TOWARDS A METAMODEL FOR EXTENDED QUEUING NETWORKS

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Abstract
This paper focuses on the development of EQNM²L which is an extended queuing modelling and markup language. We discuss the DSML metamodel and its XML-based exchange format which represent the cornerstone of the development process. EQNM²L enhances interoperability between a wide range of analytical solvers and simulation tools dealing with systems performance evaluation and based on the extended queuing theory. Furthermore, the Model Driven Engineering approach allows automatic generation of modelling environments and simulation/analytical codes which improve productivity and quality. Our aim is to induce discussion on and contributions for elaborating the whole metamodel and providing a starting point for the development of a standard inter-change format.

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Key Words: Extended Queuing Systems, Metamodelling, Domain Specific Modelling Language, Discrete Event Simulation, Interoperability

1. INTRODUCTION

Several Domain Specific Modelling Languages (DSMLs) have been developed in the last decade. Their use gained a lot of success and a growing popularity. However, developing a DSML is still a challenging and time-consuming task. Domain specific modelling (DSM) often also includes automating the code generation directly from the DSM models. Automatic creation and maintenance of source code increases significantly developer’s productivity. The reliability of automatic generation compared to manual coding will also reduce notably the number of defects in the resulting code thus improving quality.

Queuing network models have been used extensively as a modelling paradigm for deriving analytical as well as simulation based performance measures. They are commonly used to model a wide range of discrete event systems. Kendall’s notation is a mean for describing queuing networks especially in case of simple systems. For complex ones, a graphical notation with textual annotations is used instead. To analyse a model either by simulation or by mathematical analytic tools, the model is commonly coded and saved directly in a proprietary simulation/analysis tool file format. Although it is the same formalism, there are always some ambiguities and disagreements on certain concepts as well as on the exchange format. Therefore, tools are not interoperable and models can’t be reused. In addition to reconstructing models from scratch every time the tool is changed, the development of modelling environments and model transformations, including code generation, are time-consuming, very expensive and hard to validate and maintain. Model Driven Engineering (MDE) based on the concept of metamodelling seems to be the best solution to these problems.

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must be involved in order to improve different aspects of this DSML. This includes more complete metamodel, more concise semantics and more adequate visual or concrete syntax. In addition the proposed exchange format must also reflect those efforts. In our opinion, it is much easier to conclude an agreement on a DSML than a specific tool.

REFERENCES


