OBJECT ORIENTED JAVA PROGRAMMING

LAB RECORD

DARSHAN NINGTHOUJAM

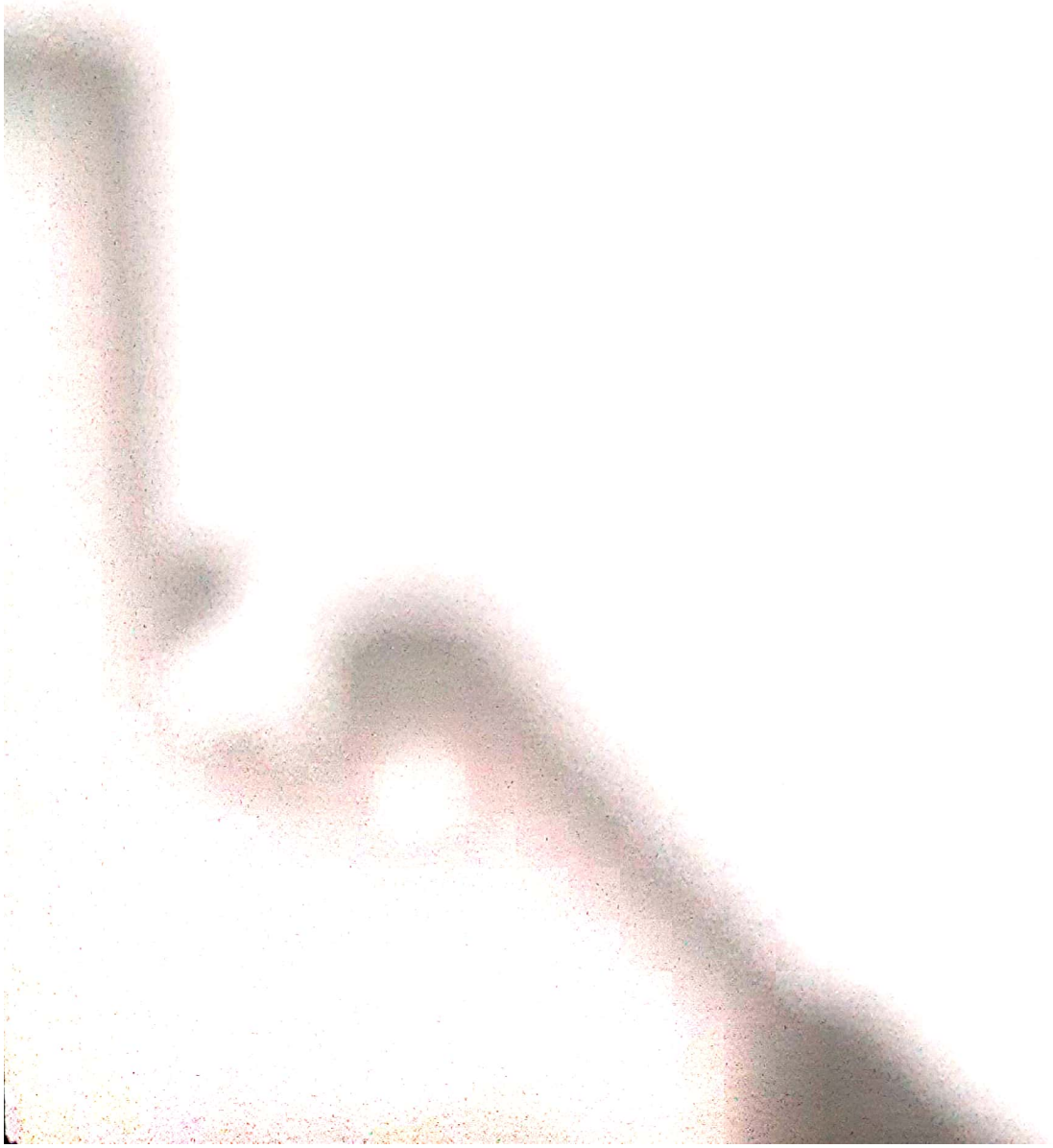
1BM19CS041

III -Sem

III rd year

Program - U.G

B.M.S. College of Engineering.



Lab Program:

Develop a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

OJJ LAB

Darshan
Ningthoujam

Quadratic Equation

```
import java.util.*;
class QuadraticEquation
{
public static void main(String[] args)
{
Scanner sc = new Scanner(System.in);
System.out.println("Quadratic Equation of
                    form ax^2+bx+c);
System.out.println("enter the values of a, b & c
                    respectively");

double ~~int~~ a = sc.nextInt();
double ~~int~~ b = sc.nextInt();
double ~~int~~ c = sc.nextInt();
    while(a!=0)
    {
double ~~float~~ D = (b*b)-(4*a*c);
    ~~System.out.println("the~~
    if (D==0)
    {
double ~~float~~ x = (b*b)/(2*a);
    System.out.println("the roots are real, equal
                        and is equal to "+x);
    break;
    }
```

```
}
else if (D>0)
{
double xa = (-b + (b*b - 4*a*c)^(1/2)) / (2*a);
double xb = (-b - (b*b - 4*a*c)^(1/2)) / (2*a);
```

Math.sqrt(D)

Math.sqrt(D)

```
System.out.println("the roots are real, unequal
                    and are equal to "+xa+"&"
                    + xb);
break;
}
else if (D<0)
{
System.out.println("the roots are imaginary");
break;
}
}
}
}
```

Lab Program 2:

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.

