Design Defects and Restructuring

Lecture 8

Sat, Nov 13, 2021

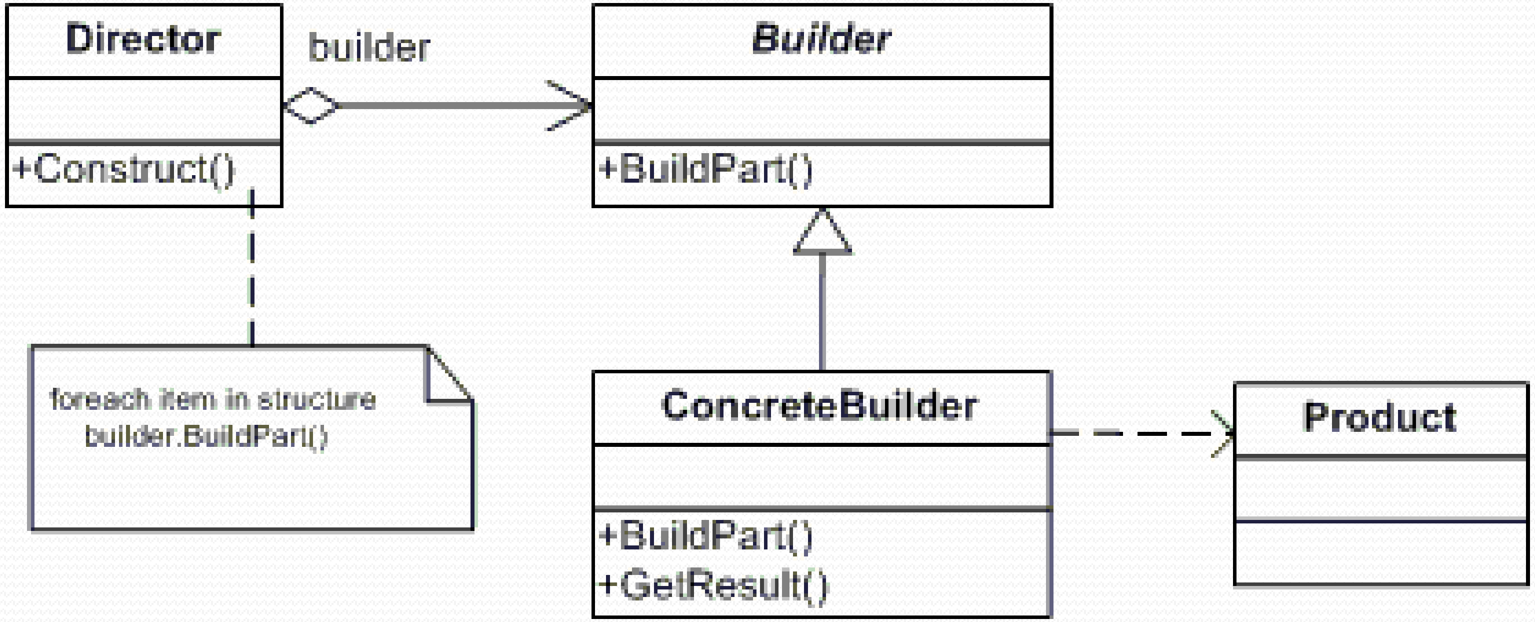
Creational Patterns

- Abstract Factory
- Builder
- Factory Method
- Prototype
- Singleton

Builder

- Intent
  - Separate the construction of a complex object from its representation so that the same construction process can create different representations
- Applicability
  - The algorithm for creating a complex object should be independent of the parts that make up the object and how they are assembled
  - The construction process must allow different representations for the object that is constructed

