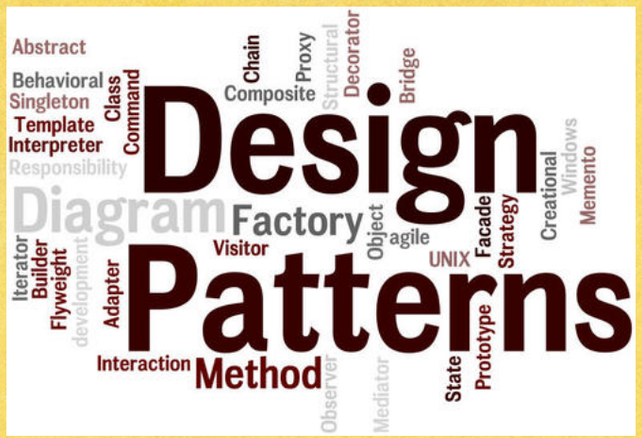
Using Design Patterns in App Development



Michael P. Redlich

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Who's Mike?

- BS in CS from RUTGERS THE STATE UNIVERSITY OF NEW JERSEY
- "Petrochemical Research Organization"
- InfoQ Java Queue News Editor
- Garden State Java User Group
- Jakarta EE Ambassadors

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Objectives

- What are Design Patterns?
- How Design Patterns Solve Design Problems
- Design Pattern Categories
- Review Factory, Decorator and Observer Design Patterns (with demos!)

What are Design Patterns?

What are Design Patterns? (1)

- Recurring solutions to software design problems that are repeatedly found in real-world application development
- All about the design and interaction of objects

What are Design Patterns? (2)

- Four essential elements:
  - pattern name
  - problem
  - solution
  - consequences

What are Design Patterns? (3)

- A pattern is a solution to a problem in a context
- A context is the situation to which a pattern applies

What are Design Patterns? (4)

- The problem refers to the desired goal in the context, but also refers to any constraints that may occur
- The solution is a general design that anyone can apply

How Design Patterns Solve Design Problems

Design Patterns Solve Design Problems (1)

- Help identify less obvious abstractions
- Clients should only know about abstract classes that define an interface
- Reduce implementation dependencies

Design Patterns Solve Design Problems (2)

- Avoid:
  - directly creating objects
  - dependencies on specific operations
  - algorithmic dependencies
  - tight coupling

Thinking in Design Patterns

- Keep to simple
- Design patterns are not the “magic bullet”
- Know when to apply a design pattern
- Don’t be afraid to remove a design pattern

Design Pattern

Categories

Design Pattern Categories

- Creational
  - Abstract the instantiation process
  - Dynamically create objects so they don't have to be instantiated directly
- Structural
  - Compose groups of objects into larger structures

Design Pattern Categories

- Behavioral
  - Define communication among objects in a given system
  - Provide better control of flow in a complex application

Creational Patterns

- Abstract Factory
- Builder
- Factory Method
- Prototype
- Singleton

Structural Patterns

- Adapter
- Bridge
- Composite
- Decorator
- Facade
- Flyweight
- Proxy

Behavioral Patterns

- Chain of Responsibility
- Command
- Interpreter
- Iterator
- Mediator
- Memento
- Observer
- State
- Strategy
- Template Method
- Visitor

What are OO Design Principles?

- A set of underlying principles for creating flexible designs that are easy to maintain and adaptable to change
- Understanding the basics of OOP isn't enough

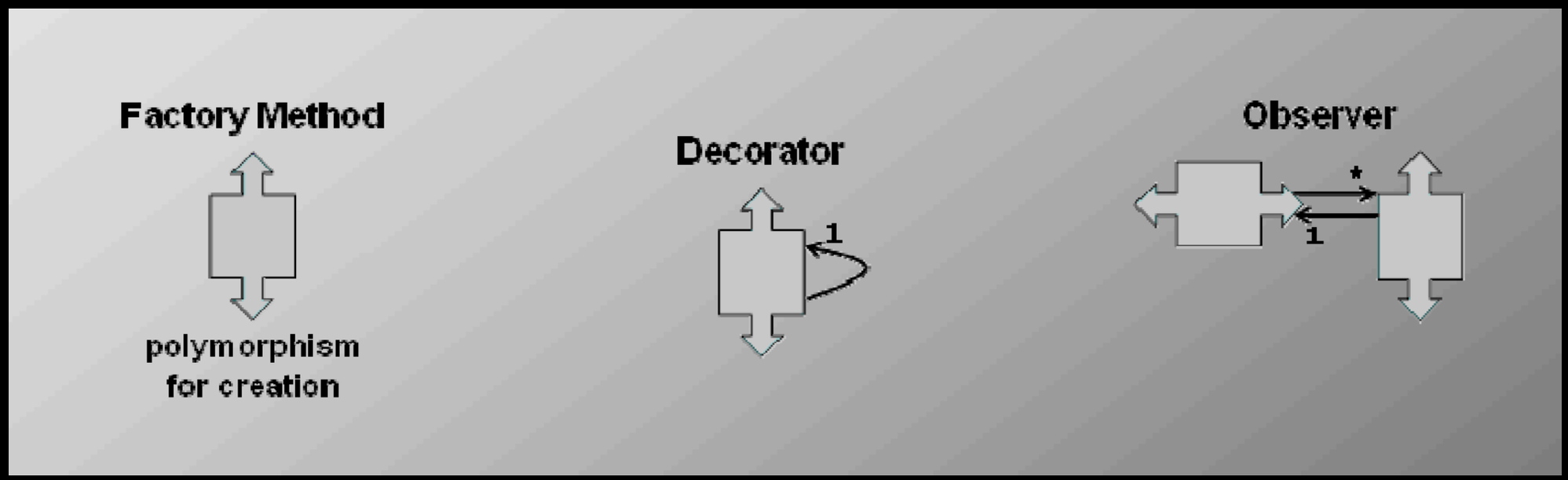
Some OO Design Principles (1)

- Encapsulate What Varies
- Program to Interfaces, Not Implementations
- Favor Composition Over Inheritance
- Classes Should Be Open for Extension, But Closed for Modification

Some OO Design Principles (2)

- Strive for Loosely Coupled Designs Between Objects That Interact
- A Class Should Have Only One Reason to Change

