Creational Pattern: Builder

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Coming Up

Describing the builder pattern

Structure of the builder pattern

Implementation

- Real-life sample: vehicle builder

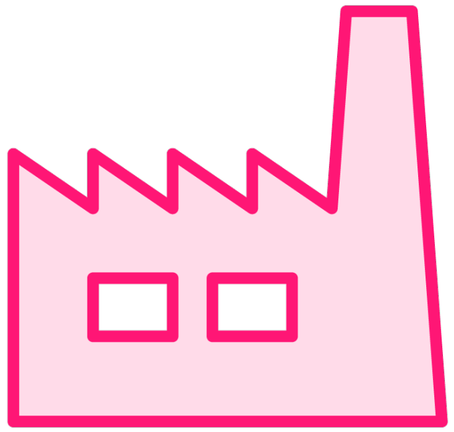
Coming Up

Use cases for this pattern

Pattern consequences

Related patterns

Describing the Builder Pattern



Creational

Structural

Behavioral

Builder

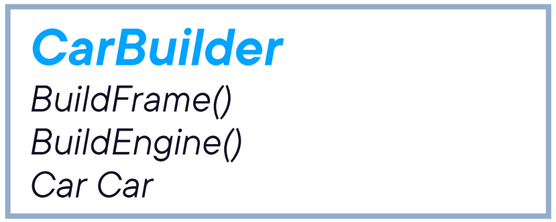
The intent of the builder pattern is to separate the construction of a complex object from its representation. By doing so, the same construction process can create different representations.

Describing the Builder Pattern

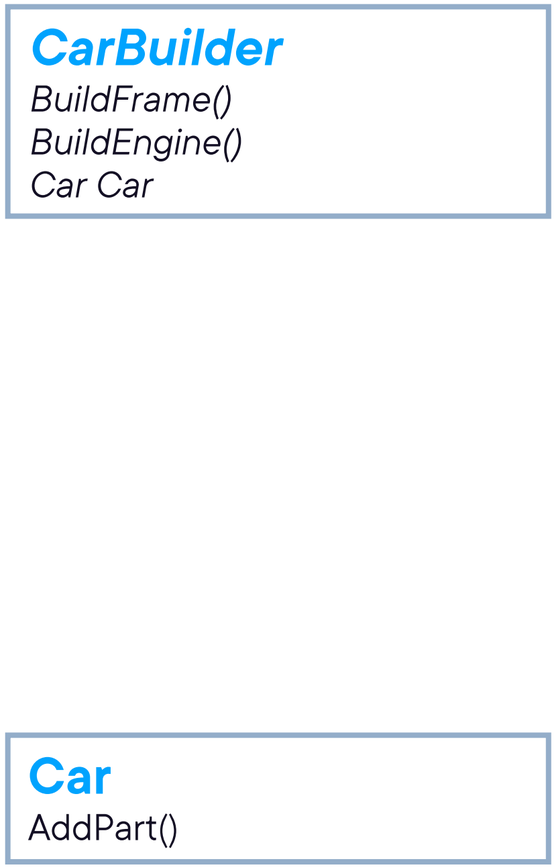
Garage

- Needs to construct cars
- Cars are complex and consist of multiple parts (engine, frame, ...)
- Multiple car representations exist (BMW, Mini, ...)

