

# Module 13: "Proxy"



# Agenda

- ▶ Introductory Example: Web Shop Products
- ▶ Challenges
- ▶ Implementing the Proxy Pattern
- ▶ Pattern: Proxy
- ▶ Overview of Proxy Pattern
- ▶ Variation: Simple Proxy
- ▶ Use Cases for Proxy



# Introductory Example: Web Shop Products

```
interface IProductRepository
{
    Product GetById( int id );
    IEnumerable<Product> GetAll();
    void Add( Product product );
}
```

```
IProductRepository products = new ProductRepository();
products.Add( new Product( ... ) );
IEnumerable<Product> books = products
    .GetAll()
    .Where(p => p.Category == Category.Book);
foreach (Product product in books)
{
    Console.WriteLine( product );
}
```

# Challenges

- ▶ How can we control that only administrators can add new products?
  - Cannot change the source code of the web shop library component!

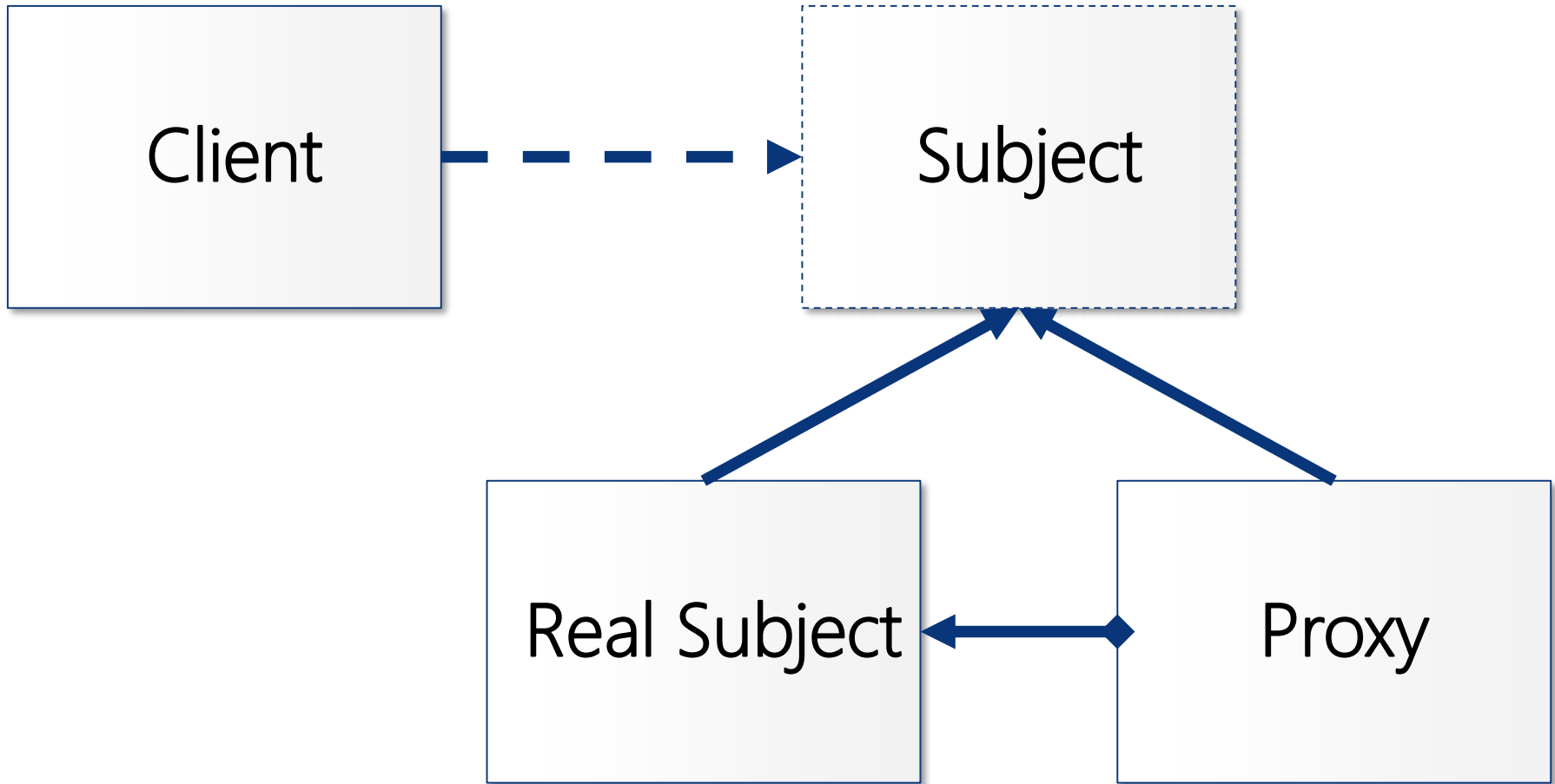


# Pattern: Proxy

- ▶ *Provide a surrogate or place-holder for another object to control access to it.*
- ▶ Outline
  - Define a substitute object with the same interface
  - Implement additional functionality or restriction in substitute object
  - Clients cannot tell whether they interact with the real object or a proxy
- ▶ Origin: Gang of Four



