

Builder DP

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Problem

- A class has 5 instance variables. The constructor must initialize all 5 variables.
 - All five are optional. If no value is specified, use a default value.



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Integrity of an object should not be compromised even if the stack unwinds due to an exception.

Always, object should exist in a valid state.

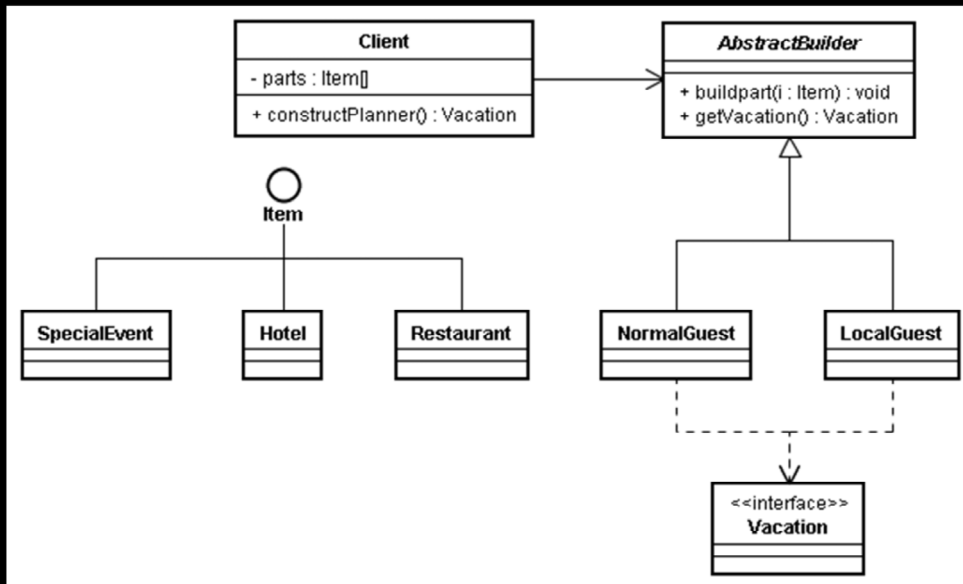
Code present for this example.

Problem

- We have to build a vacation planner for Disney Land.
 - The guest can choose a hotel, various types of admission tickets, make restaurant reservations and even book for special events.
 - Each day can have any combination of hotel reservation, ticket meals and special events.
 - A local guest may not book a hotel but he may book a restaurant.



Solution



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It encapsulates the construction of the complex object and allows it to be constructed in steps.

Hides the internal representation, of the product being built, from the client.

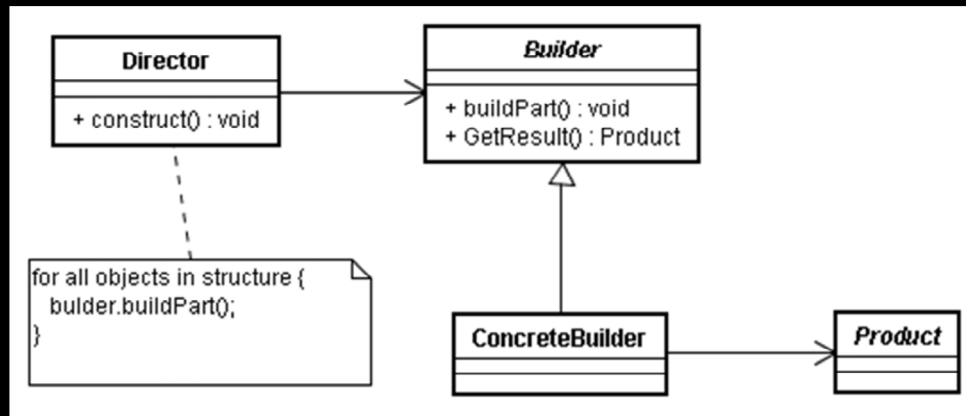
Use the Builder pattern when

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

- The construction process must allow different representations for the object that is constructed.

- Product implementation can be swapped because the client only sees the interface of the product.

