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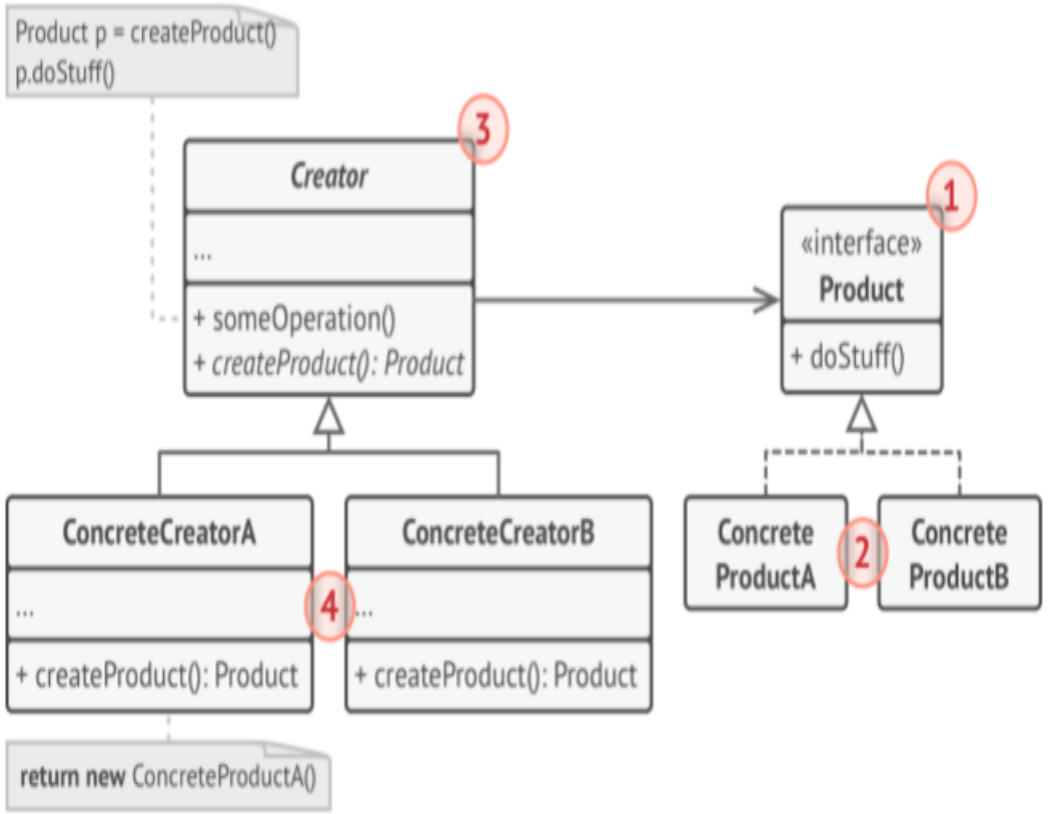
Problem Solving Programming

Design Patterns

Factory Method Overview

Classes and objects participating in this pattern are:

1. Product
   - Interface for creating the objects.
2. ConcreteProduct
   - Class which implements the Product interface.
3. Creator
   - Abstract class that declares the factory method, returns an object of type Product.
4. ConcreteCreator
   - Class which implements the Creator class and overrides the factory method to return an instance of a ConcreteProduct.



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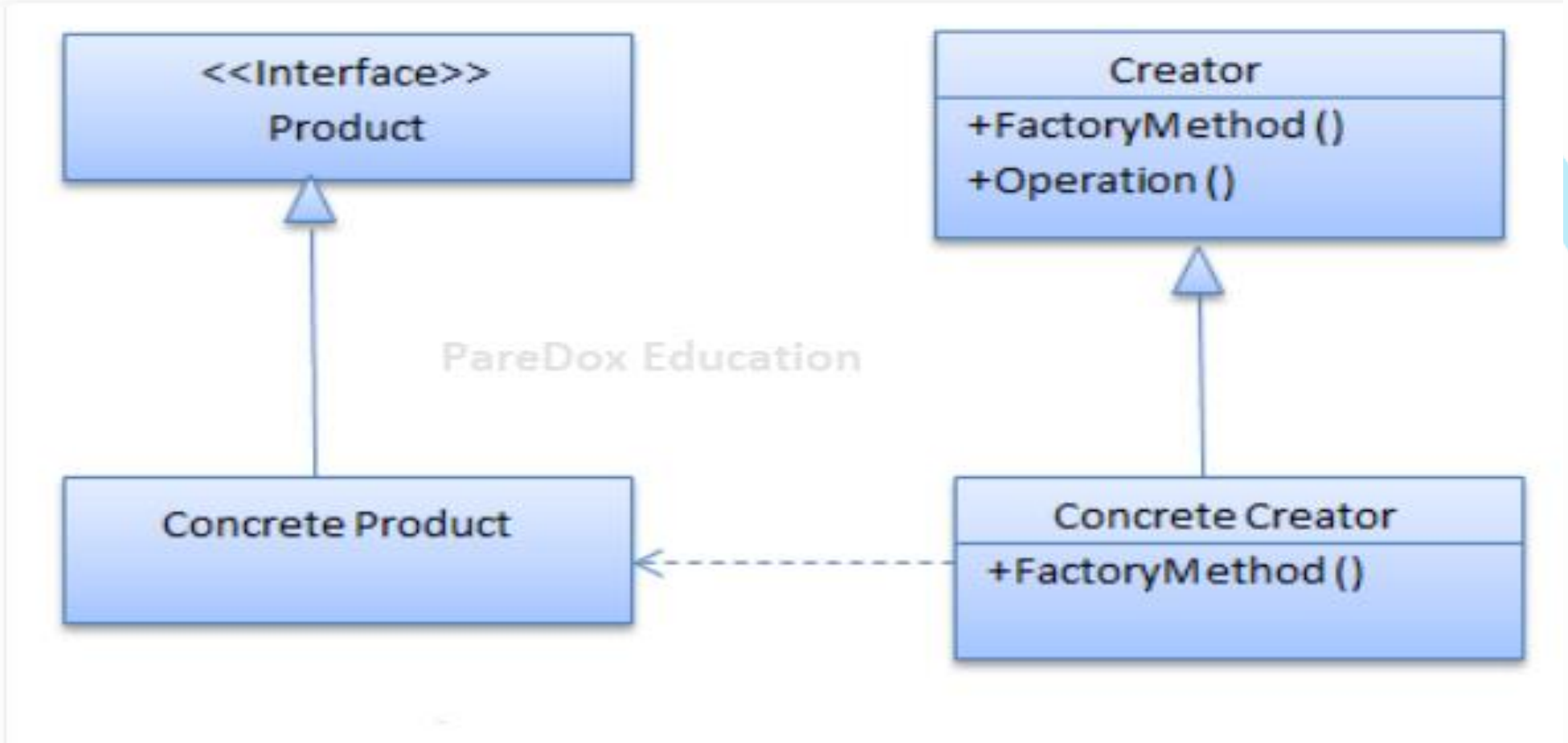
UML Diagram



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Real World Use Case - 1

- In the previous lecture we built the following Real World Use Case – 1.
- Using factory method pattern we created different types of tests given in this use-case scenario.

- COMSATS University Examination
  - Semester Examination Evaluation Contents
    - Assignments
    - Quizzes
    - Sessionals
    - Final Term
- Creating an Examination
  - Fall 2020
  - Spring 2020

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Abstract Factory Pattern Concept

- Abstract Factory is a creational design pattern that lets you produce families of related objects without specifying their concrete classes.
- In this pattern, you provide a way to encapsulate a group of individual factories that have a common theme.
- This pattern helps you to interchange specific implementations without changing the code that uses them, even at runtime. However, it may result in unnecessary complexity and extra work.
- An abstract factory is called a factory of factories.

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Abstract Factory Pattern Illustration

- Wikipedia describes a typical structure of this pattern, which is similar to Figure 1 (https://en.wikipedia.org/wiki/Abstract_factory_pattern).