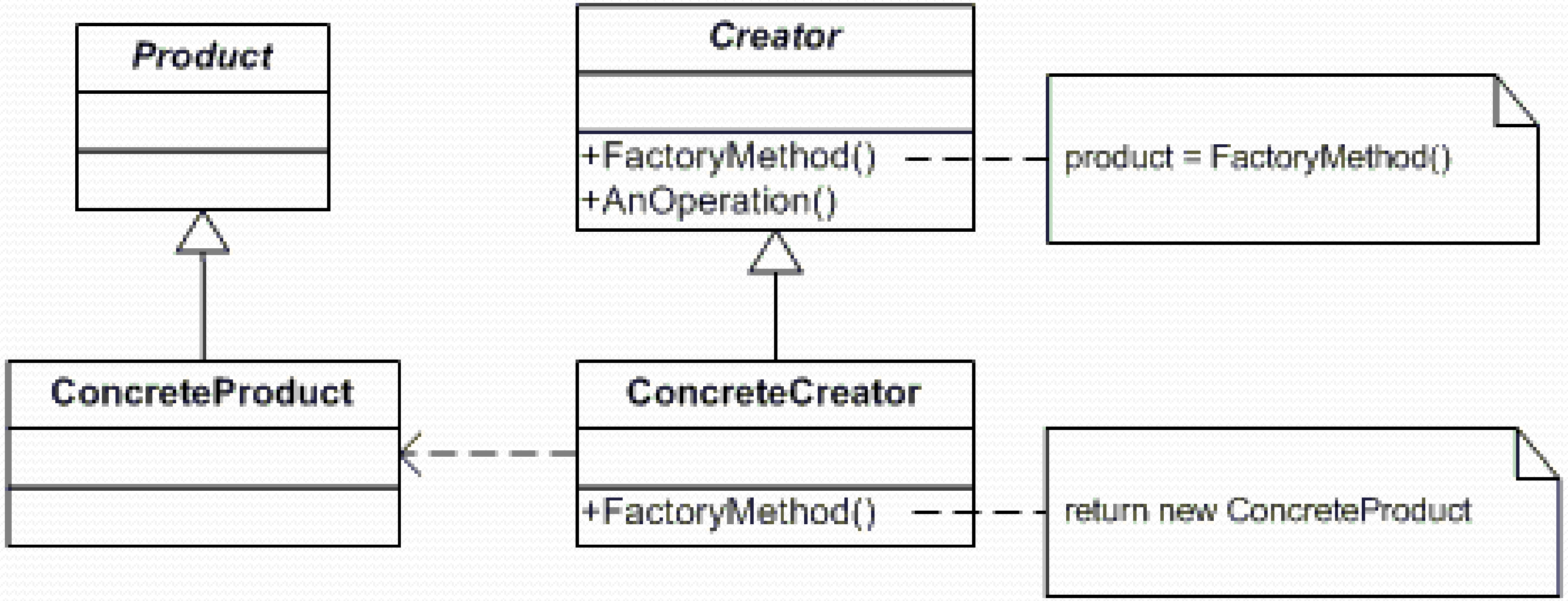
Builder


Director
+Construct()
builder
Builder
+BuildPart()
foreach item in structure
builder.BuildPart()
ConcreteBuilder
+BuildPart()
+GetResult()
Product

Factory Method

- Intent
  - Define an interface for creating an object, but let subclasses decide which class to instantiate
  - Factory Method lets a class defer instantiation to subclasses
- Applicability
  - A class can’t anticipate the class of objects it must create
  - A class wants its subclasses to specify the objects it creates
  - Classes delegate responsibility to one of several helper subclasses, and you want to localize the knowledge of which helper subclass is the delegate

