If time permits:

Module 05:
"Factory Method"

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Agenda

- Introductory Example: Publications
- Challenges
- Implementing the Factory Method Pattern
- Pattern: Factory Method
- Overview of Factory Method Pattern
- Factory Method vs. Abstract Factory

Introductory Example: Publications

```
interface IPart {}
```

```
class Chapter : IPart
{
    public int Number
    { get; }
}
```

```
class Publication : IEnumerable<IPart>
{
    ...
    public IList<IPart> Parts { get; }
    public Publication( string title )
    { ... }
    public void Print() { ... }
}
```

```
Publication book = new Publication("GoF Design Patterns in C#")
{
    new Foreword(),
    new Chapter( 1 ), new Chapter( 2 ), new Chapter( 3 ),
    new Index()
};
book.Print();
```

Challenges

- Clients should be shielded from internal object structure and creation
- The appropriate subclass should provide appropriate creational logic
- Additionally;
  - Most challenges from Builder
  - Some of the challenges from Abstract Factory

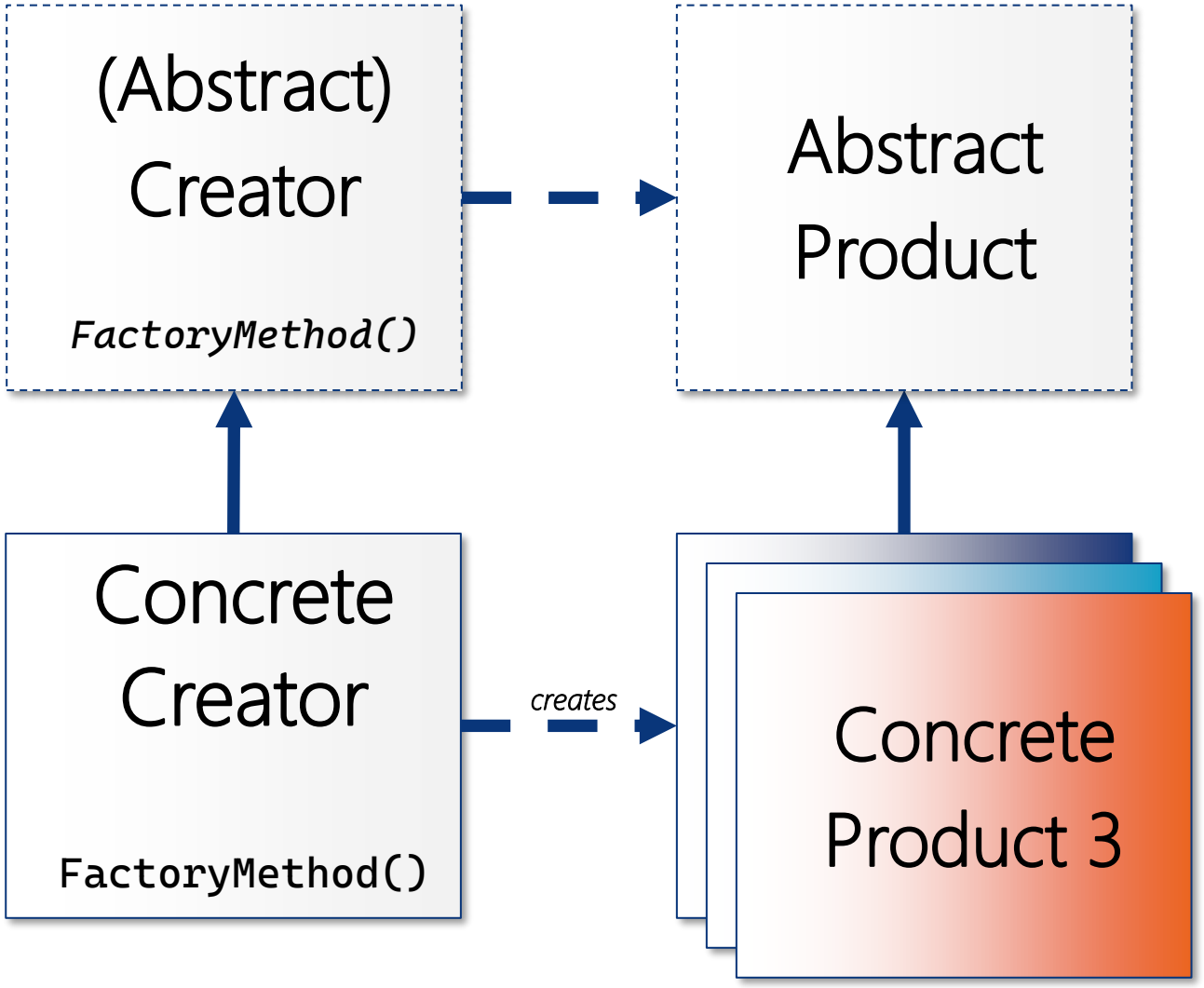
Pattern: Factory Method

- *Define an interface for creating an object, but let subclasses decide which class to instantiate. Factory Method lets a class defer instantiation to subclasses.*

- Outline
  - Define a separate operation (factory method) for creating objects
  - Create objects by invoking factory method

- Origin: Gang of Four

Overview of Factory Method Pattern



Overview of Factory Method Pattern

- Abstract Product
  - Interface or abstract class capturing a generic product
- Concrete Product
  - Concrete class implementing the Product interface
- (Abstract) Creator
  - Usually abstract class providing abstract factory method
  - Could be concrete class and/or provide default implementation
  - May or may not call factory method
- Concrete Creators
  - Overrides factory method to provide specialized object creation for subclasses
- Note: Creators and Products might not be in one-to-one relationship

Factory Method vs. Abstract Factory

- Very often confused and used interchangeably

- Factory Method
  - A single method for object instantiation
  - Uses inheritance and relies on subclasses to instantiate
  - Class is essentially “its own factory”: Calls own factory method
  - Handles a single product hierarchy

- Abstract Factory
  - A distinct other object with (multiple) factory methods
  - Client delegates object instantiation to this object
  - Handles families of product hierarchies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