Shri Dharmasthala Manjunatheshwara College of Engineering, Dharwad
Department of Computer Science & Engineering

OOP Activities Submission Report

[Submitted as part of CTA Activity No-1]

Course:	**Object-Oriented Programming**	**Course Code:**	**21UCSC401**
Semester & Division:	**IV & A**	**Academic Year:**	**2022-23**

Report submitted by:

USN:	**2SD21CS001**	**Name:**	**ABHISHEK N DESHPANDE**

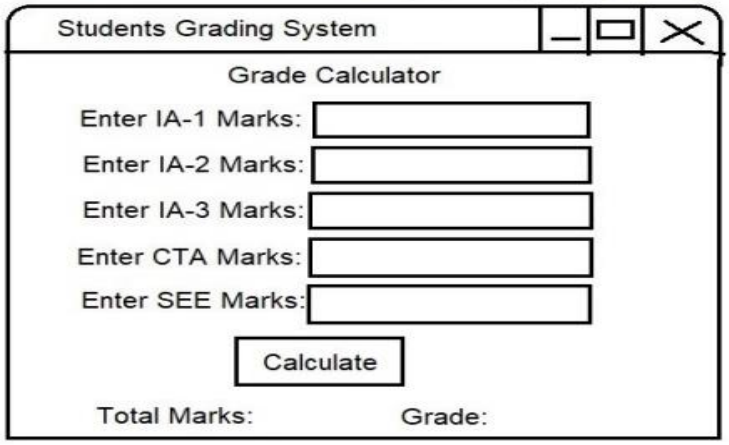
1. Problem Definition:

CTA Activity-1

You are hired as an **Associate Software Engineer** in a reputed Multi-National Company (MNC). Your company has received a software requirement from **Shri Dharmasthala Manjunatheshwara College of Engineering and Technology, Dharwad**, a software that computes and publishes the examination results.

You are assigned to work on **Students' Grading System** project. As part of this project, you are asked by your team lead to write a GUI based Java program to compute the grade obtained by a student in a single course.

Sample GUI design template for your assigned task is given below:



The project must provide the following features:

1) Provide GUI components to read IA–1, IA–2, IA–3, CTA & SEE marks scored by a student in a single course.
2) Proper error messages should be displayed if marks entered is invalid. i.e., IA marks should be between 0 – 20, CTA between 0 – 10 and SEE between 0 – 100. Incase of absentees, marks should be entered as 0.
3) CIE marks is the sum of best 2 marks of IA–1, IA–2 and IA–3 + CTA.
4) If CIE < 20, then the program should display a message "**Student is detained from taking SEE**" and the program should not display the grade.
5) If SEE marks is 38 or 39, then it should be upgraded to 40.
6) If SEE marks is < 38, then the message F Grade should be printed.
7) Total marks is to be calculated using the formula:

$$Total\ marks = CIE + \frac{SEE}{2}$$

$SEE/_2$ is to be rounded-off to next number if the fraction is ≥ 0.5, otherwise, it should be truncated.

For example:

If $SEE/_2 = 42.5$, then it should be converted to 43.

8) Grade is to be computed and displayed using the following table:

Total marks	Grade
100 – 90	S
89 – 80	A
79 – 70	B
69 – 60	C
59 – 50	D
49 – 40	E
39 – 0	F

As a beginner in Java programming, you are required to incorporate the following in your program:

- Use of object-oriented style of programming
- Use of inheritance and interfaces
- Exception handling mechanism
- Use of dynamic method dispatch feature

2. Java Program:

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.lang.*;
import java.math.*;
interface GradeCalculator {
     double calculateTotalMarks();

     String calculateGrade();
}
class Student implements GradeCalculator {
     private double ia1;
     private double ia2;
     private double ia3;
     private double cta;
     private double see;

     public Student(double ia1, double ia2, double ia3, double
cta, double see) {
          this.ia1 = ia1;
          this.ia2 = ia2;
          this.ia3 = ia3;
          this.cta = cta;
          this.see = see;
     }
     public double calculateTotalMarks() {
          double seemks = Math.ceil(see / 2);
          double cie = Math.max(ia1, ia2) + Math.max(ia2, ia3) +
cta;
```

```
            double totalMarks = cie + seemks;
            return totalMarks;
      }
      public String calculateGrade()
            double totalMarks = calculateTotalMarks();
            if (totalMarks <= 100 && totalMarks >= 90) {
                  return "S";
            } else if (totalMarks <= 89 && totalMarks >= 80) {
                  return "A";
            } else if (totalMarks <= 79 && totalMarks >= 70) {
                  return "B";
            } else if (totalMarks <= 69 && totalMarks >= 60) {
                  return "C";
            } else if (totalMarks <= 59 && totalMarks >= 50) {
                  return "D";
            } else if (totalMarks <= 49 && totalMarks >= 40) {
                  return "E";
            } else {
                  return "F";
            }
      }

}
class GradeCalculatorGUI extends JFrame {
      private JLabel lblIA1, lblIA2, lblIA3, lblCTA, lblSEE,
lblResult;
      private JTextField txtIA1, txtIA2, txtIA3, txtCTA, txtSEE;
      private JButton btnCalculate;

      public GradeCalculatorGUI() {
            setTitle("Grade Calculator");
```

```
            setSize(300, 300);
            setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
            setLayout(new GridLayout(7, 2));

            lblIA1 = new JLabel("IA-1 Marks (0-20):");
            txtIA1 = new JTextField();
            lblIA2 = new JLabel("IA-2 Marks (0-20):");
            txtIA2 = new JTextField();
            lblIA3 = new JLabel("IA-3 Marks (0-20):");
            txtIA3 = new JTextField();
            lblCTA = new JLabel("CTA Marks (0-10):");
            txtCTA = new JTextField();
            lblSEE = new JLabel("SEE Marks (0-100):");
            txtSEE = new JTextField();
            lblResult = new JLabel("");

            btnCalculate = new JButton("Calculate");
            btnCalculate.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                      try {
                           double ia1 =
Double.parseDouble(txtIA1.getText());
                           double ia2 =
Double.parseDouble(txtIA2.getText());
                           double ia3 =
Double.parseDouble(txtIA3.getText());
                           double cta =
Double.parseDouble(txtCTA.getText());
                           double see =
Double.parseDouble(txtSEE.getText());
```

```
                        if (ia1 < 0 || ia1 > 20 || ia2 < 0 ||
ia2 > 20 || ia3 < 0 || ia3 > 20 || cta < 0 || cta > 10
                                || see < 0 || see > 100) {
                            lblResult.setText("Invalid marks
entered!");
                        } else {
                            Student student = new Student(ia1,
ia2, ia3, cta, see);
                            double totalMarks =
student.calculateTotalMarks();
                            String grade =
student.calculateGrade();
                            lblResult.setText("Total Marks: "
+ totalMarks + ", Grade: " + grade);
                        }
                    } catch (NumberFormatException ex) {
                        lblResult.setText("Invalid marks
entered!");
                    }
                }
            });
            add(lblIA1);
            add(txtIA1);
            add(lblIA2);
            add(txtIA2);
            add(lblIA3);
            add(txtIA3);
            add(lblCTA);
            add(txtCTA);
            add(lblSEE);
            add(txtSEE);
```

```
            add(btnCalculate);
            add(lblResult);
            setVisible(true);
      }
}

public class Main {
      public static void main(String[] args) {
            SwingUtilities.invokeLater(new Runnable() {
                  public void run() {
                        new GradeCalculatorGUI();
                  }
            });
      }
}
```

3. Screen shots of the program execution: