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# **Brief-Documentation: Proxy Pattern & Flyweight Pattern – Homework**

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# Proxy Pattern — Image upload management

## What decides:

The problem was the excessive loading of heavy images in high resolution. This reduces productivity and increases response time when displaying multiple objects (for example, in a real estate catalog). It was also necessary to limit the ability to upload images only to authorized agents.

## How to simplify/optimized:

The Proxy pattern allows us to share responsibility: through ImageProxy, we show a lightweight thumbnail, and full loading (HighResolutionImage) occurs only with an explicit user request. Additionally, authorization verification for access control is implemented using UploadImageProxy (Protection Proxy). This makes the system scalable and reliable.

# Flyweight Pattern — Drawing markers on the map

## What decides:

Applications working with the map often display thousands of objects (for example, hospitals, restaurants, etc.), and if each object stores duplicate styles (color, icon, font), this will lead to memory overruns.

## How to simplify/optimized:

The Flyweight pattern allows you to create and reuse unique style objects through the MarkerStyleFactory. Instead of 1000+ objects with the same data, 1-2 objects are created that are reused. This significantly reduces the memory load and speeds up the application.

# Test in main:

To check the [Proxy Pattern](#_sx9n3zghjn7z), the user can select via the console whether he wants to see a thumbnail or a full image, and then try to upload a new image on behalf of the agent (when logging in, names such as “Kristina”, ”Aziz”, ”Baubek” are selected. This demonstrates both lazy loading and access protection.

Also, 1,000 markers are created for the [Flyweight Pattern](#_9f0zq9msggmz) test — 500 for hospitals and 500 for restaurants — using a common style factory. The console displays only the first 5, as well as the total number of markers and unique styles, which illustrates resource savings.