Design Patterns

Mediator

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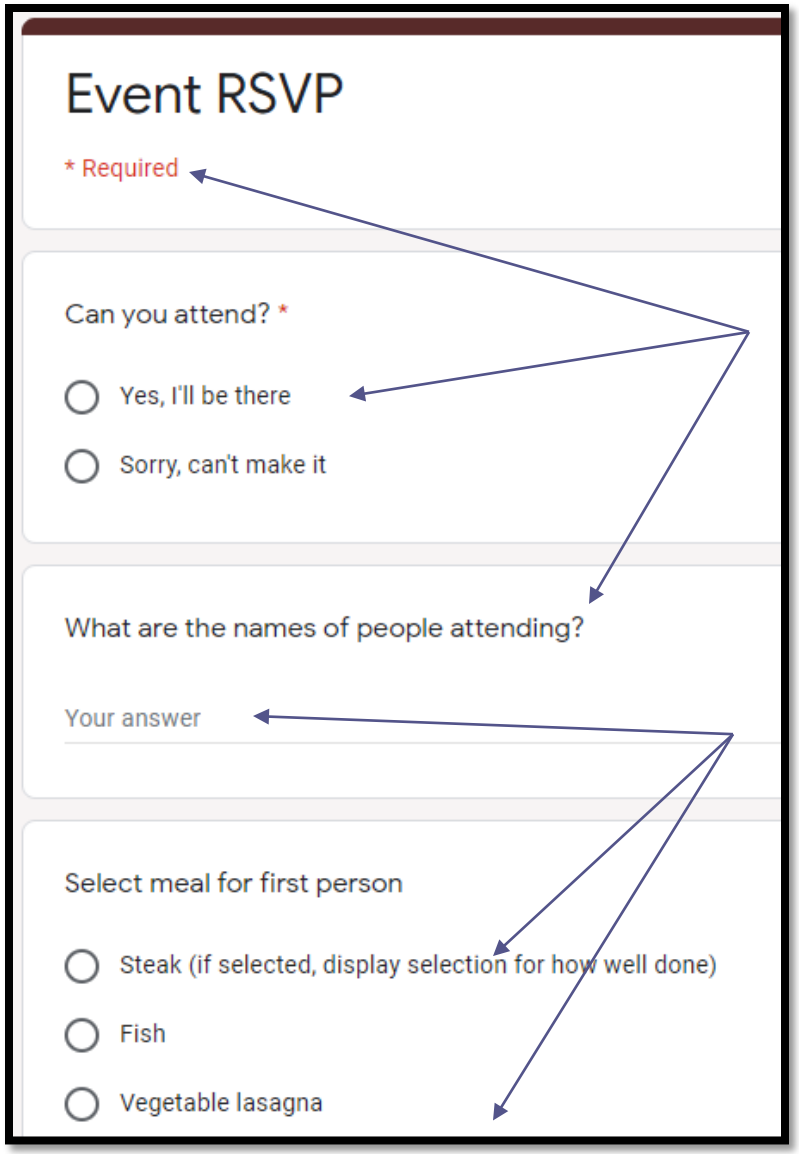
Design pattern: Mediator

- **Category**: Behavioral design pattern
- **Intent**:
  - Define an object that encapsulates how a set of objects interact. Promotes loose coupling by keeping objects from referring to each other explicitly
- **Motivation**
  - Many reuseable objects, but want to avoid direct dependencies to improve reuseability

Motivation cont.



- Various components are reusable, but run the risk of making individual components very intertwined with dependencies
- Motivation is to extract these dependencies to Mediator to make the components more loosely coupled.

