If time permits:

Module 05:
"Factory Method"

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

```csharp
interface IPart {}
```

```csharp
class Chapter : IPart
{

    public int Number
    { get; }

}
```

```csharp
class Publication : IEnumerable<IPart>
{

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

}
```

```csharp
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
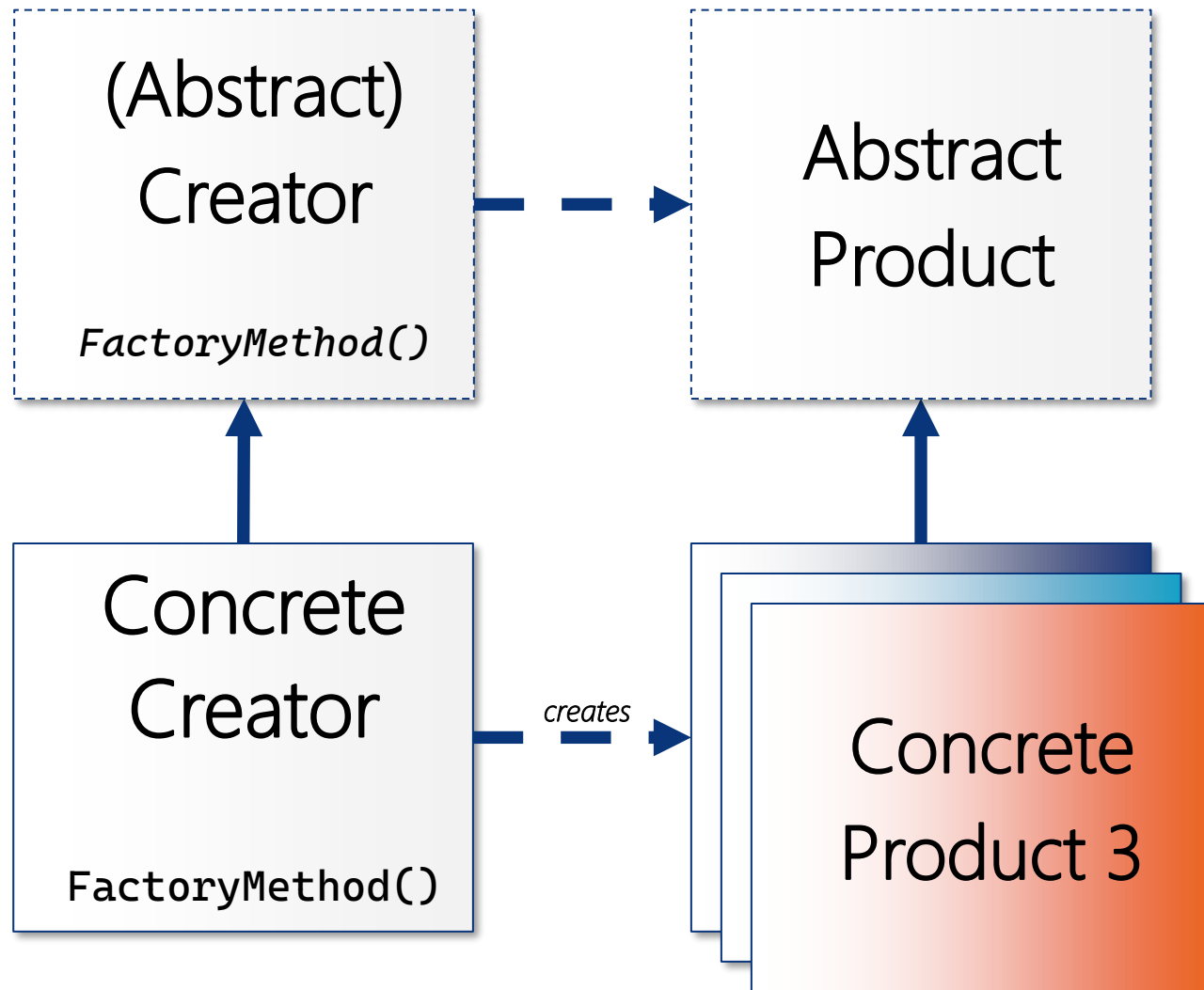
Overview of Factory Method Pattern

▶ 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

▶ <u>Note</u>: 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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