# 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

# Domain Model - UML

*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.

$\rightarrow$ 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`).
$\rightarrow$ 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.

# Event Handling - Commands

*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`.

# Event Handling - Example

Vid. Sequence diagram for *Add Party*.

# Drawing - Paint Board

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
- ...

$\rightarrow$ it is a `Facade`

# Drawing - Displaying Elements

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

- `SubWindow` draws title bar, close button, frame.
- `DiagramView` draws diagram with messages, parties, ...
  $\rightarrow$ use of `Visitor` pattern to generate figures (representations) for these diagram components.
  $\rightarrow$ these figures are `Flyweights`.
  $\rightarrow$ 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

# Extensibility - Diagram Visitors

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

# Extensibility - Commands

`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`?
  $\rightarrow$ bloated `Command` abstract class (`Visitor` pattern discussion)
- if `Chain of Responsibility` is long
  $\rightarrow$ 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
  $\rightarrow$ redesign probably warranted.

# Extensibility - Model

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

91% classes, 88% lines covered in 'all classes in scope'

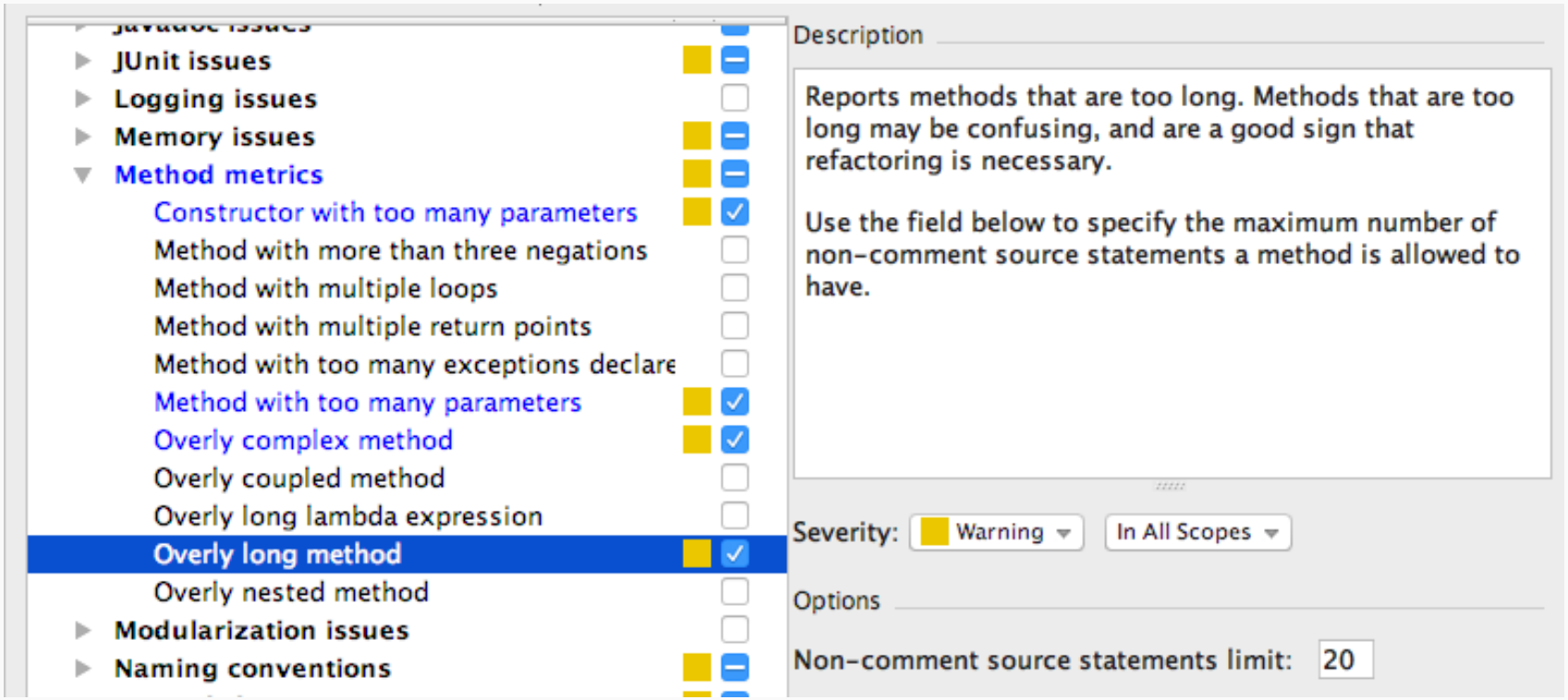
| Element | Class, % | Method, % |
|---|---|---|
| interactr.cs.kuleuven.be.domain | 90% (9/10) | 84% (78/92) |
| interactr.cs.kuleuven.be.exceptions | 78% (11/14) | 100% (3/3) |
| interactr.cs.kuleuven.be.ui.comm... | 88% (16/18) | 85% (34/40) |
| interactr.cs.kuleuven.be.ui.control | 100% (14/14) | 86% (172/199) |
| interactr.cs.kuleuven.be.ui.design | 100% (10/10) | 89% (51/57) |
| interactr.cs.kuleuven.be.ui.geome... | 100% (2/2) | 90% (19/21) |
| interactr.cs.kuleuven.be.ui.Contro... | 100% (1/1) | 94% (18/19) |
| interactr.cs.kuleuven.be.ui.Event... | 100% (1/1) | 100% (13/13) |
| 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*
  $\rightarrow$ 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



# Time Management

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

# Demonstration