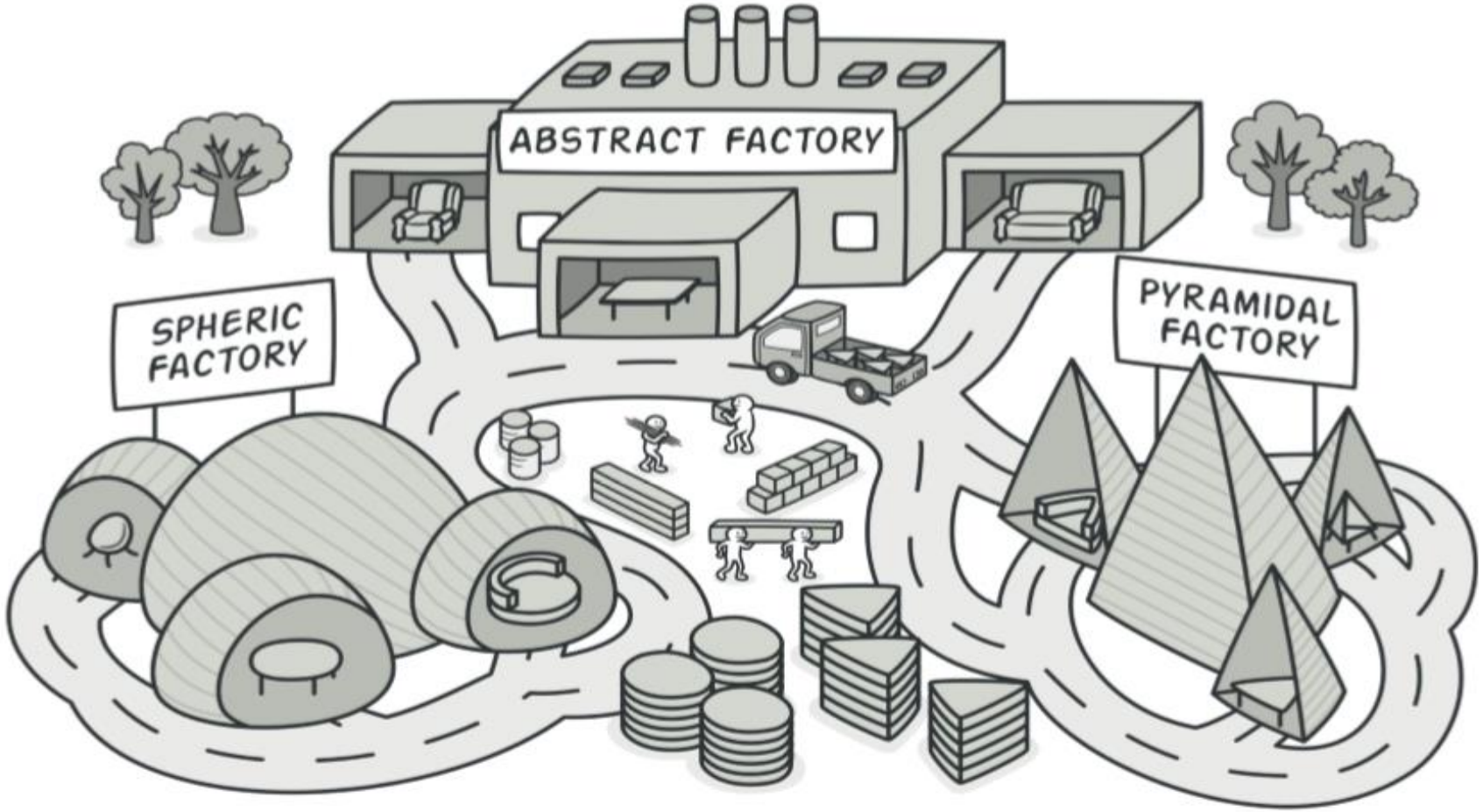

Figure 1

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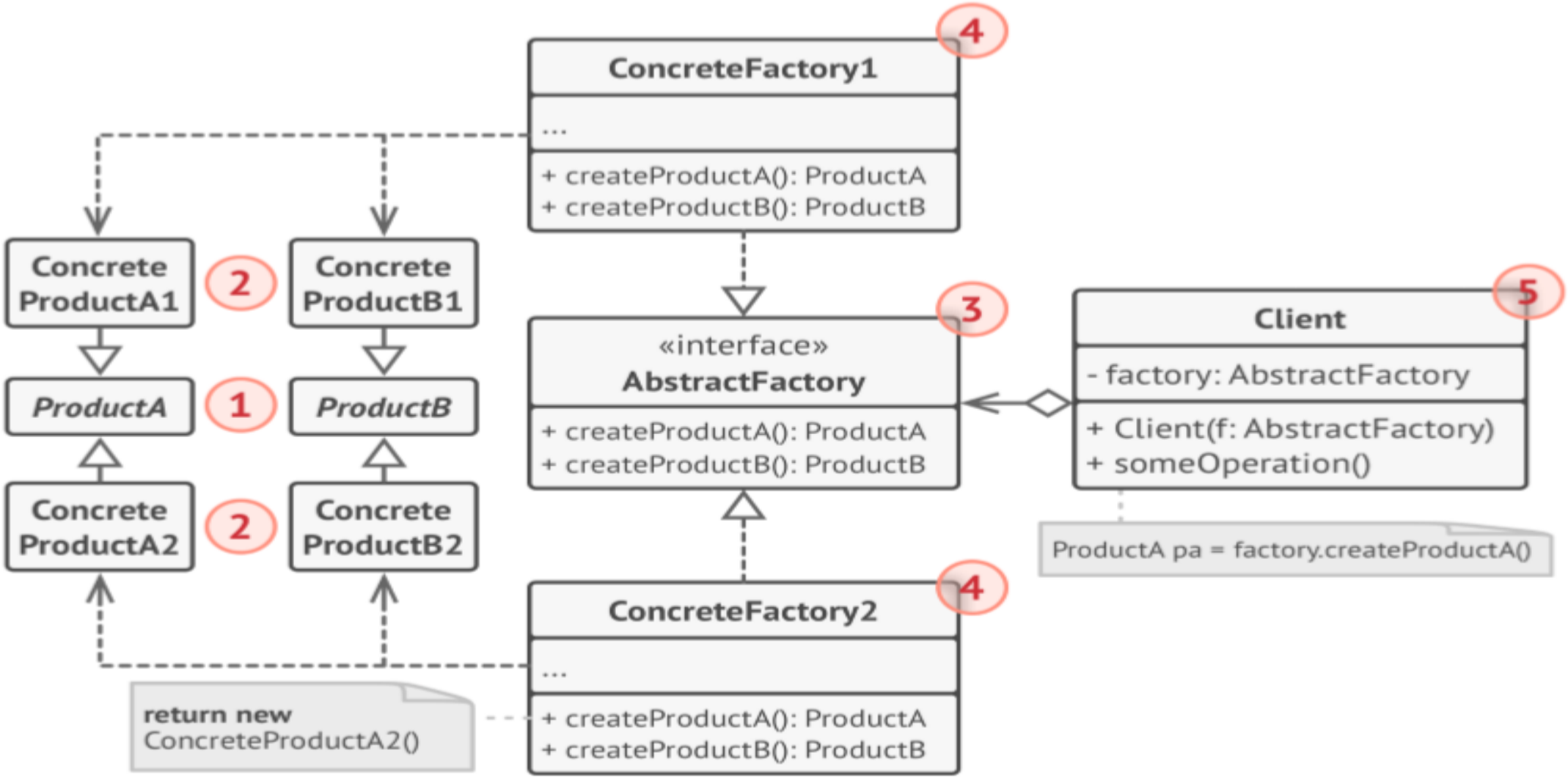
Abstract Factory Pattern Structure



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Participants

- Abstract Products declare interfaces for a set of distinct but related products which make up a product family.
- Concrete Products are various implementations of abstract products, grouped by variants. Each abstract product (chair/ sofa) must be implemented in all given variants (Victorian/ Modern).
- The Abstract Factory interface declares a set of methods for creating each of the abstract products.
- Concrete Factories implement creation methods of the abstract factory. Each concrete factory corresponds to a specific variant of products and creates only those product variants.

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Disadvantages

- Code is complex.
- A lot of understanding is required.
- Difficult to implement.
- The most complex in creational patterns.
- Refactoring – Factory Method.
- Pattern within a pattern.