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1BM19CS041

```
import java.util.*;
class Student                    SGPA
 {
    private String USN;
    private String name;
   private int n;
   private double SGPA=0;
   private int totalCredits=0;
    Scanner ss = new Scanner(System.in);

   void Details()
   {
    System.out.println("Enter USN of the student");
    USN= ss.nextLine();
    System.out.println("Enter Name of the student");
   name = ss.nextLine();
   System.out.println("Enter no. of subjects");
   n=ss.nextInt();
   int credits[]= new int[n];
   double marks[]= new double[n];
   System.out.println("Enter details of the subjects");
   for(int i=0; i<n; i++)
    {
     System.out.println("Enter credits allotted
     to the subject "+(i+1));
     credits[i] = ss.nextInt();
     System.out.println("Enter marks "+(i+1));
     marks[i] = ss.nextInt();
```

```
        Calculate(credits[i], marks[i], i);
    }
}
void Calculate(int credit, double mark, int j)
{
    totalCredits = totalCredits + credit;
    if(mark >= 90 && mark <= 100)
        SGPA = SGPA + (10 * credit);
    else if(mark >= 80 && mark <= 89)
        SGPA = SGPA + (9 * credit);
    else if(mark >= 70 && mark <= 79)
        SGPA = SGPA + (7 * credit);
    else if(mark >= 60 && mark <= 69)
        SGPA = SGPA + (6 * credit);
    else if(mark >= 50 && mark <= 59)
        SGPA = SGPA + (5 * credit);
    else
        System.out.println("Failed in subject"
                           + (j+1));
}
void Display()
{
    System.out.println("Details of the Student");
    System.out.println("Name:" + name);
    System.out.println("USN:" + USN);
    System.out.println("SGPA of student" +
                       (SGPA/totalCredits));
}
```

```
public static void main (String args[])
{
    Student s1 = new Student();
    s1.Details();
    s1.Display();
}
}
```

C:\Windows\system32\cmd.exe

```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\user2>cd documents

C:\Users\user2\Documents>cd java

C:\Users\user2\Documents\JAVA>cd work space

C:\Users\user2\Documents\JAVA\WORK SPACE>javac QuadraticEquation.java

C:\Users\user2\Documents\JAVA\WORK SPACE>java QuadraticEquation
Quadratic Equation of form ax^2+bx+c
enter the values of a, b & c respectively
1
2
3
the roots are imaginary

C:\Users\user2\Documents\JAVA\WORK SPACE>javac Student1.java

C:\Users\user2\Documents\JAVA\WORK SPACE>java Student
Enter USN of the student
12eq
Enter Name of the student
daru
Enter no of subjects
2
Enter details of the subjects:
Enter credits allotted to the subject 1
2
Enter marks in the subject 1
45
Enter credits allotted to the subject 2
2
Enter marks in the subject 2
76
Details of the Student
Name :daru
USN: 12eq
SGPA of student 6.5

C:\Users\user2\Documents\JAVA\WORK SPACE>_
```

Lab Program - 3

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 and get the details of the objects. Include a toString( ) method that could display the complete details of the book. Develop a Java program to create n book objects.

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```
import java.util.Scanner;

class Book
{
    private String name;
    private String author;
    private double price;
    private int num_pages;

    Book(String s, String a, double p, int n)
    {
        name = s;
        author = a;
        price = p;
        num_pages = n;
    }
    Book()
    {
        name = "NULL";
        author = "NULL";
        price = 0;
        num_pages = 0;
    }
    void setdata()
    {
        Scanner input = new Scanner(System.in);
        System.out.println("Enter the name of the
                                book:");
        name = input.next();
        input.nextLine();
```

```
System.out.println("Enter the author of the book:");
 author = input.next();
 input.nextLine();
 System.out.println("Enter the price of the book:");
 price = input.nextDouble();
 System.out.println("Enter the number of pages
                        in the book:");
  num_pages = input.nextInt();
}
 public String toString()
 {
  return("name of book:"+name+"\n author:
        "+author+"\n price :"+price+"\n number
         of pages:"+num_pages);
  }
}
public class Lab
 {
  public static void main(String args[])
  {
   Scanner xx= new Scanner(System.in);
   System.out.println("Enter the number of books:");
   int n = xx.nextInt();
   Book b[] = new Book[n];
   for(i
```