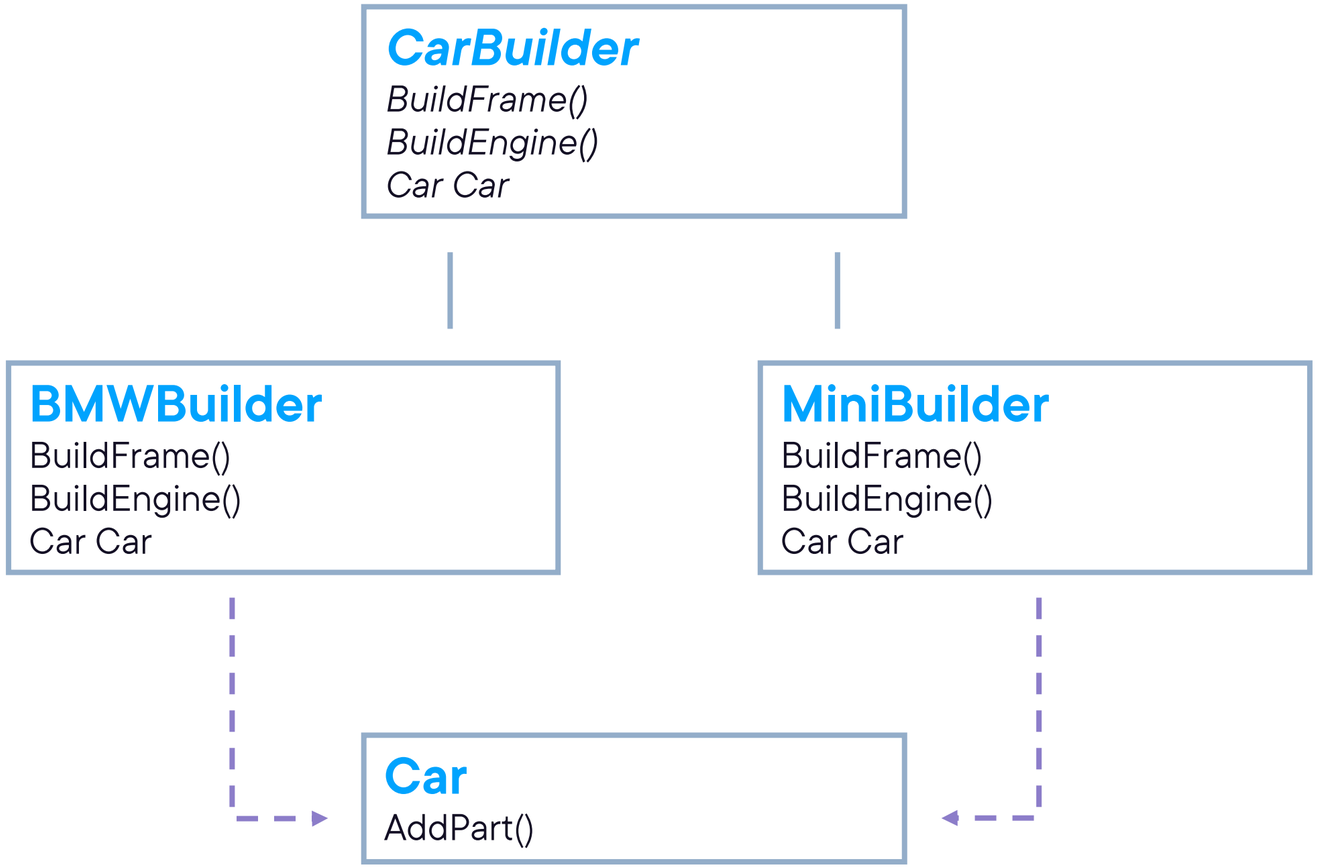
Describing the Builder Pattern



Describing the Builder Pattern



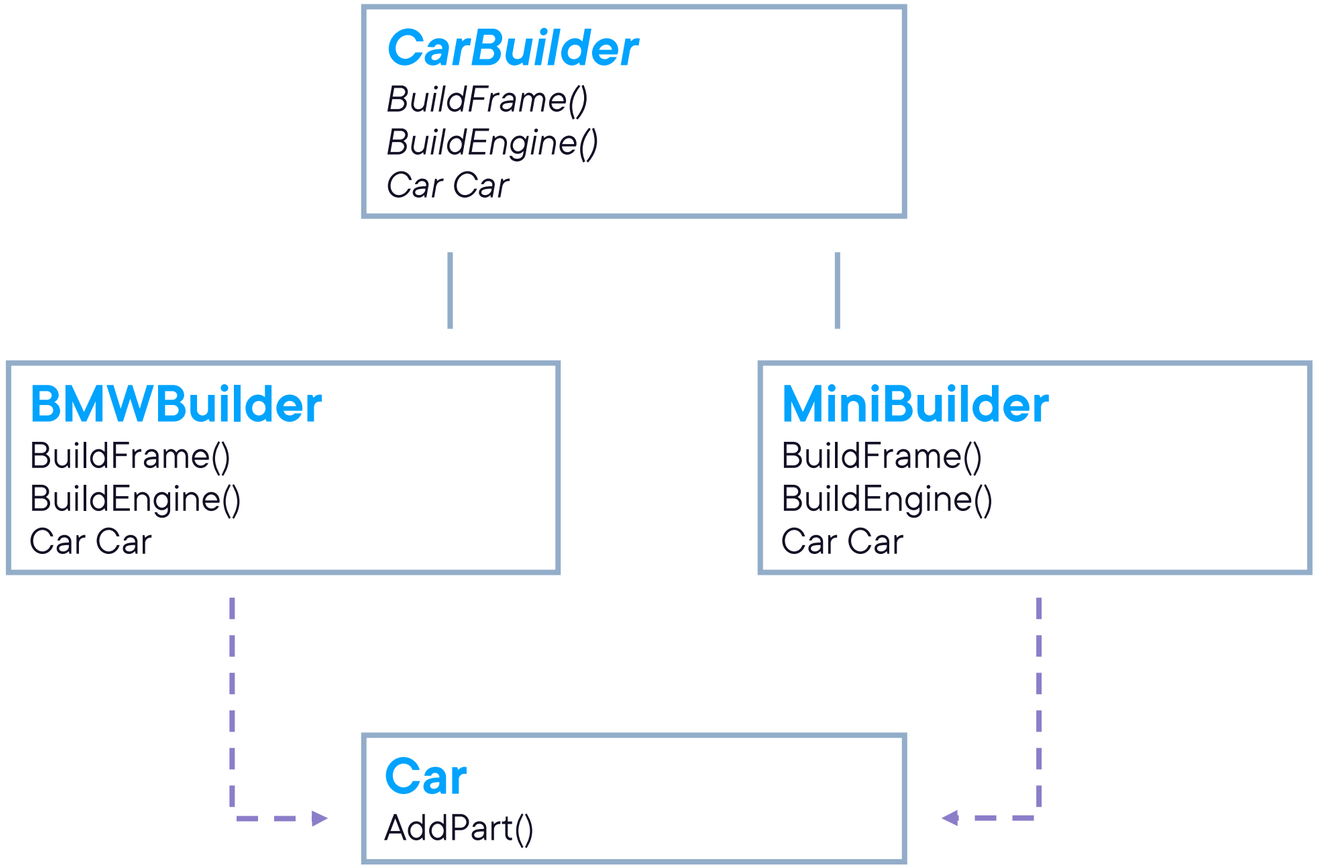
