Title

An Executable Formal Framework for Inter-DSL Collaboration

Abstract

Our proposed framework provides a model-based approach for formally coordinating the execution semantics of independent Domain-Specific Languages (DSLs). The framework consists of two main parts: modeling and formal specification. The modeling part of our framework involves several key assets, including DSL Metamodels which specify the semantics of the DSLs being collaborated, Composition Metamodels which relate the semantic domains of independent DSLs, DSL Models that define instances of the metamodels, and BPMN Diagrams which describe the collaboration between the DSLs. To build these models and metamodels, we use the Eclipse Modeling Framework (EMF). In the formal specification part, the *DSLs and Composition B Machines* are generated from the DSLs models and metamodels to instrument DSLs with formal semantics using the B method, the *CSP Process Model* is specified from the BPMN diagrams to enable inter-DSL animation and verification. The *Meeduse Framework* is used for generating the B specifications and the the *ProB Animator and Model Checker* for their animation.

Keywords

DSL · BPMN · Model Composition · Models Collaboration· Formal Methods · B Method · CSP · Animation · Verification.

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The format of the artefact is source code listed in tow folders: DSLs\_Modeling, and DSLs\_Formal\_Specification.

To view the DSLs metamodels and the models, you should download and run *Eclipse Modeling Framework* (<https://www.eclipse.org/downloads/packages/release/2022-12/r/eclipse-modeling-tools>), and install BPMN2 Modeler (https://www.eclipse.org/bpmn2-modeler/downloads.php).

To animate the DSLS B specifications, you should download and run the the *ProB Animator and Model Checker* (https://prob.hhu.de/w/index.php?title=Download).

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