Loosening Coupling

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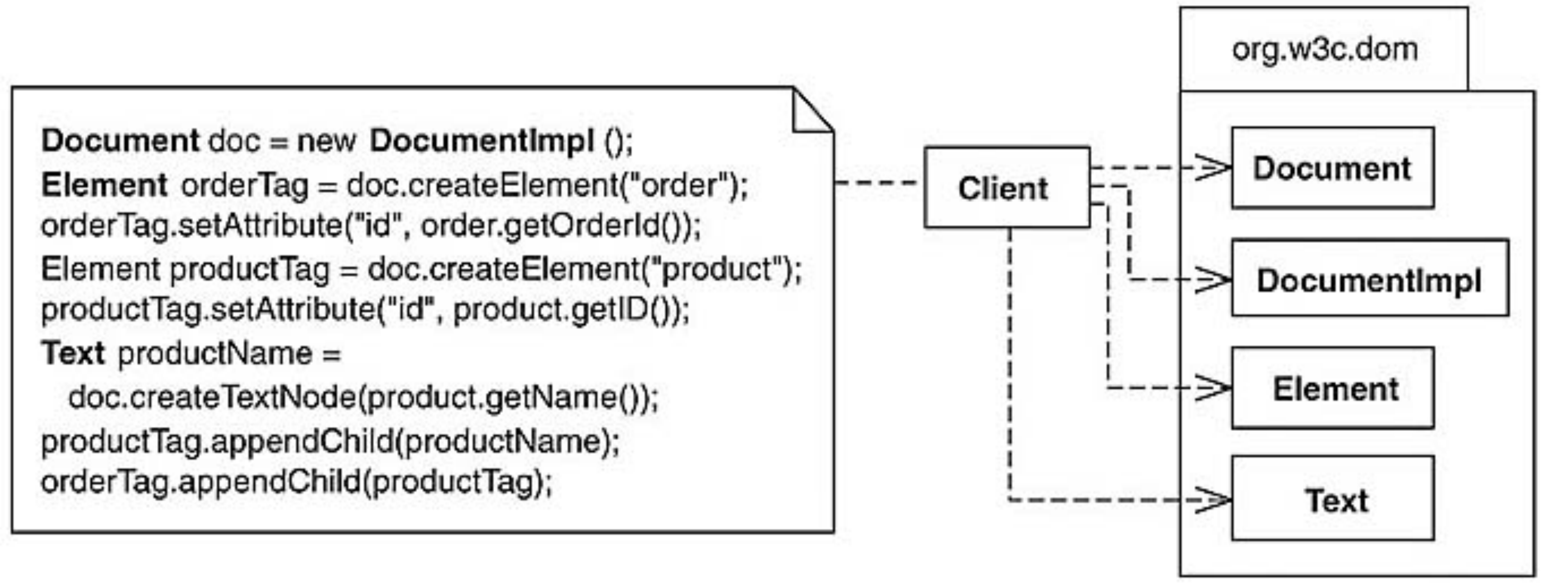
Composite construction

Building a Composite is repetitive, complicated, or error-prone

- You can forget to add a new node to a parent
- You can add a new node to the wrong parent
- Same batch of steps over and over again
- Client code coupled to Composite