Describing the Builder Pattern



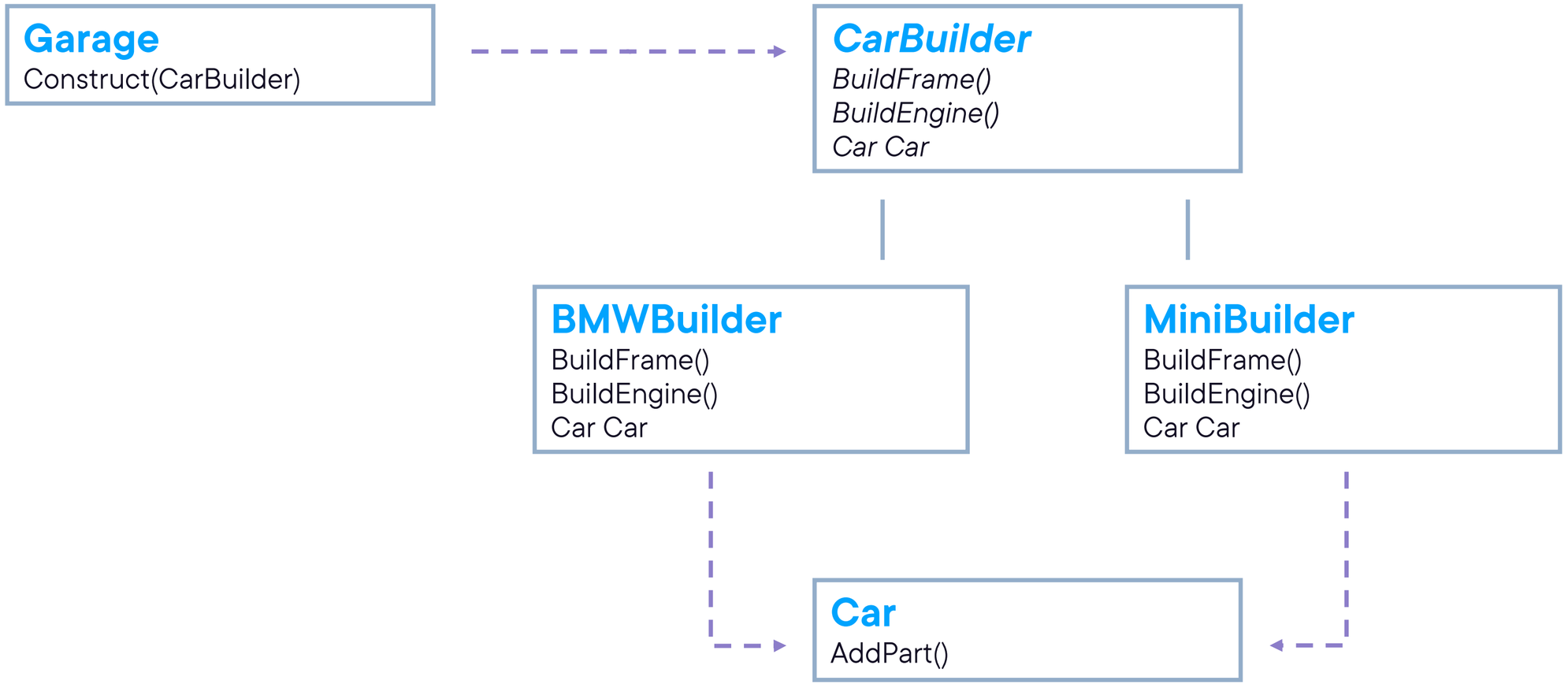
Creating a complex car object is transparent for the consumer of the builder

