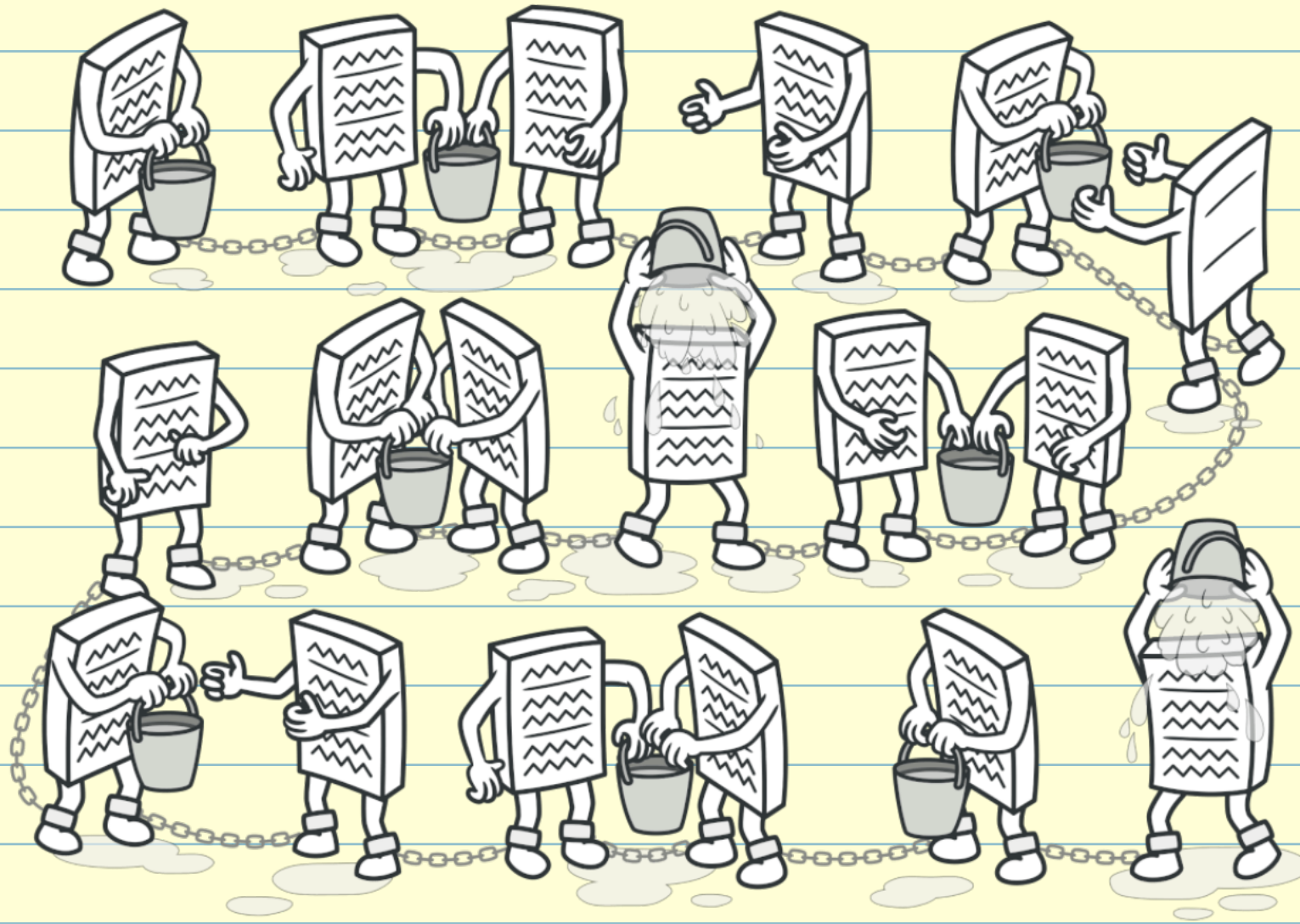
Behavioral Design Patterns

- Command
- Chain of Responsibility
- Interpreter
- Iterator
- Mediator
- Memento
- Observer
- State
- Strategy
- Template method

Chain of Responsibility



- lets you pass requests along a chain of handlers. Upon recieving a request, each handler deside either to process the request or to pass it to the next hardler in the chain.

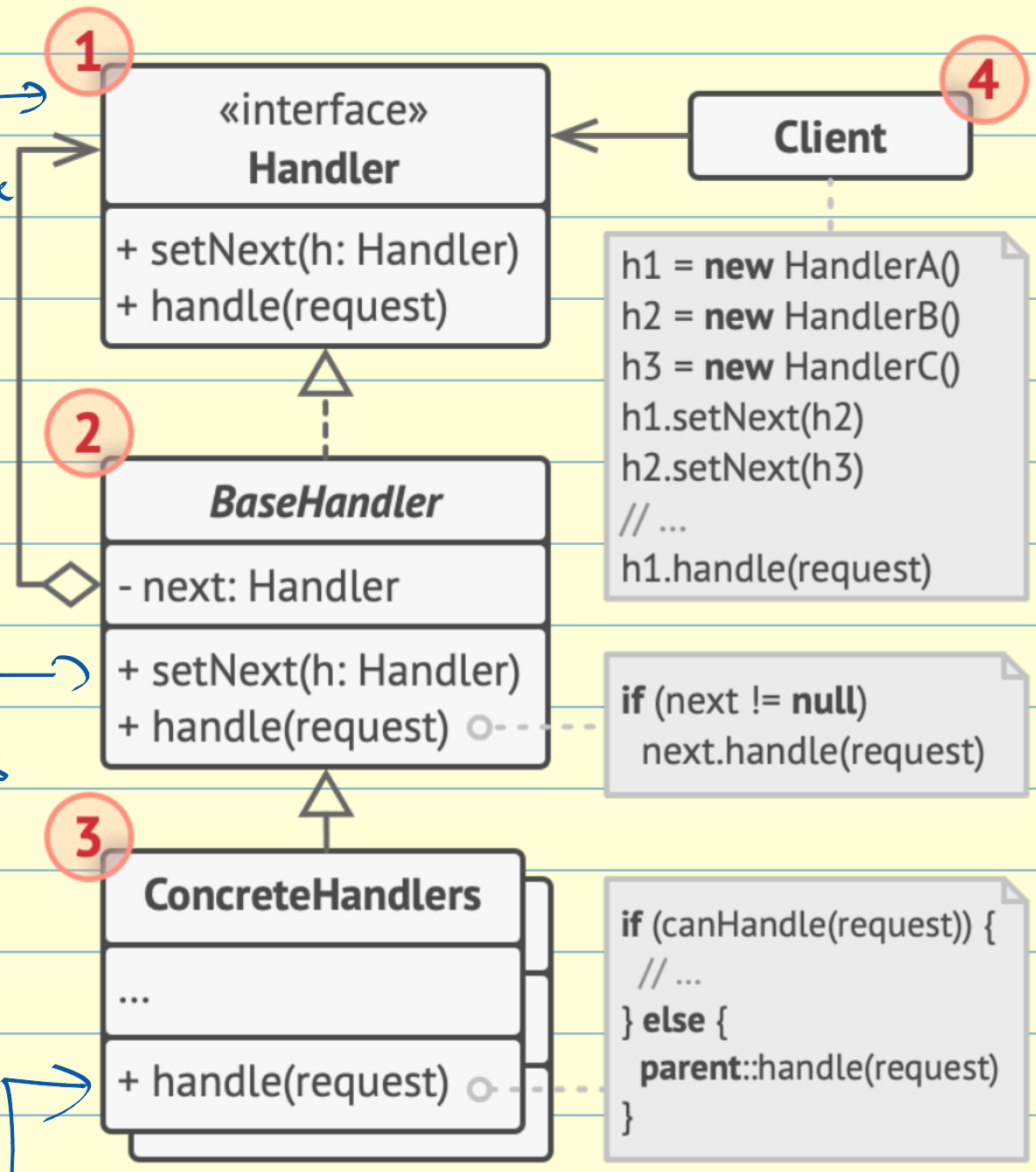
- This pattern encourages loose coupling between sender and recieven, providing freedom in handling the request.

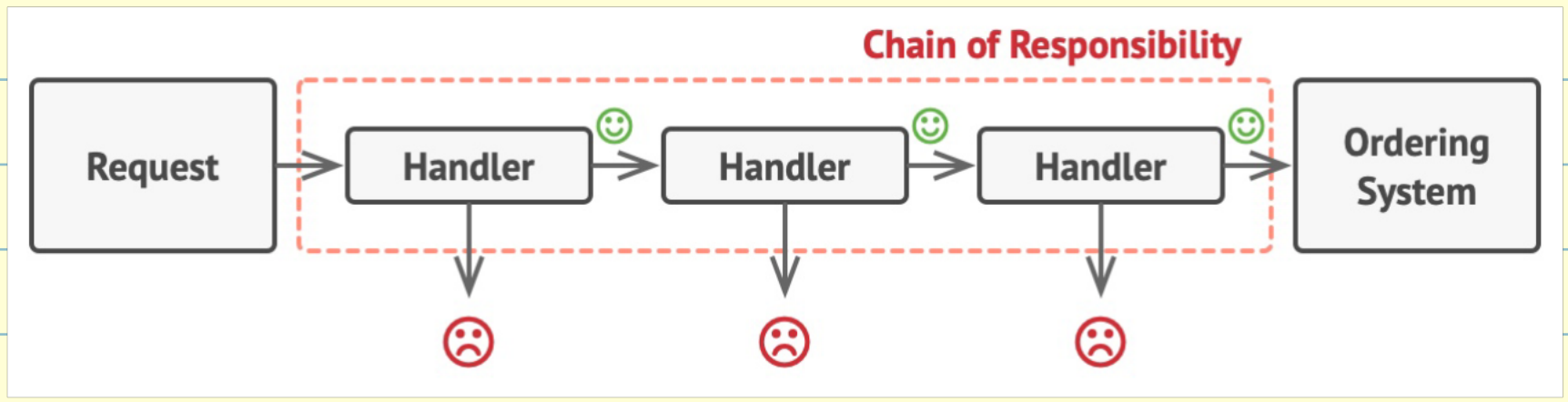
- requests are passed sequentially along the chain, ensuring that each request handled in a predefined order.

common interface for all concrete handlers.

optional class, usually this class defines to store reference to the next handler.

