

Interactr

Iteration 3

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Design

Domain Model - Overview

- Low representational gap
- Main classes : Diagram, Message, Party
- Business logic completely separate from UI

Put diagram of domain model here

Domain Model - Diagram Visitors

Interface `DiagramVisitor` can be implemented by various visitors in other subsystems.

Every `DiagramComponent` can accept such a visitor.

→ makes it easy to add functionality to the domain layer without having to add code to the classes themselves (like UI-related code)

Example of visitors used in our UI layer : `DialogCreator` (makes dialog for a given diagram component without resorting to the use of *instanceof*)

Domain Model - Diagram Observers

Interface `DiagramObserver` represents an observer of a diagram.

A diagram has a list of such observers that it notifies when a party is added, a label is edited, ...

We currently implement this interface in our classes representing dialog windows and diagram views, for synchronisation of, say, labels.

Entry Point - Controller

Everything starts in Controller :

- creates a Window (extends CanvasWindow)
- associates the window with PaintBoard (draw events)
- associates the window with EventHandler (key/mouse events)

Both support Protected Variations. Both encapsulate *awt* package.

Entry Point - Controller

Put diagram of Controller, PaintBoard and EventHandler and Window + CanvasWindow here

Controller - Underlying Structure

The Controller keeps track of a list of SubWindows.

A SubWindow can be a DiagramWindow or a DialogBox.

Each SubWindow has a frame.

Each SubWindow is '*activated*' by putting it at the front of the window list.

SubWindows - Diagram Windows & Dialog Boxes/Windows

A DiagramWindow has two DiagramViews.

A DialogWindow aggregates Models representing *controls*.

A Diagram is directly altered by DiagramViews and DialogWindows.

Synchronization is either done with the Observer pattern, or *lazily*
(update upon drawing).

Since Diagram knows when it changes, it keeps a list of
DiagramObservers and notifies them (Information Expert).

→ disadvantage : coordinates aren't synchronised (solved by '*making room*' upon addition of a diagram component to a 'DiagramView')

Event Handling - How it all Starts

- Every mouse or key event goes from Window → EventHandler.
- EventHandler interprets the events and transforms them into Command instances.
- Command is forwarded to Controller.

Note : if event is a *mouse press*, EventHandler asks the Controller to activate the SubWindow at that coordinate first. This very window will be the first receiver for the command.

Put diagram of Command etc. here

Event Handling - Executing Commands

Precondition : SubWindow is active

- Every Command can be handled by a CommandHandler.
- DiagramWindow, DiagramView and DialogBox extend the CommandHandler class.
- The first CommandHandler is the active SubWindow.
- Every CommandHandler either deals with the Command or (on failure) passes it to the next CommandHandler in its chain.

Patterns used : Command, Visitor and (some sort of) Chain of Responsibility.

Vid. Sequence diagram for *Add Party*.

The `PaintBoard` encapsulates the *awt* package. It is passed along to any class responsible for drawing. Drawing is done 'on' the paint board.

- manages clip rect (to prevent overflowing)
- allows color changes
- ...

→ it is a Facade

Each class that displays something draws itself (Information Expert) :

- SubWindow draws title bar, close button, frame.
- DiagramView draws diagram with messages, parties, ...
 - use of Visitor pattern to generate figures (representations) for these diagram components.
 - these figures are Flyweights.
 - separation of UI / domain logic without use of type checking (i.e. instanceof).
- Class hierarchy for Model (Composite pattern) used for representation/drawing of a variety of elements in the system (parties, messages, controls, ...).

Extensibility

As stated before, `DiagramVisitor` interface makes it easy to add functionality to the domain model without 'polluting' it with, say, UI logic.

Command pattern eases undoing, allows delayed processing, use by menu items, ... When using new types of events (eg. speech recognition) only `EventHandler` has to change.

Disadvantages ;

- many new types of `CommandHandler`?
→ bloated `Command` abstract class (Visitor pattern discussion)
- if Chain of Responsibility is long
→ wasted processing (command goes down the whole chain before realising that it can't be handled)
- if many new system operations for many different types of windows
→ redesign probably warranted.

Representation of various elements in the system can be done with the `Model` class.











→ new elements in domain model and elsewhere is a matter of creating subclasses of `Model`, whenever necessary.

More complex Models can be made (and recycled) by composing them out of 'primitives' (`Lines`, `Ovals`, ...).

Testing

Testing - Coverage

90% classes, 87% lines covered in 'all classes in scope'

Element	Class, %	Method, %
 interactr.cs.kuleuven.be.domain	90% (9/10)	84% (78/92)
 interactr.cs.kuleuven.be.exceptions	78% (11/14)	100% (3/3)
 interactr.cs.kuleuven.be.ui.command	88% (16/18)	85% (34/40)
 interactr.cs.kuleuven.be.ui.control	92% (13/14)	82% (164/200)
 interactr.cs.kuleuven.be.ui.design	100% (10/10)	96% (55/57)
 interactr.cs.kuleuven.be.ui.geometry	100% (2/2)	90% (19/21)
 interactr.cs.kuleuven.be.ui.Controller	100% (1/1)	94% (18/19)
 interactr.cs.kuleuven.be.ui.EventHandler	100% (1/1)	100% (13/13)
 interactr.cs.kuleuven.be.ui.PaintBoard	100% (1/1)	90% (19/21)
 interactr.cs.kuleuven.be.ui.Window	100% (1/1)	100% (10/10)

Project Management

Refactoring

- No *duplicated code*.
- *Moved methods* here and there.
- Addressed *long methods* with *extract method*
→ not the best metric ... but all methods (easily) 'fit on the screen'
(max. \approx 25 lines).
- If appropriate a *temporary variable* was replaced with getters.
- Avoided *message chains*.
- Virtually no *switch statements* (in `EventHandler`).
- *Comments* never really necessary (maybe when drawing messages in `SequenceView`).

Refactoring - Tools

The screenshot shows the 'Java Code Issues' settings window. On the left, a tree view lists various issue categories. Under 'Method metrics', 'Overly long method' is selected and highlighted in blue. To the right of the list, each item has a yellow square icon and a checkbox. 'Overly long method' has both checked. The right pane, titled 'Description', contains text explaining the issue and a field for the 'Non-comment source statements limit'. Below the description, the 'Severity' is set to 'Warning' and 'In All Scopes' is checked. The 'Options' section shows the 'Non-comment source statements limit' set to 20.

Issue Category	Issue Name	Severity	In All Scopes
Method metrics	Constructor with too many parameters	Warning	Checked
	Method with more than three negations	Warning	Unchecked
	Method with multiple loops	Warning	Unchecked
	Method with multiple return points	Warning	Unchecked
	Method with too many exceptions declared	Warning	Unchecked
	Method with too many parameters	Warning	Checked
	Overly complex method	Warning	Checked
	Overly coupled method	Warning	Unchecked
	Overly long lambda expression	Warning	Unchecked
	Overly long method	Warning	Checked
Overly nested method	Warning	Unchecked	
Modularization issues			
Naming conventions			

Description

Reports methods that are too long. Methods that are too long may be confusing, and are a good sign that refactoring is necessary.

Use the field below to specify the maximum number of non-comment source statements a method is allowed to have.

Severity: Warning In All Scopes

Options

Non-comment source statements limit:

- weekly meeting with assistant
- +- 40 hours per person
- designed, refactored, tested, redesigned, ... in no particular order

Demonstration