Work on interfaces, not implementations

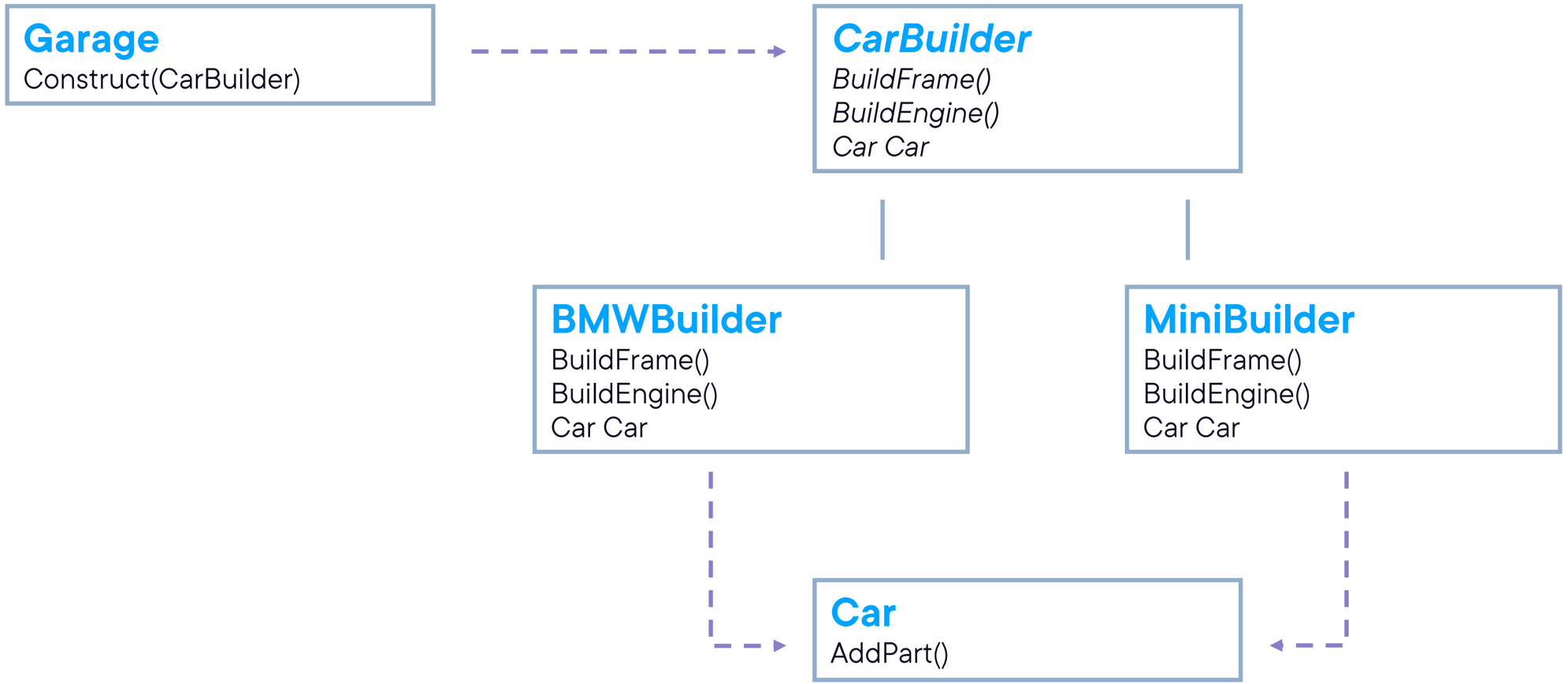
Describing the Builder Pattern



Describing the Builder Pattern

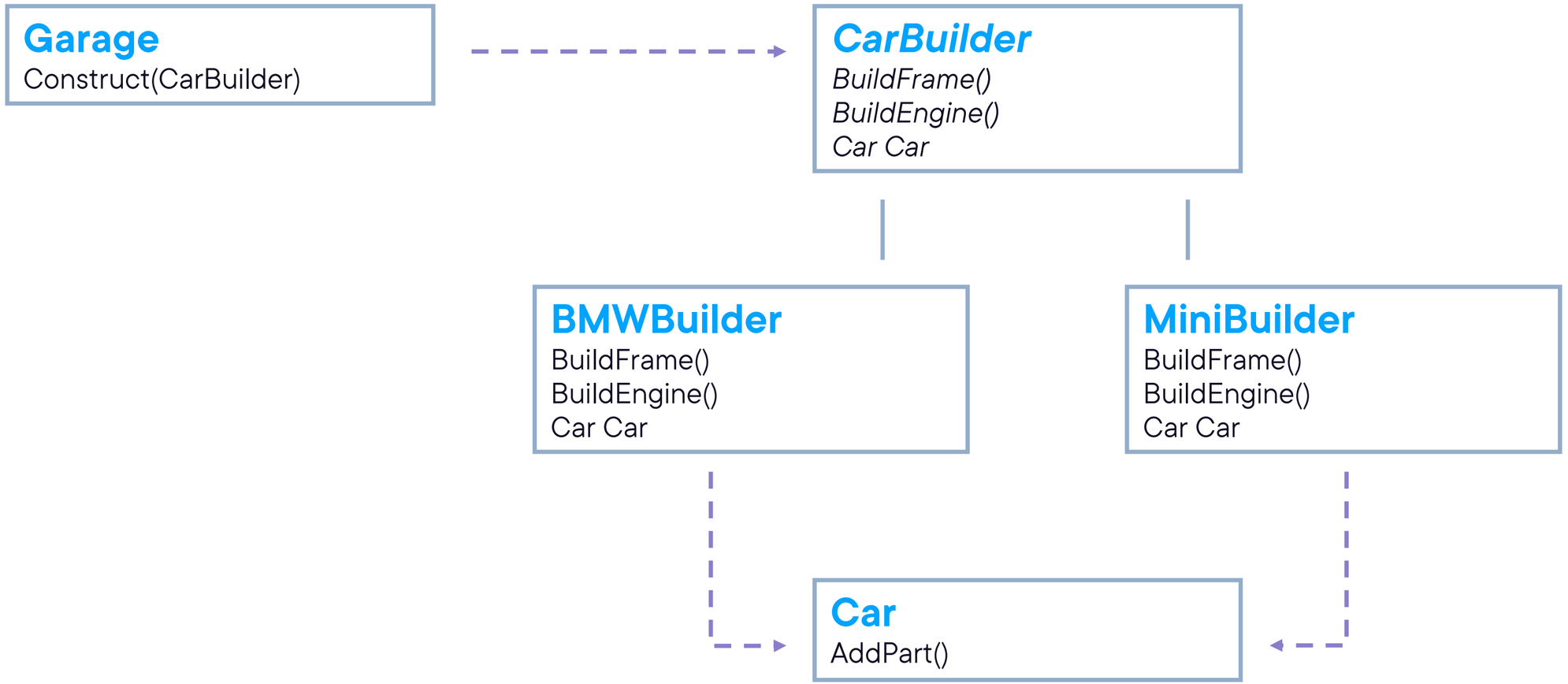