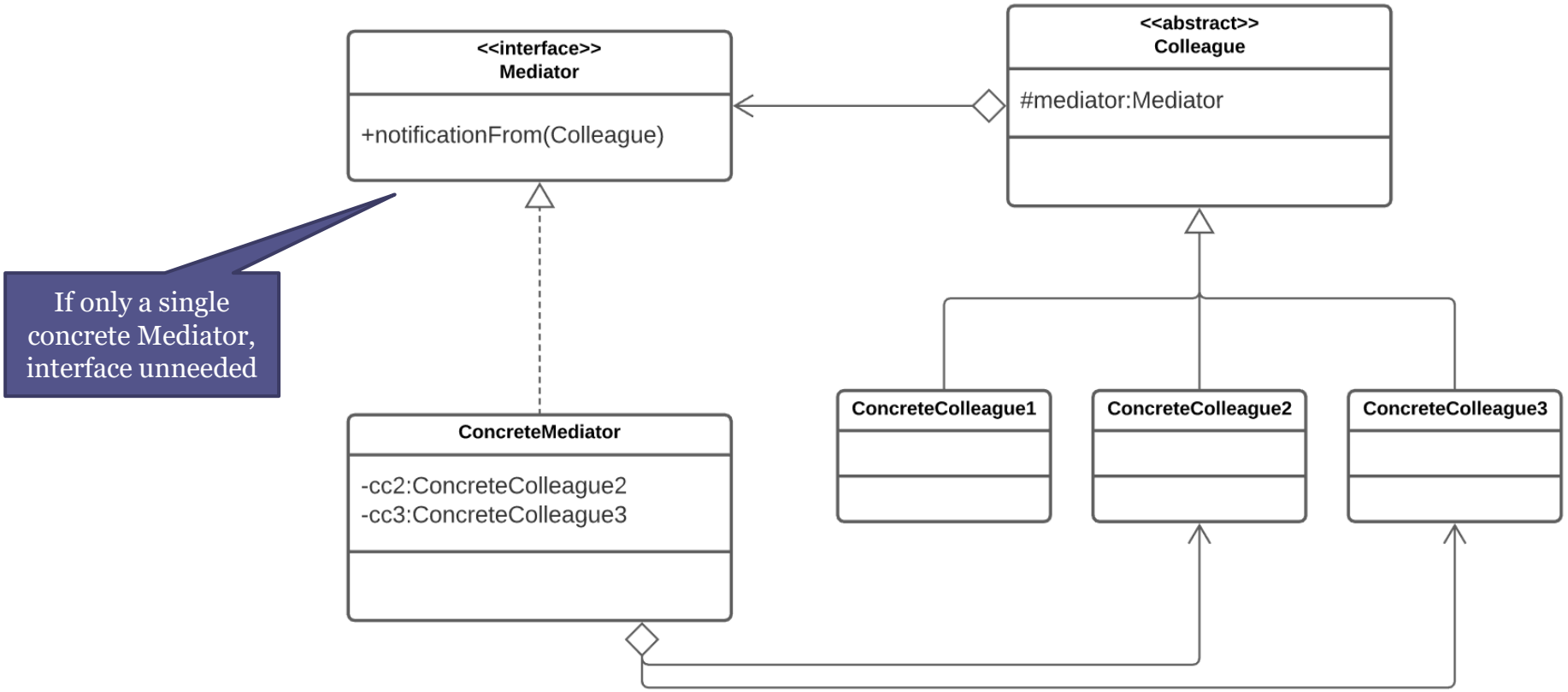
Applicability

- Use the Mediator pattern when
  - Set of objects communicate in well-defined but complex ways, resulting in interdependencies becoming difficult to understand
  - Reuse is becoming difficult due to references with many other objects
  - Behavior that is distributed between several classes should be customizable without a lot of subclassing

