

LAB # 2

Good practices of programming

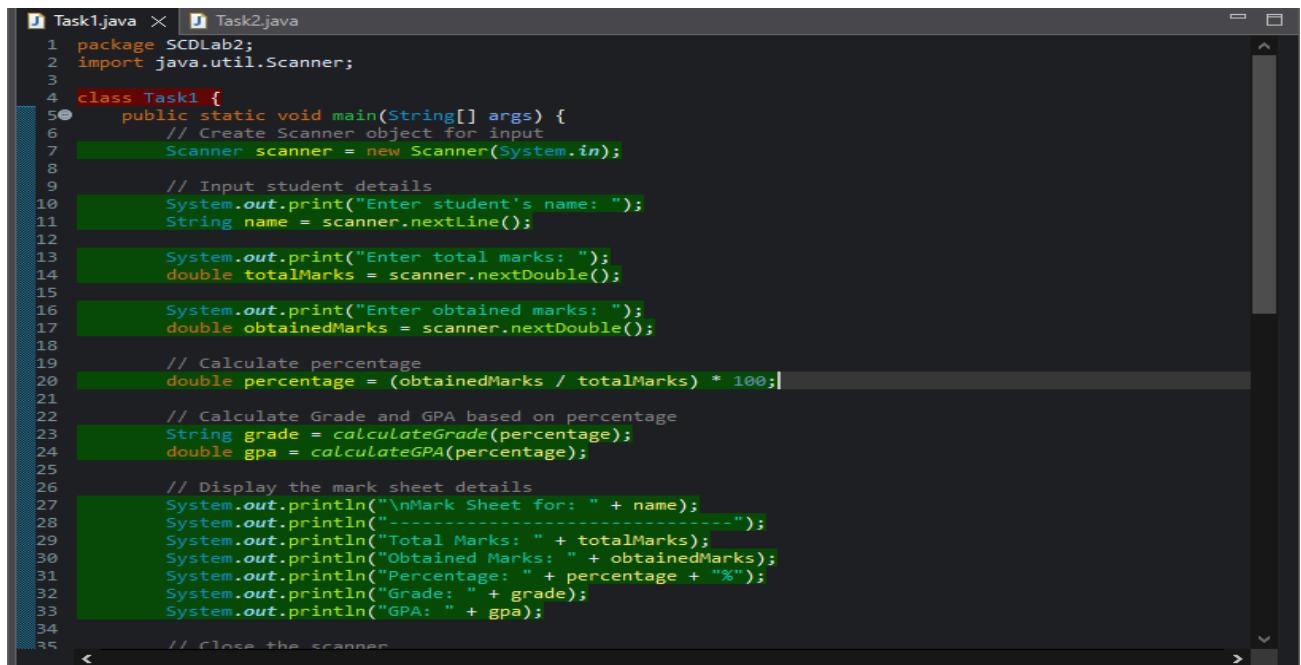
OBJECTIVE:

Implementing good code practices and code optimization techniques.

Lab Task:

1. Create a design for the mark sheet by taking runtime value of student name, total marks, obtained marks and calculate its percentage, grade and GPA. Use good practices of programming that we have studied and ensure that the outcomes should be presented in a proper Viewable approach.

