Lab: Interfaces and Abstraction

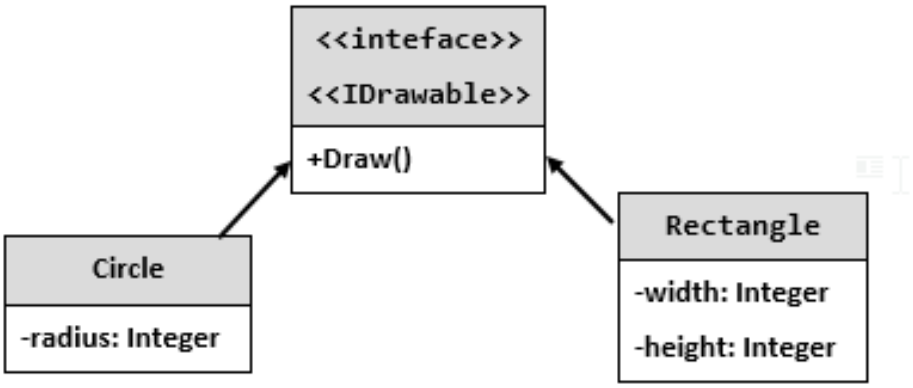
Problems for exercises and homework for the "C# OOP" course @ SoftUni".

You can check your solutions here: https://judge.softuni.bg/Contests/1501/Interfaces-and-Abstraction-Lab

1. Shapes

NOTE: You need a public **StartUp** class with the namespace **Shapes**.

Build hierarchy of interfaces and classes:



You should be able to use the class like this:

StartUp.cs

```
var radius = int.Parse(Console.ReadLine());
IDrawable circle = new Circle(radius);

var width = int.Parse(Console.ReadLine());
var height = int.Parse(Console.ReadLine());
IDrawable rect = new Rectangle(width, height);

circle.Draw();
rect.Draw();
```

Examples

Input	Output

3
4
5
	`  *******`
	` **     **`
	`**       **`
	`*         *`
	`**       **`
	` **     **`
	`  *******`
	`****`
	`* *`
	`* *`
	`* *`
	`****`

Solution

The algorithm for drawing a circle is:

```
double rIn = this.radius - 0.4;
double rOut = this.radius + 0.4;
for (double y = this.radius; y >= -this.radius; --y)
{
    for (double x = -this.radius; x < rOut; x += 0.5)
    {
        double value = x * x + y * y;

        if (value >= rIn * rIn && value <= rOut * rOut)
        {
            Console.Write("*");
        }
        else
        {
            Console.Write(" ");
        }
    }
    Console.WriteLine();
}
```

The algorithm for drawing a rectangle is:

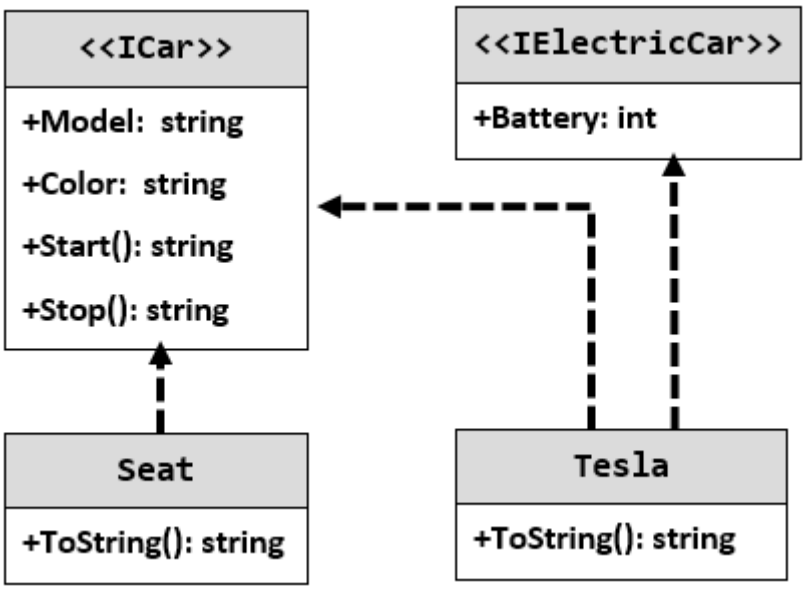
```
public void Draw()
{
    DrawLine(this.width, '*', '*');
    for (int i = 1; i < this.height - 1; ++i)
    {
        DrawLine(this.width, '*', ' ');
    }
    DrawLine(this.width, '*', '*');
}

private void DrawLine(int width, char end, char mid)
{
    Console.Write(end);
    for (int i = 1; i < width - 1; ++i)
    {
        Console.Write(mid);
    }
    Console.WriteLine(end);
}
```

2. Cars

NOTE: You need a public **StartUp** class with the namespace **Cars**.

Build a hierarchy of interfaces and classes:



Your hierarchy must be used with this code:

StartUp.cs

```
ICar seat = new Seat("Leon", "Grey");
ICar tesla = new Tesla("Model 3", "Red", 2);

Console.WriteLine(seat.ToString());
Console.WriteLine(tesla.ToString());
```

Examples

Output
Grey Seat Leon Engine start Breaaak! Red Tesla Model 3 with 2 Batteries Engine start Breaaak!