Module 04: "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

```
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("Gang of Four 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

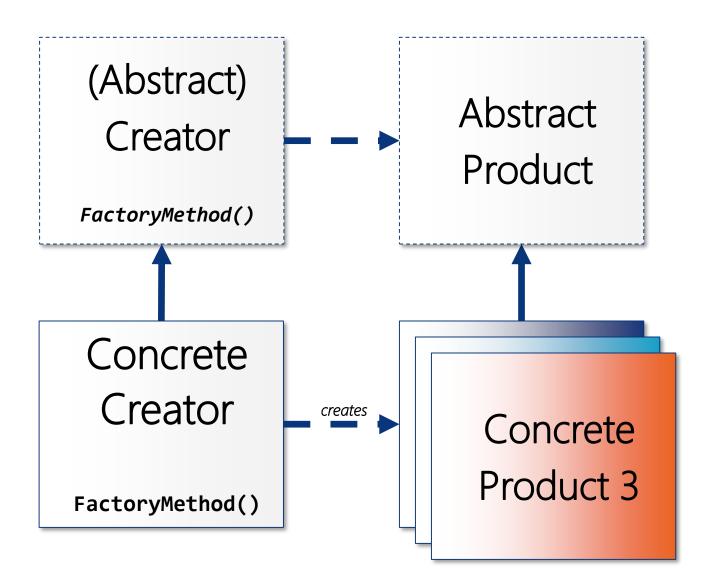


Pattern: Factory Method

- 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