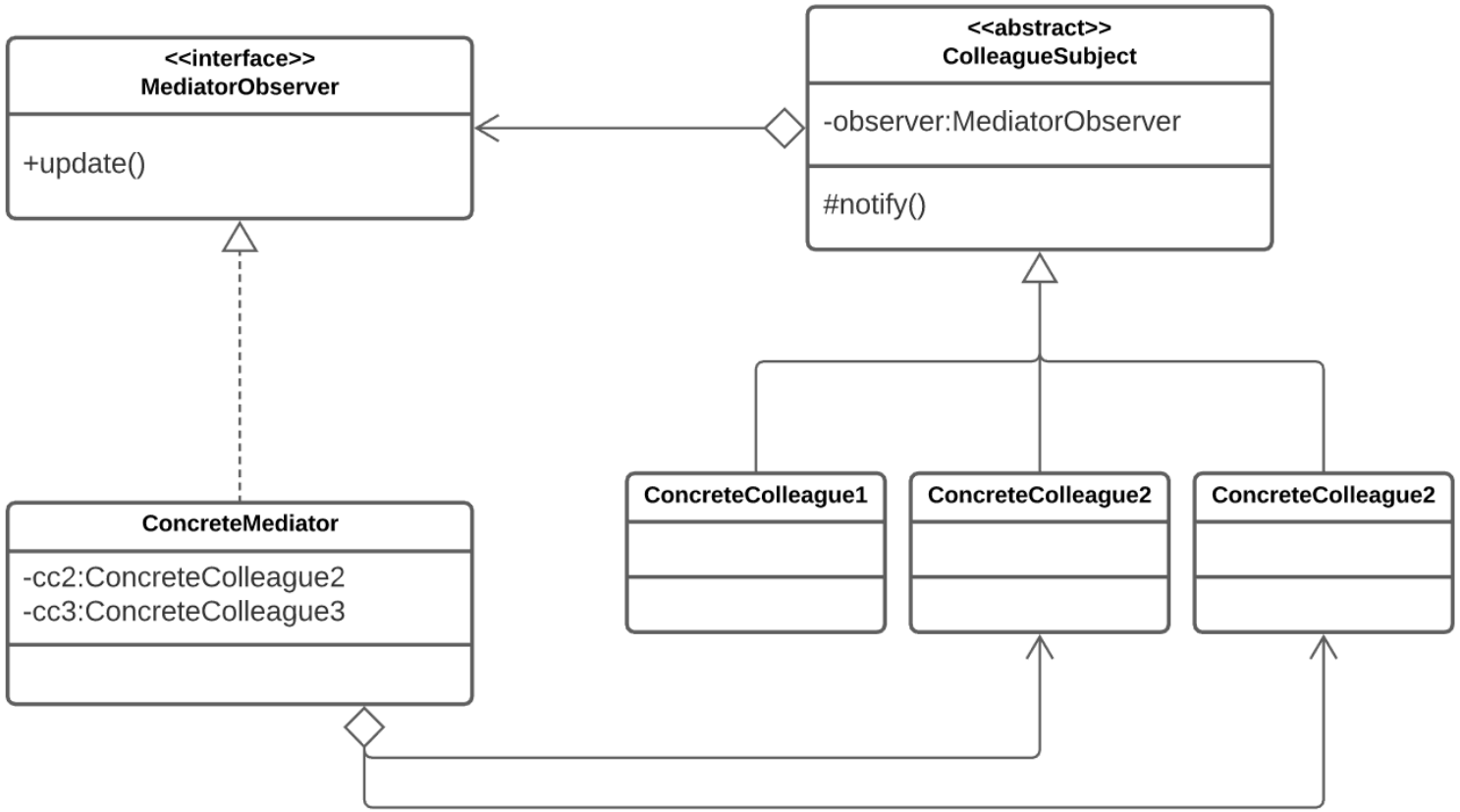
Participants

- Mediator
  - Defines an interface for communicating with Colleague objects
- Concrete Mediator
  - Implements cooperative behavior by coordinating Colleague objects
  - Knows and maintains its colleagues
- Colleague class
  - Each Colleague class knows its Mediator object
  - Each colleague communicates with its mediator whenever it would have otherwise communicated with another colleague