```
System.out.println("Enter the details of the
for(i=0; i<n; i++)   book:");
");  {
 System.out.println("Enter the details of the"+(i+1)+"
                                book");
   b[i]=new Book();
   b[i].setdata();
  }
 System.out.println("The details of the books are:");
 for(i=0; i<n; i++)
  {
   System.out.println("the details of the"+(i+1)+"
                                book is:");
    System.out.println(b[i]);
   }
  }
}
```

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.

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SHAPE

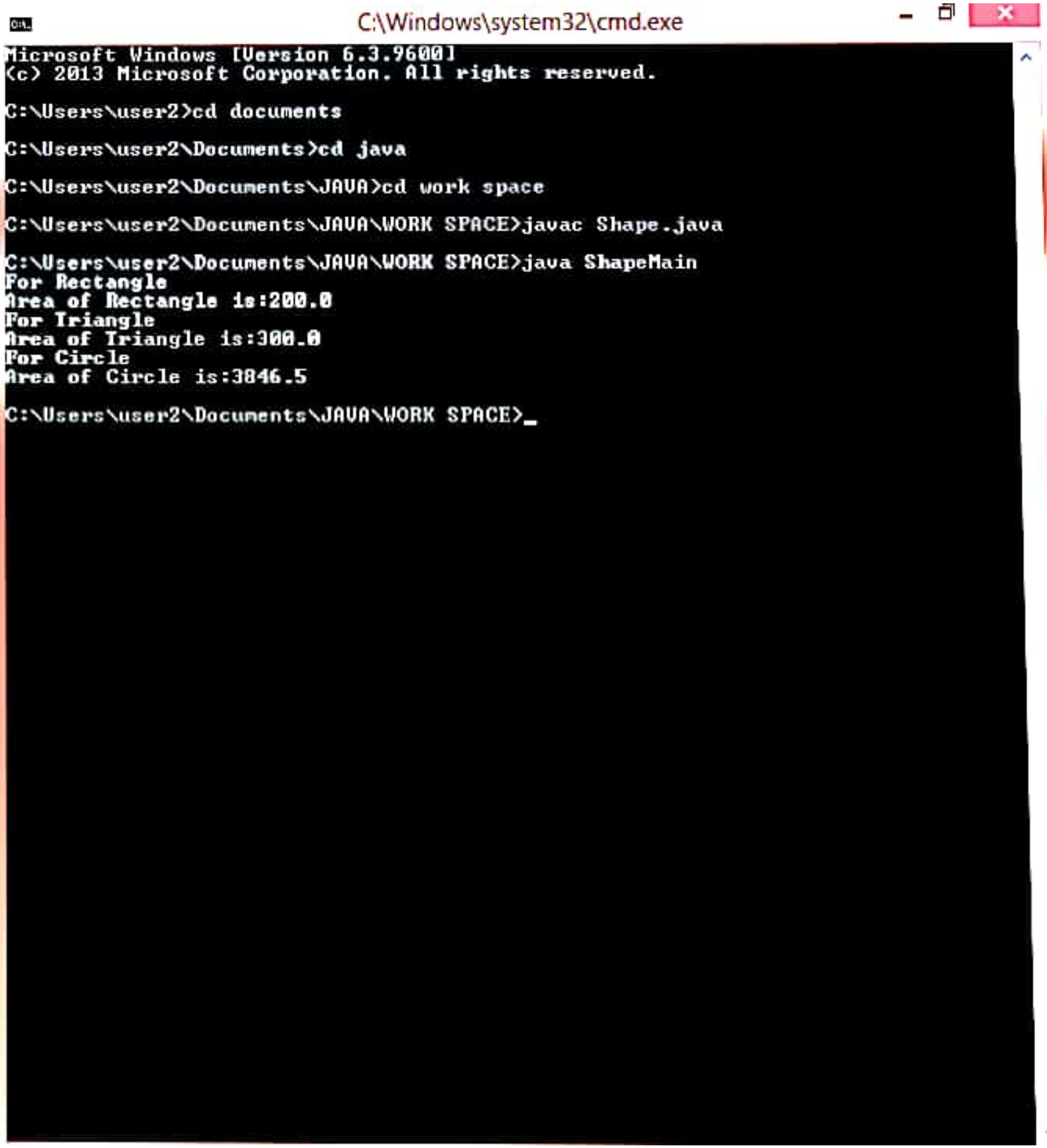
```
import java.util.Scanner;
abstract class Shape
 {
  double
   int int1, int2;
   abstract double printArea();
 }
class Rectangle extends Shap
 {
   Rectangle (int a, int b)
    {int1 = a;
     int2 = b;
    }
   double printArea()
    {
    System.out.println("For Rectangle");
     return int1*int2;
    }
 }
class Triangle extends Shape
 {
  Triangle (int a, int b)
   { int1 = a;
     int2 = b;
   }
   double printArea()
    {
    System.out.println("For Triagle");
    return (int1*int2)/2
    }
 }
```