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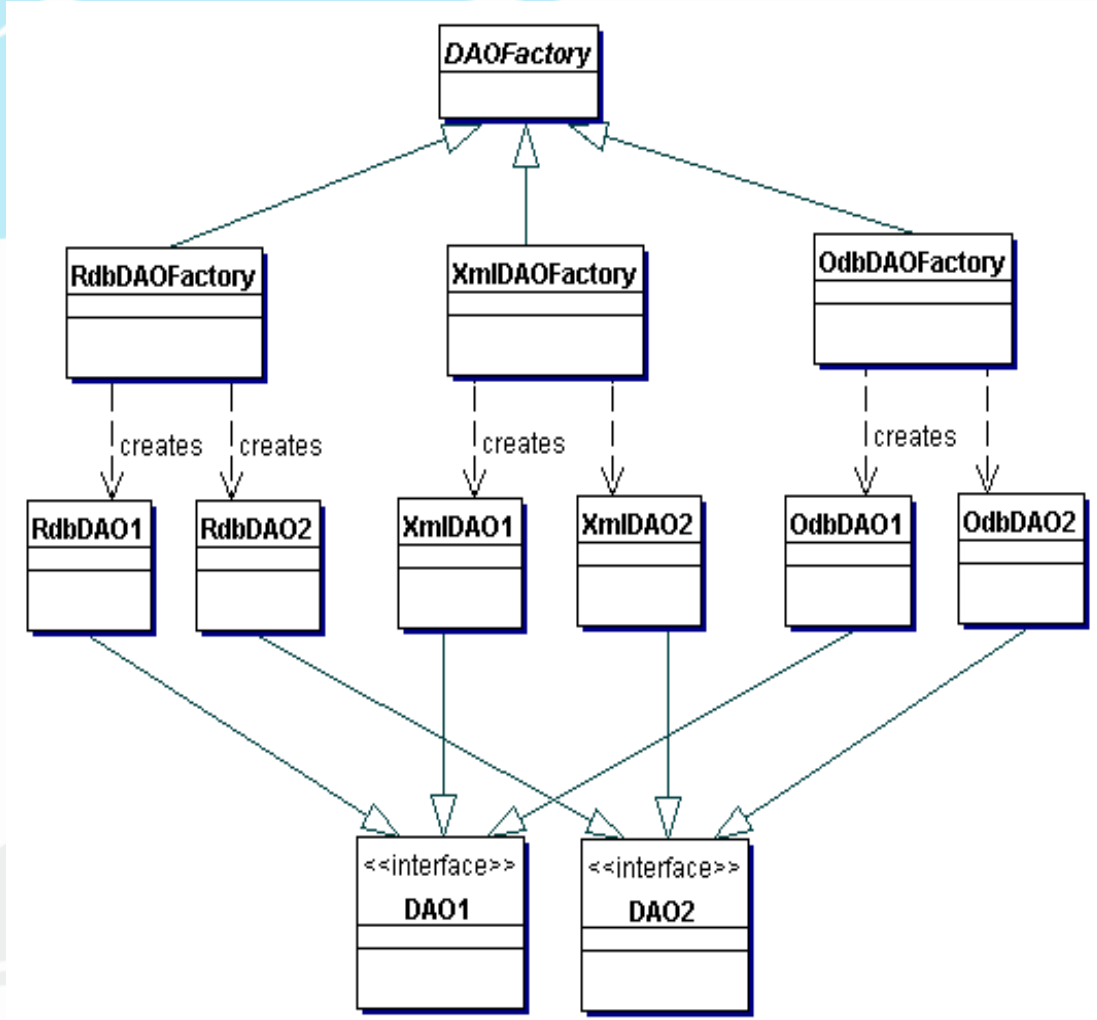
Oracle Example

- A good use case of Abstract Factory Method borrowed from a Oracle documentation which shows how to model data access strategy if your client is only exposed to very specific DAO interfaces, but you have multiple data storage implementation available which can offer data access through the same interface.