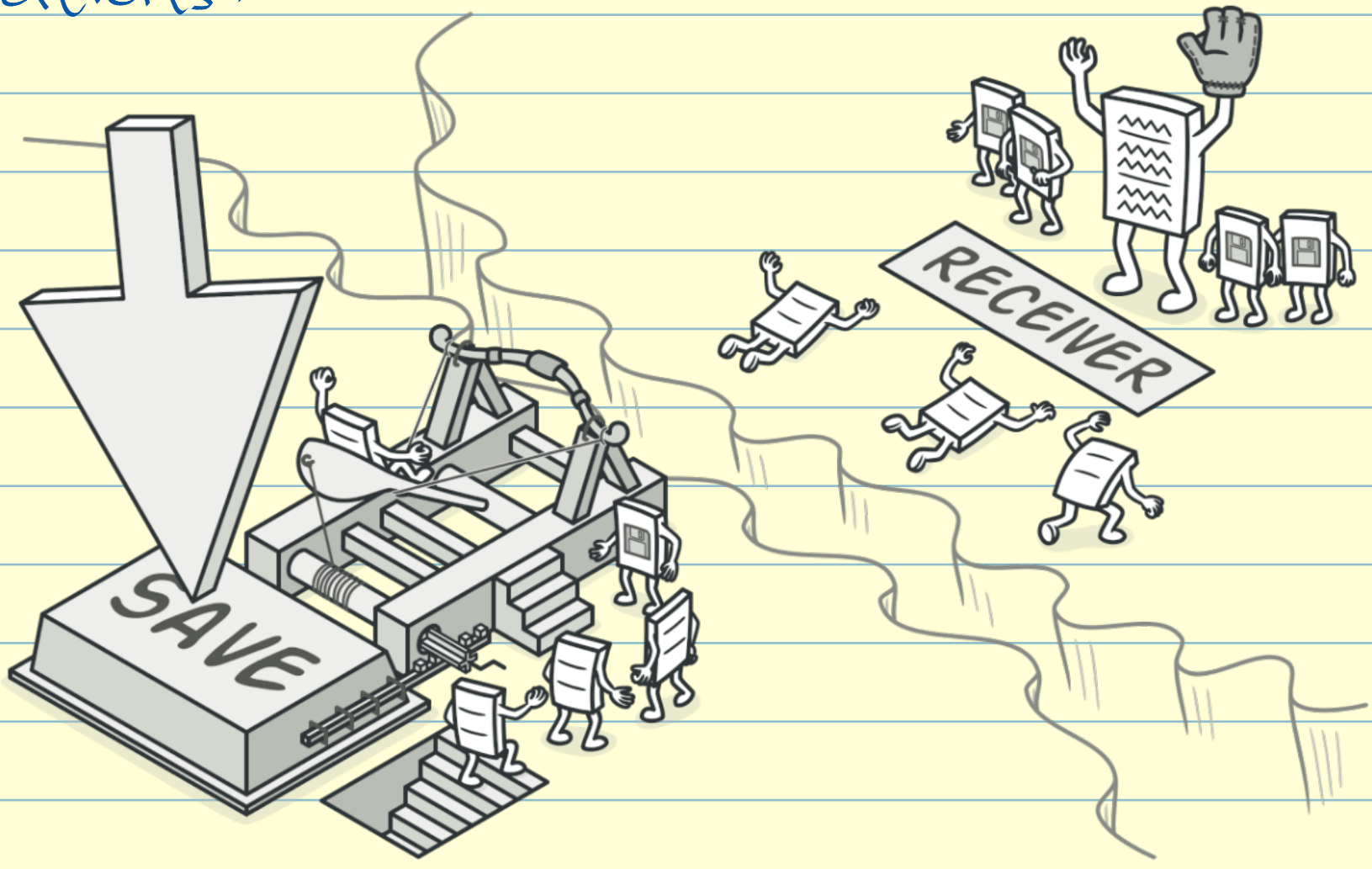
contain actual code for processing requests.





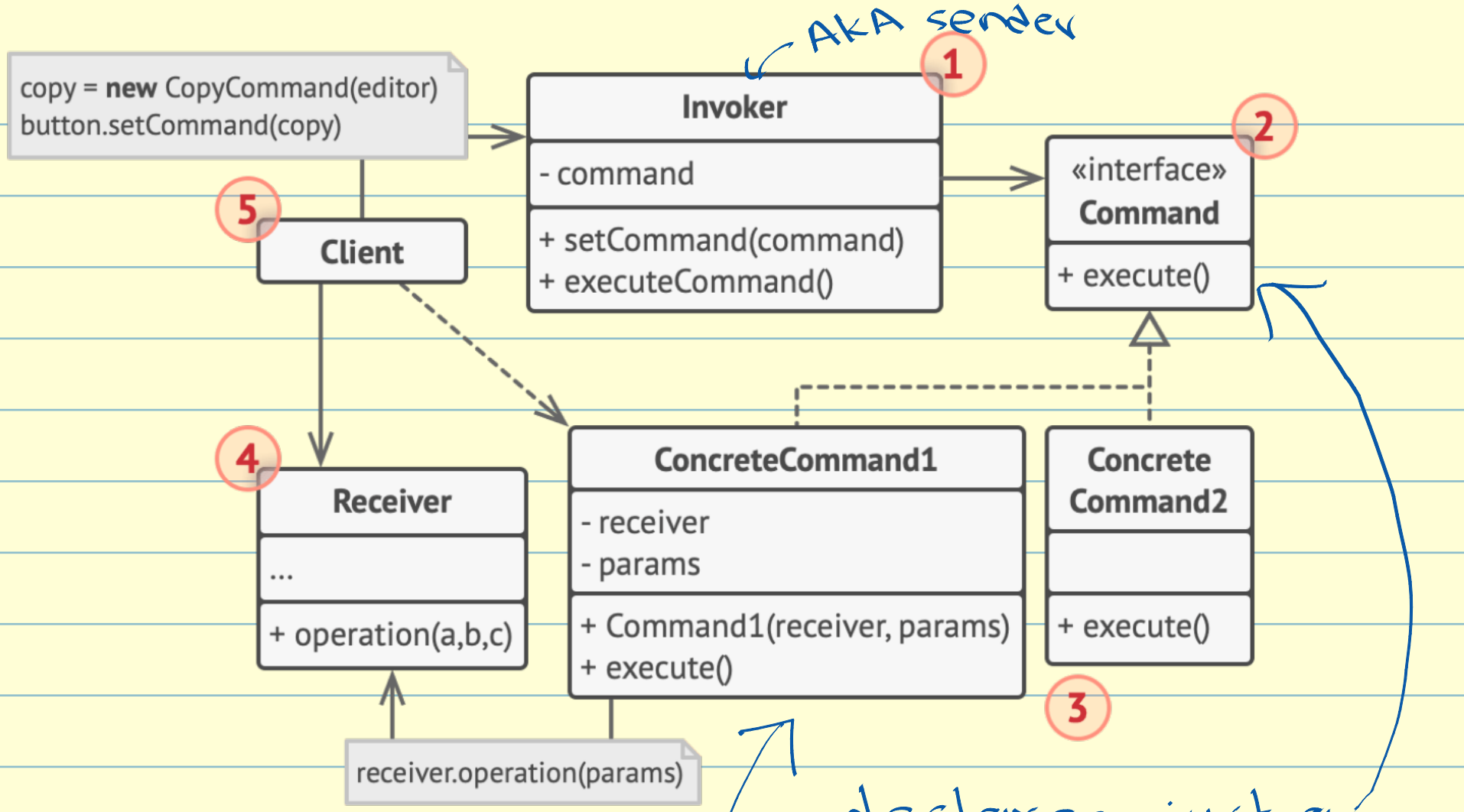
Command

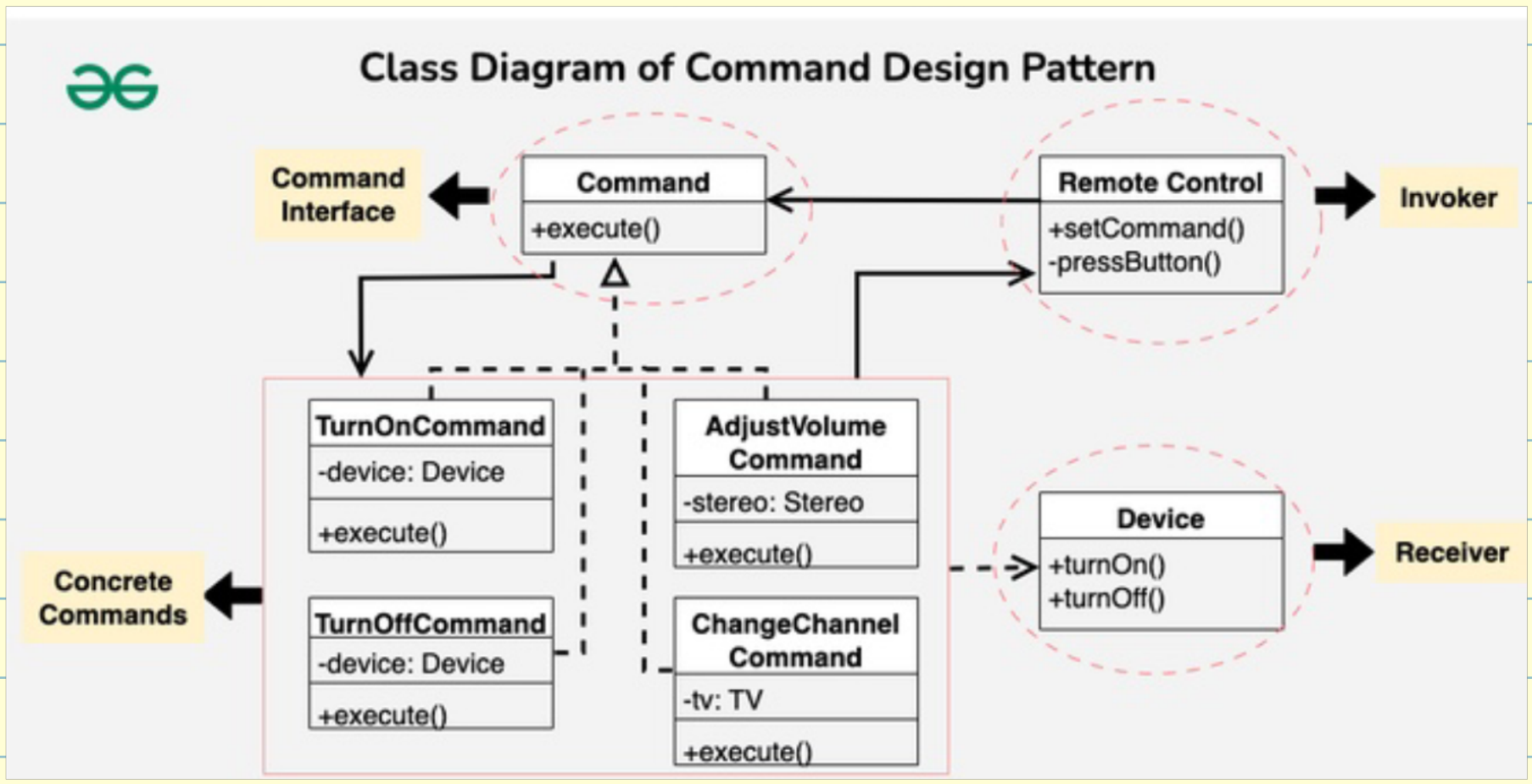
- turns a request into a stand-alone object that contains all information about the request. This transformation lets you pass requests as a method arguments, delay or queue a request's execution, and support undoable operations.



When to use the command design patter ?

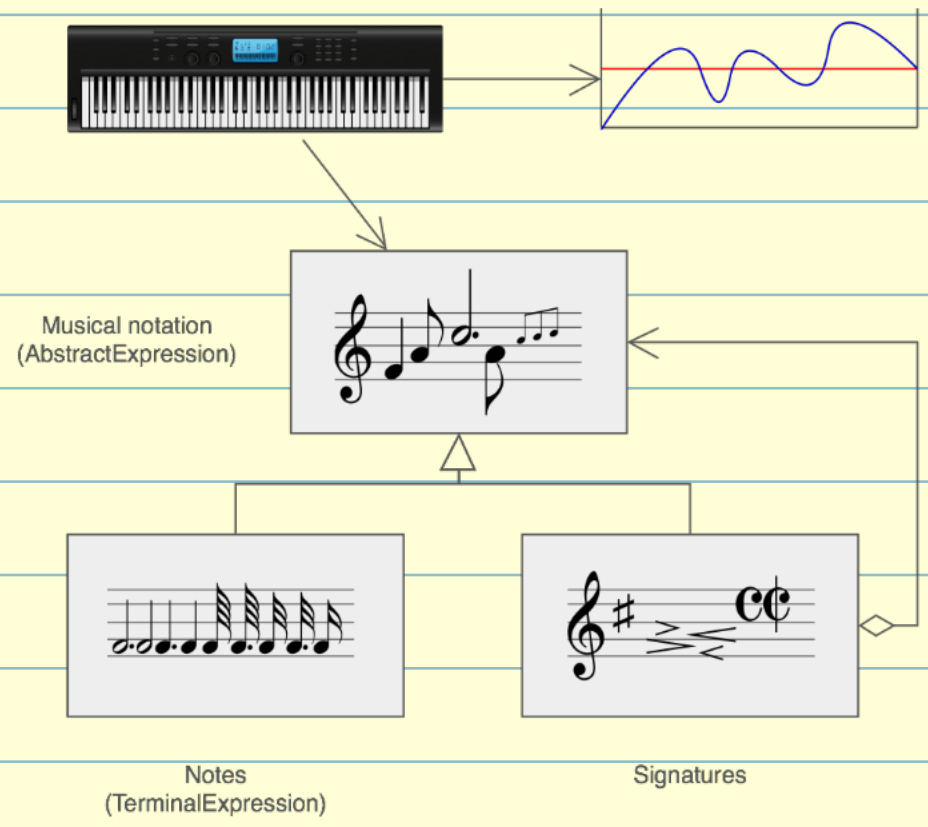
- When you need decouple sender of a request from the object that performs the request.
- When Redo / Undo functionality is required
- Support for queue and logging.

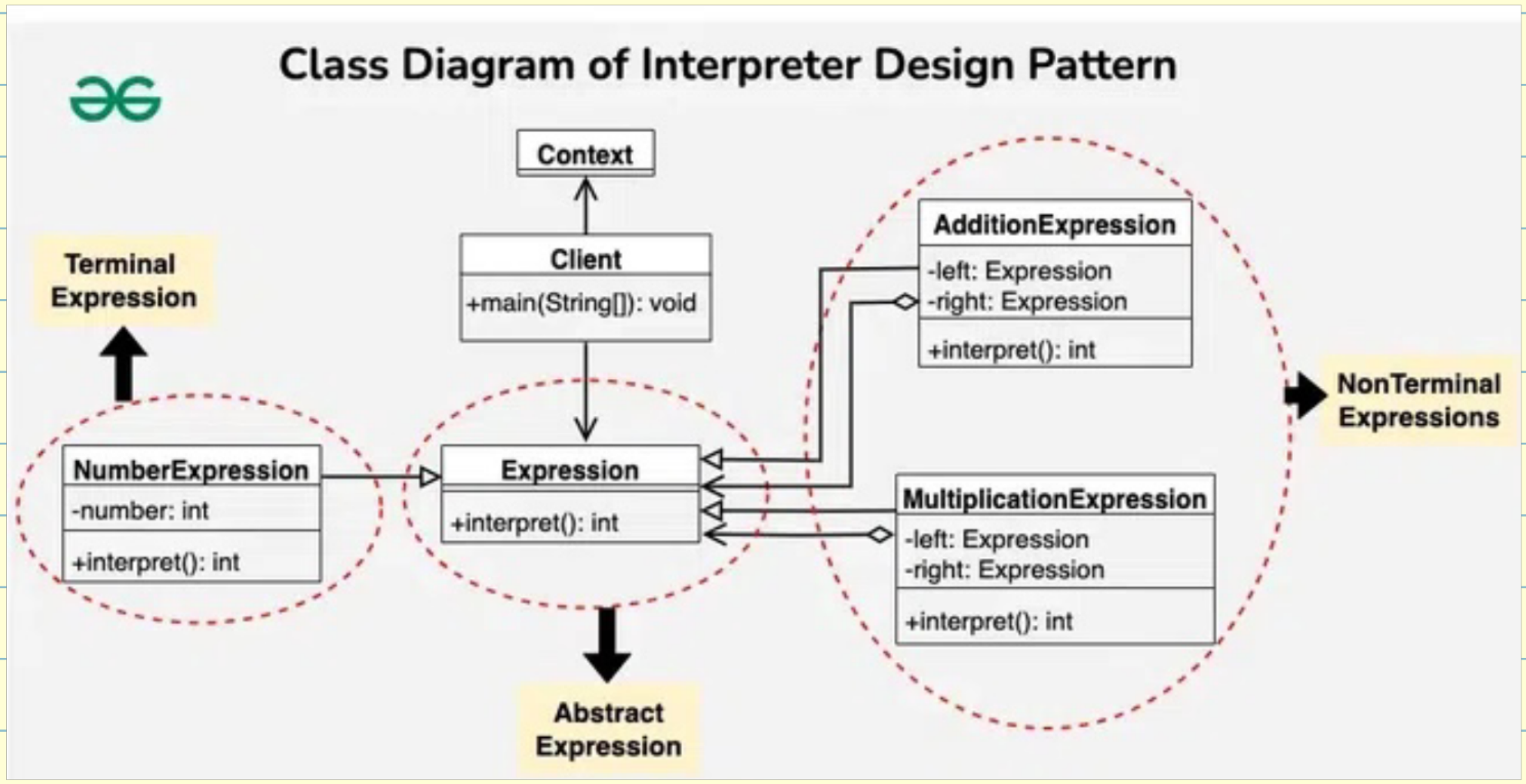

AKA sender
copy = new CopyCommand(editor)
button.setCommand(copy)
1
Invoker
- command
+ setCommand(command)
+ executeCommand()
2
«interface»
Command
+ execute()
5
Client
4
Receiver
...
+ operation(a,b,c)
ConcreteCommand1
- receiver
- params
+ Command1(receiver, params)
+ execute()
Concrete
Command2
+ execute()
3
receiver.operation(params)
declares just a single method for excuting the command.
implement various requests.


Class Diagram of Command Design Pattern
Command Interface
Command
+execute()
Remote Control
+setCommand()
-pressButton()
Invoker
TurnOnCommand
-device: Device
+execute()
AdjustVolume Command
-stereo: Stereo
+execute()
Concrete Commands
TurnOffCommand
-device: Device
+execute()
ChangeChannel Command
-tv: TV
+execute()
Device
+turnOn()
+turnOff()
Receiver

Interpretor

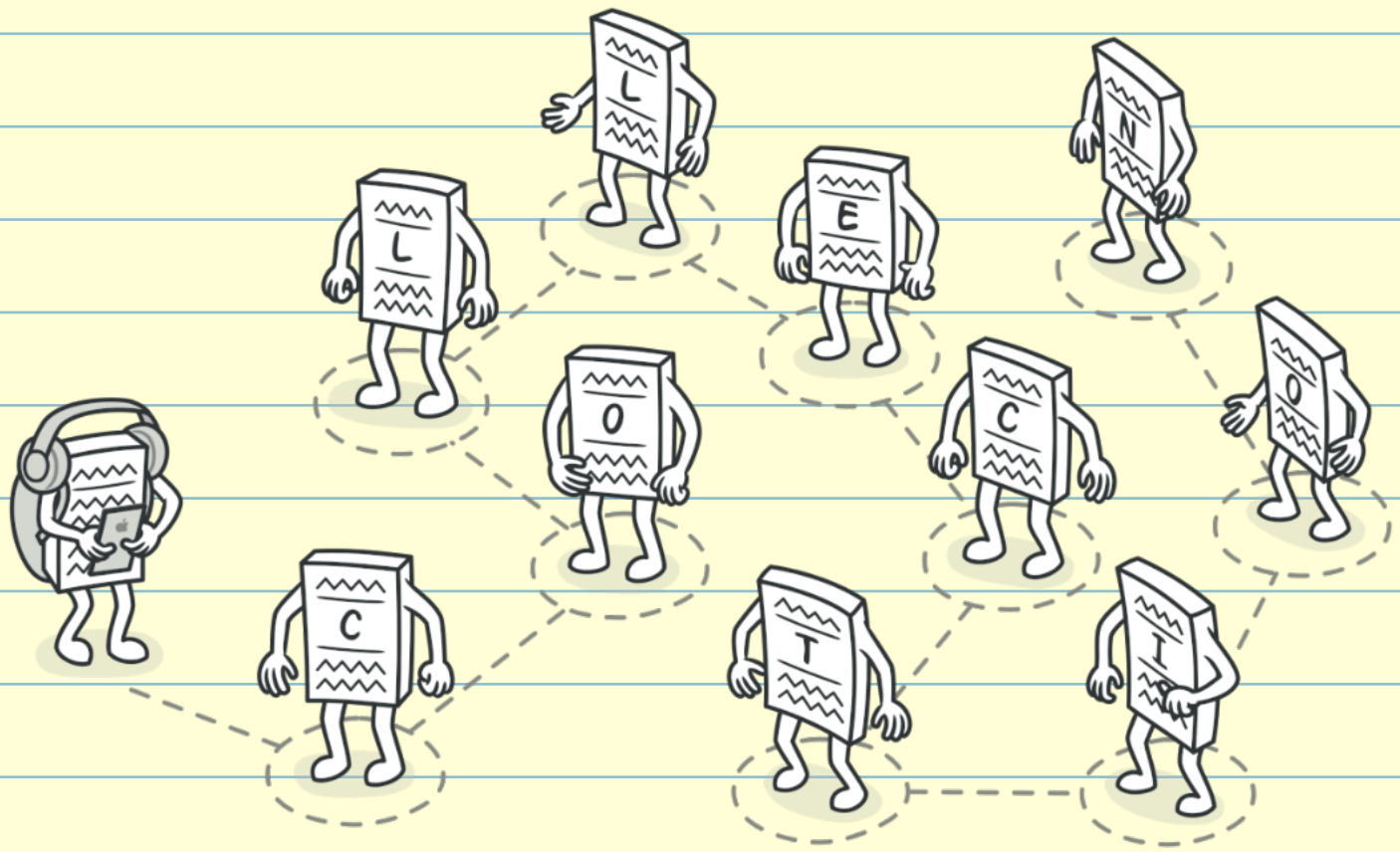
- defines a representation for its grammer along with an interpreter that uses the representation to interpret sentences in a language.

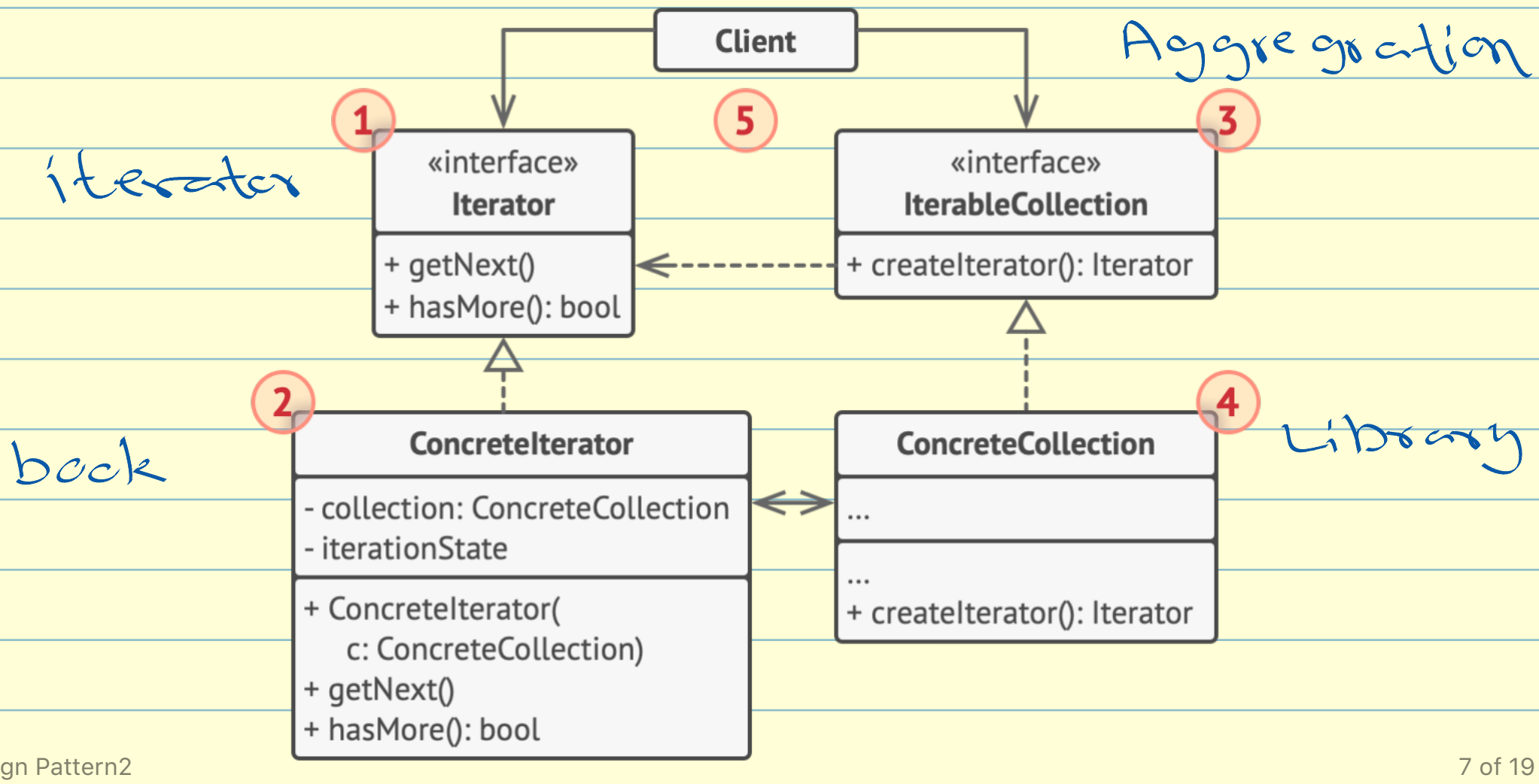




Iterator

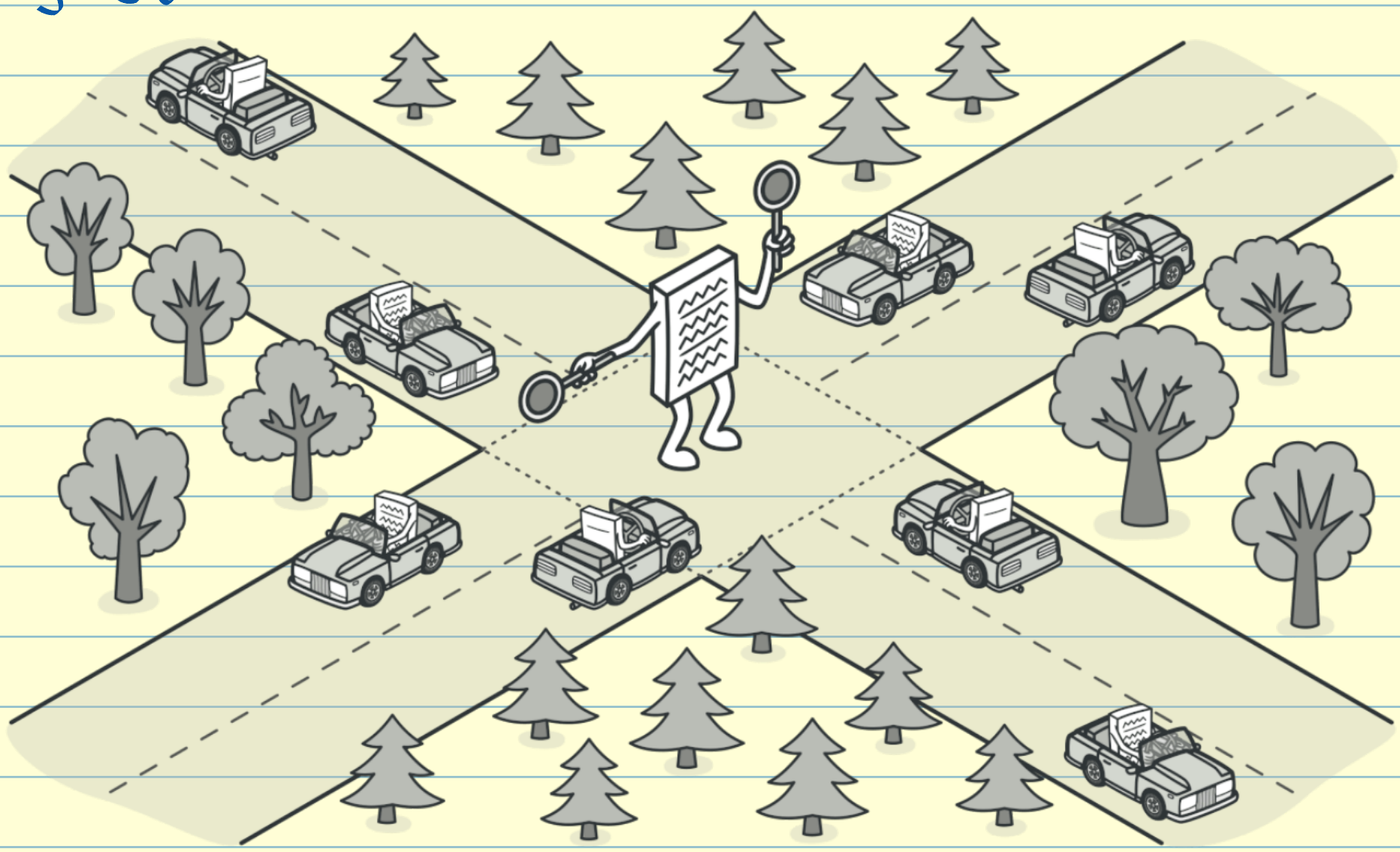
-Iterator is a behavioral design pattern that lets you traverse elements of a collection without exposing its underlying representation



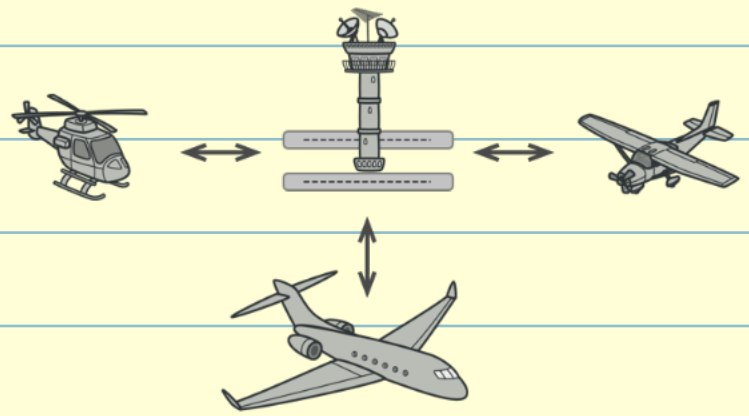


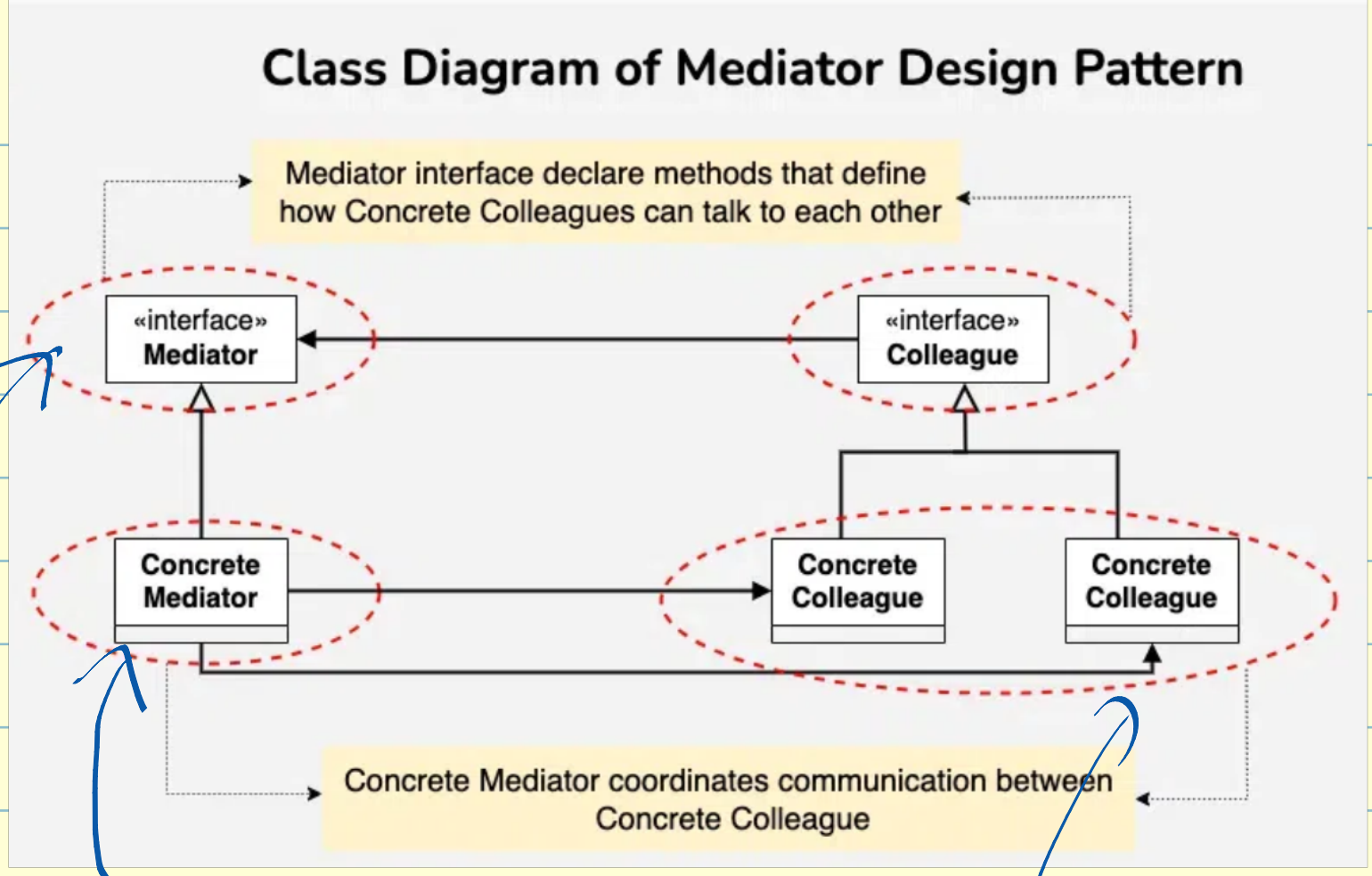
Mediator

- lets you reduce chaotic depencies between objects. The pattern restricts direct communications between the objects and forces them to collaborate only via a mediator object.



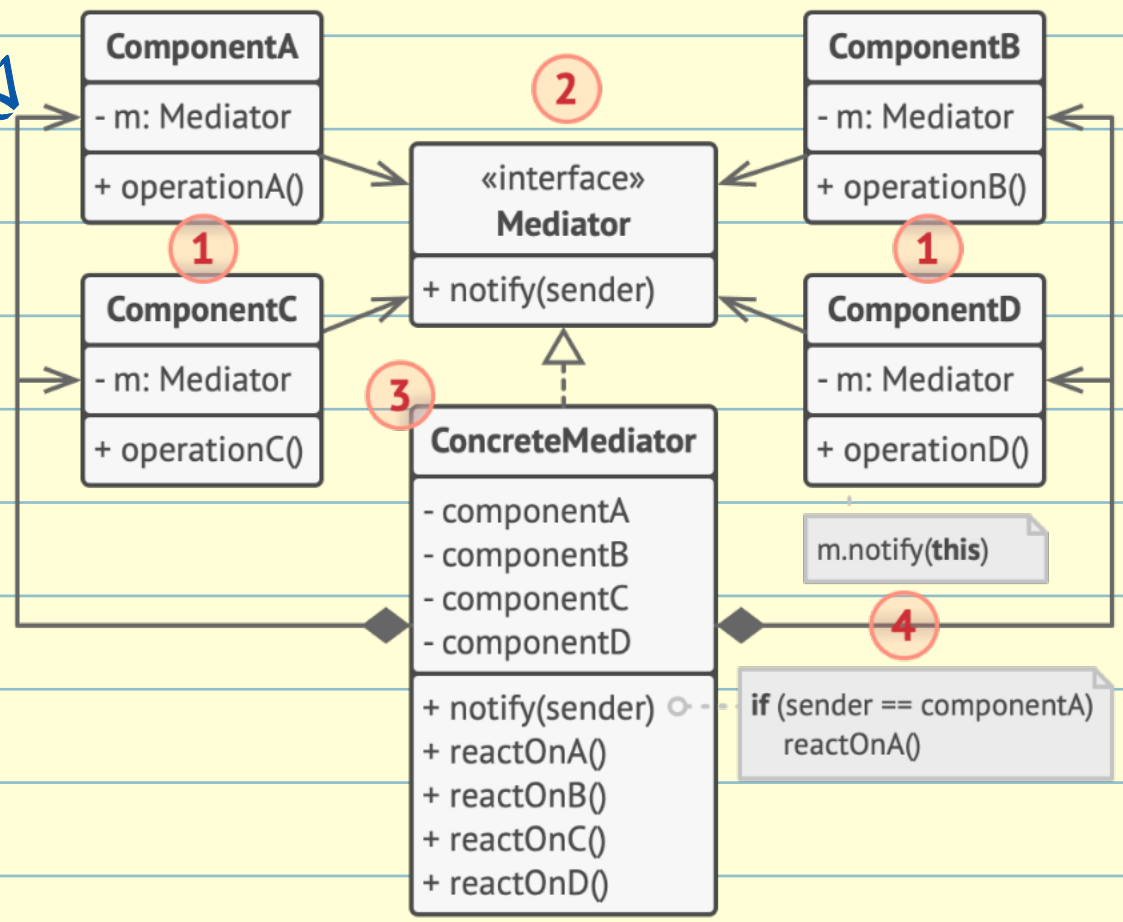
ex:- online bidding system
air traffic management system