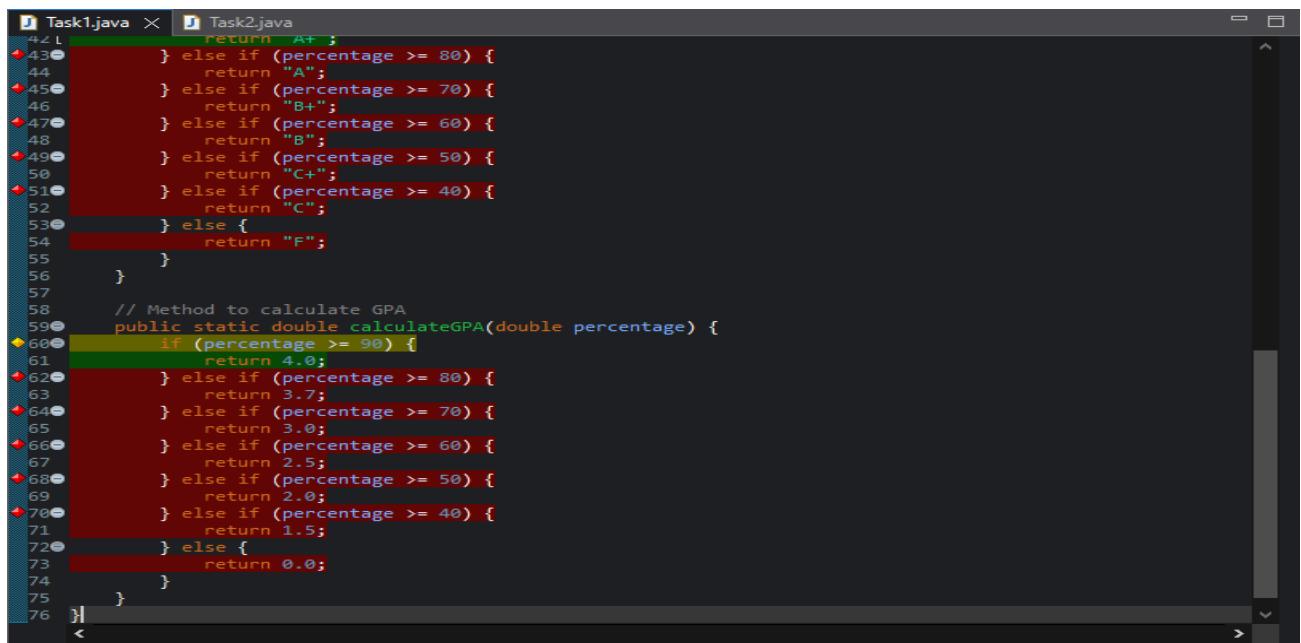
CODE:



```

1 package SCDLab2;
2 import java.util.Scanner;
3
4 class Task1 {
5     public static void main(String[] args) {
6         // Create Scanner object for input
7         Scanner scanner = new Scanner(System.in);
8
9         // Input student details
10        System.out.print("Enter student's name: ");
11        String name = scanner.nextLine();
12
13        System.out.print("Enter total marks: ");
14        double totalMarks = scanner.nextDouble();
15
16        System.out.print("Enter obtained marks: ");
17        double obtainedMarks = scanner.nextDouble();
18
19        // Calculate percentage
20        double percentage = (obtainedMarks / totalMarks) * 100;
21
22        // Calculate Grade and GPA based on percentage
23        String grade = calculateGrade(percentage);
24        double gpa = calculateGPA(percentage);
25
26        // Display the mark sheet details
27        System.out.println("\nMark Sheet for: " + name);
28        System.out.println("-----");
29        System.out.println("Total Marks: " + totalMarks);
30        System.out.println("Obtained Marks: " + obtainedMarks);
31        System.out.println("Percentage: " + percentage + "%");
32        System.out.println("Grade: " + grade);
33        System.out.println("GPA: " + gpa);
34
35        // Close the scanner
36    }
37}

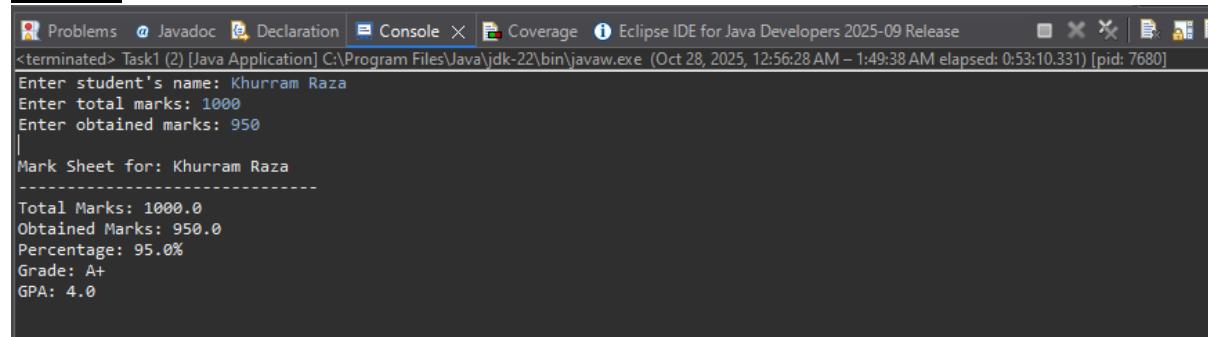
```



```

1 package SCDLab2;
2
3 public class Task2 {
4     // Method to calculate Grade
5     public static String calculateGrade(double percentage) {
6         if (percentage >= 90) {
7             return "A+";
8         } else if (percentage >= 80) {
9             return "A";
10        } else if (percentage >= 70) {
11            return "B+";
12        } else if (percentage >= 60) {
13            return "B";
14        } else if (percentage >= 50) {
15            return "C+";
16        } else if (percentage >= 40) {
17            return "C";
18        } else {
19            return "F";
20        }
21    }
22
23    // Method to calculate GPA
24    public static double calculateGPA(double percentage) {
25        if (percentage >= 90) {
26            return 4.0;
27        } else if (percentage >= 80) {
28            return 3.7;
29        } else if (percentage >= 70) {
30            return 3.0;
31        } else if (percentage >= 60) {
32            return 2.5;
33        } else if (percentage >= 50) {
34            return 2.0;
35        } else if (percentage >= 40) {
36            return 1.5;
37        } else {
38            return 0.0;
39        }
40    }
41}

