Behavioral Pattern: Memento

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Coming Up

Describing the memento pattern

- Storing a command's state to support undo actions

Structure of the memento pattern

Coming Up

Use cases for this pattern

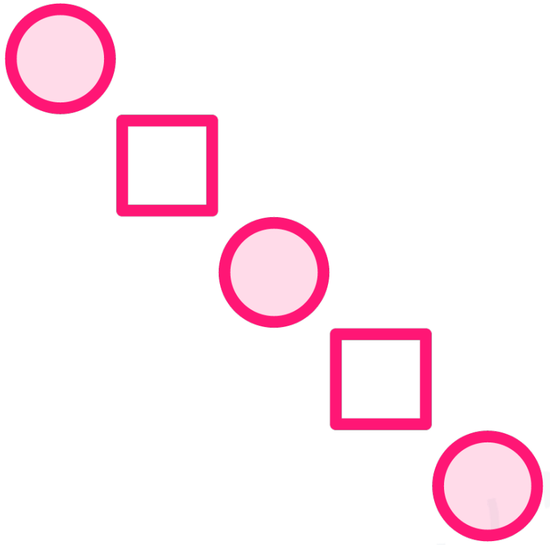
Pattern consequences

Related patterns

Describing the Memento Pattern

Creational

Structural



Behavioral

Memento

The intent of this pattern is to capture and externalize an object's internal state so that the object can be restored to this state later, without violating encapsulation.

Describing the Memento Pattern

Supporting undo when working with commands

- Consider the command as a class that has internal state that needs to be stored

```
public class AddEmployeeToManagerList : ICommand
{
     private readonly IEmployeeManagerRepository _employeeManagerRepository;
     private readonly int _managerId;
     private readonly Employee? _employee;

// implementation ... }
```

Describing the Memento Pattern

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// implementation ... }
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Describing the Memento Pattern

```
public class CommandManager
{
    private readonly Stack<ICommand> _commands = new Stack<ICommand>();

    public void Invoke(ICommand command)
    { // implementation
    }

    public void Undo()
    { // implementation
    }
}
```