```
class Circle extends Shape
  {
   Circle(int a)
   int l = a;
   }
   double printArea()
   {
   System.out.println("For Circle");
   return 3.14*int l *int l;
   }
  }
  class ShapeMain
  {
   public static void main(String args[])
   {
   Rectangle r = new Rectangle(10, 20);
   Triangle t = new Triangle(20, 30);
   Circle c = new Circle(35);
   System.out.println("Area of Rectangle is:"+
                          r.printArea());

   System.out.println("Area of Triangle is :"
                          +t.printArea());

   System.out.println("Area of Circle is:"+c.print
                          Area());

   }
  }
```



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 Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: • Accept deposit from customer and update the balance. • Display the balance. • Compute and deposit interest • Permit withdrawal and update the balance • Check for the minimum balance, impose penalty if necessary and update the balance

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BANK ACCOUNT

```
import java.util

class Account
{
  private String name;
  private double account_no;
  private char account_type;
  private double balance;
  void getdata(char ch)
  {
   Scanner sc= new Scanner(System.in);
   System.out.print("Enter the name of the costomer:");
   name = sc.next();
   sc.nextLine();
   System.out.print("Enter the account number of
                     the costomer:");

   account_no= sc.nextDouble();
   System.out.println("Enter the balace of the
                       customer:");

   balace = sc.nextDouble();
   account_type = ch;
  }
  void updatebalance(double n)
   {
     balance = balance+n;
   }
```

```
void updatebalance2(double n)
 {
  balance = balance - n;
 }
 double getbalance()
 {
  return balance;
 }
 void displaybalance()
 {
  System.out.print("The balance is :" + balance);
  }
}
class Saving_Account extends Account
  {
   private double interest_rate;
   Saving_Account()
   {
    Scanner sn = new Scanner(System.in);
    getdata('S');
    System.out.println("Enter the interest
                        rate :");
    interest_rate = sn.nextDouble();
   }
```

```
void getdeposit()
 {
  Scanner nn = new Scanner(System.in);
  System.out.println("Enter the amount to
                      be deposited:");
  double n = nn.nextDouble();
  updatebalance(n);
 }
 void compute interest()
  {
   double n = (getbalance() * interest_rate)/100;
   updatebalance(n);
   System.out.println("The computed interest
                       is:"+n);
   displaybalance();
  }
  void withdrawl()
  {
   System.out.print("Enter the amount to be
                     withdrawn:");
   Scanner nx = new Scanner(System.in);
   double n = nn.nextDouble();
   while (n>getbalance())
   {
    System.out.println("The amount withdrawn
                        is more than the balance
                        enter again:");
    n = nn.nextDouble();
  }
```

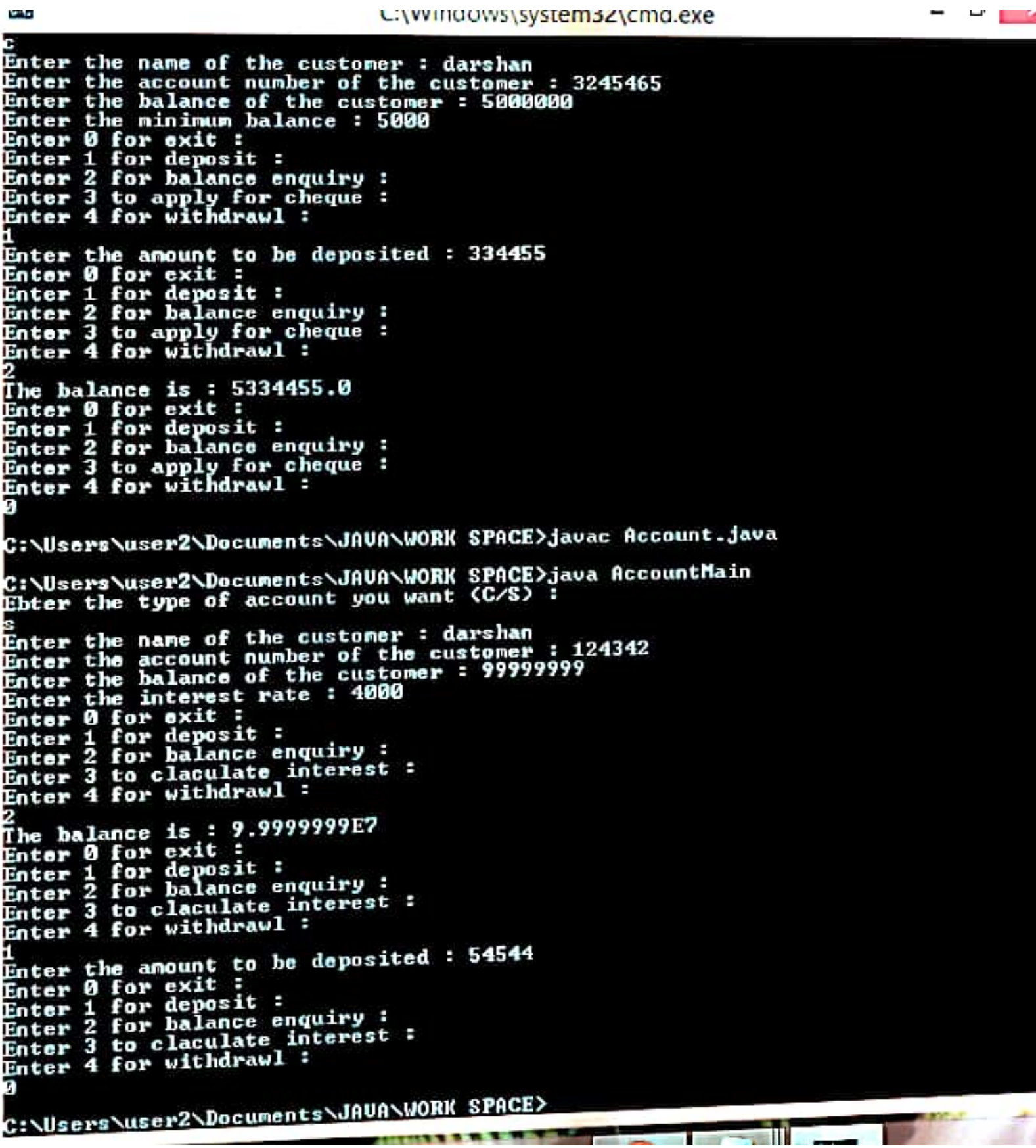
```
        update balance1(n);
        displaybalance();
      }
    }