Builder Pattern Structure

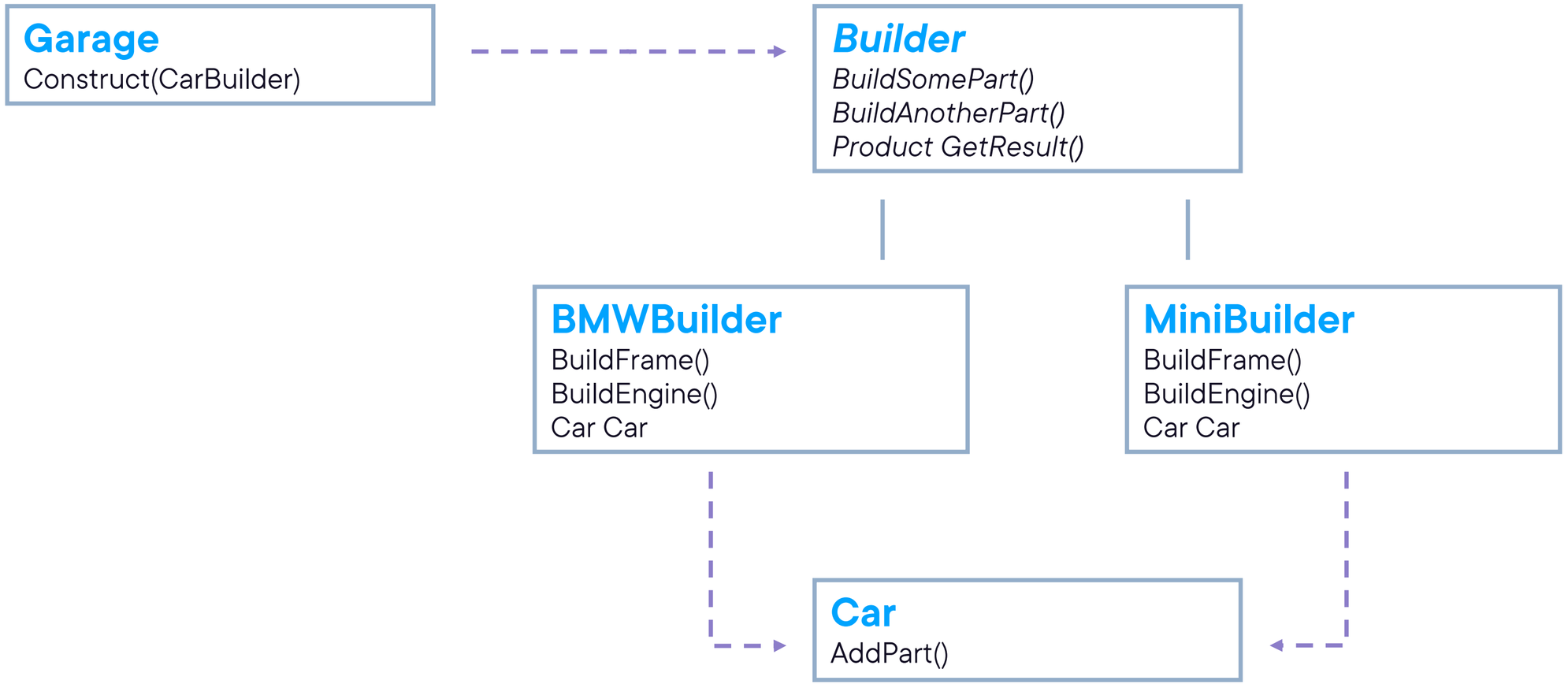


`Builder` **specifies an abstract interface for creating parts of a** `Product` **object**