Factory Method



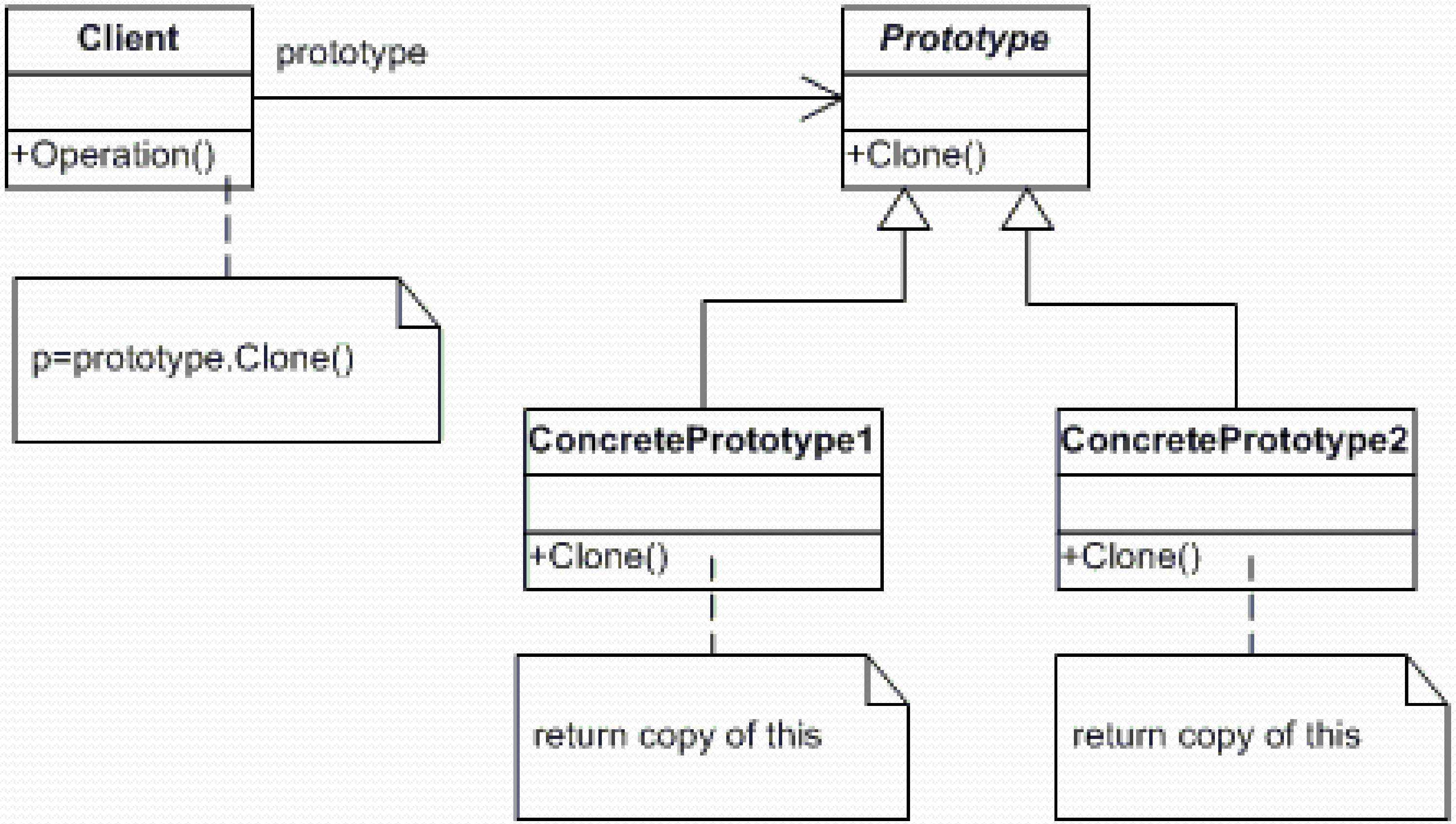
Prototype

- Intent
  - Specify the kinds of objects to create using a prototypical instance, and create new objects by copying this prototype

Prototype

- Applicability
  - When the classes to instantiate are specified at run-time, for example, by dynamic loading; or
  - To avoid building a class hierarchy of factories that parallels the class hierarchy of products; or
  - When instances of a class can have one of only a few different combinations of state
    - It may be more convenient to install a corresponding number of prototypes and clone them rather than instantiating the class manually, each time with the appropriate state

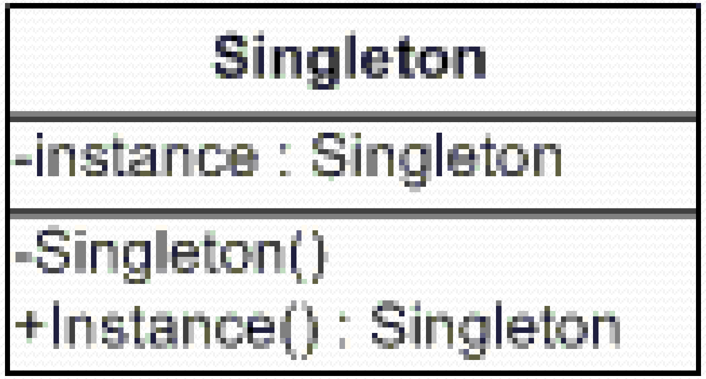
Prototype


Client
+Operation()
prototype
Prototype
+Clone()
p=prototype.Clone()
ConcretePrototype1
+Clone()
ConcretePrototype2
+Clone()
return copy of this
return copy of this

Singleton

- Intent
  - Ensure a class only has one instance, and provide a global point of access to it
- Applicability
  - There must be exactly one instance of a class, and it must be accessible to clients from a well-known access point
  - When the sole instance should be extensible by sub-classing, and clients should be able to use an extended instance without modifying their code

Singleton



Singleton

-instance : Singleton

-Singleton()

+Instance() : Singleton