```

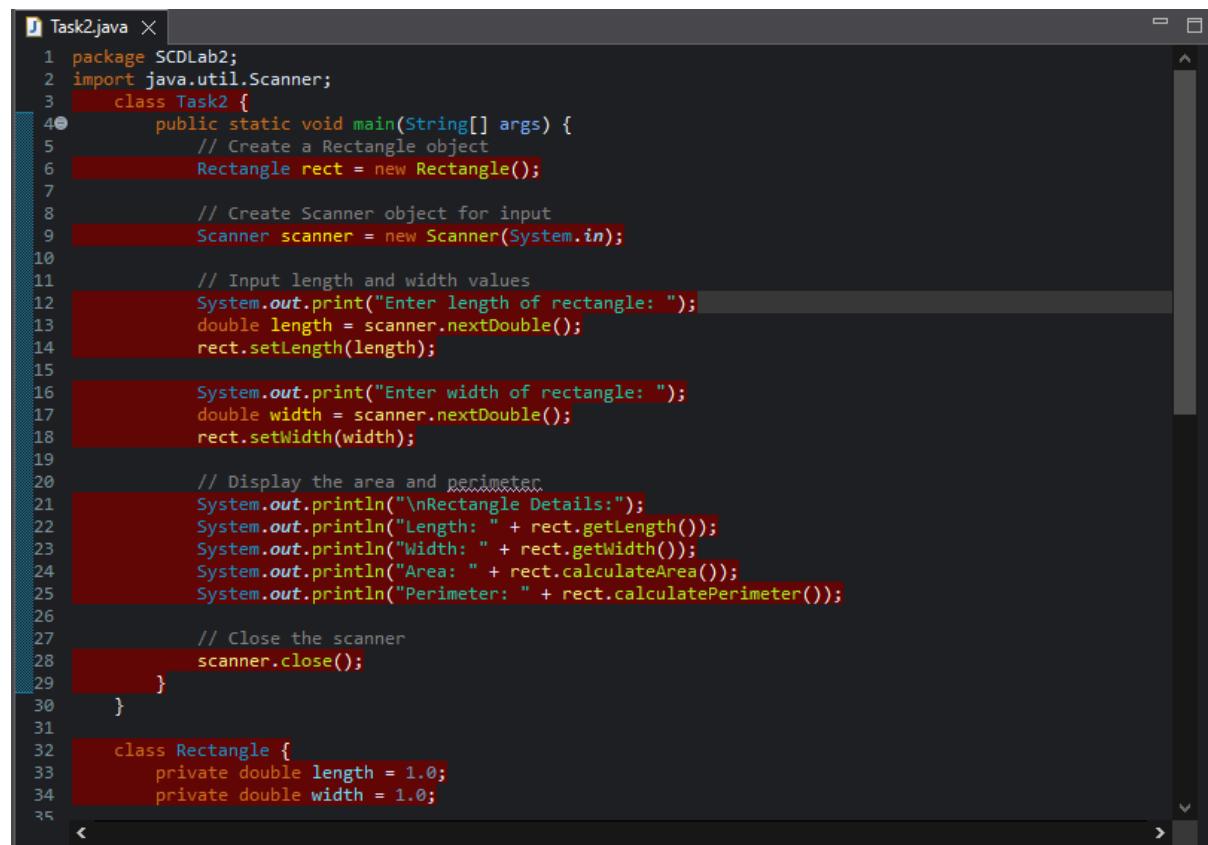
Output:


```

Problems Javadoc Declaration Console Coverage Eclipse IDE for Java Developers 2025-09 Release
<terminated> Task1 (2) [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Oct 28, 2025, 12:56:28 AM – 1:49:38 AM elapsed: 0:53:10.331) [pid: 7680]
Enter student's name: Khurram Raza
Enter total marks: 1000
Enter obtained marks: 950
|
Mark Sheet for: Khurram Raza
-----
Total Marks: 1000.0
Obtained Marks: 950.0
Percentage: 95.0%
Grade: A+
GPA: 4.0