Builder Pattern Structure



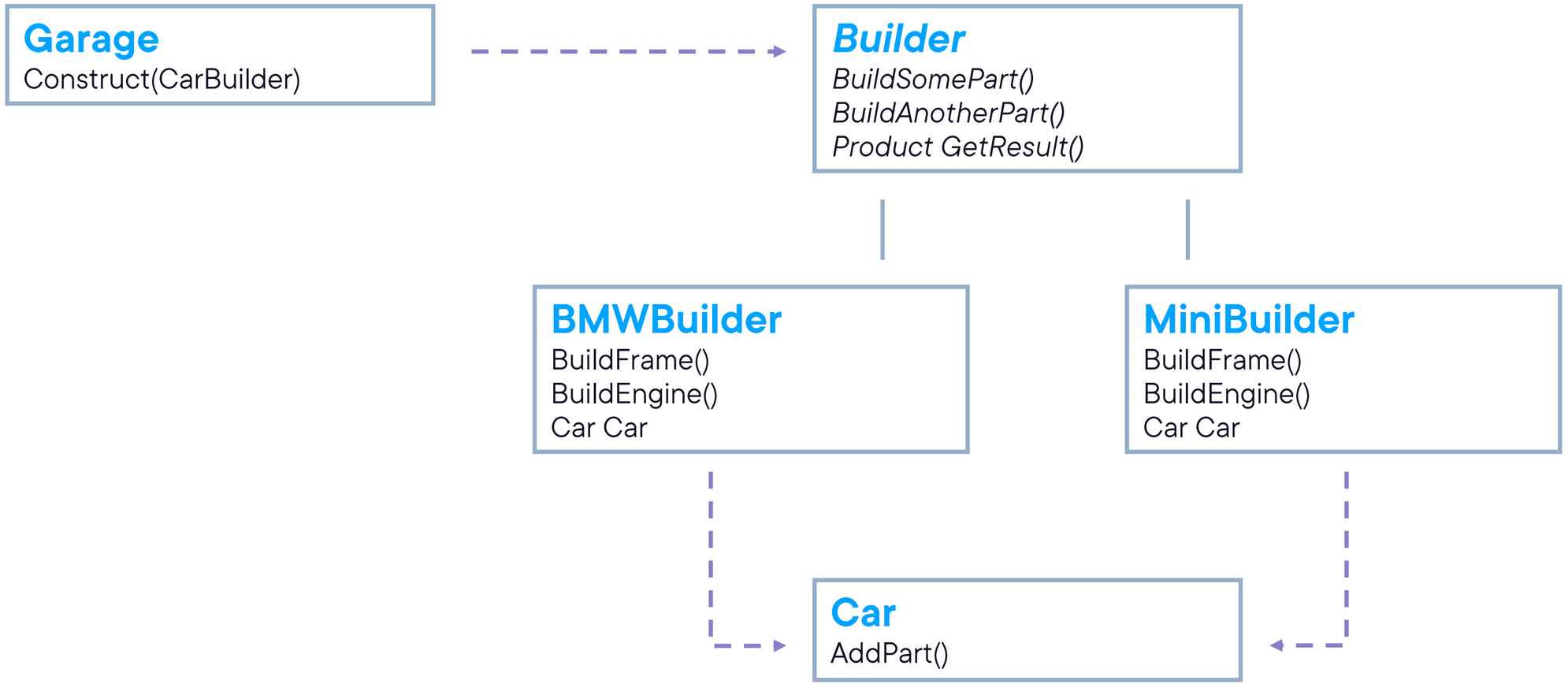
Builder Pattern Structure



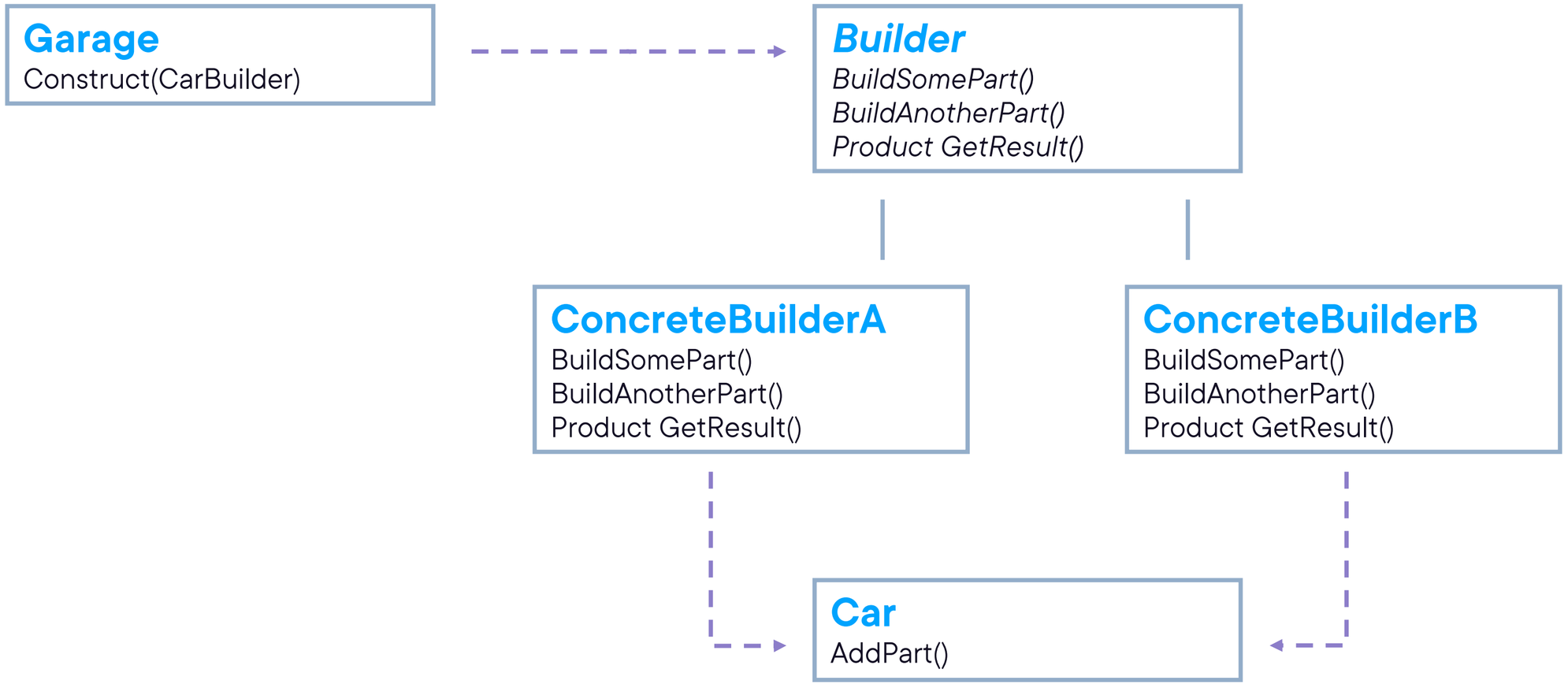
`ConcreteBuilder` **constructs and assembles parts of the** `Product` **by implementing the Builder interface**

It keeps track of the representation it creates, and provides an interface for retrieving the `Product`

