Design Patterns and Refactoring

Course of Software Engineering II
A.A. 2011/2012

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Starting Scenario

- "We have a DeviceManager that have to handle objects that is able to connect to the GPS Network"
- Objectives of current lecture:
  - Improve and complicate the starting scenario
    - Through refactoring and patterns
  - Interactive Improvements
    - Let's do it together
- As usual let's do Program Comprehension first

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- **A: (Refactoring)**
  - **Extract Interface**

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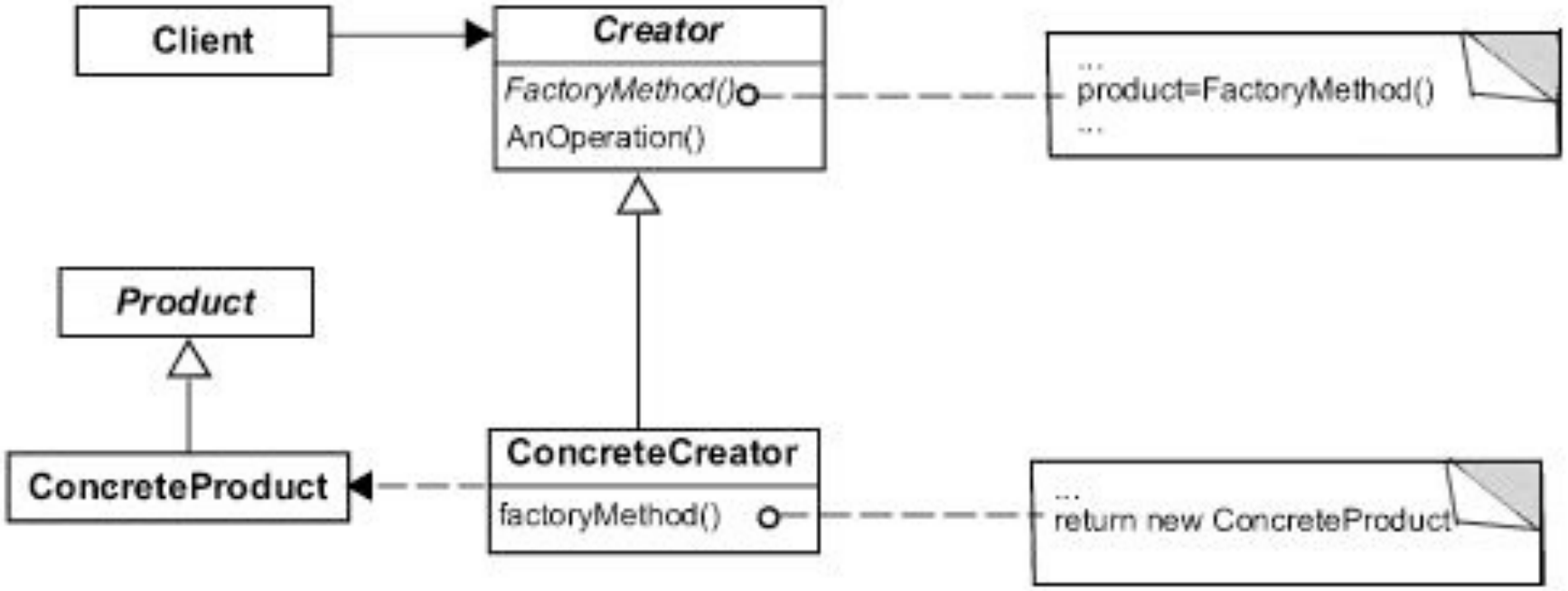
- **A [1]:**
  - Collection of Super-Type Istances
- **A [2] (design pattern) :**
  - **Factory Method**

Factory Method Pattern

- Intent:
  - Define an interface for creating an object
    - Factory Method let's a class defer instantiation to subclasses.
  - Defining a “virtual” constructor.
  - The new operator considered harmful.

- Needs to standardize the architectural model for a range of products,
  - Allow for individual applications to define their own domain objects and provide for their instantiation.