# Overview of Proxy Pattern

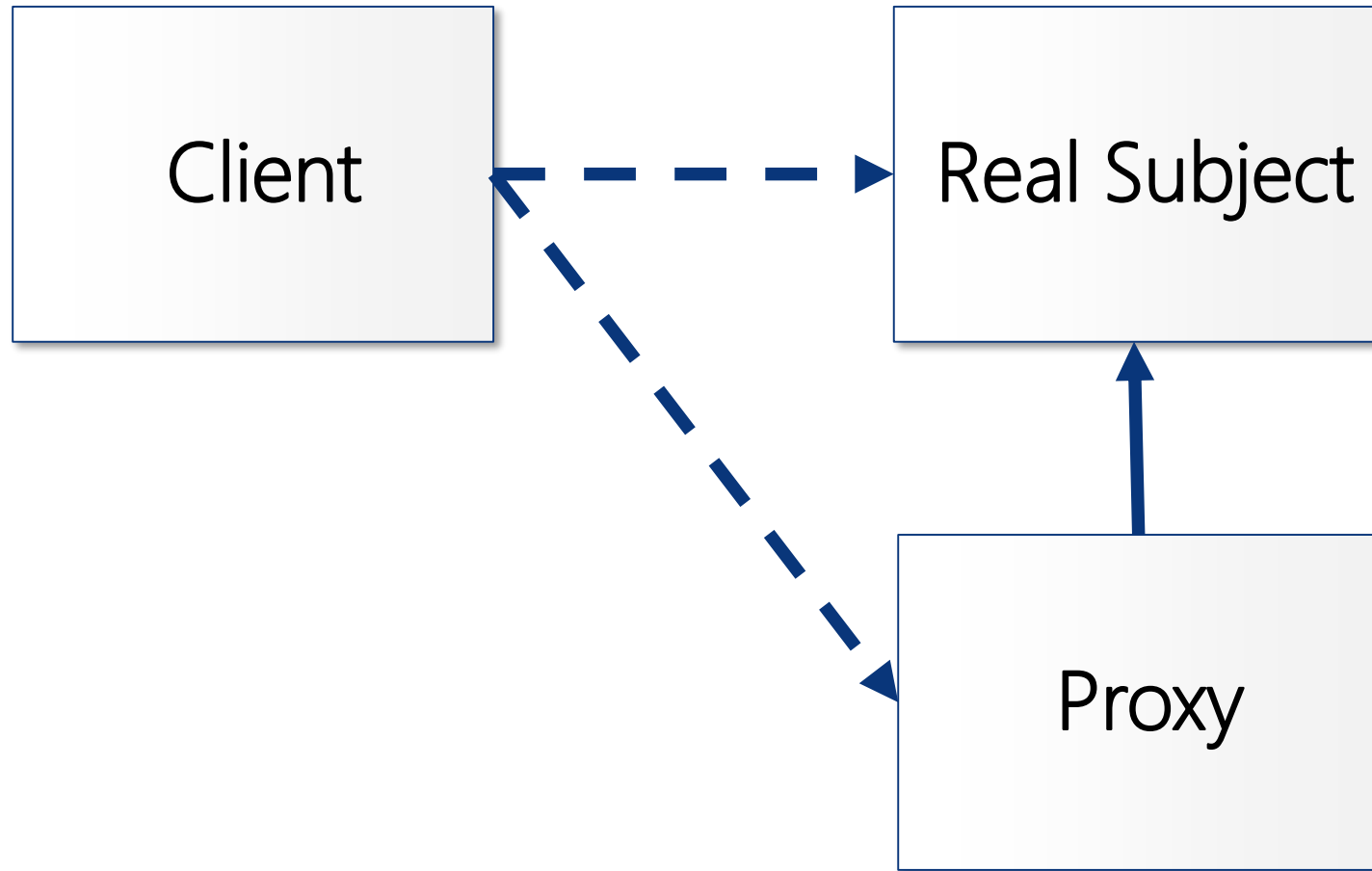


# Overview of Proxy Pattern

- ▶ Client
  - Interacts with any Subject through a general interface
- ▶ Subject
  - Interface or base class to subject functionality
- ▶ Real Subject
  - Concrete subject class implementing Subject interface
  - Provides concrete functionality
- ▶ Proxy
  - Substitute subject class implementing Subject interface
  - Implements added functionality or control restrictions to underlying Real Subject being controlled



# Variation: Simple Proxy





# Simple Proxy Pros and Cons

- ▶ Simple to implement
- ▶ Easier to maintain
- ▶ Only works when Real Subject is suitably "open"
- ▶ Violates Single Responsibility Principle of SOLID
- ▶ Uses inheritance instead of composition
- ▶ Fits well when there is no general interface to proxy



# Proxy vs. Adapter

- ▶ Proxy
  - Simple, nice and clean to implement
  - Can be a slight burden to maintain if not autogenerated
  - Satisfies SOLID principles – Fits beautifully with Dependency Injection
  - Keeps same interface
  
- ▶ Adapter
  - Changes the interface



# Use Cases for Proxy

- ▶ Use cases include
  - Virtual proxies
    - Lazy loading
    - Caching (See Lab 13.1)
  - Remote proxies
    - Distributed communication
  - Protection proxies
- ▶ Very frequently used





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