Builder Pattern Structure

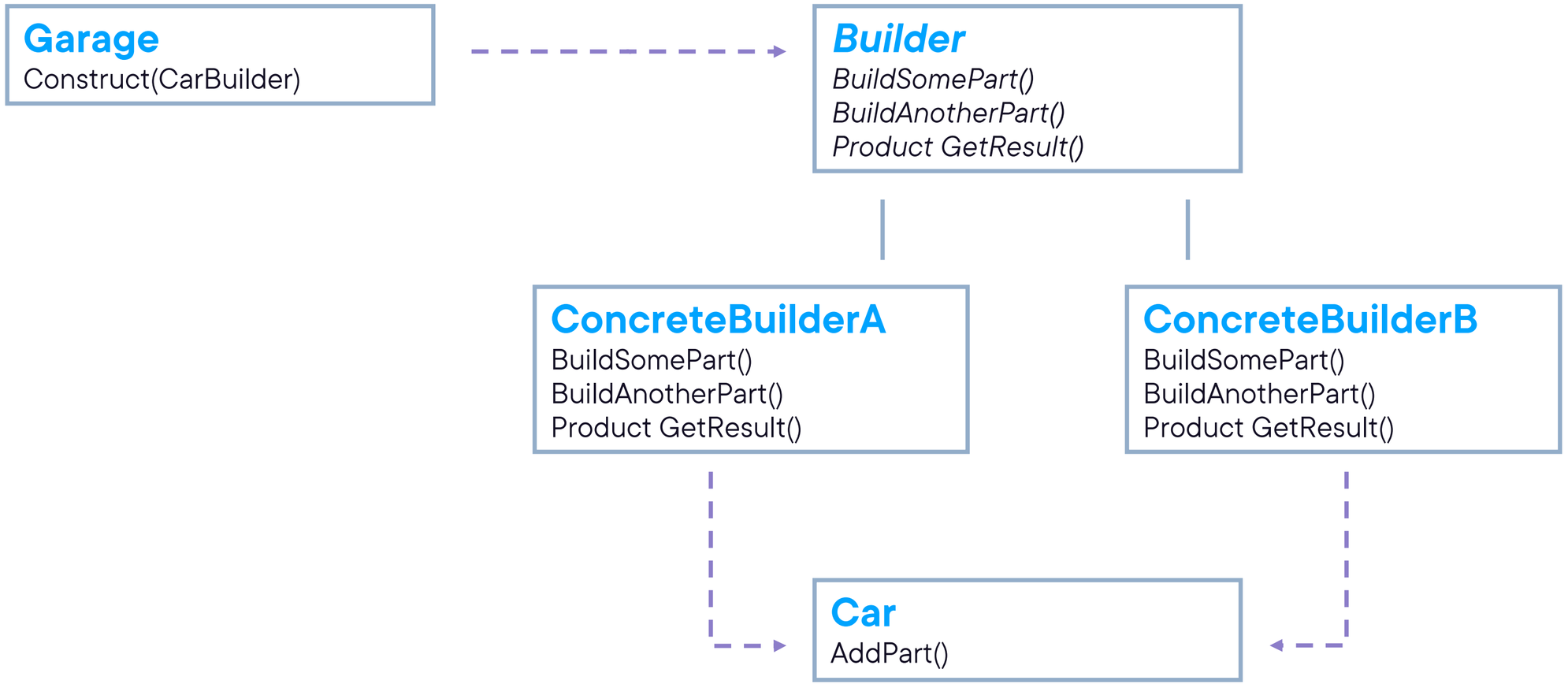


Builder Pattern Structure

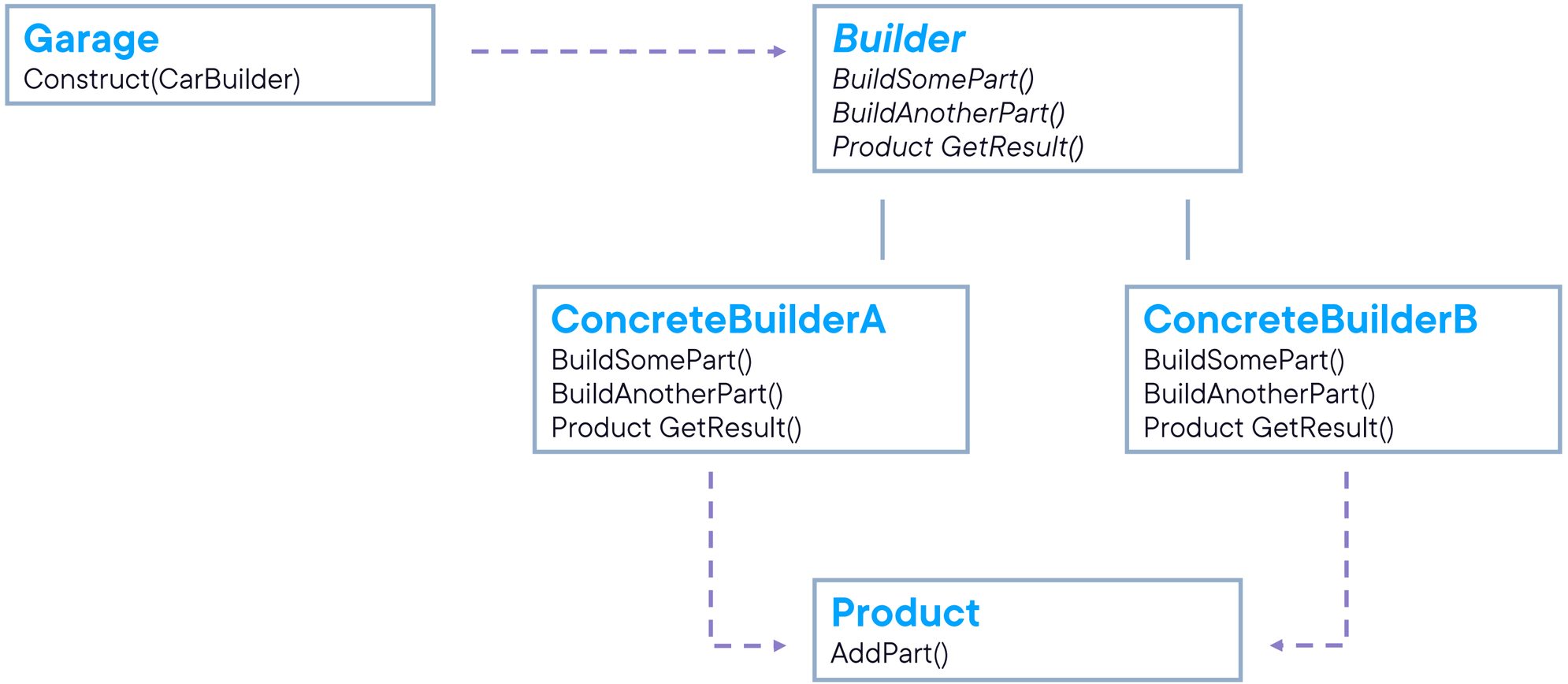


`Product` **represents the complex object under construction**

Builder Pattern Structure

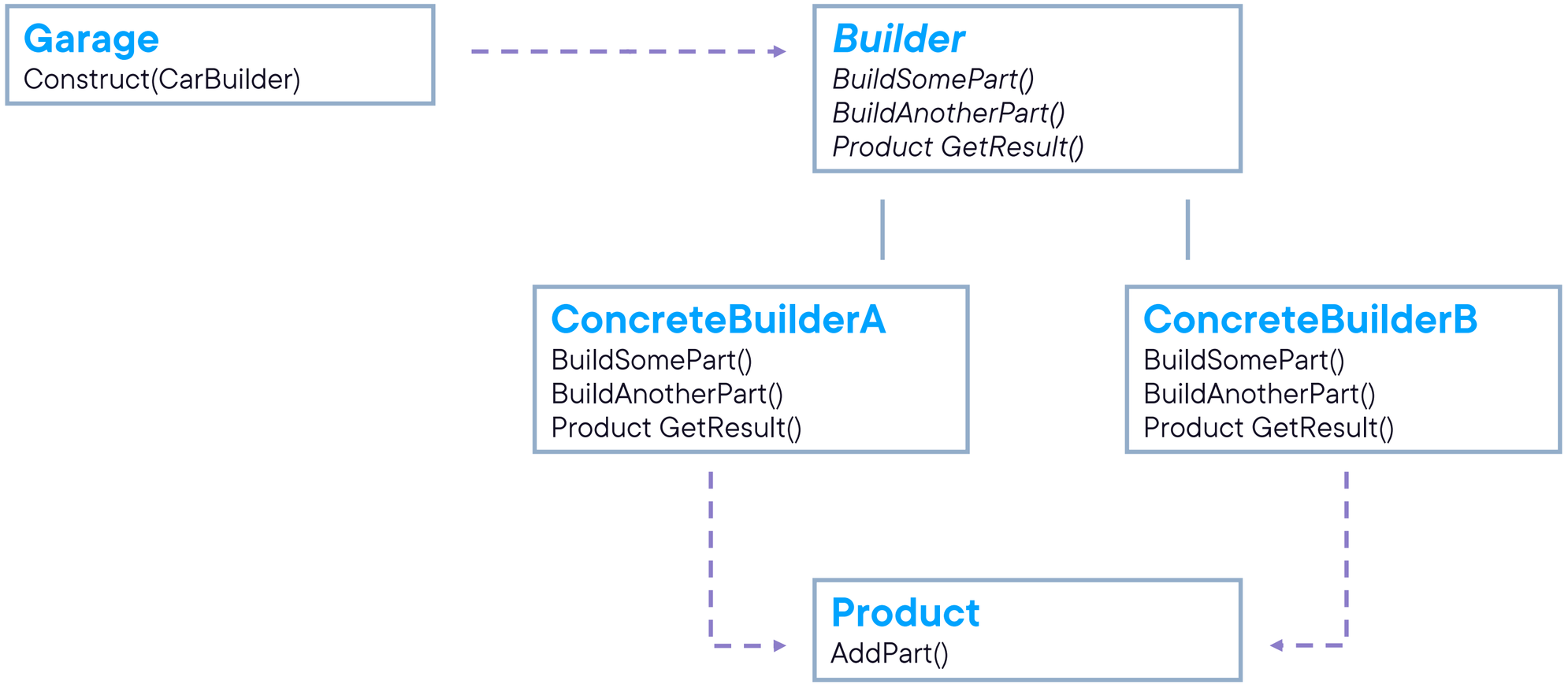


Builder Pattern Structure

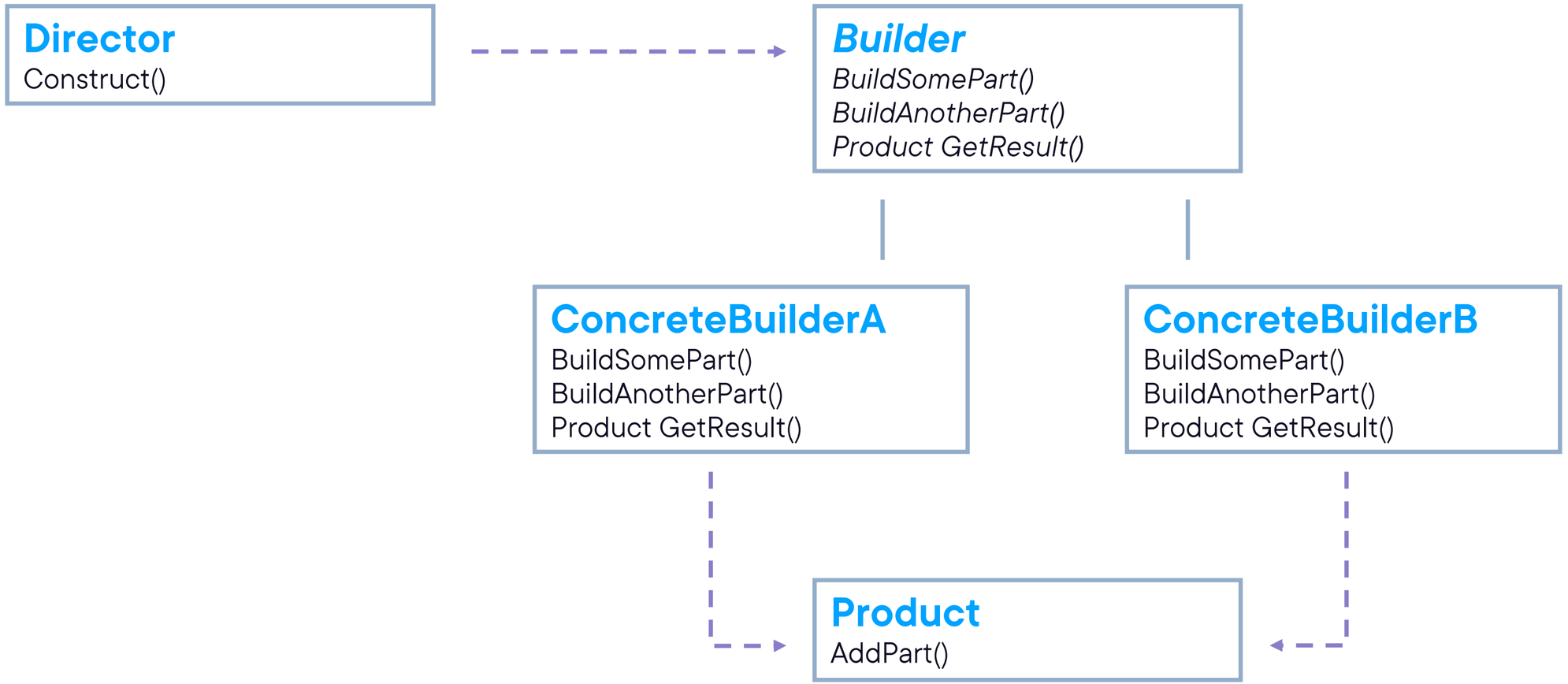


`Director` **constructs an object by using the** `Builder` **interface**

Builder Pattern Structure



Builder Pattern Structure



Demo

Implementing the builder pattern

Use Cases for the Builder Pattern

When you want to make the algorithm for creating a complex object independent of the parts that make up the object and how they're assembled

When you want to construction process to allow different representations for the object that's constructed

Use Cases for the Builder Pattern

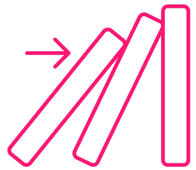
Generating documents

Building a database query

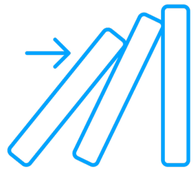
Creating a game character

Constructing a UI or form

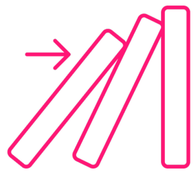
Pattern Consequences



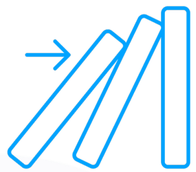
It lets us vary a products' internal representation



It isolates code for construction and representation; it thus improves modularity by encapsulating the way a complex object is constructed and represented: single responsibility principle

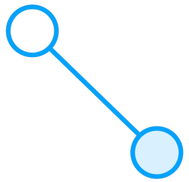


It gives us finer control over the construction process

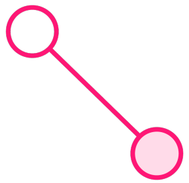


Complexity of your code base increases

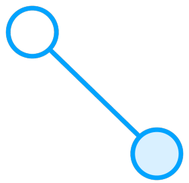
Related Patterns



Abstract factory
Both can be used to construct complex objects, but the builder constructs the complex objects step by step



Singleton
A builder can be implemented as a singleton



Composite
Composites are often built by builders

Summary

Intent of the builder pattern:

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

Use it when you want to make the algorithm for creating a complex object independent of the parts that make up the object and how they're assembled

Summary

Implementation:

- Define an abstract base class or interface as `Builder`
- Have the director work on the `Builder`, not on `ConcreteBuilder` implementations

Up Next:

Creational Pattern: Prototype