Command Pattern – Behavioural

- Intent
  - » **Encapsulate a request as an object**
  - » **Parameterize clients with different requests**
  - » **Queue or log requests**
  - » **Support undoable operations**

- Alternate names

  Action, Transaction

Motivation

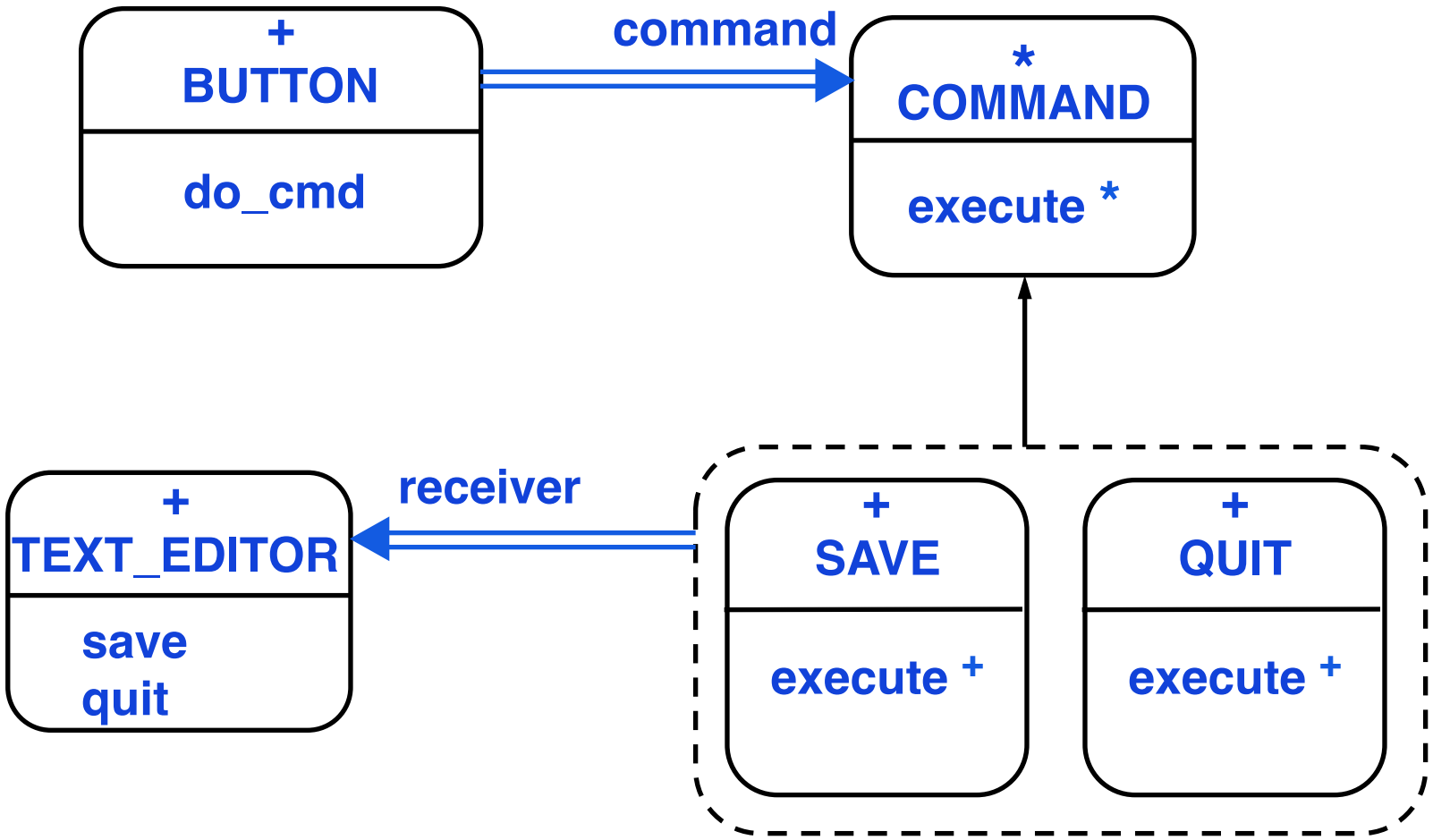
- Need to issue requests to objects without knowing anything about the operation or the receiver of the request

