

Abstract

On Verifying the Use of a Pattern Language in Model Driven Design

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Concordia University, 2009

This thesis addresses the problem of verifying the application of a Pattern Language in a design that is built based upon the patterns of the language in a Model-Driven approach. Exploiting the ideas of compilers, we propose a process named Pattern Language Verifier (PLV). We argue that building a PLV for a given Pattern Language, requires the Structural, Syntactic, and Semantic rules of the language to be precisely defined. We present three formalisms for defining these three groups of rules. PLV is a profile-driven process and assumes that a UML Profile is already defined for the underlying Pattern Language.

PLV consists of four phases: Pattern Structural Verifier (PSV), Pattern Language Syntactic Verifier (PTV), Pattern Language Semantic Verifier (PMV), and Pattern Language Advisor (PLA). PSV verifies the structure of every single pattern used in the design model. PTV verifies the relationships between the detected patterns. PMV verifies the semantic aspects of the patterns. PLA reports the problems to the designer and guides him/her in fixing the errors.

For the case study, a group of enterprise architectural patterns is selected as the Pattern Language. The Structural, Syntactic, and Semantic rules of the language are defined using the proposed formalism, and a UML Profile is defined for the language. A PLV is designed and implemented as an integration into an open source modeling tool. The tool is then utilized in designing a sample web application: Online Student Registration System. The usefulness of the tool is represented by walkthrough scenarios that show finding the mistakes in the model and helping the designer repair the detected problems.