class Current_Account extends Account
{
  private double min_balance;
  private int cheque_book;
   Current_Account()
   {
    Scanner sn = new Scanner (System.in);
    getdata('C');
    System.out.println("Enter the minimum
                        balance:");
    min_balance = sn.nextDouble();
   }
 void getdeposit()
   {
    Scanner sn = new Scanner(System.in);
    System.out.println("Enter the amount to
                        be deposited:");
    double n = sn.nextDouble();
    update balance(n);
   }
  void issuecheck()
   {
    Scanner sn = new Scanner (System.in);
    System.out.print("Enter the amount of the
                      check:");
    double n = sn.nextDouble();
```

```
if (x > (getbalance()-minbalance))
{
System.out.println("You have issued check
                    of more than the minimum
                   balance and you have been
                   charged the penalty of 100 rupees");
      updatebalance1(100);
  }
 else
  {
   update balance2(x);
  }
 displaybalance();
}
void withdrawal()
 {
  System.out.println("Enter the amount to be
                      withdraw:");
 Scanner xx = new Scanner(System.in);
 double x = xx.nextDouble();
 while (x) (getbalance()-minbalance))
  {
   System.out.println("The amount withdraw is
                       more than the balance enter again");
    x= xx.nextDouble();
  }
  updatebalance2(x);
  displaybalance();
 }
}
```

```
class AccountMain{
public static void main(String []args) {
Scanner input = new Scanner(system.in);
char ch;
System.out.println("Enter the type of account you
                    want (C/S):");
ch = input.next().charAt(0);
if (ch == 'S' || ch == 's')
 {
   Saving_Account s = new Saving_Account();
   int n = 1;
    while (n != 0)
   {
   System.out.println("Enter 0 for exit:");
   System.out.println("Enter 1 for deposit");
   System.out.println("Enter 2 for balance enquiry
   System.out.println("Enter 3 to calculate inter
   System.out.println("Enter 4 for withdrawal:
   n = input.nextInt();
    if (n == 0)
    break;
    else if (n == 1)
    s.getdeposit();
    else if (n == 2)
    s.displaybalance();
    else if (n == 3)
     s.computeinterest();
    else if (n == 4)
     s.withdraw();
}
```

```
}
else
{
  Current_Account s=new Current_Account();
  int x=1;
  while (x!=0)
  {
  System.out.println("Enter 0 for exit:");
  System.out.println("Enter 1 for deposit:");
  System.out.println("Enter 2 for balance enquiry:");
  System.out.println("Enter 3 to apply for cheque:");
  System.out.println("Enter 4 for withdrawal:");
  x=input.nextInt();
  if(x==0)
     break;
  else if(x==1)
   s.setdeposit();
   else if(x==2)
    s.displaybalance();
   else if(x==3)
   s.issuecheck();
   else if(x==4)
    s.withdrawal();
  }
 }
}
}
```



Solve this program and write the procedure you have used to execute this in your observation

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.

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WEEK 9

Procedure

As given in the question, we make three classes Student, Internals & Externals. Out of which Student and Internals are included in package cie & Externals in package see. And we also have a driver class FinalMarks included to display the total marks obtained in CIE & SEE by the students.

First we ~~compile Student~~ save all the .java files in the same folder, say pac which contains packages cie & see.

Then we compile student class and internals class. Now, since we have been told to derive Externals from class Student and therefore it imports cie package, we move the class file Student.class into package cie.

Then we go further and compile Externals.java.

Now, coming to the compilation of Driver class, we shift all the remaining .class files to their respective packages ∴ the driver class imports the packages cie & see. Then we compile & execute it. End of execution.

C:\Windows\system32\cmd.exe