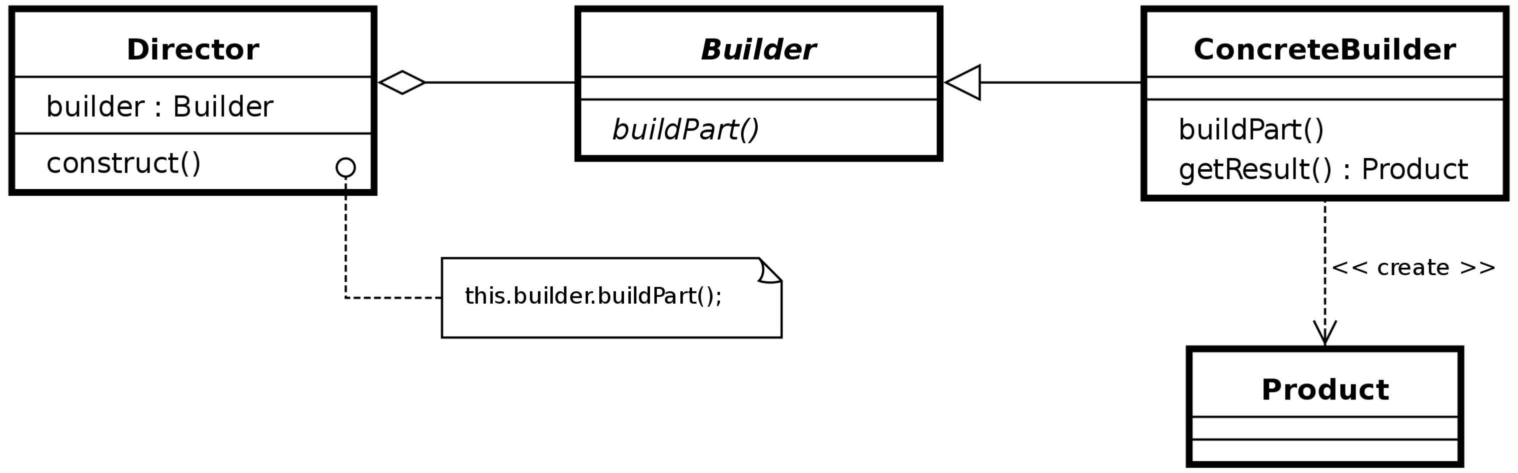
```
Document doc = new DocumentImpl ();
Element orderTag = doc.createElement("order");
orderTag.setAttribute("id", order.getOrderId());
Element productTag = doc.createElement("product");
productTag.setAttribute("id", product.getID());
Text productName =
  doc.createTextNode(product.getName());
productTag.appendChild(productName);
orderTag.appendChild(productTag);
```

Builder

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

Motivation

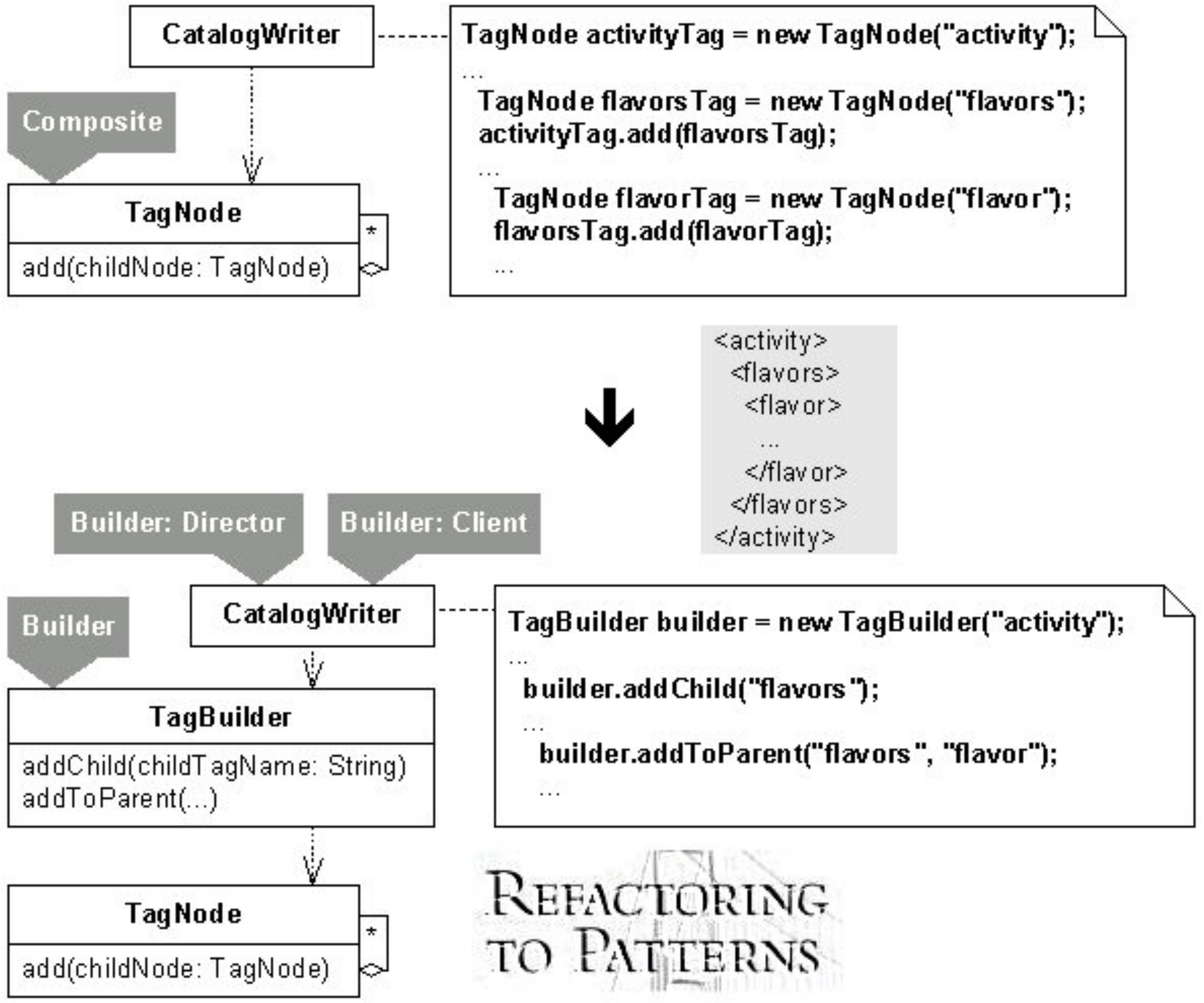
- A reader for the RTF format needs to convert RTF to many text formats
- Objects that requires laborious, step-by-step initialization of many fields and nested objects