```

2. Create a class Rectangle with attributes length and width, each of which defaults to 1. Provide methods that calculate the rectangle's perimeter and area. It has set and get methods for both length and width. The set methods should verify that length and width are each floating-point numbers larger than 0.0 and less than 20.0. Write a program to test class Rectangle.

CODE:


```

Task2.java X
1 package SCDLab2;
2 import java.util.Scanner;
3 class Task2 {
4     public static void main(String[] args) {
5         // Create a Rectangle object
6         Rectangle rect = new Rectangle();
7
8         // Create Scanner object for input
9         Scanner scanner = new Scanner(System.in);
10
11        // Input length and width values
12        System.out.print("Enter length of rectangle: ");
13        double length = scanner.nextDouble();
14        rect.setLength(length);
15
16        System.out.print("Enter width of rectangle: ");
17        double width = scanner.nextDouble();
18        rect.setWidth(width);
19
20        // Display the area and perimeter
21        System.out.println("\nRectangle Details:");
22        System.out.println("Length: " + rect.getLength());
23        System.out.println("Width: " + rect.getWidth());
24        System.out.println("Area: " + rect.calculateArea());
25        System.out.println("Perimeter: " + rect.calculatePerimeter());
26
27        // Close the scanner
28        scanner.close();
29    }
30
31    class Rectangle {
32        private double length = 1.0;
33        private double width = 1.0;
34    }
35

```

The screenshot shows a code editor window for a Java file named Task2.java. The code defines a class with methods for setting and getting length and width, and calculating area and perimeter. It includes validation logic to ensure values are between 0.0 and 20.0. Lines 43 and 57 have red highlights.

```
Task2.java
39     }
40
41     // Setter for length with validation
42     public void setLength(double length) {
43         if (length > 0.0 && length < 20.0) {
44             this.length = length;
45         } else {
46             System.out.println("Invalid length. It must be greater than 0.0 and less than 20.0.");
47         }
48     }
49
50     // Getter for width
51     public double getWidth() {
52         return width;
53     }
54
55     // Setter for width with validation
56     public void setWidth(double width) {
57         if (width > 0.0 && width < 20.0) {
58             this.width = width;
59         } else {
60             System.out.println("Invalid width. It must be greater than 0.0 and less than 20.0.");
61         }
62     }
63
64     // Method to calculate the area of the rectangle
65     public double calculateArea() {
66         return length * width;
67     }
68
69     // Method to calculate the perimeter of the rectangle
70     public double calculatePerimeter() {
71         return 2 * (length + width);
72     }
73 }
```

OUTPUT:

The screenshot shows the Eclipse IDE's Console tab with the output of the Task2 application. It prompts for length and width, then displays the rectangle details (Length: 18.0, Width: 15.0, Area: 270.0, Perimeter: 66.0).

```
Eclipse IDE for Java Developers 2025-09 Release
<terminated> Task2 [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe (Oct 28, 2025, 1:51:18 AM – 1:51:45 AM elapsed: 0:00:26.595) [pid: 10200]
Enter length of rectangle: 18
Enter width of rectangle: 15
|
Rectangle Details:
Length: 18.0
Width: 15.0
Area: 270.0
Perimeter: 66.0
```