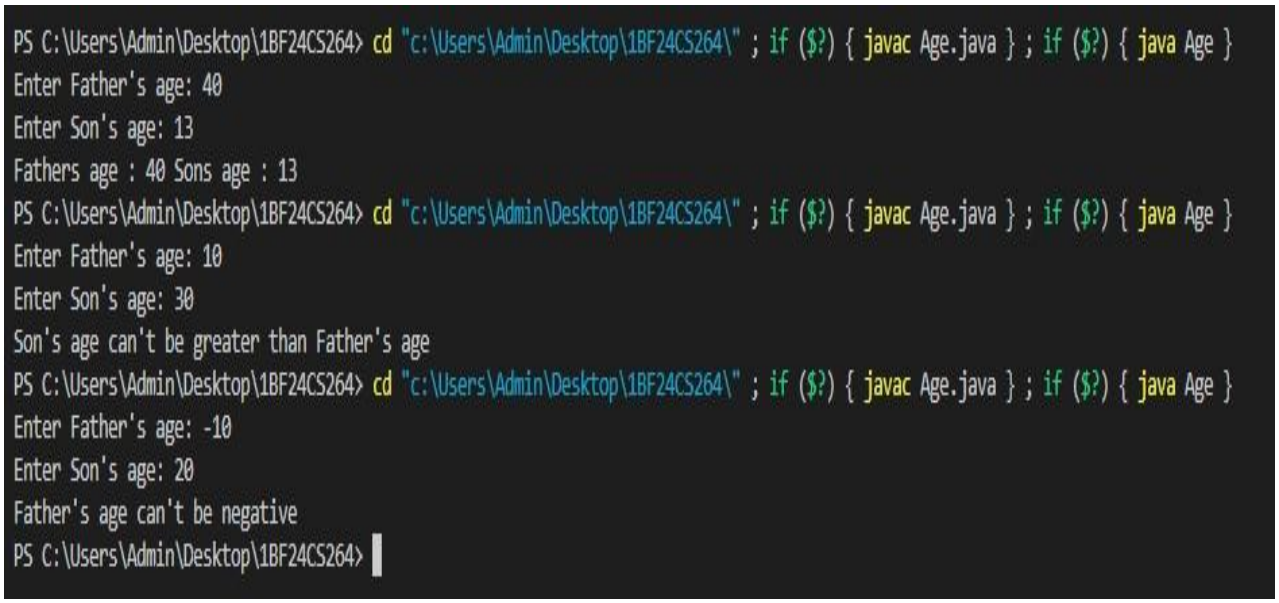
Program 7 : Age verification using try and catch

CODE :

```
import java.util.Scanner;
class Wrongage extends Exception {
   public Wrongage(String msg) {
      super(msg);
   }
}
class Father {
   int fage;
   Father(int fage) throws Wrongage {
      if (fage < 0) {
         throw new Wrongage("Father's age can't be negative"); }
      this.fage = fage;
   }
}
class Son extends Father {
   int sage;
   Son(int fage, int sage) throws Wrongage {
      super(fage); // call Father constructor
      if (sage < 0) {
         throw new Wrongage("Son's age can't be negative");
      }if (sage > fage) {
         throw new Wrongage("Son's age can't be greater than Father's age");
      }  this.sage = sage;}
   void display(){
      System.out.println("Fathers age : "+fage+" Sons age : "+sage);
```

```
  } }
public class Age{
  public static void main(String[] args) {
    Scanner s = new Scanner(System.in);
    try {
      System.out.print("Enter Father's age: ");
      int fage = s.nextInt();
      System.out.print("Enter Son's age: ");
      int sage = s.nextInt();
      Son o = new Son(fage,sage);
      o.display();
    } catch (Wrongage e) {
      System.out.println(e.getMessage());}  }  }
```

OUTPUT :



Program 8 : Concepts of threading

CODE :

```
class BMS extends Thread {
    public void run() {
        for (int i = 0; i < 5; i++) {
            System.out.println("BMSCE");
            try {
                Thread.sleep(10000);
            } catch (InterruptedException e) {
                System.out.println(e);
            }
        }
    }
}
class CSE extends Thread {
    public void run() {
        for (int i = 0; i < 5; i++) {
            System.out.println("CSE");
            try {
                Thread.sleep(2000);
            } catch (InterruptedException e) {
                System.out.println(e);
            }
        }
    }
}
```

```
public class Threads{
   public static void main(String args[]) {
      BMS t1 = new BMS();
      CSE t2 = new CSE();

      t1.start();
      t2.start();
   }
}
```

OUTPUT :