Applicability

- Construction process must allow different representations for the constructed object
- Objects with “telescoping constructors”

Encapsulate Composite with Builder



```
TagNode activityTag = new TagNode("activity");
...
  TagNode flavorsTag = new TagNode("flavors");
  activityTag.add(flavorsTag);
  ...
    TagNode flavorTag = new TagNode("flavor");
    flavorsTag.add(flavorTag);
    ...
```

```
TagBuilder builder = new TagBuilder("activity");
...
  builder.addChild("flavors");
  ...
    builder.addToParent("flavors", "flavor");
    ...
```

https://www.industriallogic.com/xp/refactoring/compositeWithBulder.html
https://www.informit.com/articles/article.aspx?p=1398606&seqNum=5

Encapsulate Composite with Builder

Benefits	Liabilities
Simplifies a client's code for constructing a Composite.	May not have the most intention-revealing interface.
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.	

Encapsulate Composite with Builder – Mechanics

1. Create a **builder**, make it possible for it to produce a one-node Composite.
✓ Compile and test

2. Make the builder capable of building children.
✓ Compile and test

3. Make the builder capable of settings attributes and values (if any).
✓ Compile and test

4. Reflect on how simple your builder is for clients to use, and then make it simpler.
✓ Compile and test

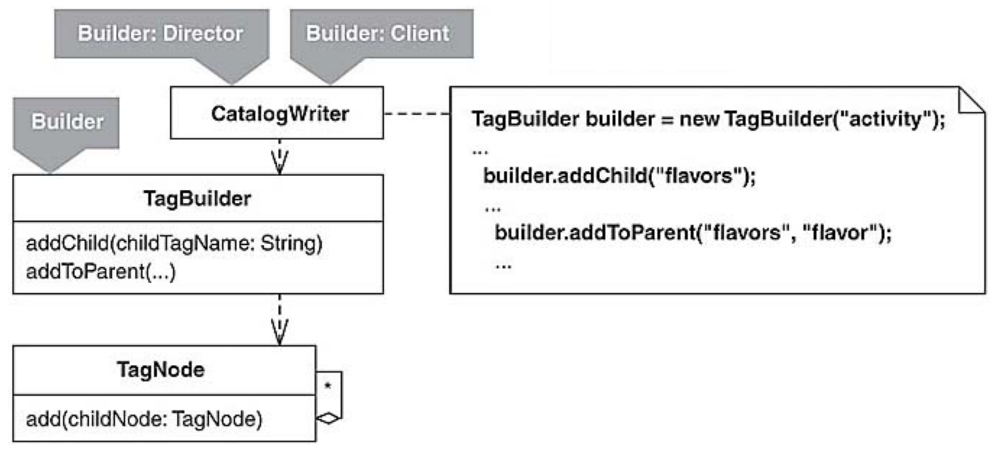
5. Refactor your Composite-construction code to use the new builder.
✓ Compile and test

Encapsulate Composite with Builder – Example

Let’s apply this refactoring to the Composite `TagNode` in the *composite* branch of the following repository.

https://github.com/dario-campagna/encapsulate-composite-with-builder

- Example from Refactoring to Patterns
- Continuation of “Replace Implicit Tree with Composite”



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