Let's Check Out These Patterns



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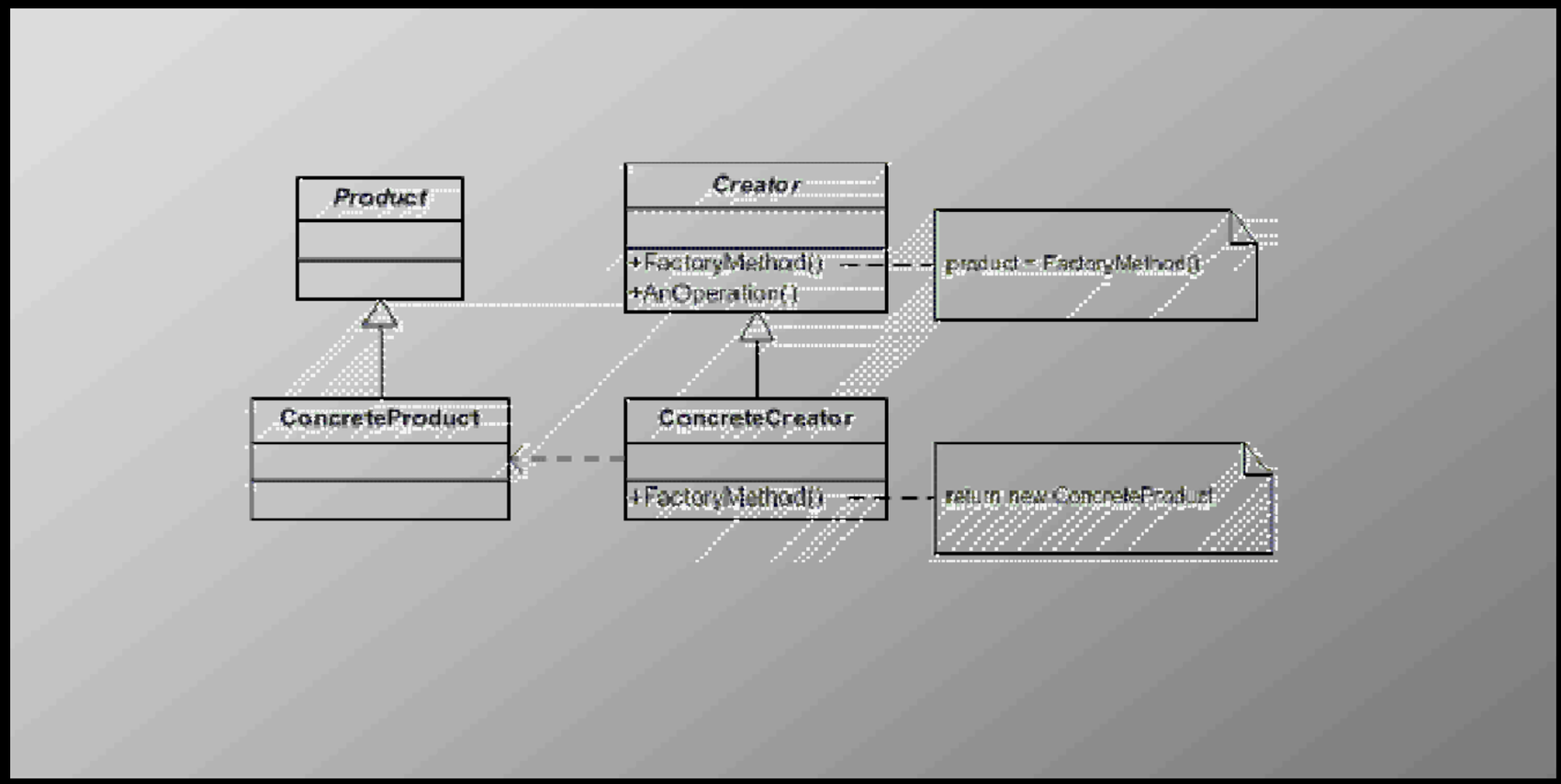
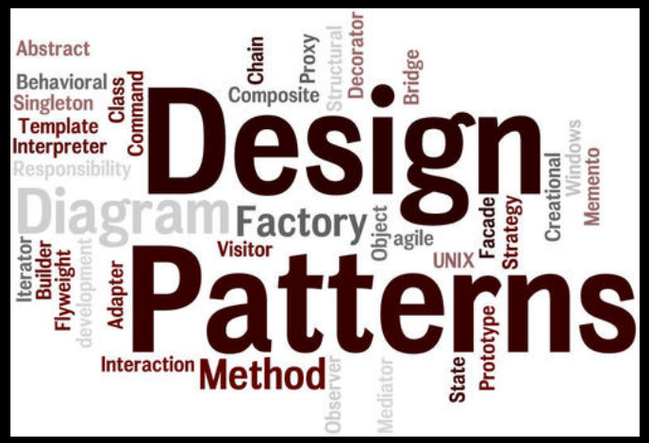
Factory Method

- Intent
  - Defines an interface for creating an object, but lets subclasses decide which classes to instantiate
- Design Principles
  - Depend on abstractions, not concrete classes
  - AKA The Dependency Inversion Principle

