Lecture 5: Modeling Software Behaviour

- → UML sequence Diagrams
- → Comparing Designs
- → Explaining Design Patterns
- → Style tips

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Things to Model

E.g. Structure of the code
- Code Dependencies
- Components and couplings

E.g. Behaviour of the code
- Execution traces
- State machines models of complex objects

E.g. Function of the code
- What functions does it provide to the user?

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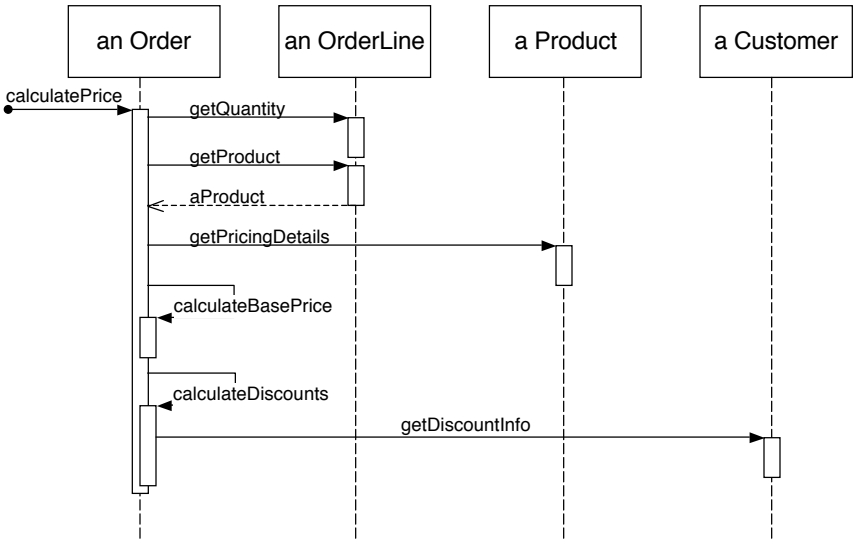
Sequence Diagrams



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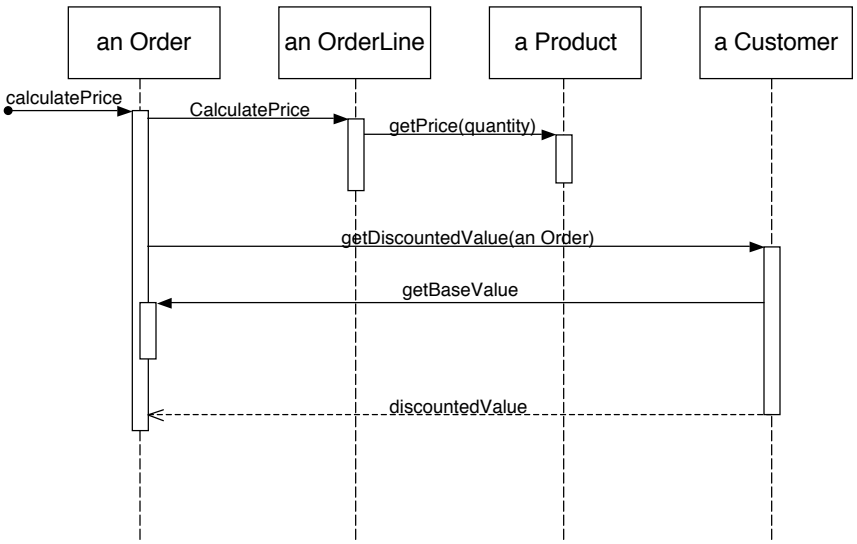
Design Choices…



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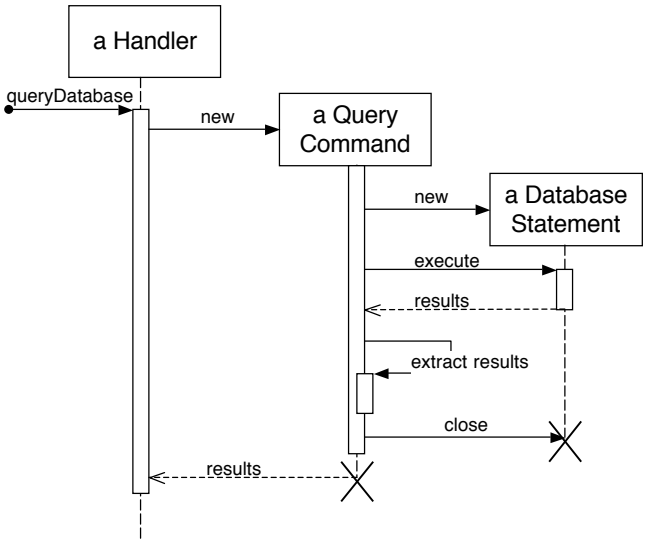
Creating and Deleting Objects



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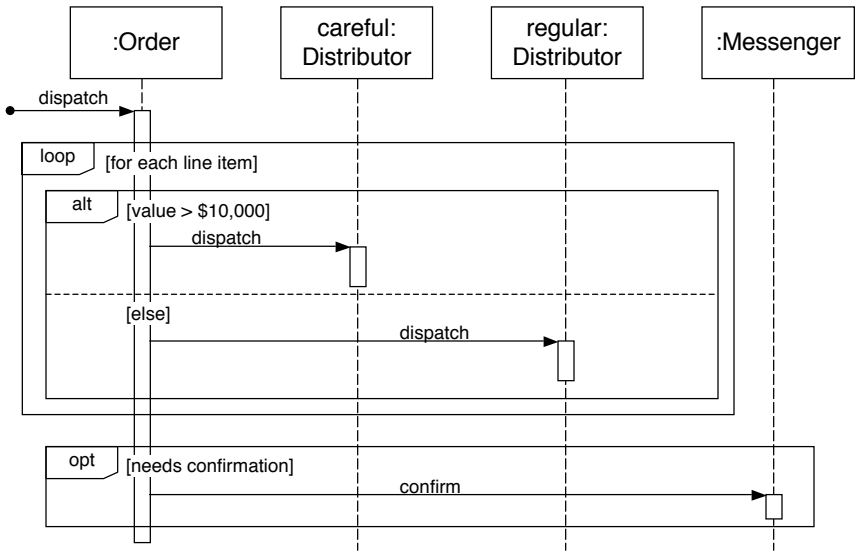
Interaction Frames