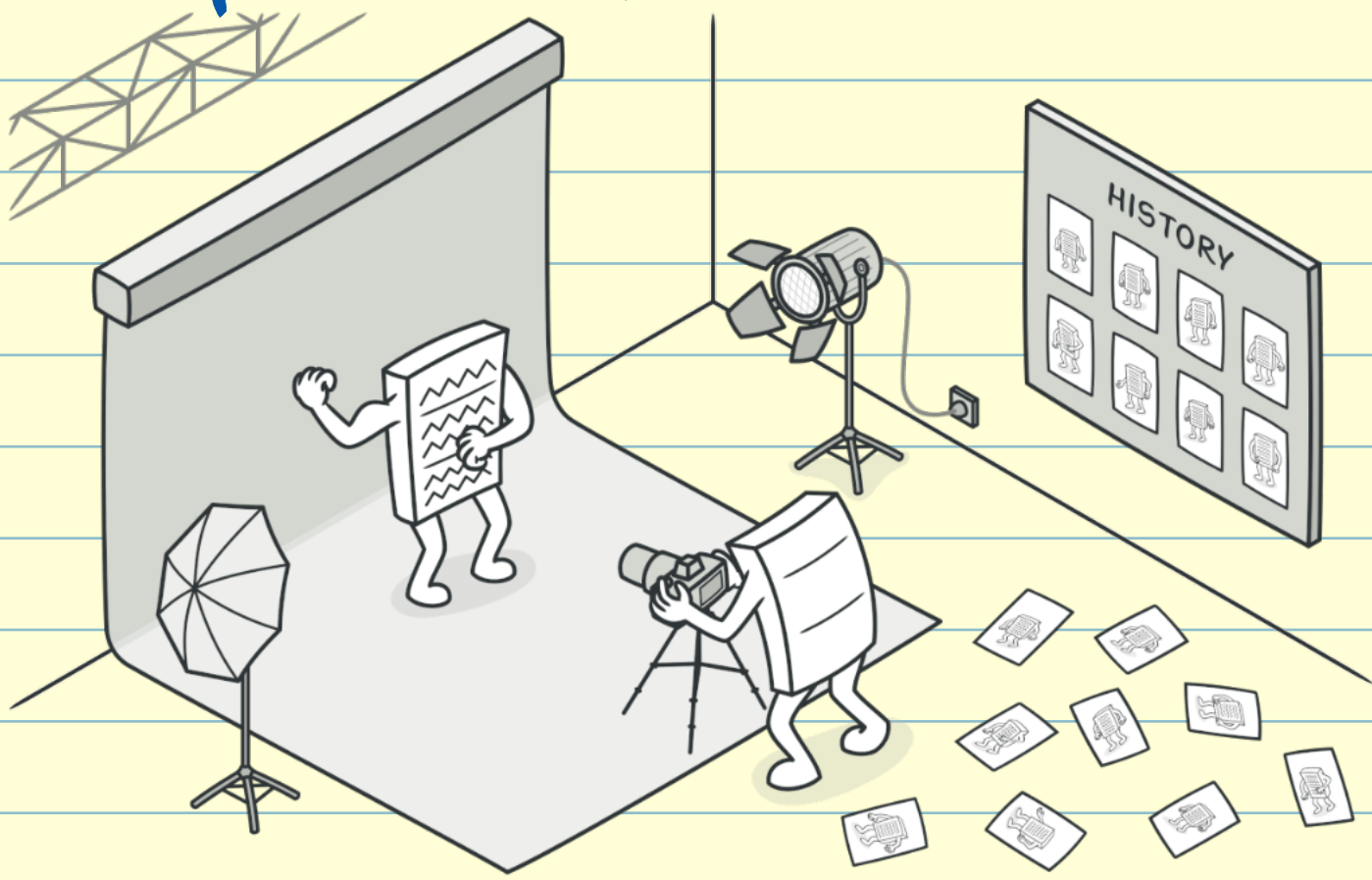
declares methods of communication with components, which usually include single notification method

to mediator.



Memento / Snapshot DP

- let's you save and restore the previous state of an object without revealing the details of its implementation.



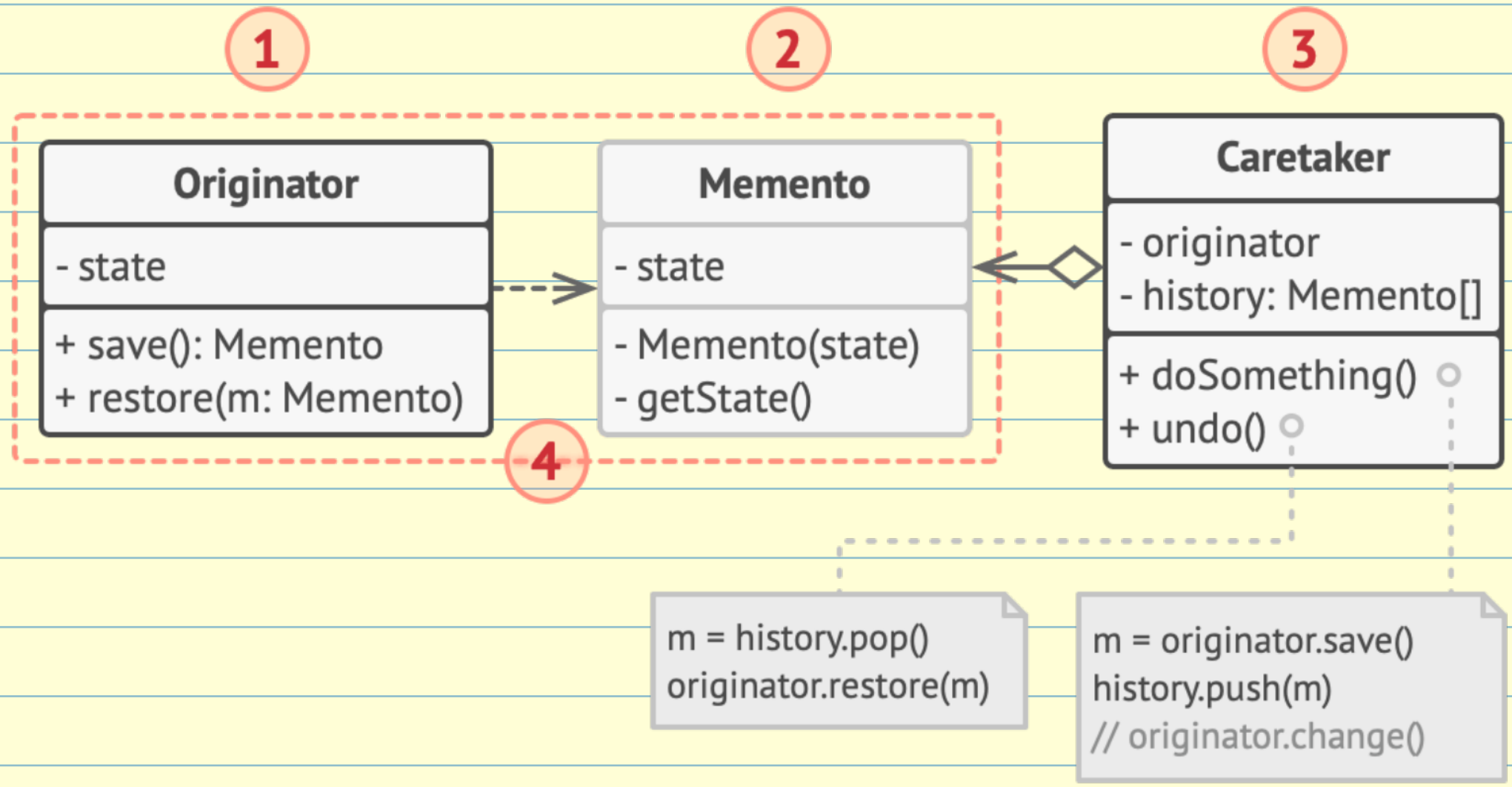
Why required & when to use?

- provides an ability to revert an object to a previous state.
  i.e. UNDO capability.
- it does not expose the object internal implementation.

Originator
- it is the object that state need to be saved and restored.
- expose methods to save and restore its state using Memento object.

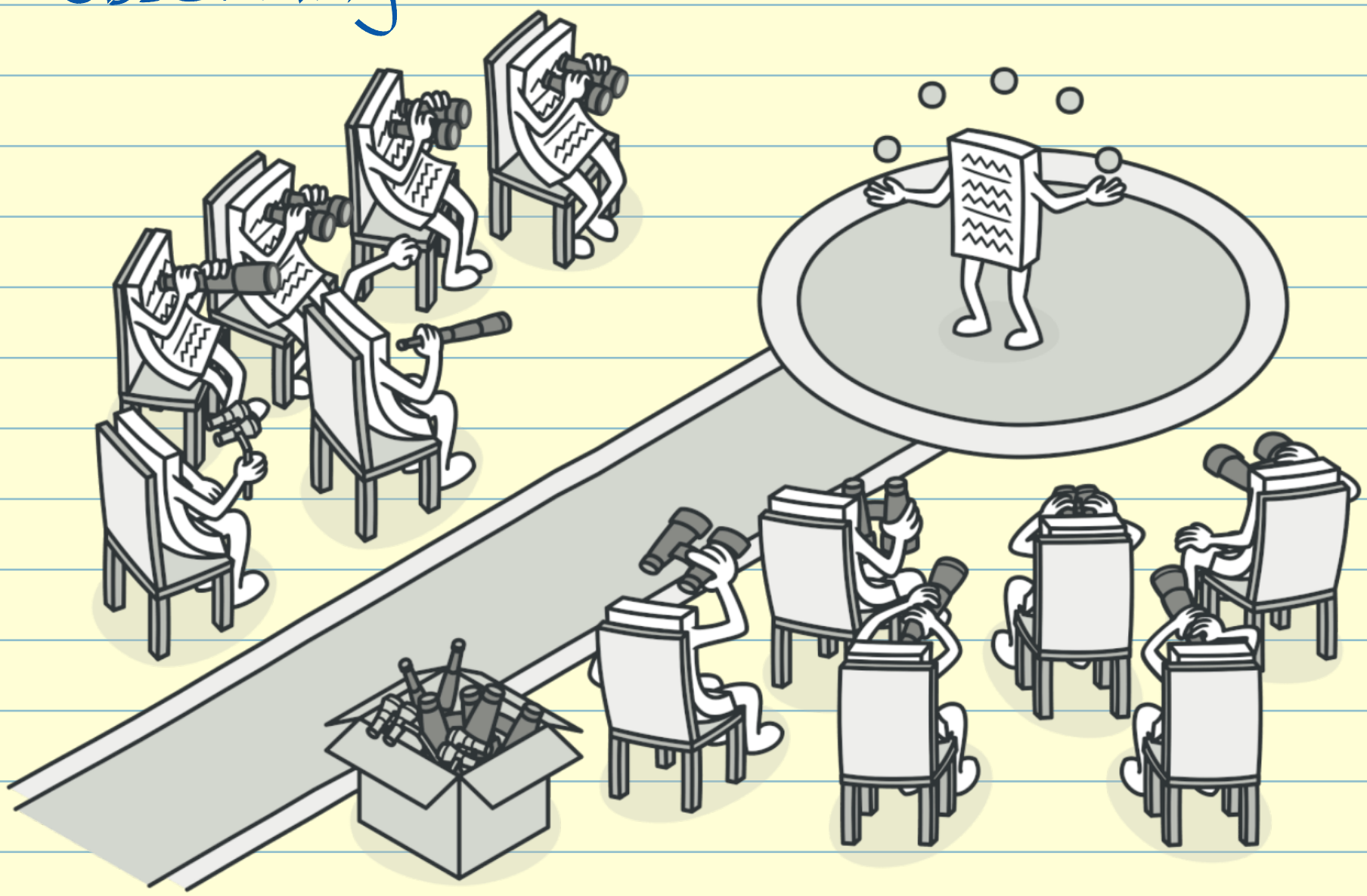
Memento
- it represent an object which holds the state of the originator

Caretaker
- manage a list of mementos.