Describing the Memento Pattern

```
public class CommandManager
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    private readonly Stack<ICommand> _commands = new Stack<ICommand>();

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Describing the Memento Pattern

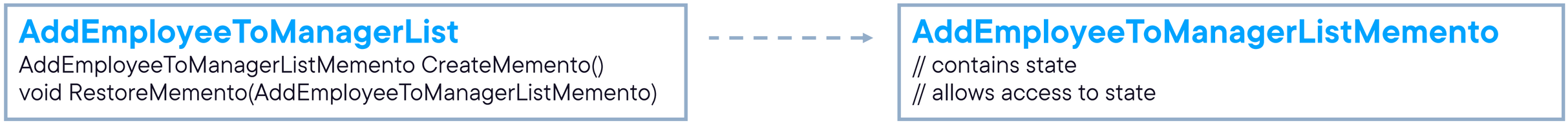
Making internal state public breaks encapsulation

Describing the Memento Pattern

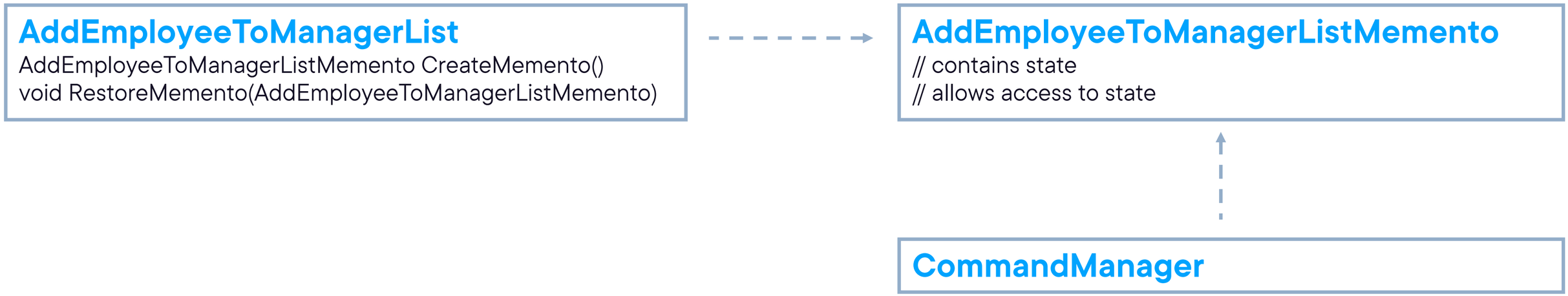
AddEmployeeToManagerListMemento

// contains state
// allows access to state

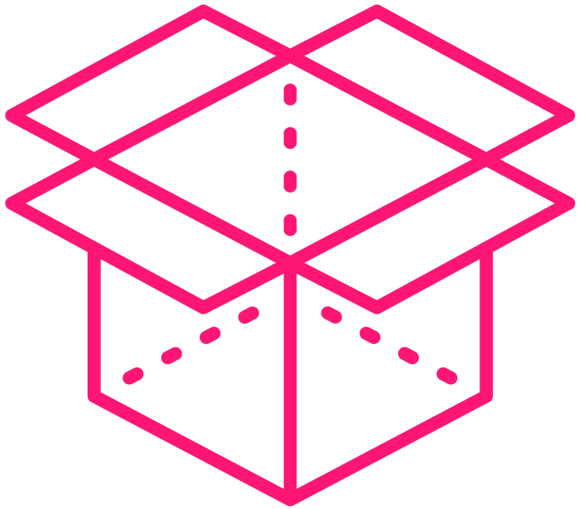
Describing the Memento Pattern



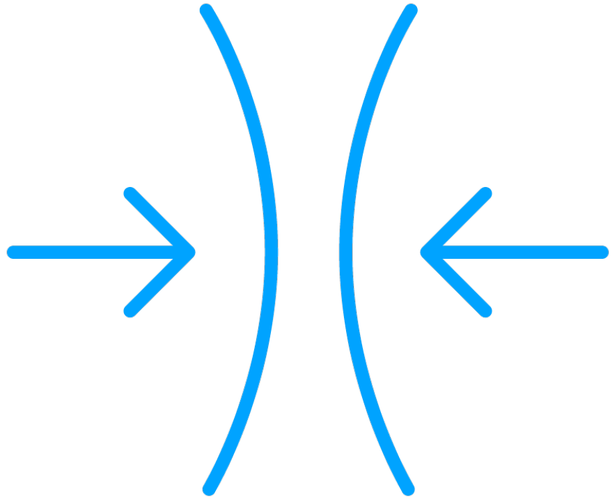
Describing the Memento Pattern



Provide 2 Interfaces to the Memento

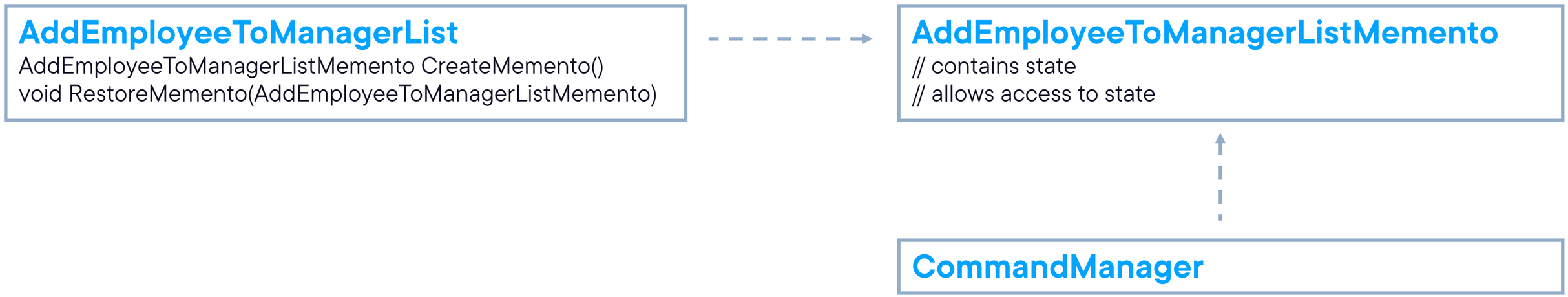


Wide interface, used by the command to create the memento

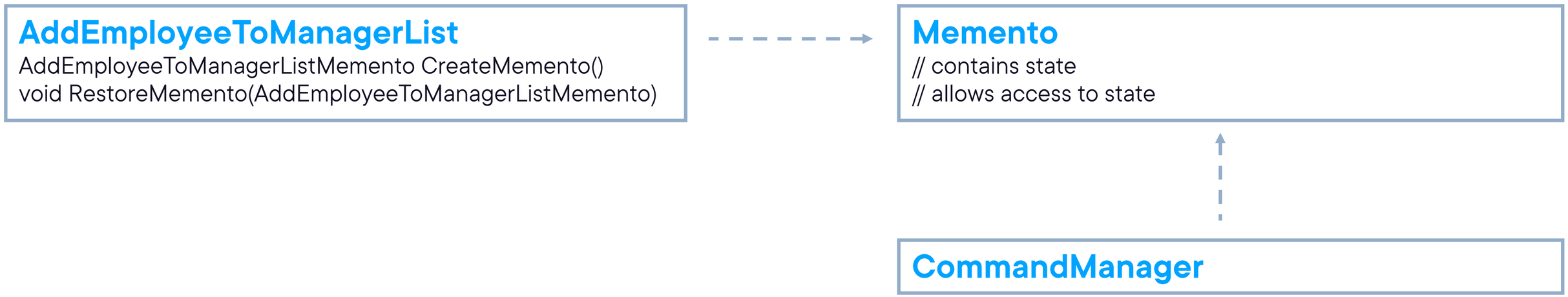


Narrow interface, used by the command manager

Structure of the Memento Pattern

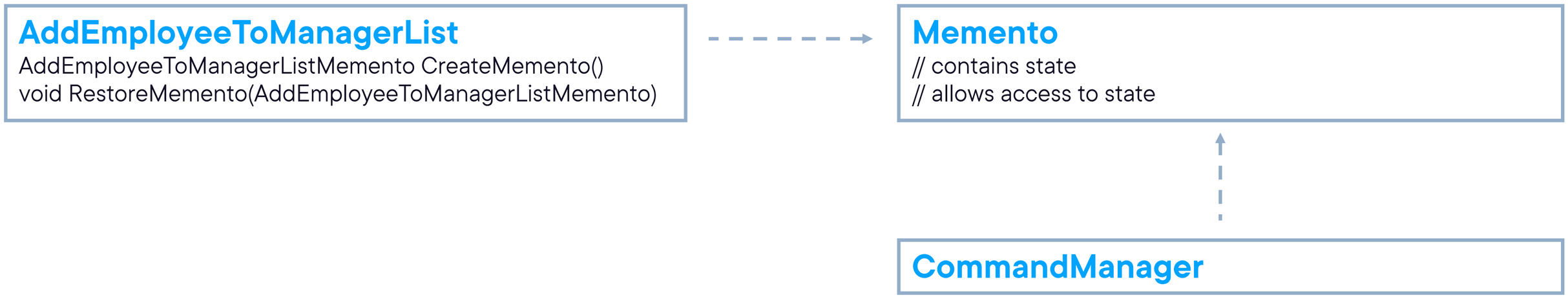


Structure of the Memento Pattern



