Separation of concerns and Model Driven Development Applied to Web Systems

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ABSTRACT
Aspect-oriented software development and model-driven software development are two approaches that have been widely accepted by the research community. Combining both of them, our software can be better adapted to changes of requirements and technology. This paper introduces a thesis project that is based on these two props, and also proposes the use of concern modelling languages to adopt the Model-Driven Architecture approach and rise the level of abstraction of current aspect modelling languages.

Keywords
Model Transformation, MDA, Aspect-Oriented Programming

1. INTRODUCTION
Software industry has a special feature that makes it different from other industries: the high rate of changes that it has to support in a short period of time. Thus, many times its survival depends on its ability of adaptation to changes. This adaptation capacity can be focused on two main lines: requirement's variability and technological advances.

In order to cope with these two aims, this research project is based on two main props: aspect-oriented software development (AOSD) [2] and model driven architecture (MDA) [5]. On the one hand, aspect-oriented software development improves software evolution, because changes are better localized and dependencies are minimized. On the other hand, MDA helps to face up to technological changes due to its different levels of modelling (Computation Independent Model, Platform Independent Model and Platform Specific Model).

By means of these two approaches, we have our system separated in two dimensions. While the AOSD provides an horizontal separation of concerns, we can think of MDA as a way of providing a vertical separation between the main functionality of a system and the implementation details in specific platforms. Figure 1 shows a scheme of these two dimensions.

The model-driven development (MDD) paradigm has made models to be the main artifacts during the development of a software project, and also has made transformations to play a key role in the life cycle. Currently there are two main approaches for a model-driven development: on the one hand, the MDA, proposed by the OMG, and, on the other hand, the Software Factories [3] proposed by Microsoft, an approach that is based on domain specific languages and software factories. Although it seems that both approaches clash, they can be used together [4].

The rest of the paper is structured as follows: firstly, the research hypotheses are introduced, after that, a list of the expected contributions is enumerated, then, a list of questions is proposed, and, finally, the paper is concluded.

2. RESEARCH HYPOTHESES
After having in mind these ideas, a survey of current aspect-modelling languages was made [6], and as a result it was stated that they were low-level and general purpose. Low-level means that they use construct that are very near to the ones used in programming languages, and general purpose means that these constructs are thought to specify every kind of aspects. So, in a certain way, we think that they are platform-dependent, that is, they have been thought to generate directly code expressed with some aspect-oriented language.

In order to adapt this idea to the Model-Driven Architecture approach, we think that it is necessary to rise the level of abstraction of current aspect modelling languages. Thus, most of the studied proposals should be left for platform specific modelling.

Therefore, to rise the level of abstraction we propose the use of concern specific modelling languages. A concern specific language [1] is a programming language or executable specification language that offers, through appropriate notations and abstractions, expressive power focused on, and usually restricted to or in support of, a particular crosscutting concern, comprising implicit or explicit quantification over events in the dynamic control flow.
With these CSL’s, comprehensibility and maintainability will be increased. And also evolvability, specially if a repository of such CSL’s is provided. Furthermore, a bridge is built between the Software Factories and the MDA approaches.

After having done a survey of current aspect modelling languages, a study of the state-of-the-art and the available tools for dealing with MDA and transformations should be made. The idea is to follow an bottom-up approach, in the sense that we will start with the study of transformations and current aspect modelling languages, that is, the platform specific modelling level, and after that, to rise the level of abstraction. To do so, a repository of concern modelling languages should be defined and created. The purpose is to have navigation as our study case at this level. These hypotheses drive us to the expected contributions detailed in the next section.

3. MAIN CONTRIBUTIONS

The main expected contributions can be divided into three main groups:

- In this task, a comparative study of tools (commercial and free) to support MDD must be done. This study must include tools that follow the MDA standard, the proposal of the OMG for MDD, and also tools that are focused on transformations.
- At the platform specific modelling level, the contribution will be the definition of the set of transformations needed to weave current aspect-modelling languages at this level.
- At the platform independent modelling, the definition of a repository capable of storing high-level aspects, that is, aspects that are expressed in a concern specific modelling language. But also, the definition of transformations needed to obtain PSM from PIM, having navigation as a study case.

4. DISCUSSION

The three main important questions to discuss about my research are the following ones:

- How do I evaluate and validate my work?
- How do I identify and formulate precisely my contributions?
- How do I know when the problem is enough closed, surrounded and concretized?

5. ACKNOWLEDGMENTS

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6. REFERENCES