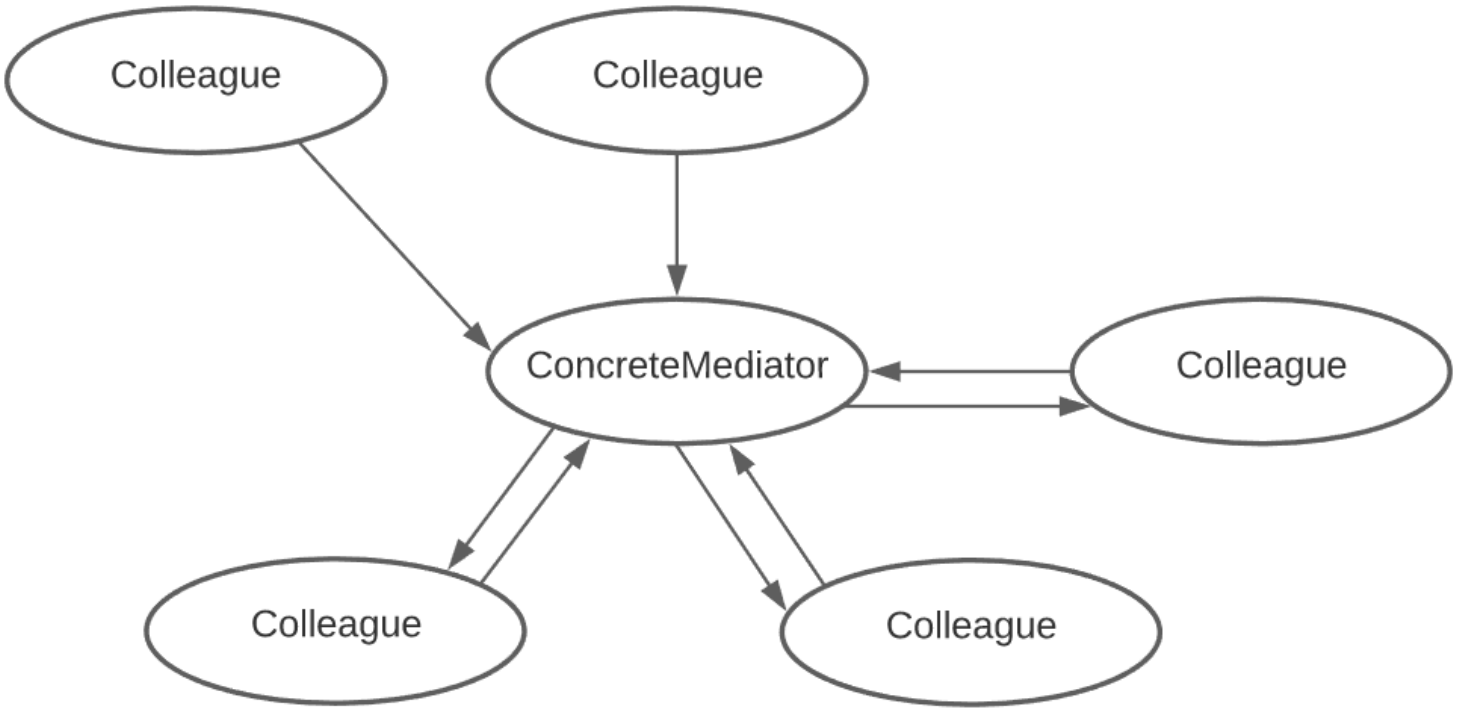
Mediator structure option 1:



