

16. Design practice

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Introduction

- 1 You are strongly advised to use the `image.hpp` class from study materials for this lesson
- 2 These exercises build on each other, so skipping some might be impractical

Exercises

- 1 Create a class `Canvas` that has all the properties of `Image`, but has an extra `draw()` method allowing to draw objects inheriting from class `Drawable`
- 2 Create a `Triangle` class inheriting from `Drawable` that, draws a triangle with given coordinates of points on the image
- 3 Create a `Parallelepiped` class inheriting from `Drawable` that is composed of two triangles and uses them for drawing itself
- 4 Create a `Polygon` class in a similar way to the previous exercise
- 5 Create a `Colour` class and use it to set colours to objects with less code

Somewhere during the process, change the way colours are handled to avoid code duplication. Solutions to the first two exercises can be pasted from:

github.com/Dugy/simplest_image_library_possible

Exercises #2

- 1 Create a `Polygon3D` class that can be projected into a `Polygon` (or drawn on the `Canvas`) and rotated in 3 axes
- 2 Create a `Light` class with a direction and modify the `Polygon3D` class appropriately so that the projection into the `Polygon` class changes the colour according to the illumination
- 3 Create a `PolygonSet` class that contains several `Polygon` objects and draws them in proper order and can be rotated
- 4 Create a `Cube` class that is a cube that can be drawn on the `Canvas` while using illumination somehow

Somewhere in the process, create a `Vector3D` class holding three coordinates and supports dot product and cross product. Also, change the `Canvas` class to add a method to draw `Polygon3D` objects with illumination.

Homework

- Change the class system from these exercises so that they would draw over a picture, but add the changes to the original contents of the picture with chosen opacity
- You have two weeks to do it
- Challenge for the Advanced: finish the regular exercises