  Buttons and menus

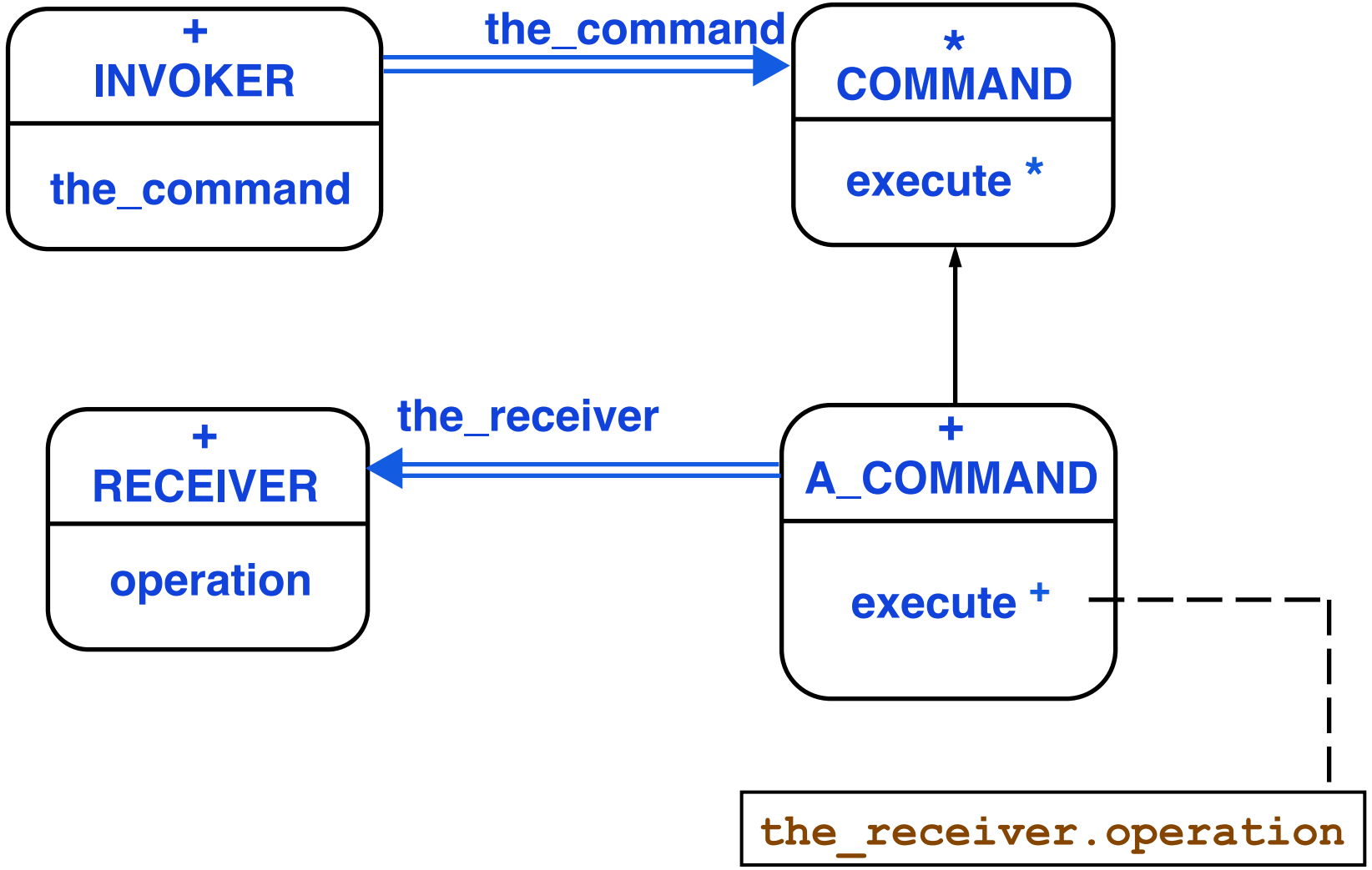
  Operation is not implemented in them

- Command pattern is the OO language equivalent of a callback in a procedural language

Example Architecture



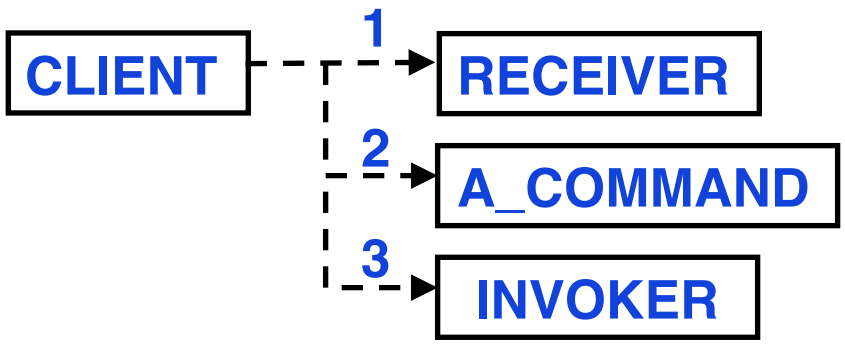
Abstract Architecture



Scenario

Scenario: Set things up

1 Create the_receiver
2 Create a command object and set the receiver
3 Create an invoker and set the command object



Later

Scenario: do command

1 do_command
2 execute

Participants

- Command

  Declares interface for command execution

- A_command
  - » **Has binding between a receiver and an operation**
  - » **Defines execute to do corresponding operation on receiver**

- Invoker

  Asks Command to execute the command

- Receiver

  Does the real work for the command

- Client

  Creates command object, sets Receiver and Invoker

Applicability

- Want to parameterize objects by an action to perform
- Specify, queue and execute requests at different times
  - » **Command object has a life time independent of the request**
  - » **Provided requests are represented in an address-space independent way, then requests can be executed in a different process than the original process**

Applicability – 2

- Want to support undo
  - » **Execute operation stores state**
- Want logging of changes to recover in case of a crash
- Command pattern can model transaction systems
  - » **Transaction systems are structured around high-level operations build on primitive operations**
  - » **Easy to extend with new transactions**

Related Patterns

- Composite can be used to implement macro commands
- Memento can hold the state a command requires to undo its effect
- Commands that are copied before being placed on a history list act as Prototypes