```
Enter External Marks of Student in subject 3 :
23
Enter External Marks of Student in subject 4 :
24
Enter External Marks of Student in subject 5 :
44
Enter USN of Student:
23425
Enter Name of Student:
raj
Enter Semester of Student:
2
Enter Marks of obtained by Student in Internals in 5 subjects
Enter Internal Marks of Student in subject 1 :
34
Enter Internal Marks of Student in subject 2 :
50
Enter Internal Marks of Student in subject 3 :
23
Enter Internal Marks of Student in subject 4 :
34
Enter Internal Marks of Student in subject 5 :
44
Enter Marks of obtained by Students in Externals in 5 subjects
Enter External Marks of Student in subject 1 :
67
Enter External Marks of Student in subject 2 :
88
Enter External Marks of Student in subject 3 :
98
Enter External Marks of Student in subject 4 :
78
Enter External Marks of Student in subject 5 :
67
Total marks for student1in each subject are:

Total marks in subject1for student1is:
62
Total marks in subject2for student1is:
50
Total marks in subject3for student1is:
33
Total marks in subject4for student1is:
56
Total marks in subject5for student1is:
72
Total marks for student2in each subject are:

Total marks in subject1for student2is:
67
Total marks in subject2for student2is:
94
Total marks in subject3for student2is:
72
Total marks in subject4for student2is:
73
Total marks in subject5for student2is:
```

Week 10: Lab Programs-7 and 8:

7. Write a program to demonstrate generics with multiple object parameters.

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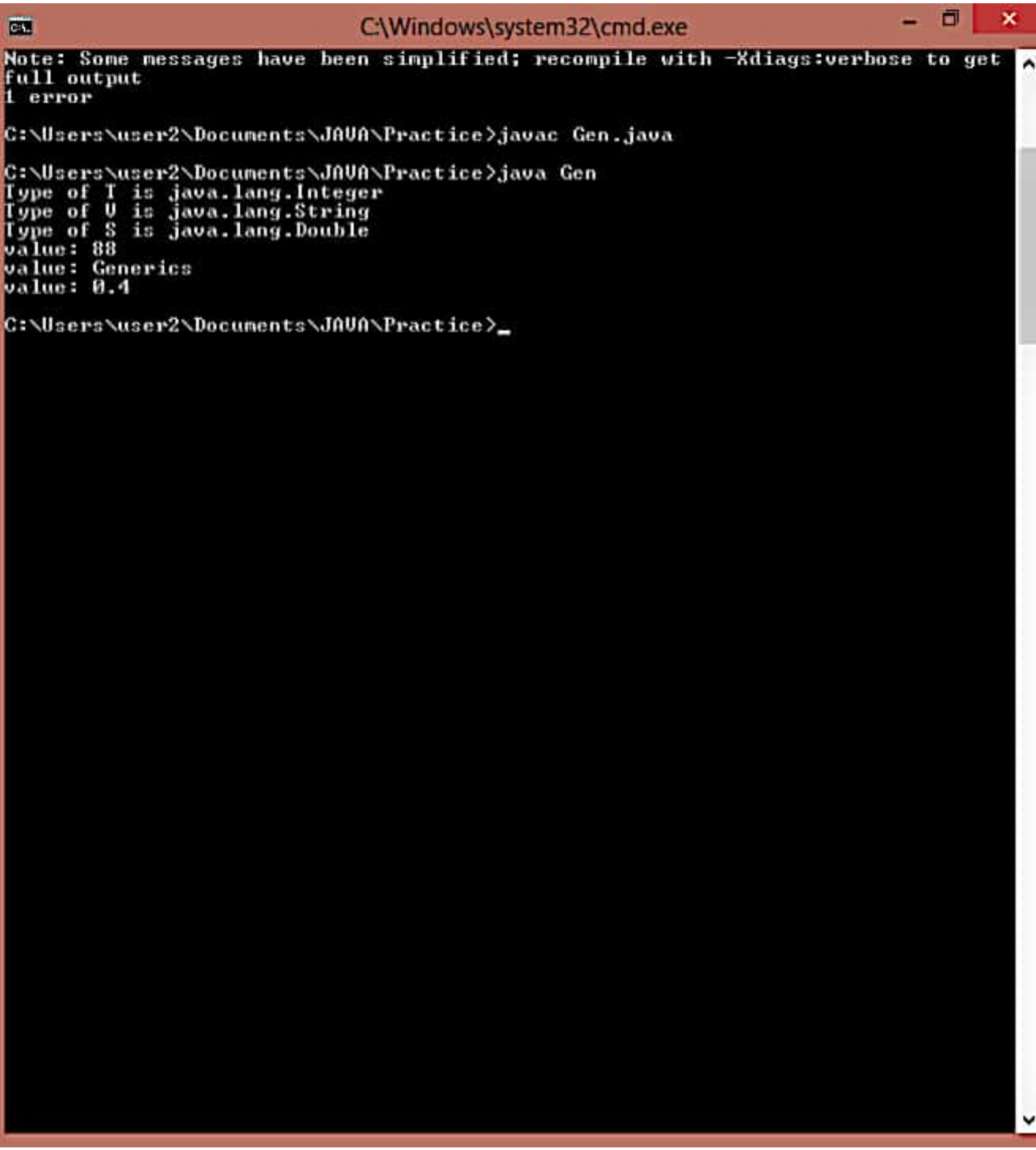
Generics

