Module 03: "Builder"





Agenda

- Introductory Example: Creating Pizzas
- Challenges
- Implementing the Builder Pattern
- Pattern: Builder
- Overview of Builder Pattern
- Fluent APIs



Introductory Example: Creating Pizzas

```
class Pizza
{
    public CrustKind Crust { get; set; }
    public bool HasSauce { get; set; }
    public IEnumerable<ToppingKind> Toppings { get; set; }
    public CheeseKind? Cheese { get; set; }
    public bool Oregano { get; set; }
}
```

```
Pizza hawaii = new Pizza
{
    Crust = CrustKind.Classic, HasSauce = true, Oregano = true,
    Cheese = CheeseKind.Regular,
    Toppings = new List<ToppingKind>
    { ToppingKind.Ham,ToppingKind.Pineapple }
};
```



Challenges

- Need to create the same configuration of object whenever needed
- Might end up with partially-defined objects
- Cannot define sequencing constraints

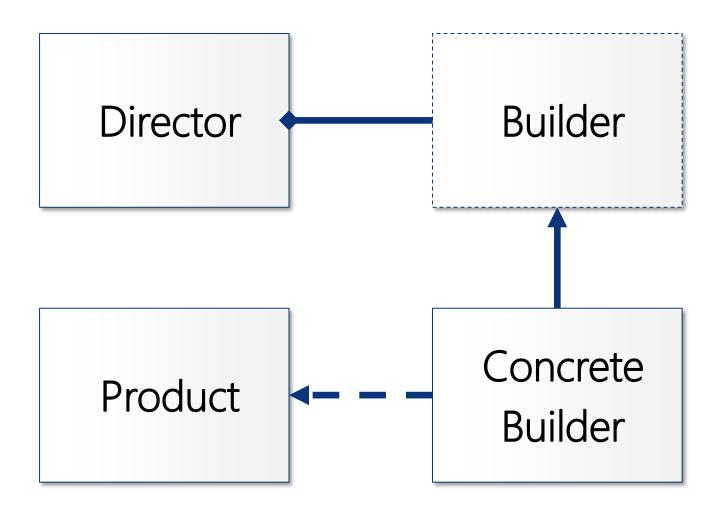


Pattern: Builder

- Separate the construction of a complex object from its representation so that the same construction process can create different representations.
- Outline
 - Construct complex objects in individual, reusable steps in the correct order.
 - Separate data from construction logic
 - reuse the construction logic
 - Construction data is handled by the Builder
 - Construction logic is handled by a Director
- Origin: Gang of Four



Overview of Builder Pattern





Overview of Builder Pattern

- Director
 - Knows the steps and the sequencing of the construction process
 - Just needs the concrete data pieces
- Builder
 - Abstract class or interface
 - Knows the data pieces
 - Keeps the Product
- Concrete Builder
 - Concrete class implementing the general Builder specification
 - Knows the concrete data pieces for a specific variation of object
- Product
 - Composite or complex objects
 - A single type of Product
 - but the <u>data</u> of the product object varies



Fluent APIs

- Fluent APIs configure the Builder instances in a "fluent" fashion
 - Flows like natural, spoken language
 - See Lab

```
FluentPizzaBuilder builder = new FluentPizzaBuilder();
Pizza hawaii = builder
    .Begin()
    .WithCrust(CrustKind.Classic)
    .Sauce
    .AddTopping(ToppingKind.Ham)
    .AddTopping(ToppingKind.Pineapple)
    .AddCheese()
    .Oregano
    .Build();
```