Courtesy Oracle

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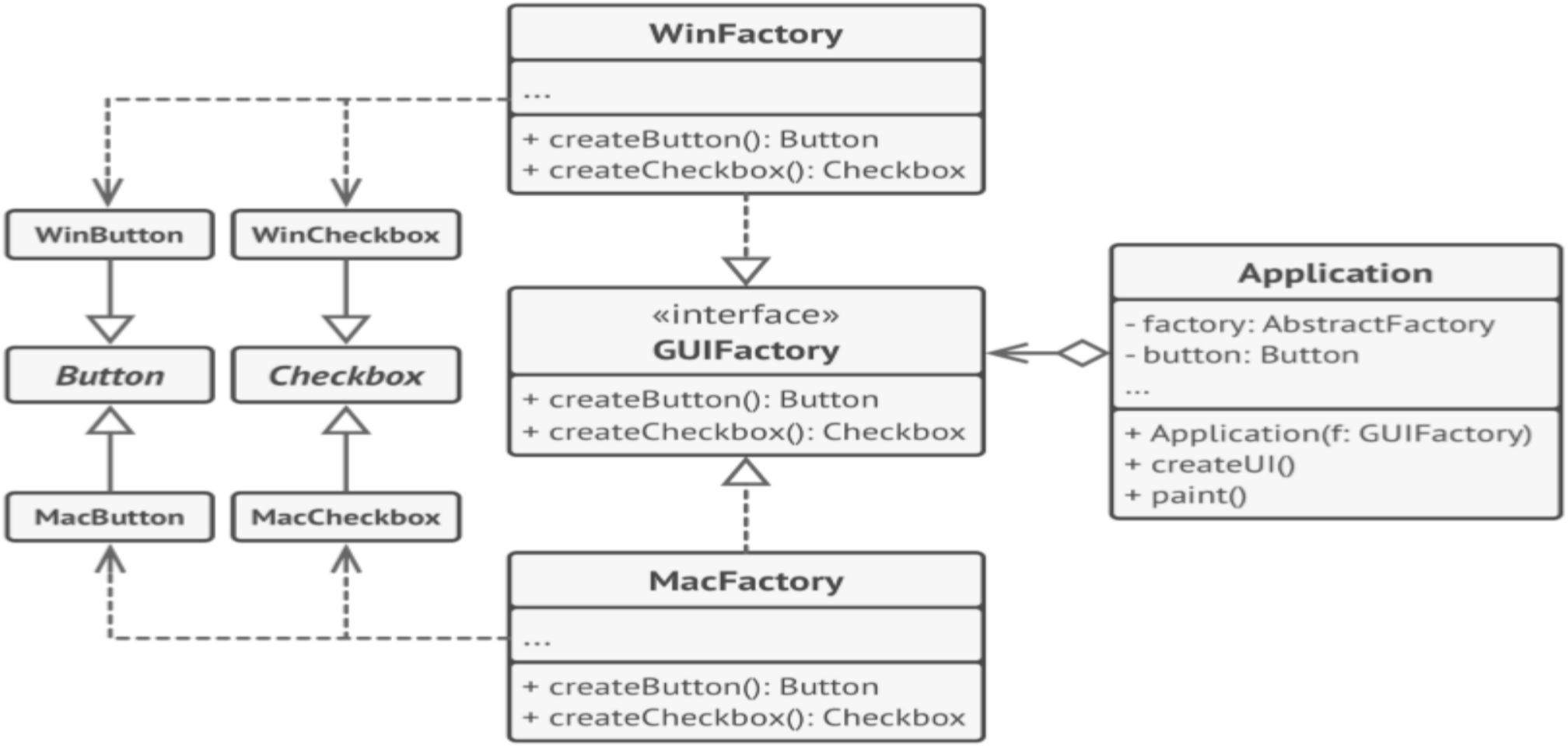
Cross-Platform UI Example



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Real World WhatMobile.com Example

- Whatmobile.com provides information about cell phones
- The information is grouped into different categories
- By selecting a cell phone manufacturer displays its list of cell phones.
- Scenarios like this can be good candidate for Abstract Factory Pattern.
- Analyze and implement
- Writing code using C# .Net

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Real World WhatMobile.com Example