```
import java.util.*;
class ThreeGen<T, V, S>
{
T ob1;
V ob2;
S ob3;

ThreeGen(T o1, V o2, S o3)
 {
  ob1 = o1;
  ob2 = o2;
  ob3 = o3;
 }

void showTypes()
{
 System.out.println("Type of T is " + ob1.getClass().
                                        getName());
 System.out.println("Type of V is " + ob2.getClass().
                                        getName());
 System.out.println("Type of S is " + ob3.getClass().
                                        getName());
  }
 T getob1()
 {
  return ob1;
 }
 V getob2()
  {return ob2;
  }
```

Scanned with CamScanner

```
S getob3()
 {
  return ob3;
 }
}

class Gen
 {
 public static void main(String args[])
  {
  ThreeGen<Integer, String, Double> tgObj = new
                    ThreeGen<Integer, String, Double>
                              (88, "Generics", 0.4);
  int v = tgObj.getob1();
  System.out.println("value :"+v);
  String str = tgObj.getob2();
   System.out.println("value:"+str);
  double s = tgObj.getob3();
   System.out.println("value:"+s);
 }
}
```



8. 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 Wrong Age( ) when the input age=father's age.

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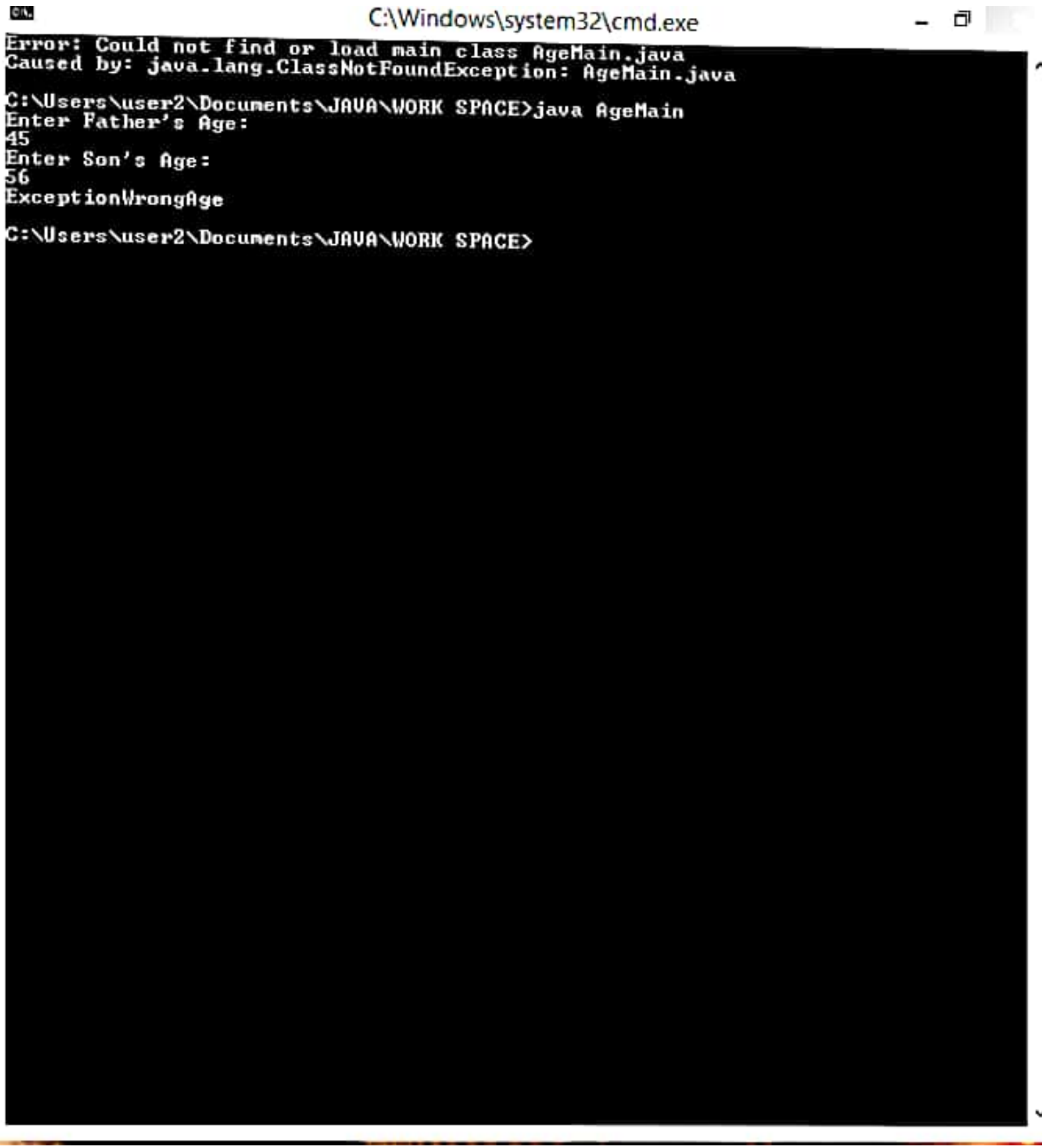
Exception Age program