Memento **stores the internal state of the originator. The state should be protected against access by other objects as much as possible.**

Structure of the Memento Pattern



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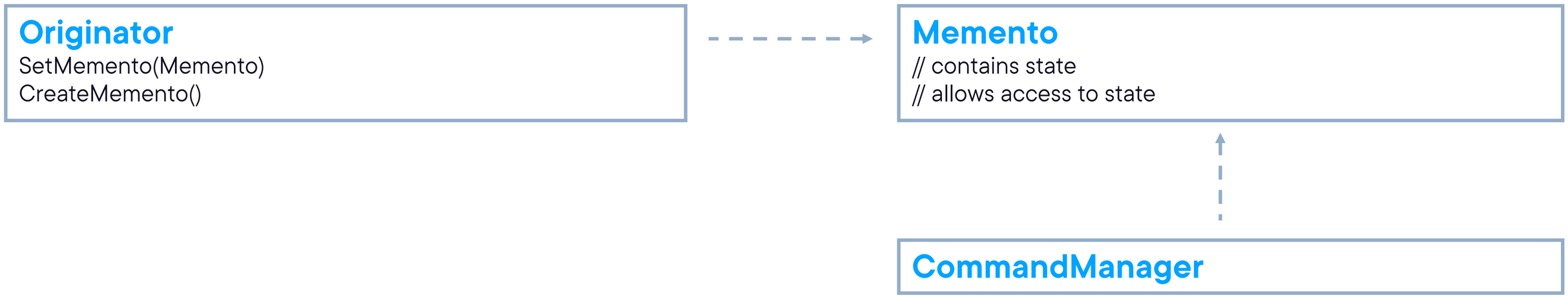
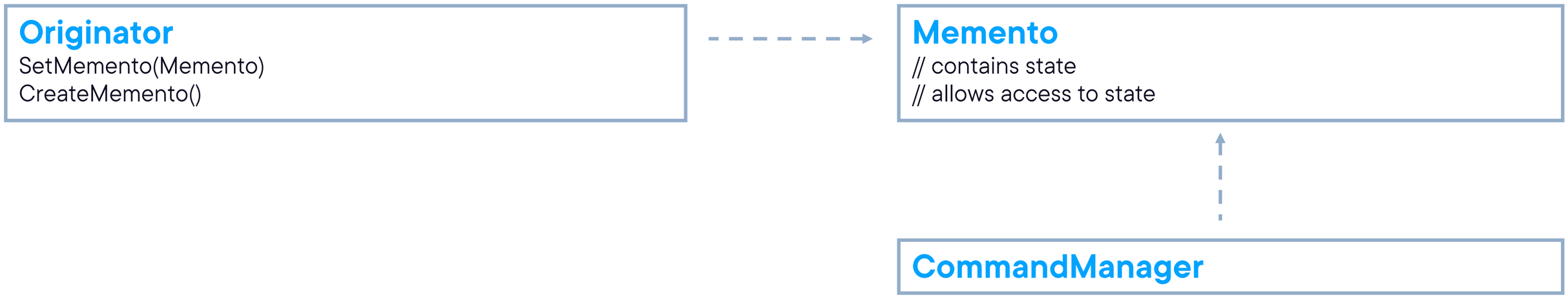


`Originator` **creates a** `Memento` **with a snapshot of its internal state. It also uses the** `Memento` **to restore its internal state.**

`Caretaker` **keeps the** `Memento` **safe, and shouldn't operate on or examine its contents.**

Structure of the Memento Pattern



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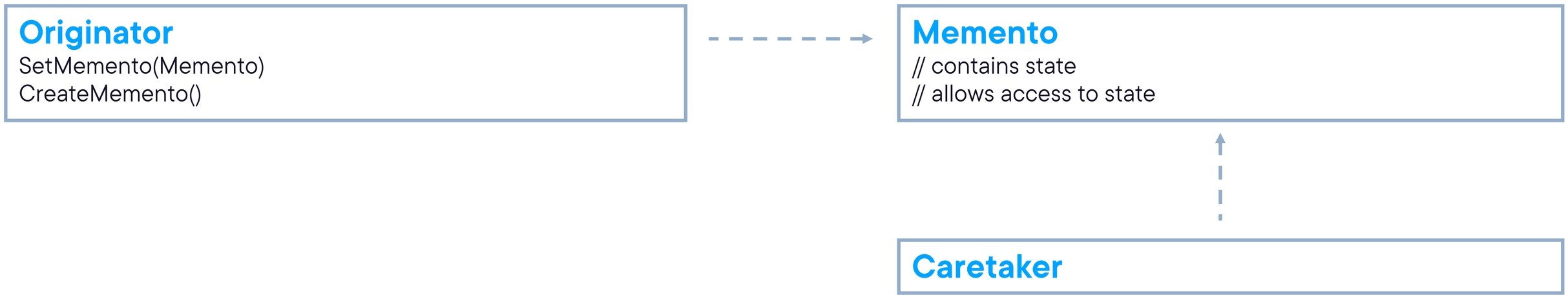


Demo

Implementing the memento pattern

Use Cases for the Memento Pattern

When part of an object's state must be saved so it can be restored later on

AND when a direct interface to obtaining the state would expose implementation details and break encapsulation

Use Cases for the Memento Pattern

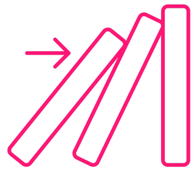
Text editors with undo/redo functionality

Version control systems

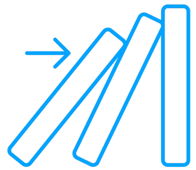
E-commerce shopping carts

Content management systems

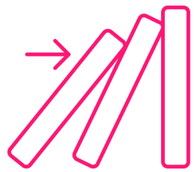
Pattern Consequences



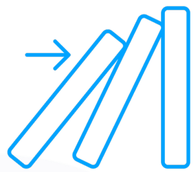
It preserves encapsulation boundaries



It simplifies the originator

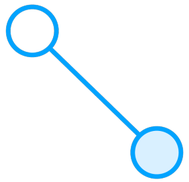


Using mementos might be expensive

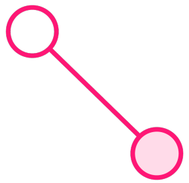


It can introduce complexity to your code base

Related Patterns



Command
Can use a memento to store and restore its state



Iterator
Memento can be used to capture the current iteration state and potentially roll it back

Summary

Intent of the memento pattern:

- To capture and externalize an object's internal state so that the object can be restored to this state later, without violating encapsulation

Summary

Implementation:

- Make the distinction between a narrow and a wider interface to the memento

Up Next:

Behavioral Pattern: Mediator