Atılım University

Computer Engineering

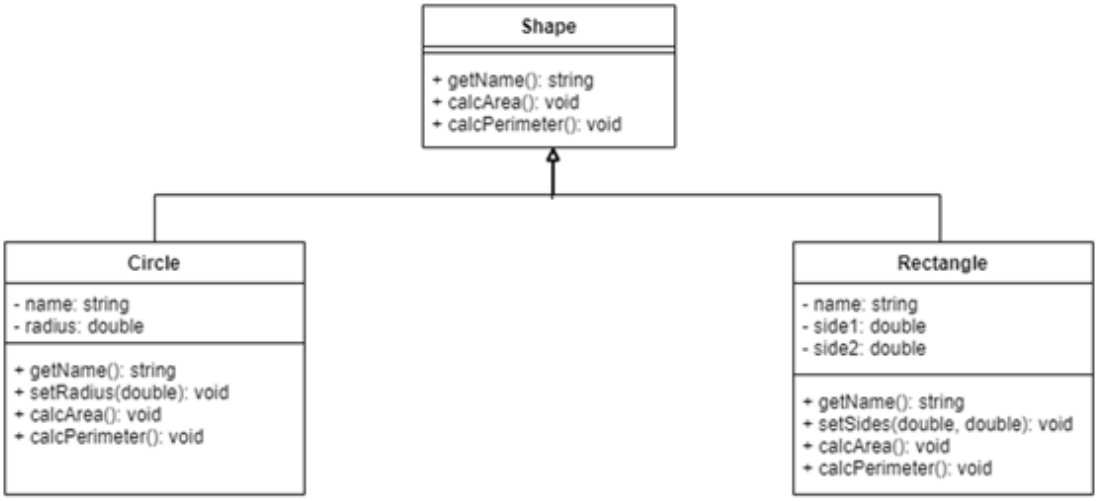
CMPE225 Object-Oriented Programming

Fall, 2024-25

Homework – II

Due Date: 17.01.2025,23:59

Write a C++ program to design the shapes such as circle, and rectangle.



In this program, you have to use **Inheritance**, **Polymorphism,** and **Exception Handling**.

The ***Shape*** class,

- Design three virtual functions;
  - getName(): returns the string "Shape class".
  - calcArea(): outputs "Area of the shape not calculated in this function."
  - calcPerimeter(): "Perimeter of the shape cannot be calculated in this function."

The ***Circle*** class,

- Declare two private variables and related methods:
  - name(string): initialize the name as "Circle".
  - radius(double)
  - height(double)
  - getName(): return the name of the class.
  - setRadius(double): assign radius value.

- calcArea(): calculates the area of the circle.
- calcPerimeter(): calculates the perimeter of the circle.

The ***Rectangle*** class,

- Declare three private variables and related methods:
  - name(string): initialize the name as "Rectangle".
  - side1(double)
  - side2(double)
  - getName(): return the name of the class.
  - setSides(double): assign side1 and side 2 value.
  - calcArea(): calculates the area of the cube.
  - calcPerimeter(): calculates the perimeter of the rectangle.

Create a function named as chooseCalc(), this function takes one parameter which is the reference of a Shape object. Then, asks the user to input a character (a for area and p for perimeter), so that the corresponding operation can be performed. Then, **by using exception handling**, if the operation code is 'a' or 'p', calcArea() or calcPerimeter() functions are called for that Shape object; otherwise, the operation code entered by the user is thrown, and in the catch block an **error message** is printed as shown in the sample run.

In the **main function**,

Create objects from the classes ***Circle*** and ***Rectangle***. Then, set the related variables for these figures. After that create two instances of the ***Shape*** class by assigning the ***Circle***, and ***Rectangle*** objects into each ***Shape*** object references. Then, send these two ***Shape*** objects one by one into the chooseCalc() function. Consider the sample runs given below.

Sample Run 1:

```
Would you like to calculate area or perimeter for Circle
a
Area of the circle is 78.5
Would you like to calculate area or perimeter for Rectangle
p
Perimeter of the square is 18
```

Sample Run 2:

```
Would you like to calculate area or perimeter for Circle
p
Perimeter of the circle is 31.4
Would you like to calculate area or perimeter for Rectangle
g
g choice is invalid. Please enter a for area and p for perimeter
```

- **The grading of the homework will be based on:**
  1. You have to upload your homework on time on Moodle.
  2. Your file should be in the format that **yourname_surname_hw2.cpp**
  3. Please **do not** upload the **.exe** file, otherwise you will get zero.
  4. Homework submitted via e-mail will be ignored.
  5. This is not group work, so if anyone cheats or has a high similarity percentage (above 90%), will get zero.
  6. If your code does not compile, your program will be evaluated over 80 pts.
  7. Late submissions will not be graded.