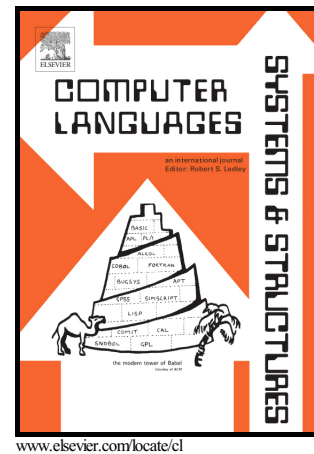


Author's Accepted Manuscript

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PII: S1477-8424(16)30094-X
DOI: <http://dx.doi.org/10.1016/j.cl.2016.11.001>
Reference: COMLAN240

To appear in: *Computer Language*

Received date: 8 July 2016
Revised date: 10 October 2016
Accepted date: 4 November 2016

Cite this article as: Pablo Gómez-Abajo, Esther Guerra and Juan de Lara, A domain-specific language for model mutation and its application to the automated generation of exercises, *Computer Language* <http://dx.doi.org/10.1016/j.cl.2016.11.001>

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A Domain-Specific Language for Model Mutation and its Application to the Automated Generation of Exercises

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Abstract

Model-Driven Engineering (MDE) is a software engineering paradigm that uses models as main assets in all development phases. While many languages for model manipulation exist (e.g., for model transformation or code generation), there is a lack of frameworks to define and apply model mutations.

A model mutant is a variation of an original model, created by the application of specific model mutation operations. Model mutation has many applications, for instance, in the areas of model transformation testing, model-based testing or education.

In this paper, we present a domain-specific language called WODEL for the specification and generation of model mutants. WODEL is domain-independent, as it can be used to generate mutants of models conformant to arbitrary meta-models. Its development environment is extensible, permitting the incorporation of post-processors for different applications. In particular, we describe WODEL-EDU, a post-processing extension directed to the automated generation of exercises for particular domains and their automated correction. We show the application of WODEL-EDU to the generation of exercises for deterministic automata, and report on an evaluation of the quality of the generated exercises, obtaining overall good results.

Keywords: Model-Driven Engineering, Domain-Specific Languages, Model Mutation, Education, Automatic Exercise Generation and Correction

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