- Mobile Manufacturers
  - Manufacturers create families of products
- Products
  - The cell phone products.
- Good candidate for Factory Method Pattern as well as for Abstract Factory Pattern
- Implementing Abstract Factory Pattern

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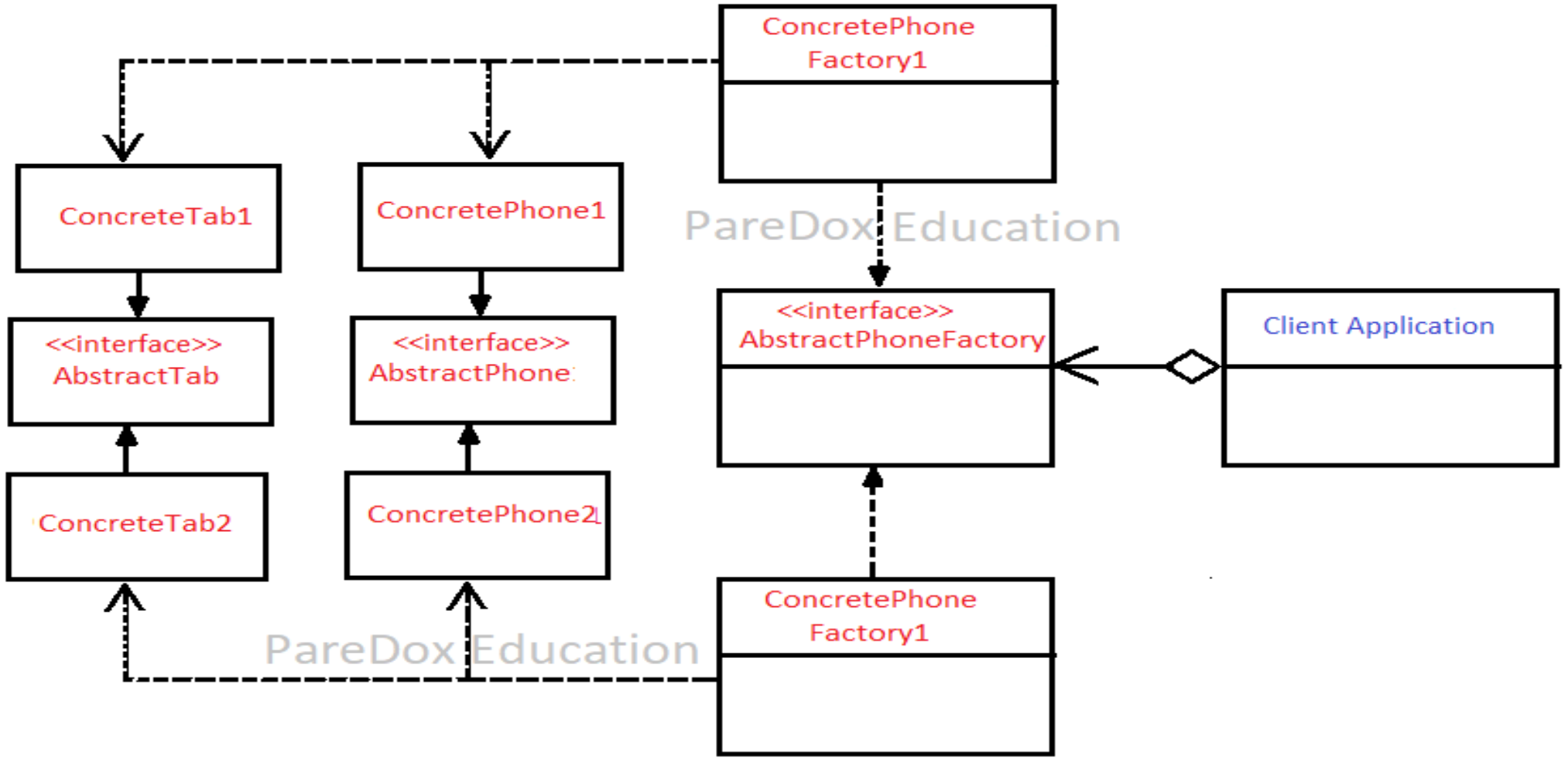
Structure



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