```
import java.util.*;

class WrongAge extends Exception
{
 int F, S;
 WrongAge (int fatherage, int sonage)
  {
   F = fatherage;
   S = sonage;
  }
}

class Father
 {
 int fatherage;
 int sonage;
 Father (int f, int s) throws WrongAge
 {
  if (f == s)
   throw new WrongAge (fatherage, sonage);
   else
   {
    this.fatherage = f;
    this.sonage = s;
   }
  }
}
```

```
Class Son extends Father
 {
 Son(int f, int s) throws WrongAge
  {
  super(f, s);
  if (s>=f)
   throw new WrongAge(fatherage, sonage);
   System.out.println("Valid Age");
   }
  void display()
   {
    System.out.println("Father's Age :" + fatherage);
     System.out.println("Son's Age :" + sonage);
   }
 }
 class MainAgeMain{
  public static void main(String[] args){
  int f, s;
  Scanner S = new Scanner(System.in);
  System.out.println("Enter Father's Age:");
  f = S.nextInt();
   System.out.println("Enter Son's Age:");
   s = S.nextInt();
   try{ Son s1 = new Son(f, s);
     s1.display();
    }
    catch(WrongAge e)
    { System.out.println("Exception:" + e);
    }
   }}
```



Object Oriented Java Programming-19CS3PCOOJ

WEEK 11

LAB PROGRAM:

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.

WEEK 11

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MultiThreading Program

```
import java.util.*;

class ThreadM implements Runnable
{
String name;
int number;
 Thread t;
 ThreadM(String tn, int n)
 {
  name = tn;
  number = n;
  t = new Thread(this, name);
  System.out.println("Thread: "+t);
  t.start();
 }

 public void run()
{
 try{
  if(number==1)
  {
  for(int i=6; i>0; i--){
  System.out.println(name+": "+i);
  Thread.sleep(2000);
  }}
  }
```

```
if (number==2)
 {
 for(int i=6 ; i>0; i++){
 System.out.println(name+ ": "+i);
  Thread.sleep(2000);
  }}
 }
catch (InterruptedException e)
 {
 System.out.println(name+ "Interrupted");
 }
 System.out.println(name+"Exiting");
 }}
 class ThreadMain
  {
  public static void main (String[] args)
   {
    new ThreadM("B.M.S College of Engineering", 1);
    new ThreadM ("C.S.E", 2);
     }
    }
```

Lab Program:

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.

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Event Handling (Division)

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
public class Division extends Frame implements
        ActionListener
{
 TextField n1, n2, res;
 Label l1, l2, lres;
 Button b;
 public Division()
 {
  setLayout(new FlowLayout());
  Label l1 = new Label("NUM1", Label.RIGHT);
  Label l2 = new Label("NUM2", Label.RIGHT);
  Label lres = new Label("RESULT", Label.RIGHT);
  n1 = new TextField(12);
  n2 = new TextField(8);
  res = new TextField(10);
  b = new Button("DIVIDE");
  add(l1);
  add(n1);
  add(l2);
  add(n2);
  add(b);
  add(lres);
  add(res);
  b.addActionListener(this);
  addWindowListener(new MyWindowAdapter());
```

```
}
public void actionPerformed(ActionEvent ae)
{
  if(ae.getSource()==b)
   {
     try{
       int num1=Integer.parseInt(n1.getText());
       int num2=Integer.parseInt(n2.getText());
       int num3=num1/num2;
       res.setText(String.valueOf(num3));
     }
     catch(NumberFormatException ne)
     {
      JOptionPane.showMessageDialog(this, ne, "ERROR",
          JOptionPane.ERROR_MESSAGE);
     }
     catch(ArithmeticException a)
     {
      JOptionPane.showMessageDialog(this, a, "ERROR",
       JOptionPane.ERROR_MESSAGE);
     }
  }
public static void main(String[] args)
 {
   Division i=new Division();
   i.setSize(new Dimension(400,400));
   i.setTitle("INTEGER DIVISION OF TWO NUMBERS");
   i.setVisible(true);
 }
 class MyWindowAdapter extends WindowAdapter.
  {
   public void WindowClosing(WindowEvent we)
    {
      System.exit(0);
    }
  }
}
```