Builder DP



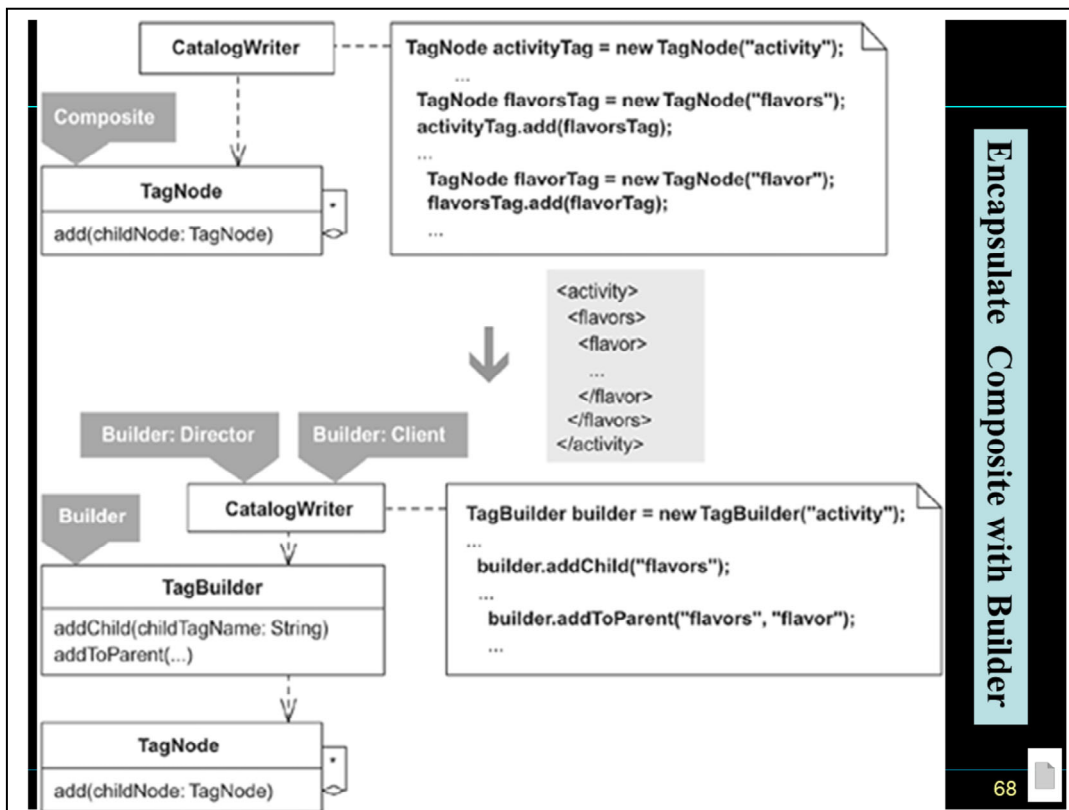
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The Product represents the complex object under construction.
The Director constructs the object using the Builder interface.
ConcreteBuilder constructs and assembles parts of the Product.
It also provides an interface for retrieving the product

Consequences:

It hides the details of how the product is assembled.
It isolates the steps for construction from the representation of the product.
After the product is finished, the director retrieves it from the builder.
A Builder lets us vary the internal representation of the product it builds.
We can create a new product by adding a new concrete-builder.



A Builder performs burdensome or complicated construction steps on behalf of a client. A common motivation for refactoring to a Builder is to simplify client code that creates complex objects. When difficult or tedious parts of creation are implemented by a Builder, a client can direct the Builder's creation work without having to know how that work is accomplished.

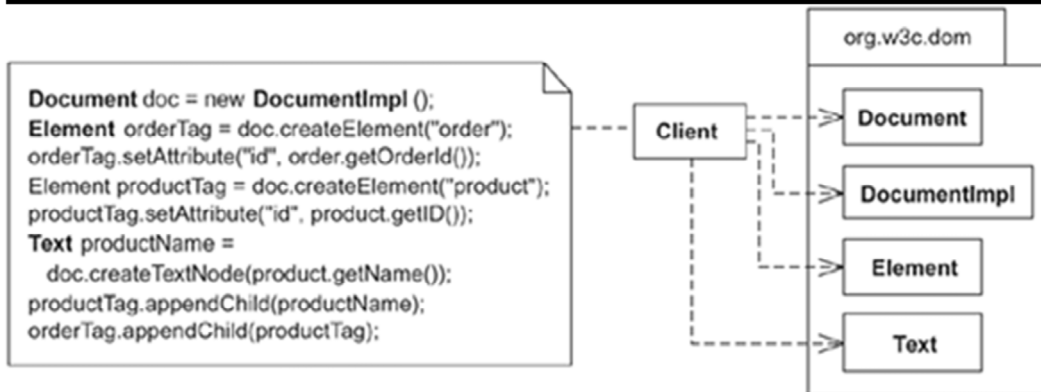
Builders often encapsulate Composites because the construction of Composites can frequently be repetitive, complicated, or error-prone. For example, to add a child node to a parent node, a client must do the following:

- Instantiate a new node

- Initialize the new node

- Correctly add the new node to the right parent node

Identify the problem



Decoupling

```
DOMBuilder orderBuilder = new DOMBuilder("order");  
orderBuilder.addAttribute("id", order.getOrderID());  
orderBuilder.addChild("product");  
orderBuilder.addAttribute("id", product.getID());  
orderBuilder.addValue(product.getName());
```

Client

DOMBuilder

```
addAttribute(name: String, value: String)  
addChild(childName: String)  
addValue(value: String)
```

org.w3c.dom

Document

DocumentImpl

Element

Text

Builder decouples client from Composite code

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- +Simplifies a client's code for constructing a Composite.
- +Reduces the repetitive and error-prone nature of Composite creation.
- +Creates a loose coupling between client and Composite.
- +Allows for different representations of the encapsulated Composite or complex object.
- May not have the most intention-revealing interface.