Mediator structure option 2: Observer pattern

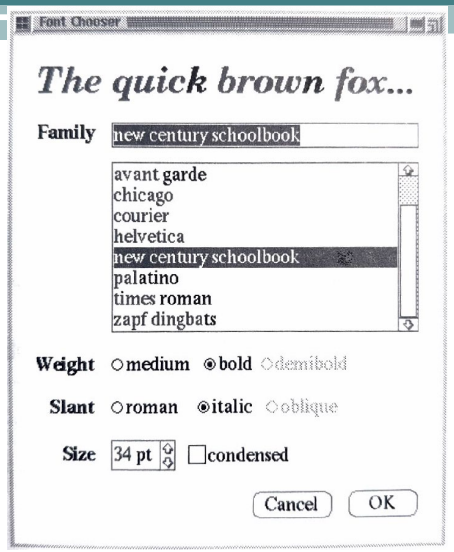


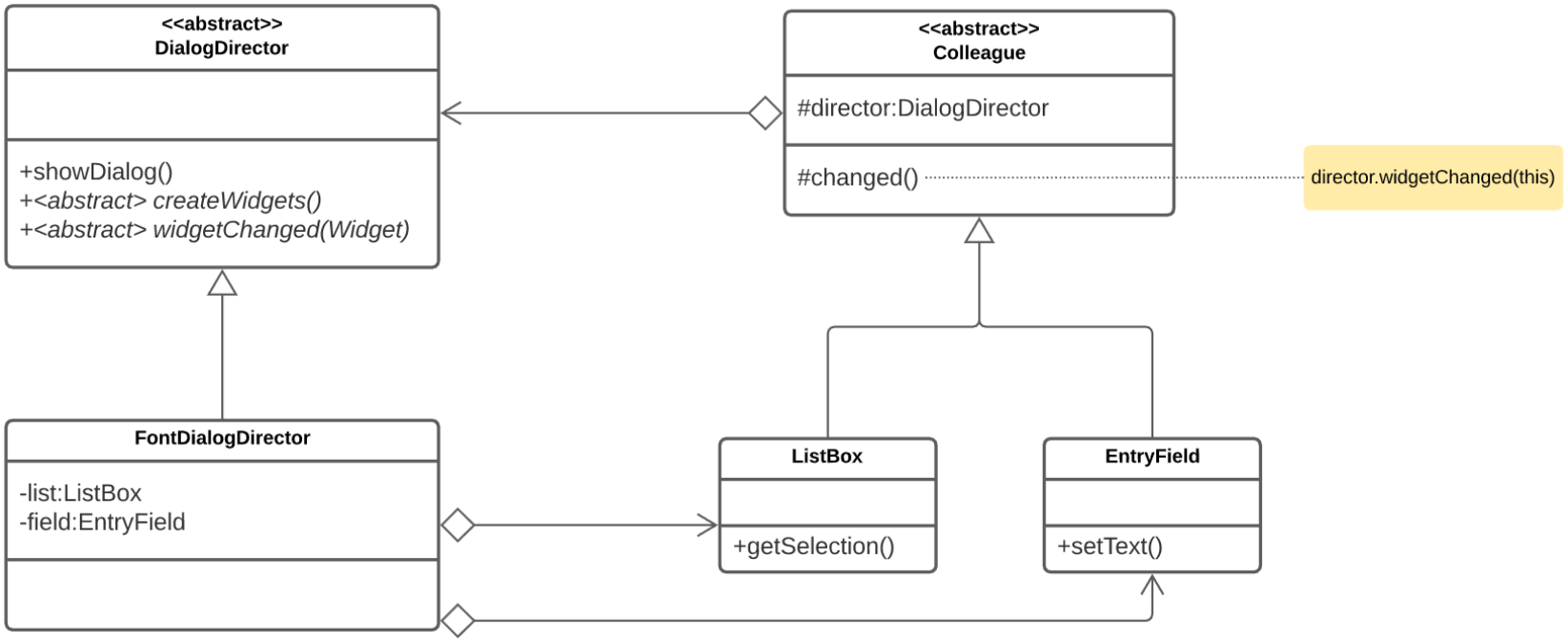
Typical instance structure



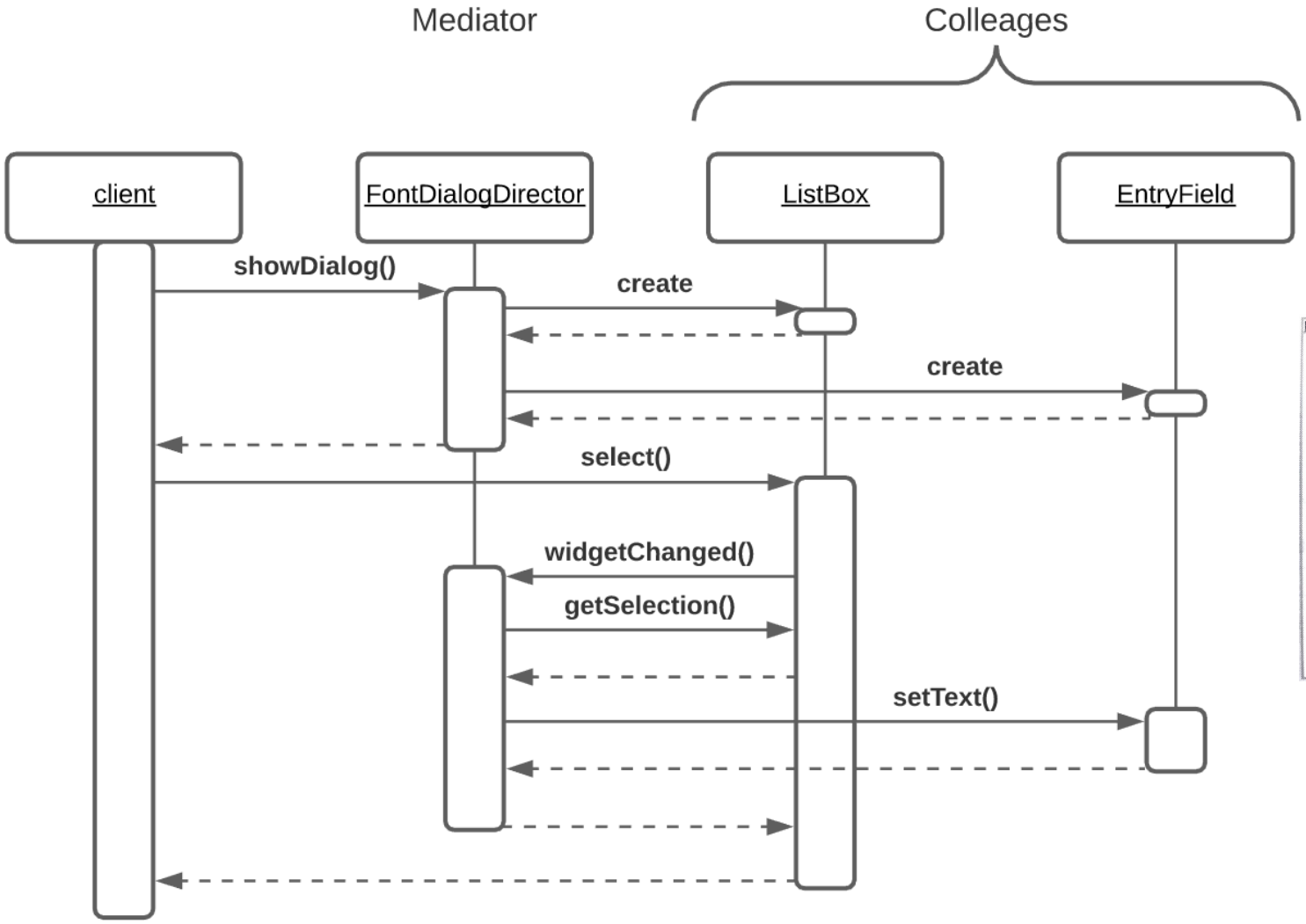
- Collaborations
  - Colleagues send and receive requests from a Mediator object, the Mediator routes requests to the appropriate colleague

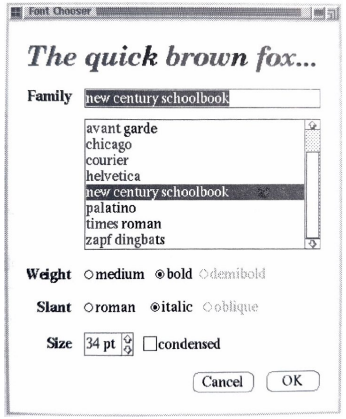
Mediator example





Interaction pattern





Consequences

- Mediator pattern has the following benefits and drawbacks
  - Benefits
    - Reduces need for Colleague subclassing - Localizes behavior that would have been distributed allowing only Mediator to need subclasses while Colleagues can be used as is
    - Decouples colleagues
    - Simplifies object protocols for many-to-many interactions
    - Abstracts how objects cooperate
  - Drawback
    - Centralizes control – simplifies colleagues, but increases complexity of Mediator which as it becomes more complex may be more difficult to maintain

Related patterns

- Observer
  - Frequently combined having Colleagues communicate with Mediator via Observer pattern
  - Observer is notification mechanism, Mediator pattern is defining specific colleague interaction extracted to Mediator
- Mediator vs Façade
  - Recall Façade's goal was hide interaction with subsystem of components from outside – inside components interacted with each other and did not know about façade
  - Mediator's goal abstract dependencies within subsystem – subsystem components no direct dependencies, all aware of Mediator