Assignment Interface CSIS-1410

Learning Objectives :

- Create an interface
- Implement an interface
- Demonstrate polymorphic behavior of interfaces
- Use the `instanceof` operator
- Develop algorithms (print methods)

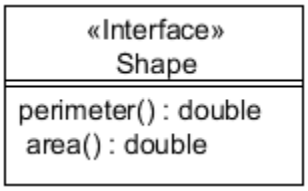
Description:

This assignment demonstrates the use of interfaces and how they can be used in combination with inheritance.
Use the four shapes that you implemented in Assignment Inheritance as a starting point.
I recommend creating a copy before you implement any changes.

In this assignment you will create **2 interfaces: Shape and Printable** and you will modify the classes Rectangle, Square, IsoscelesRightTriangle, and Circle so that they implement one or both of the interfaces.
In addition you will create a class called **InterfaceApp** (different from InheritanceApp). This class includes the main method and demonstrates the polymorphic behavior of interfaces.

Declare the interfaces according to the UML diagrams:

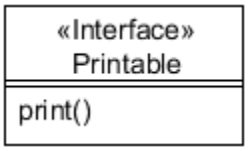
Interface Shape:



perimeter .. returns the perimeter of the shape

area .. returns the area of the shape

Interface Printable:



print … prints the outline of the shape with small circles (see output)
within a line the stars are always separated by a single space (blank)
The rectangle is printed with the length on the x-axis (more wide than high)
In case of the triangle the right angle is on the bottom left (see output)
The output produced by the print method needs to reflect the actual field values

Modify the four shape classes `Rectangle`, `Square`, `IsoscelesRightTriangle`, and `Circle` so that

- **all** of them are a **Shape**
- **all except Circle** are a **Printable**

Class **InterfaceApp:**

This class include the main method.

- All arguments passed to the constructors are hard-coded in the main method (no user input)
- Create an array of the interface type `Shape` and initialize it with two instances of `Rectangle`, `Square`, `IsoscelesRightTriangle`, and `Circle` (a total of 8 shapes)

  The rectangles have the sizes 6x3 and 5x4

  The squares have the sides 4 and 3

  The triangles have the leg sizes 5 and 3

  The circles have the radii 7 and 2
- Print the title "Shape Array: " and underline it with dashes
- Loop though all the elements of the array.

  For each of the array elements do the following:
  - print the shape (toString)
  - print the perimeter
  - print the area
  - if the shape is printable, print the shape

    Hint: use *instanceof* to find out whether a shape is printable
  - print a new line to structure the output

  The output should look like the output provided on the right

Video:

Create a screen recording (1 - 2 min)

Start with your name. Have the editor pane wide open while calmly scrolling down the code (all classes).

Point out any missing parts and known bugs in your code.

Then run the code (resize the panes so that all the output is visible)

Turning in : submit the video and a jar file that includes the source code

Output:

```
Shape Array:
-----------
Rectangle(6x3)
Perimeter: 18.0
Area: 18.0
o o o o o o
o         o
o o o o o o

Rectangle(5x4)
Perimeter: 18.0
Area: 20.0
o o o o o
o       o
o       o
o o o o o

Square(4)
Perimeter: 16.0
Area: 16.0
o o o o
o     o
o     o
o o o o

Square(3)
Perimeter: 12.0
Area: 9.0
o o o
o   o
o o o

IsoscelesRightTriangle(5)
Perimeter: 17.1
Area: 12.5
o
o o
o   o
o     o
o o o o o

IsoscelesRightTriangle(3)
Perimeter: 10.2
Area: 4.5
o
o o
o o o

Circle(7)
Perimeter: 44.0
Area: 153.9

Circle(2)
Perimeter: 12.6
Area: 12.6
```