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 object
- Cannot define sequencing constraints

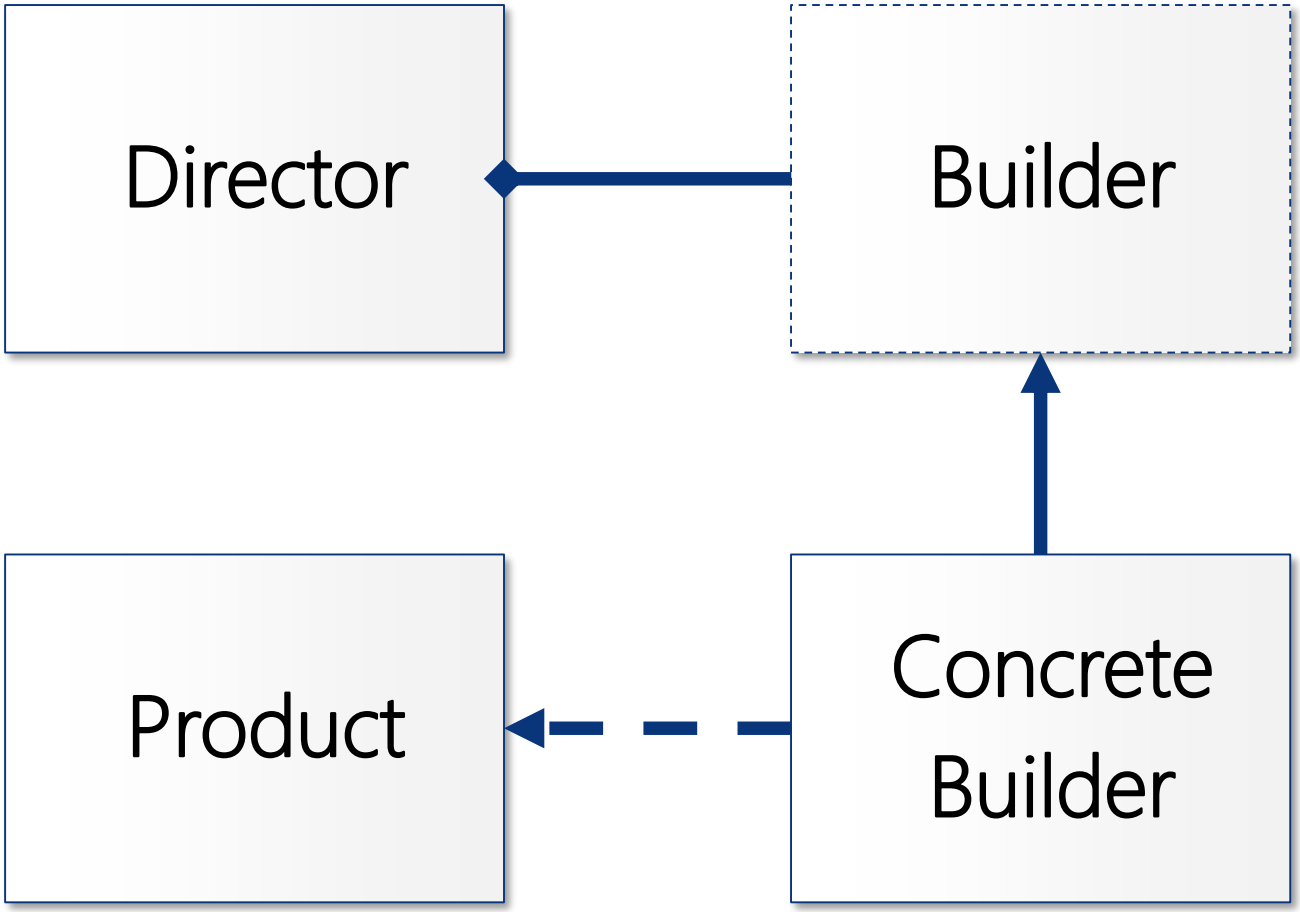
Pattern: Builder

- *Separate the construction of a complex object from its representation so that the same construction process can create different representations.*

- Purpose
  - Construct complex objects in individual, reusable steps in the correct order.
  - Separate data from construction logic and reuse that 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 sequencing
  - Just needs the concrete data pieces
- Builder
  - Abstract class or interface
  - Knows the concrete data pieces
  - Keeps the Product
  - More than one concrete Builder to be useful
- Product
  - Composite or complex objects
  - A single type of Product
    - but the data of the product object varies

Fluent APIs

- Fluent APIs configure the Builder instances in a "fluent" fashion
  - Flows like natural, spoken language
  - See Lab 03.1

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