# For Homework 5, by Yelamanov Torezhan

**Code implementation for both real-world scenarios:**

1. **Proxy Pattern — Image management system for a real estate agency:** We used the Proxy Pattern to display small thumbnails of property images initially, while larger images are only loaded when the user clicks on them. This helps speed up loading and saves resources. We also added a "protective proxy" to ensure that only authorized users can upload or modify images.
2. **Flyweight Pattern — Map with thousands of markers and shared styles:** In a map application with many markers (for gas stations, restaurants, hospitals, etc.), markers often use the same styles (icons, colors). Using the Flyweight Pattern, we ensured that these styles are not duplicated multiple times but are shared across all markers. This helps save memory and improves the performance of the application.

**Brief explanation (1–2 paragraphs for each pattern):**

**Proxy Pattern:**

**What problem was solved?**  
In the real estate agency, we have many high-resolution images that take time to load and consume a lot of space. Additionally, not all users should have the ability to modify or upload images.

**How did the pattern simplify or optimize the design?**  
We use a virtual proxy to show small images immediately and load the full-size images only upon request, improving speed and performance. The protective proxy ensures that only authorized users can upload or modify images, ensuring security without changing the main functionality.

**Flyweight Pattern:**

**What problem was solved?**  
When there are many markers on the map, using identical styles results in excessive memory usage and slows down the application.

**How did the pattern simplify or optimize the design?**  
By applying the Flyweight Pattern, we ensured that marker styles (icons, colors) are stored in one place and reused, rather than duplicating them for every marker. This saves memory and enhances performance when rendering maps with a large number of markers.