Generic Design

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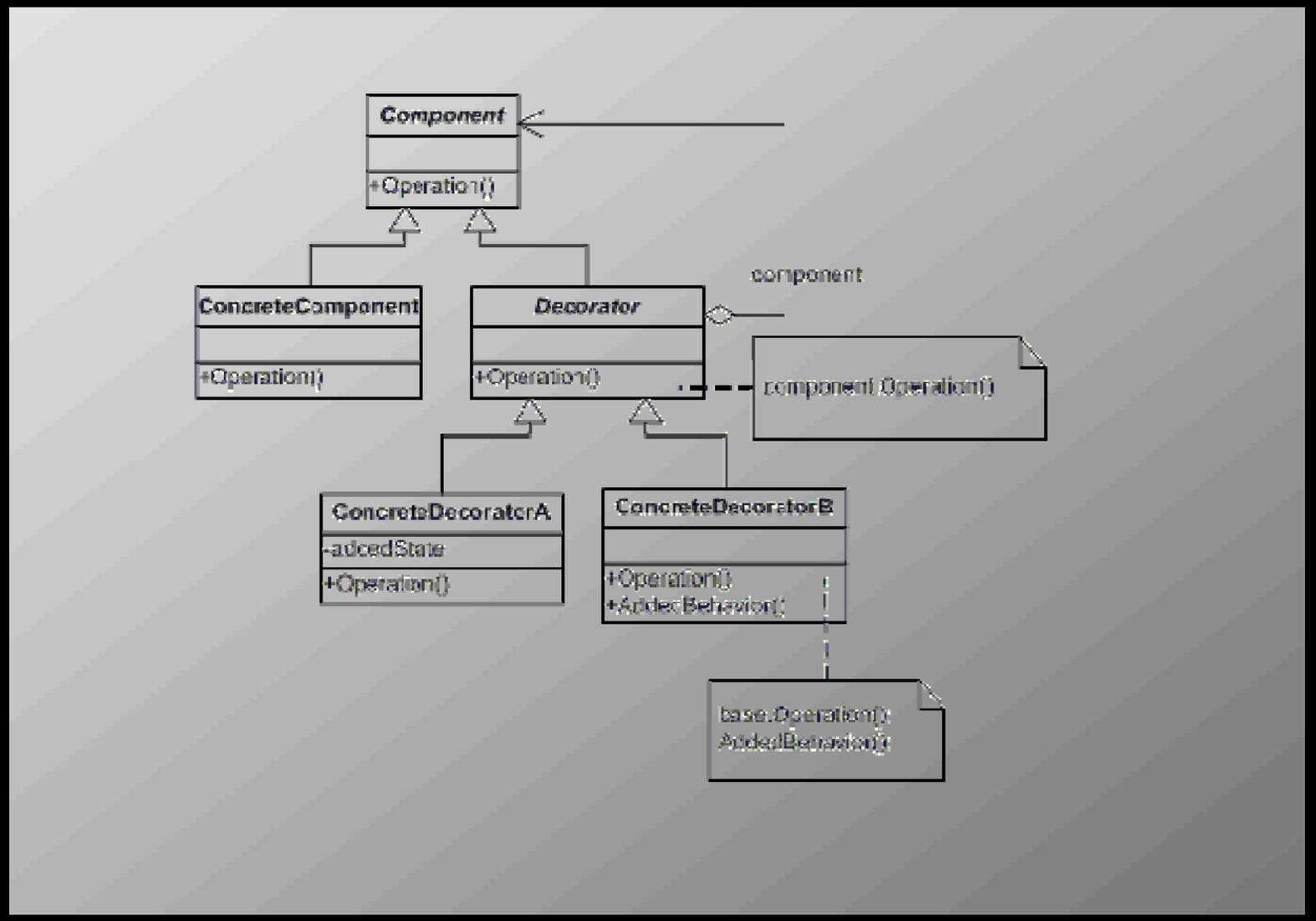
Demo

Decorator

- Intent
  - Dynamically attaches additional responsibilities to an object
  - Provides an alternative to subclassing
- Design Principle
  - Classes should be open for extension, but closed for modification

