SDU

University of Southern Denmark

The engineering programmes in Sønderborg

AOP 0

Spring Practice EXAMINATION

Thursday, 1 May 2025

Problem 1 starts on the next page!

Problem 1 – Object-Oriented Analysis (14 Points)

In the folder `Problem1\RestaurantSystem\` you can find a fully functional C# console project called RestaurantSystem. Analyze the code to answer the following questions. Write your answers in the provided text file `Problem_1_Submission.txt` in the `Problem1` folder.

1.1. General Analysis (2 Points)

In one or two sentences, briefly describe in your own words what real-world concept or system is being modeled by this code.

1.2. Object Oriented Programming (3 Points)

Identify one of the 4 basic OOP principles in the project, briefly describe how and where it's present, and what its purpose in this project is.

1.3. Properties (4 Points)

Look at the properties defined in the **MenuItem** class. Explain the concept of properties and why they are set up the way they are.

1.4. Design Patterns (5 Points)

Identify how the project implements the Strategy pattern. Describe where and how it's used, and briefly describe its purpose in general.

Problem 2 – UI Programming (20 Points)

In the folder `Problem2\Circle\` you can find a basic Avalonia project callled *Circle* that has some functionality implemented but currently has no user interface. The goal of this application is to allow a user to change the size and color of a circle. Follow the requirements below and create the user interface.

The ViewModel is already provided to you. You are only allowed to edit the `\Circle\Views\MainWindow.axaml` file. Do not change the ViewModel or the CodeBehind.

Create an UI considering the following requirements:

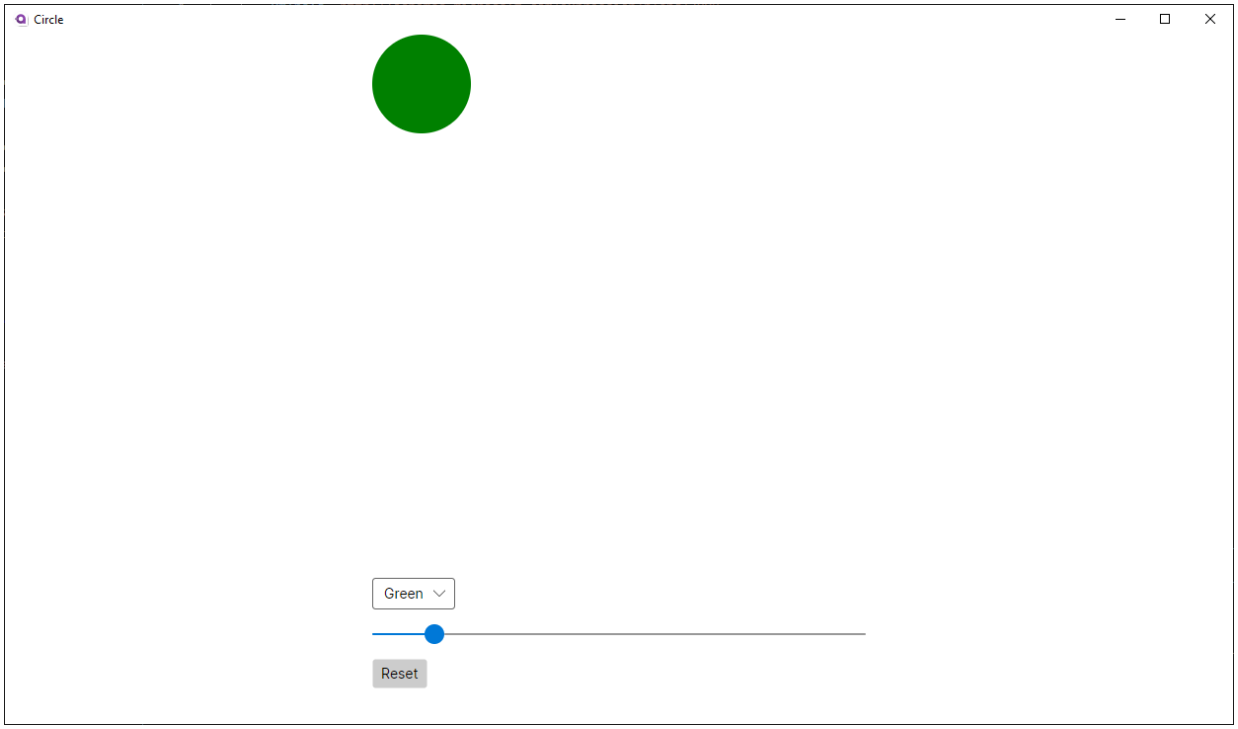
2.1. An area for displaying the circle and the Circle itself. **(2 Points)**

2.2. Add a slider and a combo box to modify the size and the color of the circle re spectively. The combo box items must be tied to the list of colors in the ViewModel. Do not hardcode the colors. **(12 Points)**

2.3. The circle should have a maximum size of 500 and minimum size of 50. Make sure that changing the circle's size does not change any other parts of the UI. **(2 Points)**

2.4. Create a reset button, that returns the circle to its initial state. **(4 Points)**

Here is an example of what your UI might look like:



Problem 3 – CSV and LINQ (16 Points)

You are given a CSV file (`data/comics.csv`) that contains a database on comics.

Create a new C# Console Application and parse the CSV into a collection.
(You can use the CSVHelper library).

Create, run, and print the results of three LINQ queries on your collection. The queries should return the following:

3.1. All comics that were released before the year 2000. **(3 Points)**

3.2. The number of comics written by each author. The result should be sorted by most comics written. **(5 Points)**

3.3. For each year, the most active author in that year *(the author who wrote the most comics)*. The result should be ordered by the year. **(8 Points)**