Introduction

- Model Driven Development (MDD) places models at the heart of all software development processes.
- Methods to describe, control, and verify the evolution and manipulation of models are thus urgently required.
- The theory of graph transformation provides a rule-based approach to manipulate graphs.
- However, graph rewriting rules are hard to get right without adequate tool support.
- The Operation Recorder provides the required tool support, but lacks the required formal background.
- If an alignment between the concepts provided by the Operation Recorder and those provided by the theory of graph transformation is achieved, we’re one step closer to our goal.

Graph Transformation Theory

- A graph rewriting rule is described by a left-hand side L, an interface graph K, and a right-hand side R.

Is this a valid rewriting rule?

Answer: Yes and no, it depends on the employed approach.

Operation Recorder

- A tool survey was conducted, which compared the features of AG6, EMF Tigris, Fujaba, and the Operation Recorder. Their modeling capabilities were tested with the Pull-up field refactoring. The Operation Recorder won, Fujaba hard on its heels.
- The Operation Recorder provides a by-demonstration environment, which allows the user to demonstrate the intended transformation.
- An operation is derived by comparing the initial and the revised model.
- Operations are described with pre- and postcondition templates.
- Advanced templates: optional, non-existence, and iteration templates as well as negative application conditions.

Conceptual Alignment

- Aim: Align the concepts provided by the Operation Recorder to those provided by the graph transformation theory.
- Establish a measure of equivalence to compare the concepts.
- Extend the theory to template graphs.

Equivalent concepts are identified by comparing the results they produce.

Conclusion

- A framework capable to transform software models, i.e., attributed graphs with inheritance, composition, and multiplicities, was gradually established.
- By embedding the Operation Recorder into this framework, standard, optional, and non-existence templates as well as negative application conditions were successfully aligned.
- The achieved alignment provides a formal foundation for the Operation Recorder allowing the verification of and reasoning about the modification it performs.


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