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Achieving Model Quality through Model Validation, Verification and Exploration

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Abstract

System development strategies, like model-driven engineering (MDE), help to abstract architectures and provide a promising way to deal with architecture complexity and design quality. Thus, the importance for the underlying models to be correct arises. Today's validation and verification tools should support the developer in generating test cases and provide good concepts for fault detection. We here introduce and structure essential use cases for model validation, verification and exploration that help developers find faults in model descriptions and thus enhance model quality. Along with the use cases, we demonstrate a modern instance finder for UML and OCL models based on an implementation of relational logic and present the results and findings from the tool.

Keywords: UML and OCL model, constraint, invariant, model validation, model verification, model quality.

1. Introduction

Model-driven engineering (MDE) is a software development paradigm that in the first place focuses on models and not on code. One purpose of a model is abstraction. A model can catch a system by abstracting its complexity through reduction of information, however preserving properties relative to a given set of concerns [1]. One advantage of MDE may be seen in the fact that a model is able to disregard details of different implementation dependent platforms, thereby allowing to concentrate on essentials characteristics that are valid for many platforms.

Today, modeling languages, such as the UML (Unified Modeling Language) which comprises the OCL (Object Constraint Language), have found their way into mainstream software development. Models are the central artifacts in MDE because other software elements like code, documentation or tests can be derived from them using model transformations. Finding correct and expressive models is important. Common model quality improvement techniques are model validation (“Are we building the right product?”) and model verification (“Are we building the product right?”) [2]. Among

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