CS 635 Advanced Object-Oriented Design & Programming Spring Semester, 2002 Doc 7 Builder

Contents

References

Design Patterns: Elements of Reusable Object-Oriented Software, Gamma, Helm, Johnson, Vlissides, Addison-Wesley, 1995, pp. 97-106

The Design Patterns Smalltalk Companion, Alpert, Brown, Woolf, 1998, pp. 47-62

Builder
Intent

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

Applicability

Use the Builder pattern when

- The algorithm for creating a complex object should be independent of the parts that make up the object and how they're assembled

- The construction process must allow different representations for the object that's constructed

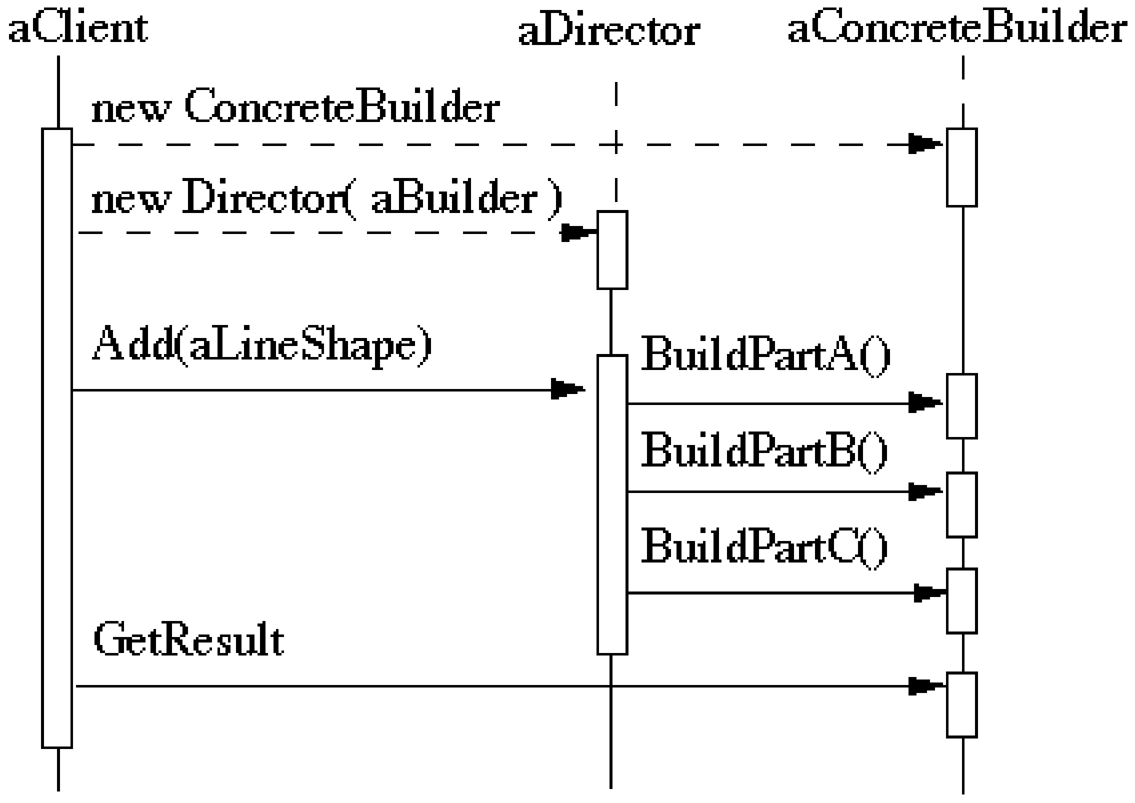
Collaborations

The client creates the Director object and configures it with the desired Builder object

Director notifies the builder whenever a part of the product should be built

Builder handles requests from the director and adds parts to the product

The client retrieves the product from the builder



Example – XML Parser

Director
  XML Parser

Abstract Builder Class
  XML.SAXDriver (Smalltalk)
  org.xml.sax.helpers.DefaultHandler (Java)
  DefaultHandler (C++)

Concrete Builder Class
  Your subclass of the abstract builder

Client
  Your code that uses the tree built

Java Example

```
public static void main(String argv[])
  {
  SAXDriverExample handler = new SAXDriverExample();

  // Use the default (non-validating) parser
  SAXParserFactory factory = SAXParserFactory.newInstance();
  try
    {
    SAXParser saxParser = factory.newSAXParser();
    saxParser.parse( new File("sample"), handler );
    }
  catch (Throwable t)
    {
    t.printStackTrace();
    }
  System.out.println( handler.root());
  }
```

Smalltalk Example

```
| builder exampleDispatcher |

builder := SAXDriverExample new.
exampleDispatcher := SAXDispatcher new contentHandler: builder.
XMLParser
   processDocumentInFilename: 'page'
   beforeScanDo:
      [:parser |
      parser
         saxDriver:(exampleDispatcher);
         validate: true].
builder root.
```

Consequences

- It lets you vary a product's internal representation
- It isolates code for construction and representation
- It gives you finer control over the construction process

Implementation

- Assembly and construction interface

  Builder may have to pass parts back to director, who will then pass them back to builder

- Why no abstract classes for products
- Empty methods as default in Builder