Factory Method Pattern



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  - Brainstorming please :)
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- **Q:** Instantiation of Factory
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- **Q:** “Virtual Constructor Methods”
  - **A:** Multiple methods vs Single Method

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  - Current products: *Smartphone Connectors*
    - *Gps and Galileo connections*
  - **New Products:** *Mobile Connectors*
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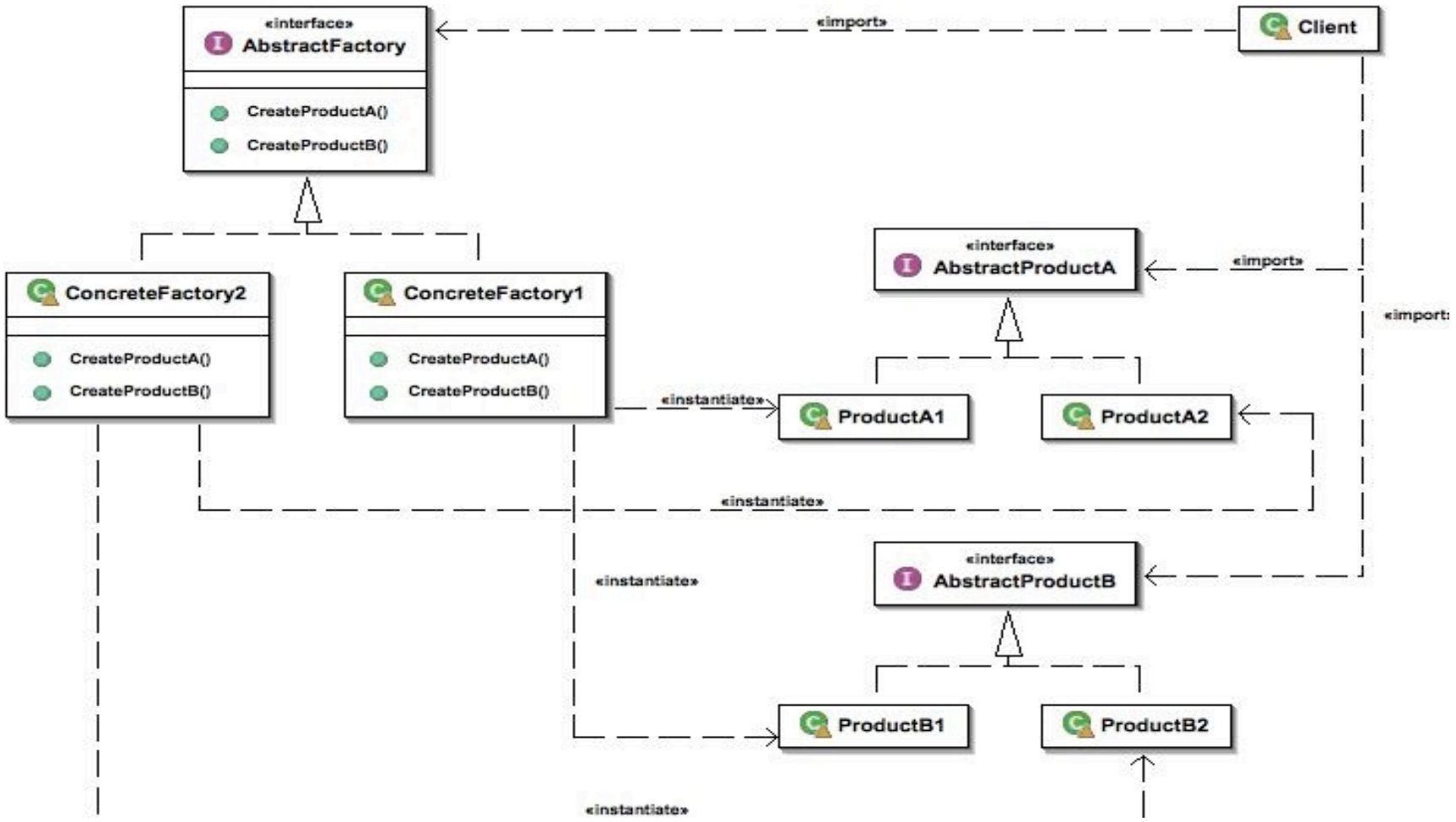
- **Q:** How to handle creation loosely coupled with client?
- **A (Pattern):**
  - **Abstract Factory**

Abstract Factory Pattern

- **Intent:**
  - Provide an interface for creating families of related or dependent objects
    - Without specifying their concrete classes.
  - A hierarchy that encapsulates
    - Many possible “platforms”
    - Construction of a suite of “products”.
- **Problem:**
  - An application has to be portable
    - Encapsulate platform dependencies.