Generic Design



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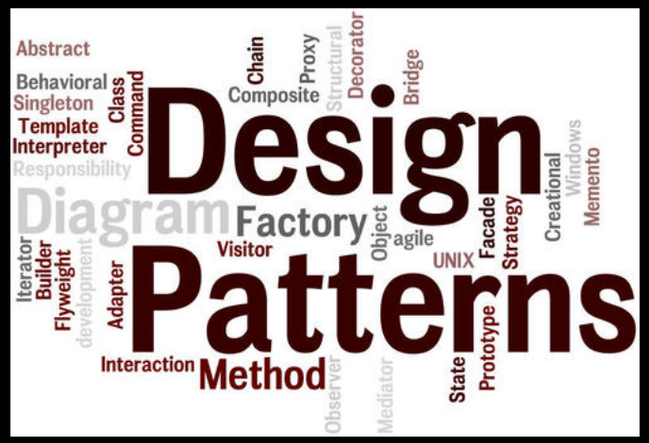
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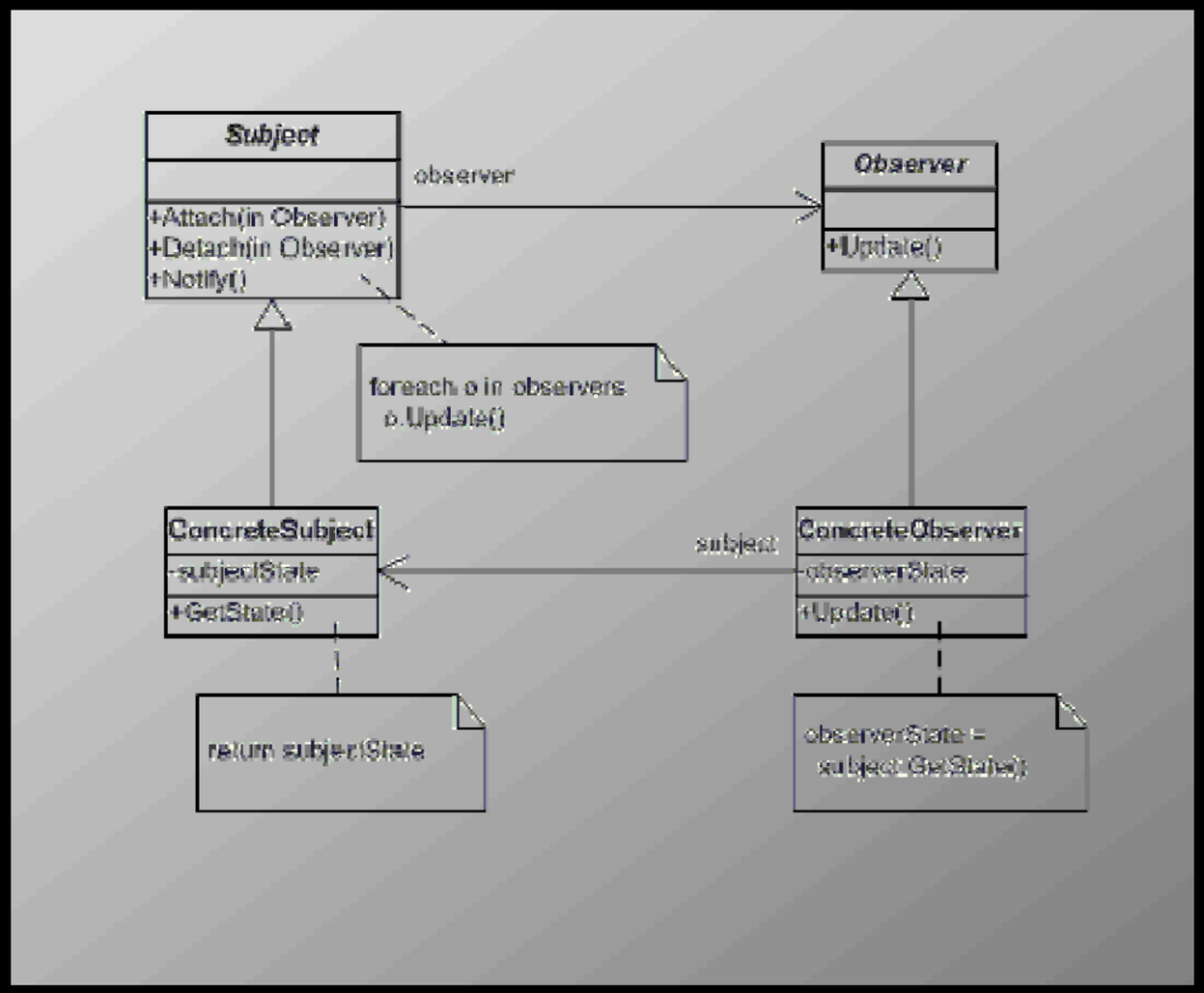
Demo

Observer

- Intent
  - Defines a one-to-many dependency among objects such that when one object changes state, all of its dependents are notified and updated
- Design Principle
  - Strive for loosely coupled designs that interact

