# Software Architectures

Assignment 1: Design Patterns

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Deadline:  $6^{th}$  March 2014, 23:59

For this assignment, you will get in touch with the Eclipse Graphical Editing Framework (GEF). The purpose of the GEF is to allow developers to take existing application models and quickly create graphical editors for it.

In this assignment, you have to identify design patterns used in the implementation of graphical editors with the GEF and in the implementation of GEF itself.

## Assignment

For this assignment you will write a report, which shows that you are able to identify design patterns in existing code and to describe them with your own words. The assignment consists of two exercises which are described below. Furthermore, you will find a short description of how to setup Eclipse to be able to use GEF in the last section of this document.

**Deadline**  $6^{th}$  March 2014 at 23:59. The deadline is fixed and cannot be extended.

Deliverables Write a report, in English. The report should be handed in as a single PDF file on the Software Architectures course page in PointCarré. Click on Assignments (Opdrachten) > Assignment 1. The file should follow the naming schema (Firstname-Lastname\_)\*1.pdf, for example: Kennedy-Kambona\_Janwillem-Swalens\_1.pdf.

**Team work** You are allowed to work alone, or in a team of two. Only one of you should submit the report on PointCarré, but be sure to mention both names in the report!

Grading The exercises will be graded and can become subject of an additional defense.

### Exercise 1

First, set up Eclipse and the Shapes example application, using the instructions in the section *Preparing Eclipse*. For this exercise, identify the following design patterns in the GEF Shapes example application:

- 1. Factory Method (Creational Pattern)
- 2. Command (Behavioural Pattern)
- 3. State (Behavioural Pattern)
- 4. Composite (Structural Pattern)
- 5. Singleton (Creational Pattern)

Be aware that real instances of these patterns do not need to follow the exact naming conventions of the Design Patterns book. However, they often do.

Find one occurrence for the listed patterns and do the following for each of them:

- Describe the participants.
- Describe the motivation and application of the pattern in its concrete situation in 20-50 words. Do not give a general description of the design pattern.
- Create a class diagram showing the involved participants. Only include elements necessary for the design pattern.

#### Exercise 2

The Model-View-Controller pattern (MVC) is an architectural pattern that is built up using the Observer pattern. It is used mostly to build (graphical) user interfaces. Figure 1 is a simple diagram that depicts the relationship between Model, View, and Controller:



Figure 1: Model-View-Controller design pattern

The GEF also relies on the MVC pattern as one of its main design principles, but it differs from the pattern introduced in the lecture. Find the MVC pattern application in the shapes example application and report on the following points:

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- List of participants.
- Differences to the normal MVC pattern in 50-100 words.
- Adapted versions of the given MVC diagrams (class and interaction diagram) which reflect the MVC pattern used in the Eclipse GEF Shapes example application.

## **Preparing Eclipse**

The assignment was designed using **Eclipse for RCP and RAP Developers** and GEF 3.9.

What follows is a short step by step description on how to setup Eclipse for your platform and to access the Shapes example application needed for this example.

- 1. Download "Eclipse for RCP and RAP Developers" from http://www.eclipse.org/downloads/.
- 2. Extract the downloaded file to a path of your choice and start Eclipse. It is recommended to create an empty workspace for these assignments.
- 3. Go to Help > Install New Software...
- 4. Click Add..., and add the following repository:

```
Name: GEF
```

```
Location: http://download.eclipse.org/tools/gef/updates/releases/
Confirm with OK.
```

- 5. Once the data has been loaded, select "Graphical Editing Framework GEF SDK" 3.9.1 and "Graphical Editing Framework GEF Examples" and press Next >
- 6. Complete the dialog and the GEF will be installed, with its examples.
- 7. After restarting Eclipse, choose File > New > Example...
- 8. Create a GEF Plugins project by selecting *Shapes* in the "GEF (Graphical Editing Framework) Plug-ins" category.
- 9. Now complete the dialog and an Eclipse plugin will be created that contains the example code you need to complete the assignment.
  Remark: to find the code of the framework itself, you can either use the Eclipse Java search or navigate to the framework classes with cmd/ctrl + right click.
- 10. Optional: to experiment with an actual diagram (as in figure 2), choose File > New > Example... Select Shapes Diagram in the category "GEF (Graphical Editing Framework)". The actual shapes for the diagram can then be found under Window > Show View > Other... > General > Palette.



Figure 2: Screenshot of the GEF shapes example