Abstract Factory Pattern



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- What is the effort?
- *Minimum effort, maximum effect*
  - *Client loosely coupled with products*
    - *Instantiation and handling*

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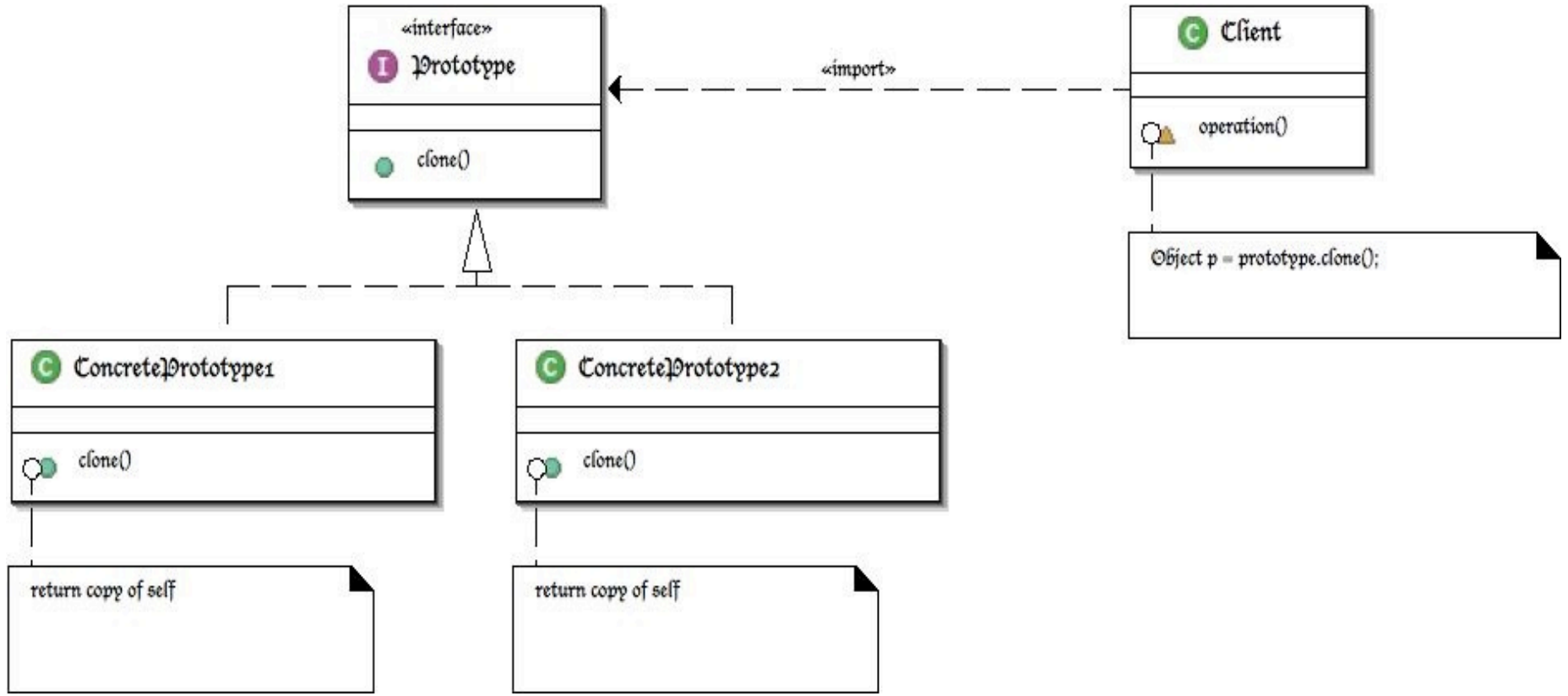
- **A (Pattern):**
  - **Prototype**

Prototype Pattern

- **Intent:**
  - Specify the kinds of objects to create using a prototypical instance
    - create new objects by copying this prototype.
  - Co-opt one instance of a class for use as a breeder of all future instances.
- **Problem:**
  - Application “hard wires” the class of object to create in each “new” expression.

Prototype Pattern



Rules of Thumbs

- Sometimes creational patterns are competitors
- Often, designs:
  - Start out using Factory Method
    - (less complicated, more customizable, subclasses proliferate)
  - Evolve toward
    - Abstract Factory
    - Prototype
    - Builder (more flexible, more complex)
- **Don't abuse on using Design Patterns!!**

References

- Gamma, E., Helm, R., Johnson, R. e Vlissides, J., **Design Patterns: Elements of Reusable Object-Oriented Software**

- http://www.artima.com/lejava/articles/designprinciples.html