Generic Design



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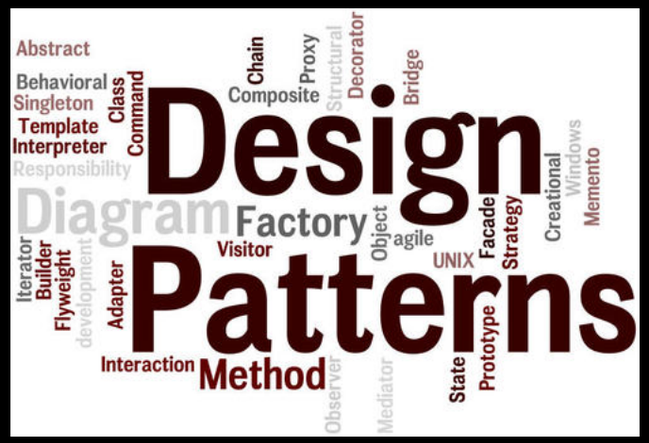
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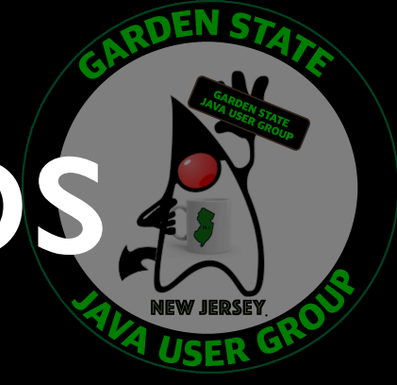
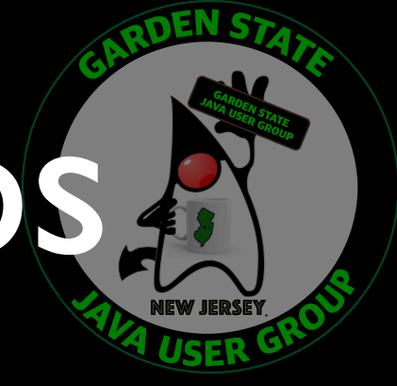
Demo

Local Java User Groups (1)



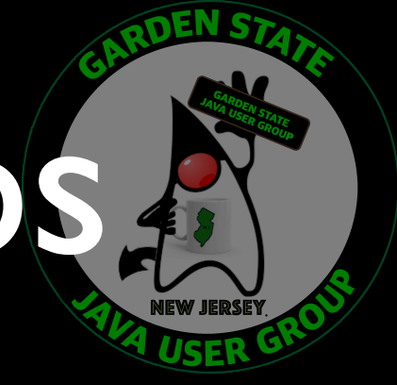
- Garden State Java Users Group (GSJUG)
  - facilitated by the GSJUG Leadership Team
  - `gsjug.org`
- NYJavaSIG
  - facilitated by Frank Greco, et.al
  - `javasig.com`

Local Java User Groups (2)



- PhillyJUG
  - facilitated by Paul Burton, et. al.
  - `meetup.com/PhillyJUG`
- Jersey City Java Users Group
  - facilitated by Amitai Schleier
  - `meetup.com/Jersey-City-Java-User-Group-JC-JUG/`

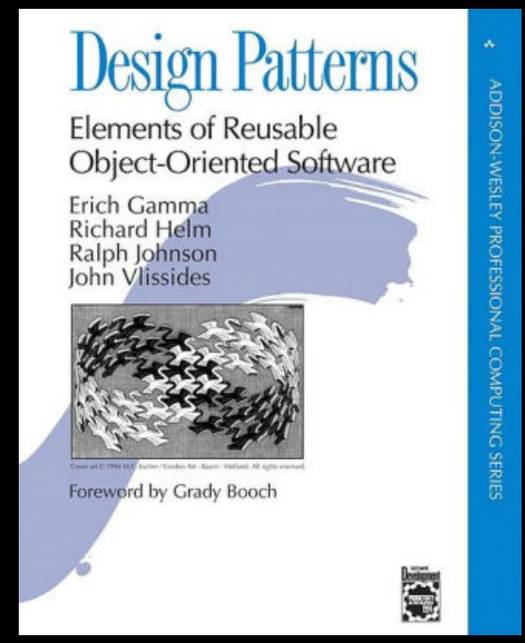
Local Java User Groups (3)



- Capital District Java Developers Network
  - facilitated by Dan Patsey
  - `cdjdn.com`
  - currently restructuring