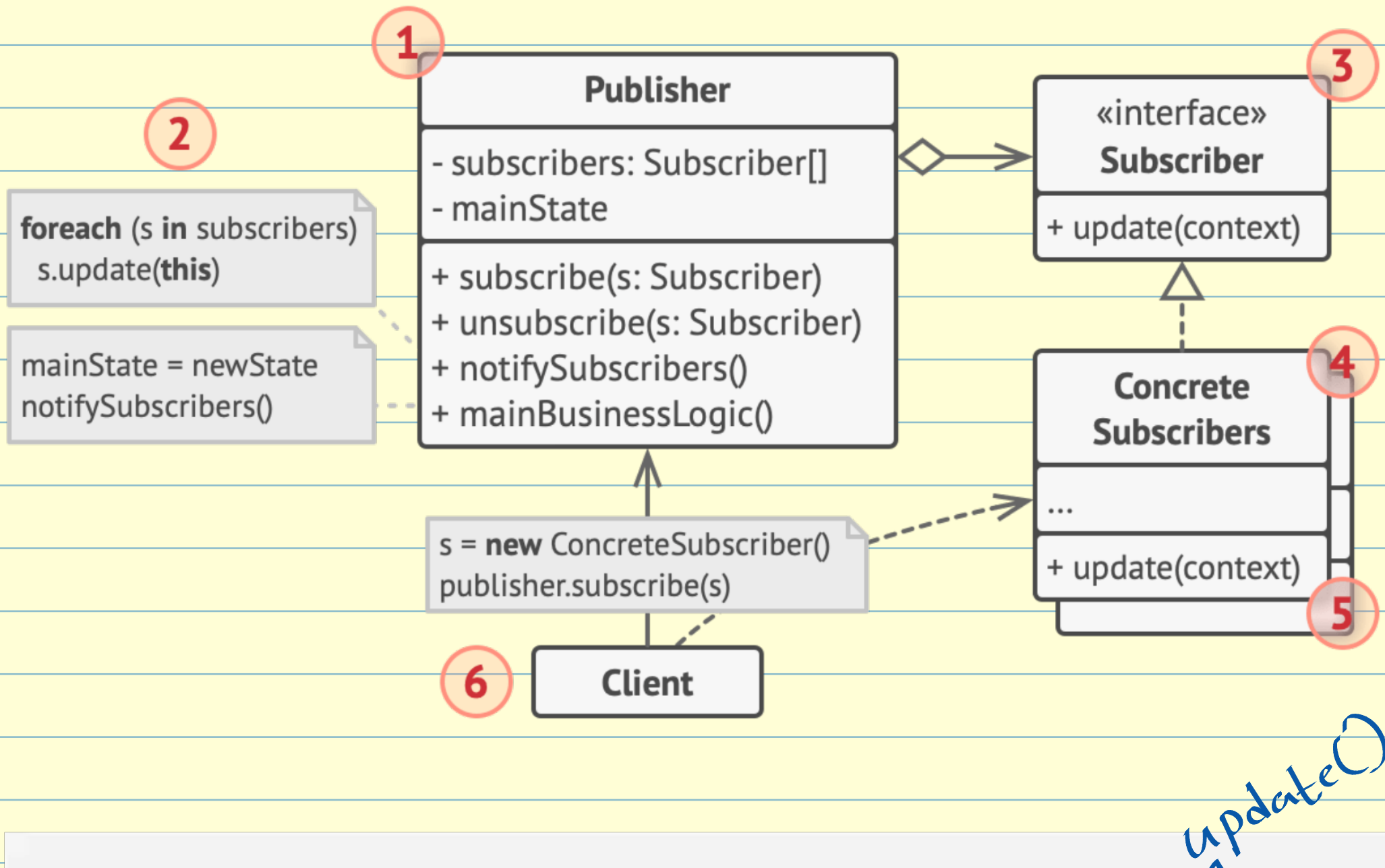


Observer

- lets you define a subscription method to notify multiple objects about any events that happen to the object they are observing.

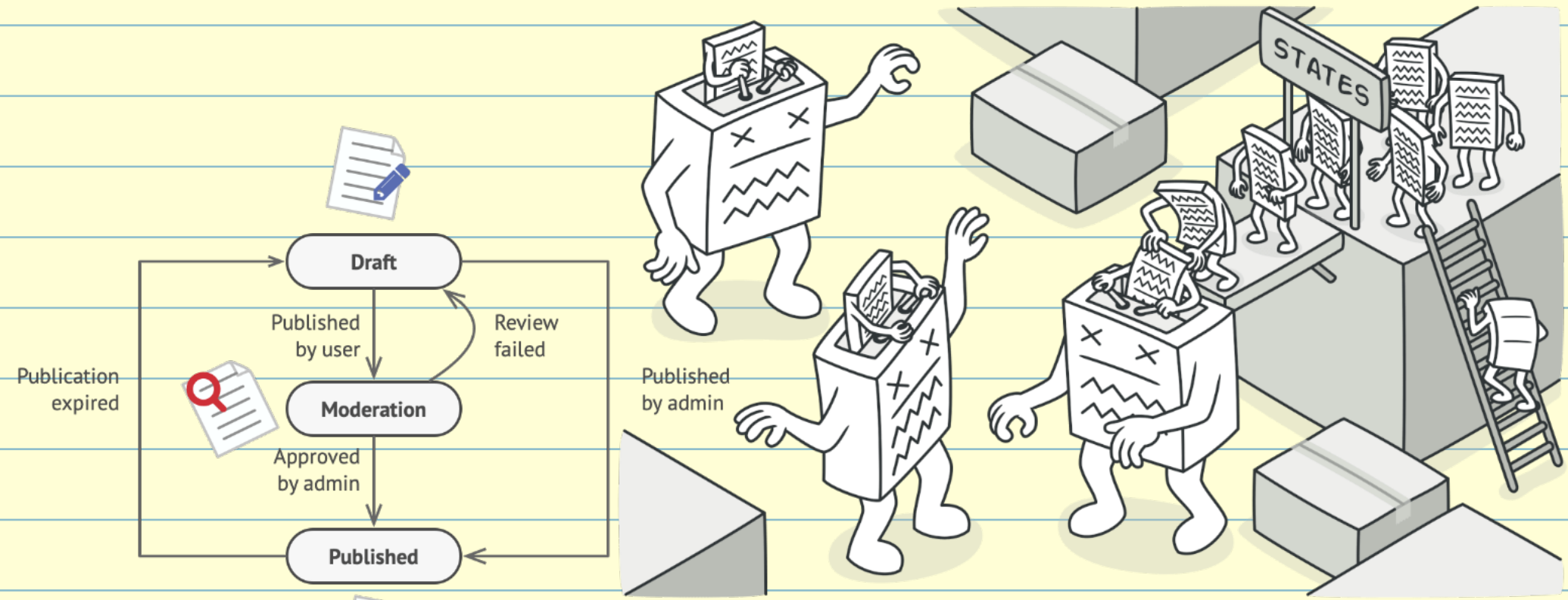


- the subject object automatically notifies the dependent observer objects whenever it's state change by calling those methods.

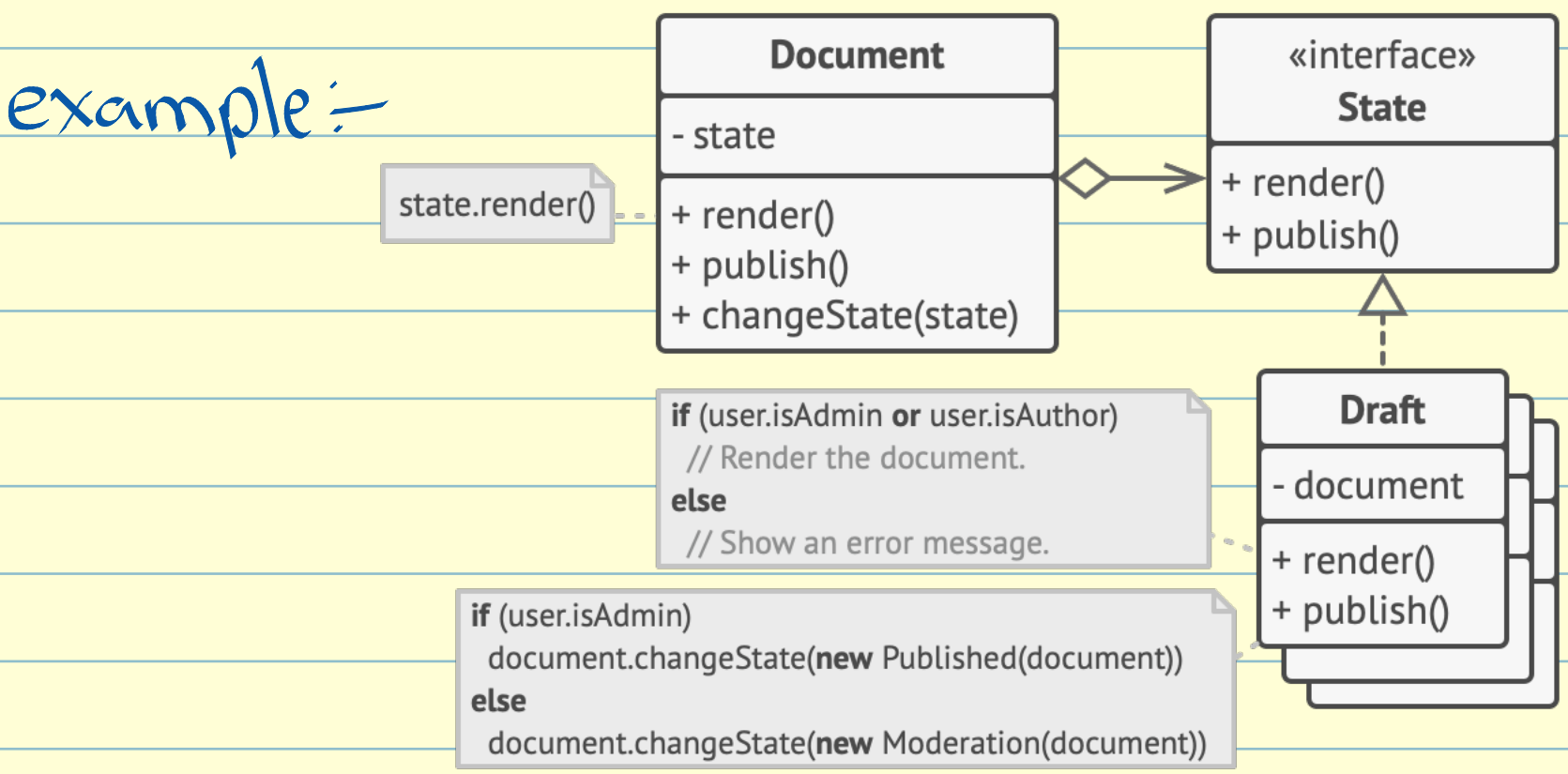

1
Publisher
- subscribers: Subscriber[]
- mainState
+ subscribe(s: Subscriber)
+ unsubscribe(s: Subscriber)
+ notifySubscribers()
+ mainBusinessLogic()
2
foreach (s in subscribers)
s.update(this)
mainState = newState
notifySubscribers()
3
«interface»
Subscriber
+ update(context)
4
Concrete
Subscribers
...
+ update(context)
5
s = new ConcreteSubscriber()
publisher.subscribe(s)
6
Client
update()
Class Diagram of Observer Design Pattern
<<interface>>
Subject
+addObserver()
+removeObserver()
+notifyObservers()
1
*
<<interface>>
Observer
+update(weather)
Subject
Observer
WeatherStation
-observers: List
+weather: String
+addObserver()
+removeObserver()
+notifyObservers()
PhoneDisplay
-weather: String
+update()
+display()
TVDisplay
-weather: String
+update()
+display()
Concrete
Subject
Concrete
Observer

