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Design Patterns Uncovered: The Memento Pattern

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Today's pattern is the Memento pattern which is used in undo frameworks to bring an object back to a previous state.

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to a previous state.

Memento in the Real World

In the real world, memento's are used a reminder or reference of how something should look. For example, if you decide to take a phone apart in order to replace an internal part, you may have an identical phone available that you use as a reference, ensuring you can take get the phone back to it's original state.

DesignPatterns Refcard
For a great overview of the most popular design patterns, DZone's Design Patterns Refcard is the best place to start.

The Memento Pattern

The Memento pattern is known as a**behavioural** pattern, asit's used to manage algorithms, relationships and responsibilities between objects.. Thedefinition of Memento as provided in the original Gang of Four book on DesignPatterns states:

> *Captures and externalizes an object's internal state so that it can be restored later, all without violating encapsulation.*

The following diagram shows how the memento pattern is modelled.

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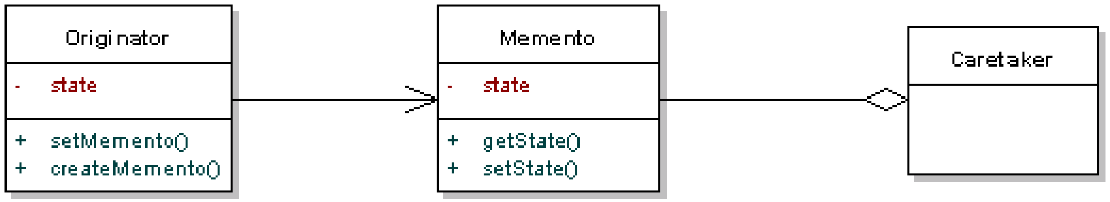

Let's take a look at each of the participants in this pattern. The **Originator** is the object that knows how to save itself: the class that you want to make stateful. The **Caretaker** is that object that deals with when, and why, the Originator needs to save or restore itself. The **Memento** holds the information about the Originator's state, and cannot be modified by the Caretaker.

The flow of events is that the Caretaker asks the Originator for the Memento object and performs any actions that it needs to. To rollback the state before these actions, it returns the memento object to the originator.

When Would I Use This Pattern?

The Memento pattern is useful when you need to provide an undo mechanism in your applications, when the internal state of an object may need to be restored at a later stage. Using serialization along with this pattern, it's easy to preserve the object state and bring it back later on.

SoHow Does It Work In Java?

Let's use a simple example in Java toillustrate this pattern.As it's a pattern used for undo frameworks, we'll model a editor.

First, the memento needs to be able to save editor contents, which will just be plain text:

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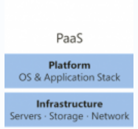

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```
//Memento
public class EditorMemento
{

  private final String editorState;

  public EditorMemento(String state)
  {
     editorState = state;
  }

  public String getSavedState()
  {
   return editorState;
  }

}
```

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Now our Originator class, the editor, can use the memento:

```
//Originator

public class Editor
{

  //state
  public String editorContents;

  public void setState(String contents)
  {
     this.editorContents = contents;
  }

  public EditorMemento save()
  {
    return new EditorMemento(editorContents);
  }

  public void restoreToState(EditorMemento memento)
  {
   editorContents = memento.getSavedState();
  }

}
```

Anytime we want to save the state, we call the save() method, and an undo would call the restoreToState method.

Our caretaker can then keep track of all the memento's in a stack for the undo framework to work.

WatchOut for the Downsides

Some problems with this pattern is that the saving or restoring of state can be a time consuming process. Used incorrectly, it can expose the internal structure of your object, thus allowing any other object to change the state of your object.

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Next Up

As we start to near the end of the series, we'll look at the Mediator pattern next.

Tags: Java Patterns

Comments

Chris Sherlock replied on Sun, 2011/10/23 - 3:59am

Good article, only I tend to agree with the Wikipedia article that a nested class with a private constructor might be better for the Memento pattern.

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Murtaza Khurshe... replied on Thu, 2012/12/20 - 4:00am

```
public void setState(String contents)

{
this.editorContents = contents;

}
```

where are you calling this method ?

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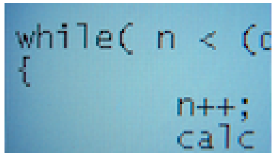

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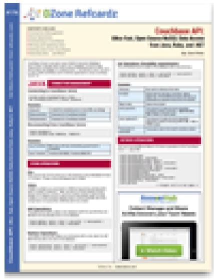

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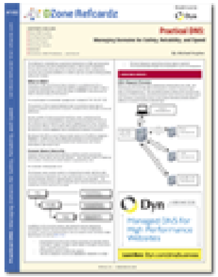

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