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Interaction Frame Operators

Operator	Meaning
alt	Alternative; only the frame whose guard is true will execute
opt	Optional; only executes if the guard is true
par	Parallel; frames execute in parallel
loop	Frame executes multiple times, guard indicates how many
region	Critical region; only one thread can execute this frame at a time
neg	Negative; frame shows an invalid interaction
ref	Reference; refers to a sequence shown on another diagram
sd	Sequence Diagram; used to surround the whole diagram (optional)

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When to use Sequence Diagrams

Comparing Design Options

- Shows how objects collaborate to carry out a task
- Graphical form shows alternative behaviours

Assessing Bottlenecks

- E.g. an object through which many messages pass

Explaining Design Patterns

- Enhances structural models
- Good for documenting behaviour of design features

Elaborating Use Cases

- Shows how the user expects to interact with the system
- Shows how the user interface operates

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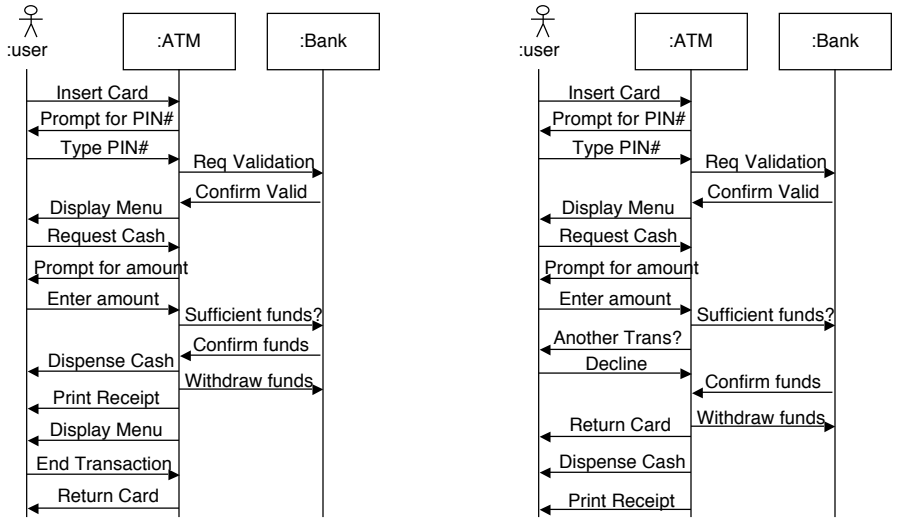
Comparing Designs



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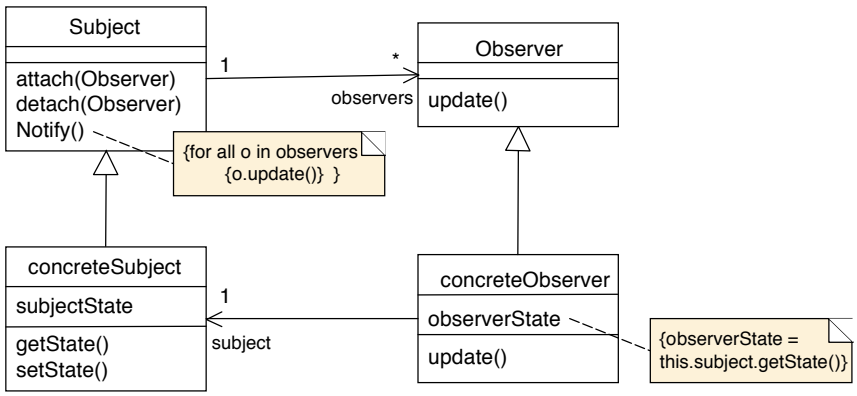
Modeling a Design Pattern

E.g. Observer Pattern

For a one-to-many dependency, when you need to maintain consistency

The subject pushes updates to all the observers



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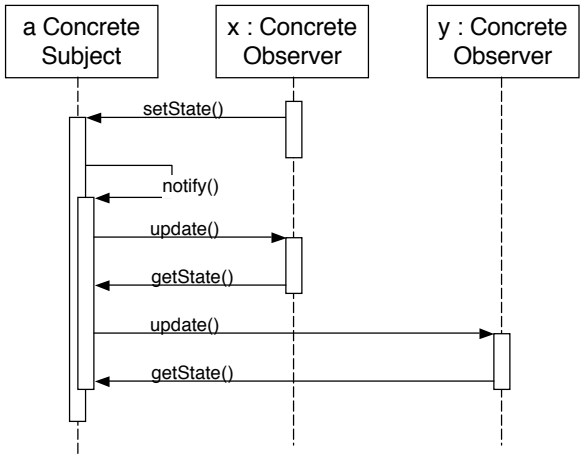
Sequence Diagram for Observer



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Style Guide

Spatial Layout

- Strive for left-to-right ordering of messages
- Put proactive actors on the left
- Put reactive actors on the right

Readability

- Keep diagrams simple
- Don't show obvious return values
- Don't show object destruction

Usage

- Focus on critical interactions only

Consistency

- Class names must be consistent with class diagram
- Message routes must be consistent with (navigable) class associations

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