State Method

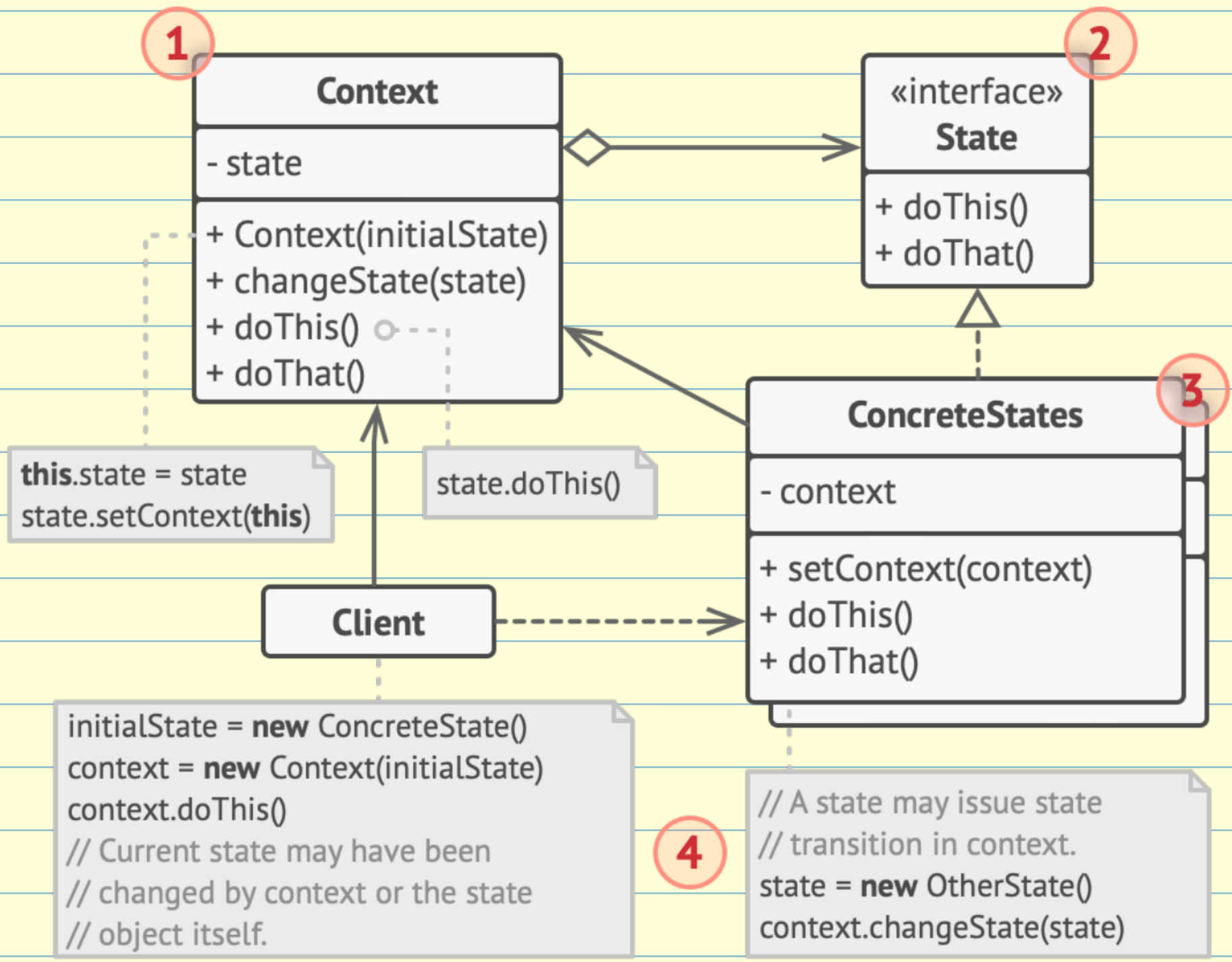
- lets an object alter his behavior when its internal state changes. It appears as if the object changed its class.



example :-



Use the state pattern when you have an object that behaves differently depending on its current state, the number of states is enormous, and the state-code changes frequently.

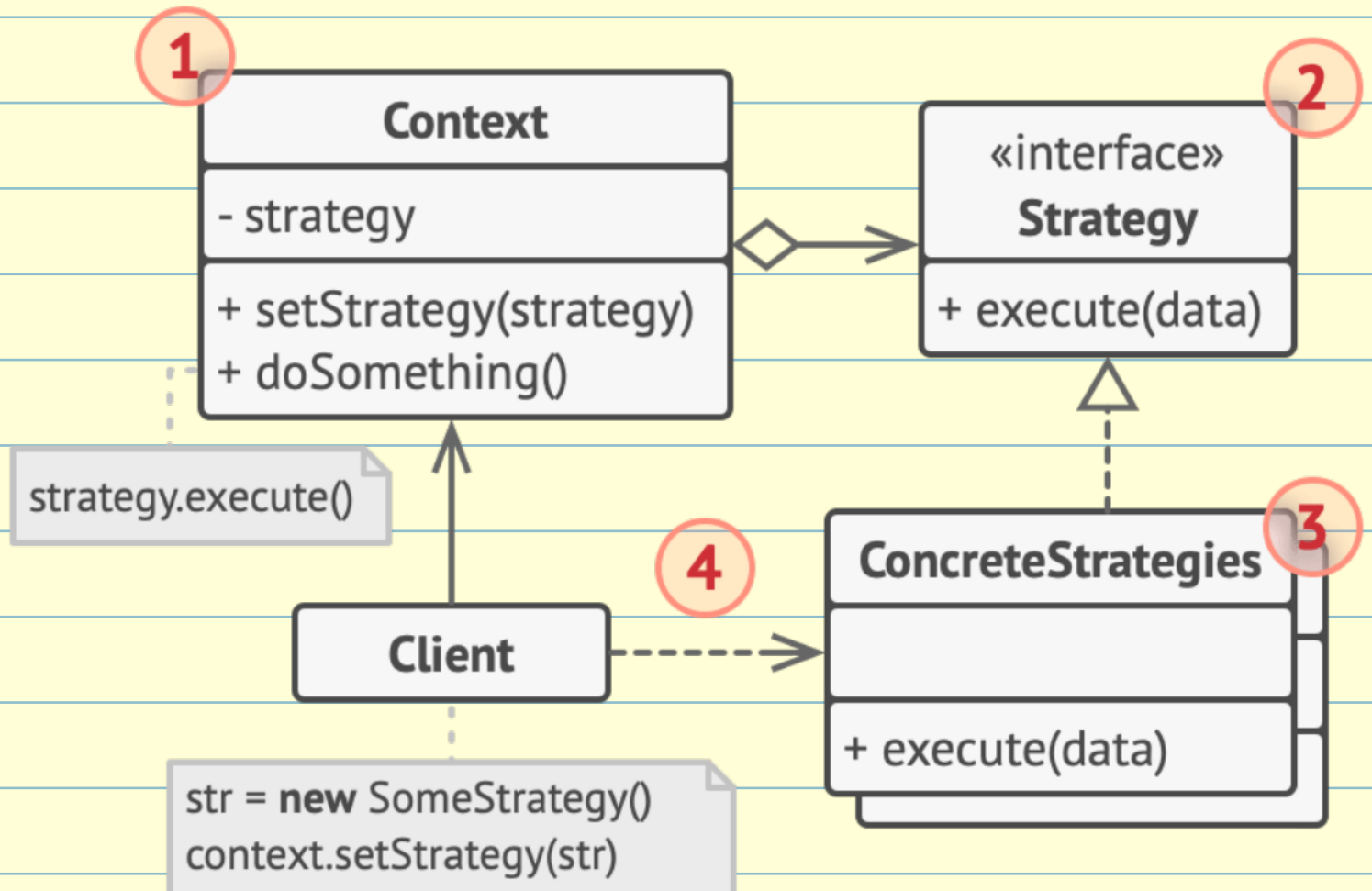


Strategy

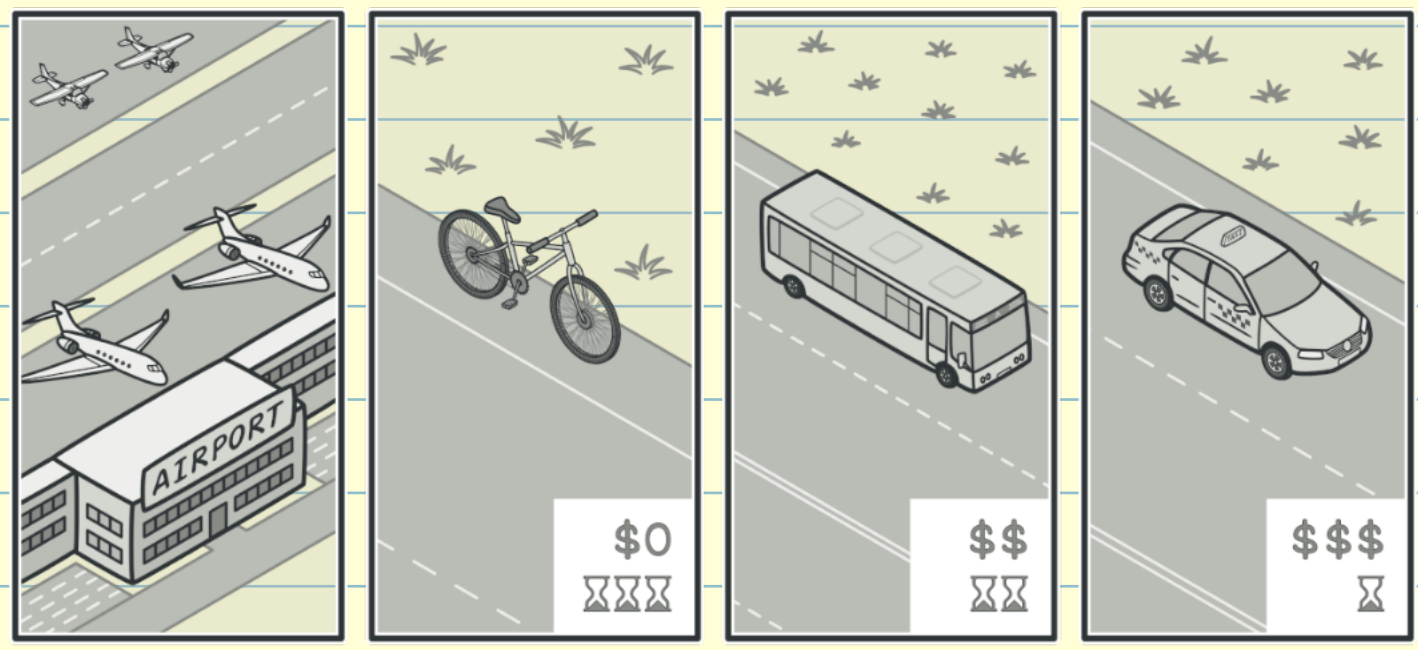
lets you define a family algorithms, put each of them into a seperate class, and make their objects interchangeable.

ex:- different sorting algorithm example

*use strategy pattern when you have a lot of similarly classes that only differ in the way they execute some behavior.