Real World Builder

Customer
(Client)

Cashier
(Director)

Restaurant Crew
(Builder)

Order Kid's Meal

Build



Build



Build



Build



Get Meal

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Compare

- Builder with Abstract Factory
- Builder with Factory

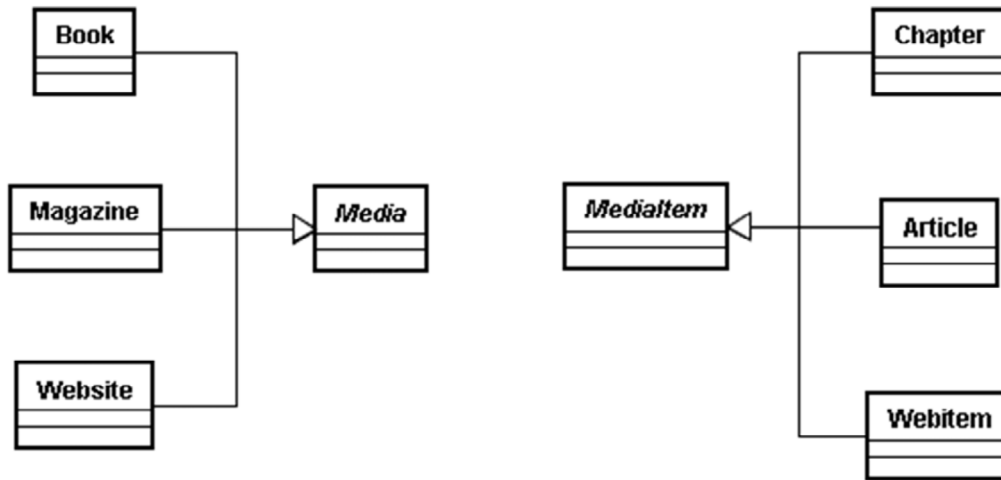
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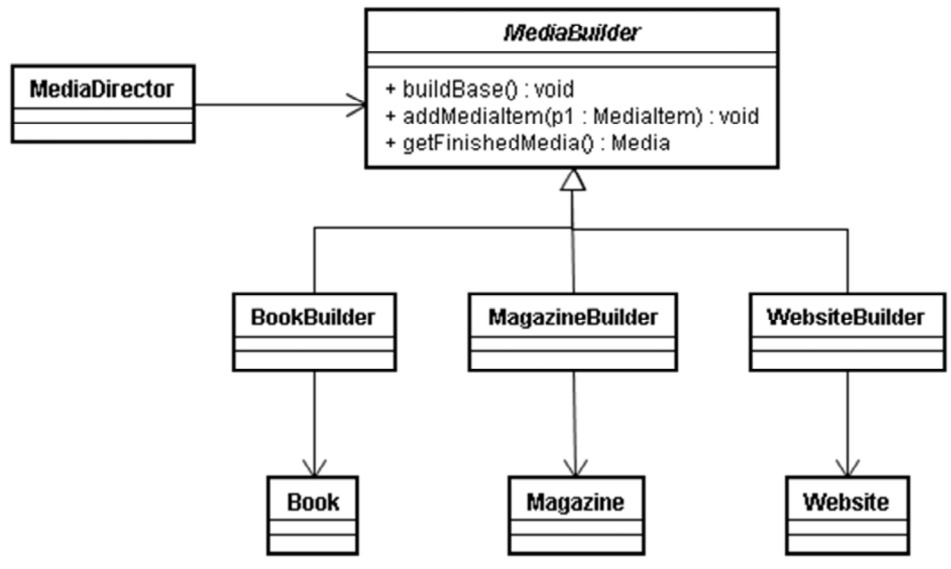
Abstract Factory DP emphasizes on product families, while Builder DP constructs a complex object step by step.

Builder returns the completed product at the end of construction, while Factory DP returns it immediately

Example of Builder



Example of a Builder



Assignment

- A Word document needs to be converted to pdf, rtf and text.



Solution