Gang of Four

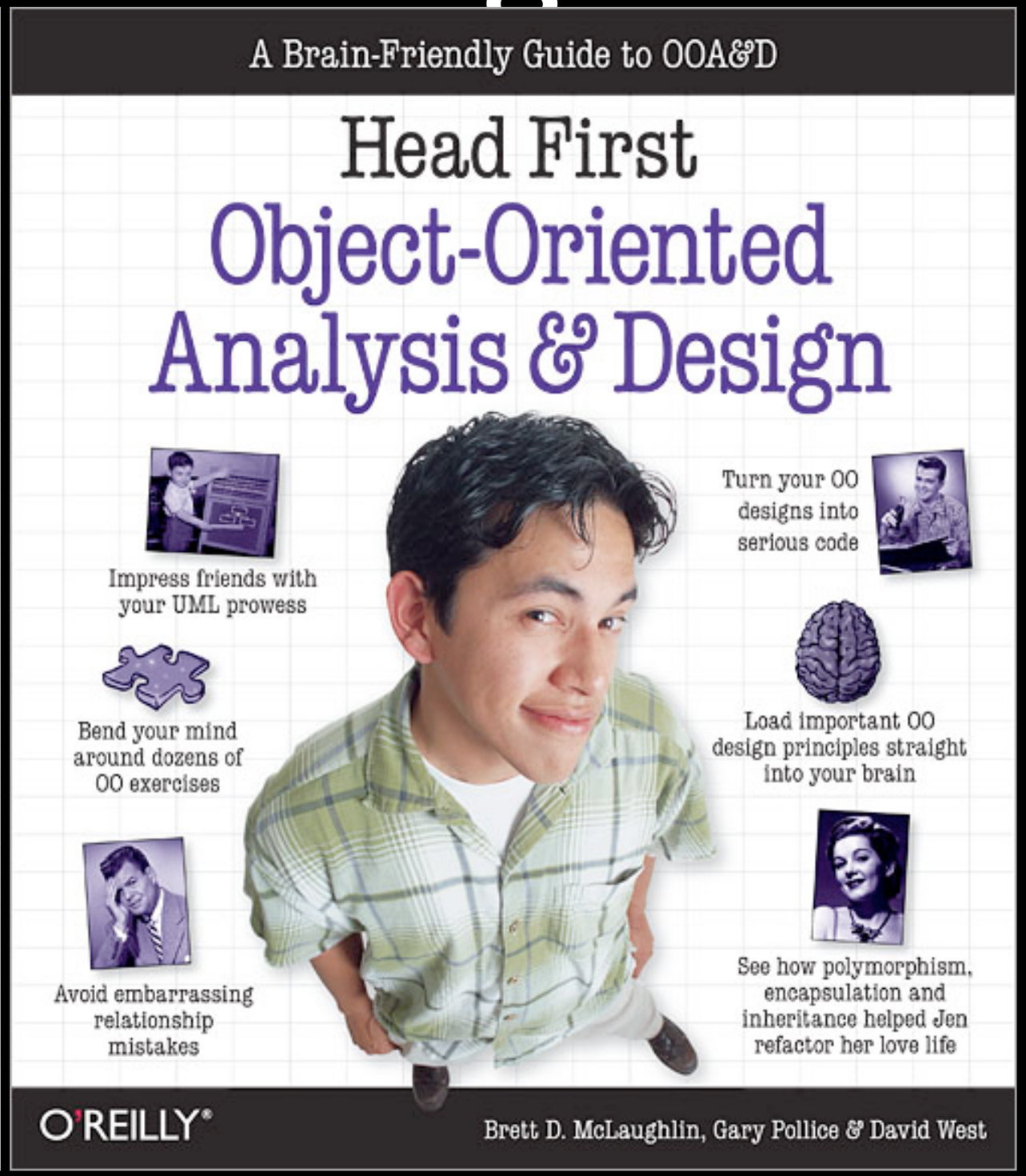
- Erich Gamma
- Richard Helm
- Ralph Johnson
- John Vlissides
- Design Patterns - Elements of Reusable Object-Oriented Software



Gang of Four Next Generation?

- Eric Freeman
- Elisabeth Freeman
- Kathy Sierra
- Bert Bates
- Head First Design Patterns

Further Reading



Resources

- `java.sun.com`
- `headfirstlabs.com`
- `themeteorbook.com`
- `eventedmind.com`
- `atmosphere.meteor.com`

Contact Info

mike@redlich.net

@mpredli

redlich.net

redlich.net/portfolio

github.com/mpredli01

Thanks!

@mpredli