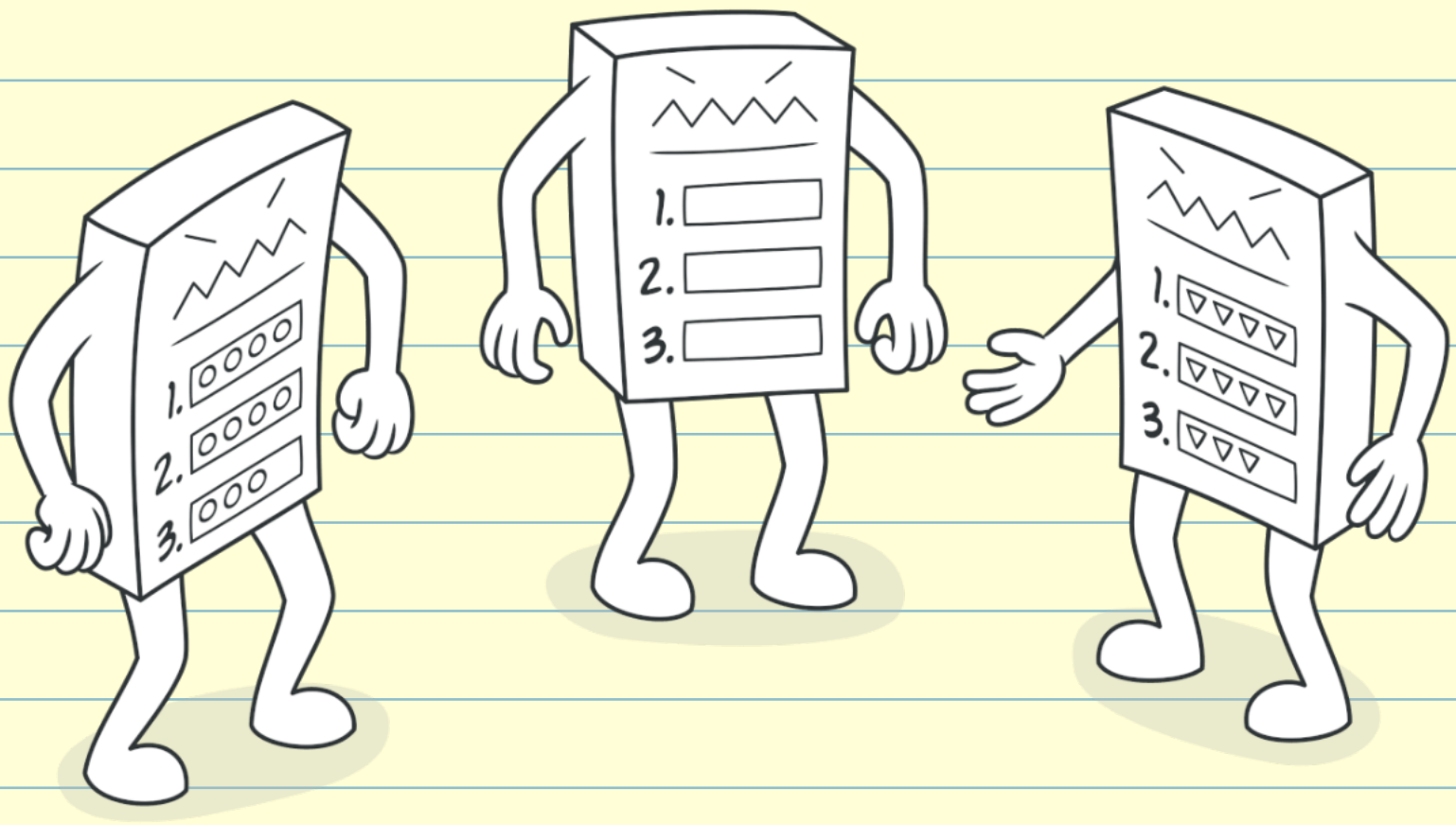


ex:- navigation app



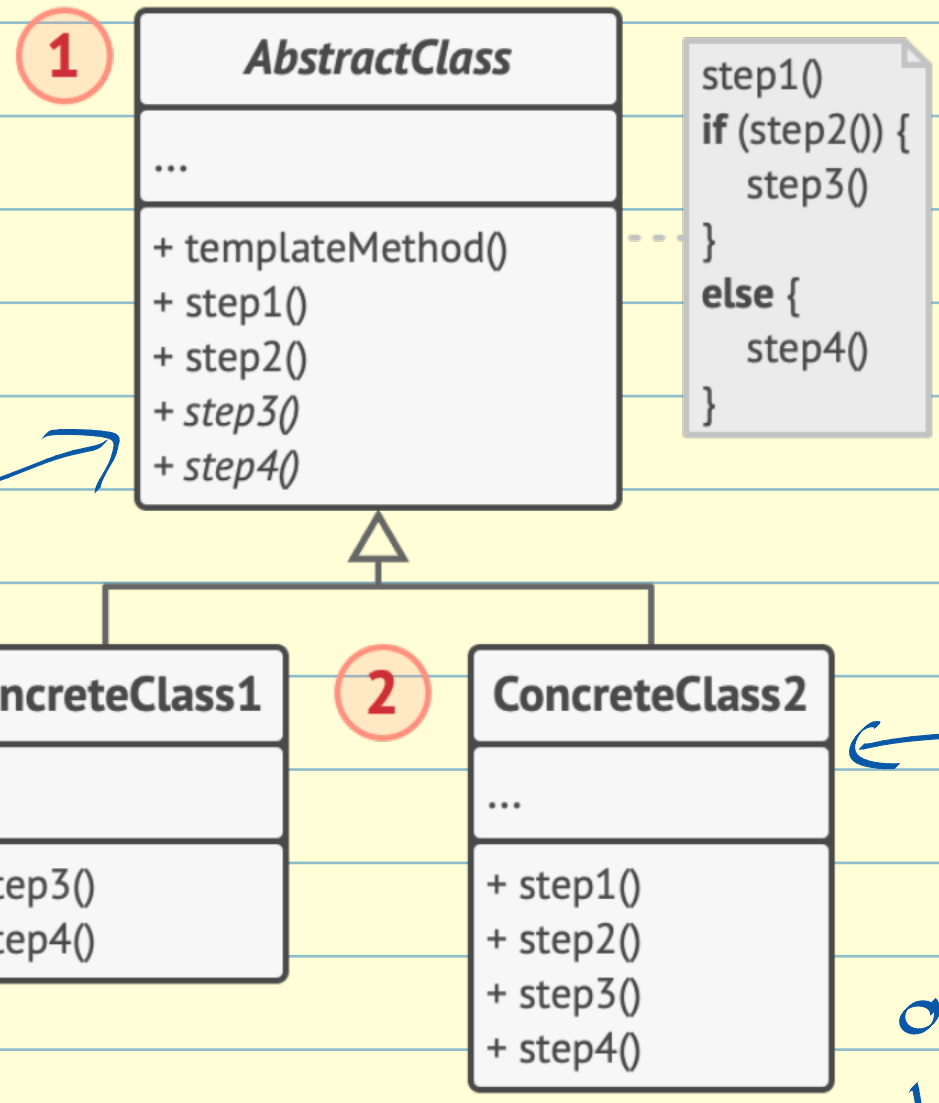
Template method

- defines the skelton of an algorithm in the superclass, but lets subclasses overide specific steps of the algorithm without changing its structure.



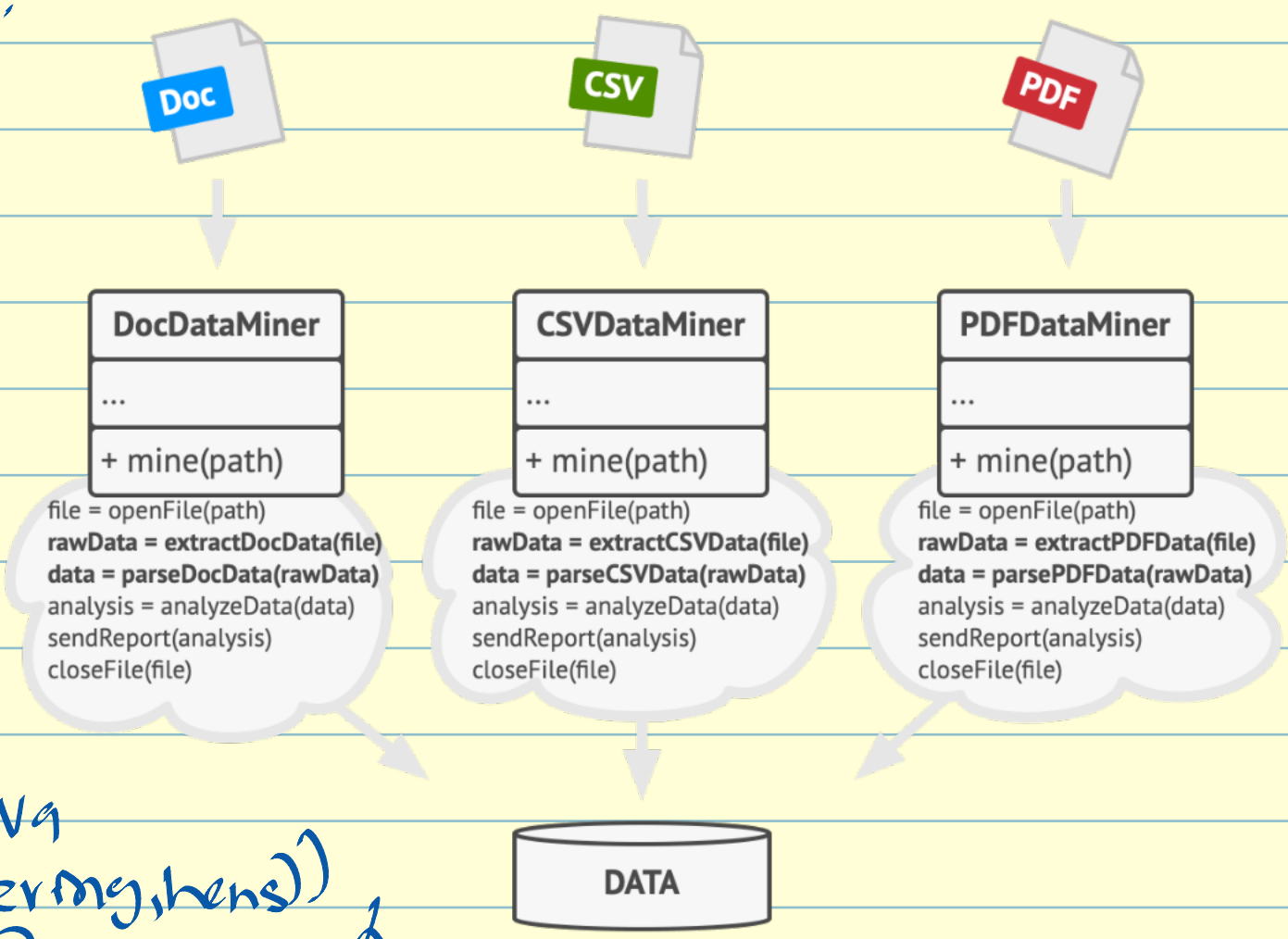
- factory method is a specialization of template method.

- use the template method when you only need to let clients extend only paticular steps of an algorithm, but not the whole algorithm.



← concrete classes can override all of the steps, but not the template method itself.

The abstract class declares methods that act as steps of an algorithm.



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