

Interactive Transformations for Visual Models

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Abstract: Model transformations are an essential and integral concept of Model Driven Engineering (MDE). However, when using state of the art modeling tools, transformations are typically executed silently and at once in the background.

This entails three main limitations. First, there is a lack of flexibility. This includes the transformation itself as well as the overall tooling. It is hardly possible to add further visualizations to the execution in a generic and re-usable way, or to react to an executed transformation. Second, no insights of the transformation process are revealed, which makes it both hard for the user to understand and hard for the developer to debug and verify without tooling that supports further debugging facilities. Third, there is few potential for further interactivity. Transformations can be applied but not, i. e., executed in smaller chunks, where the execution of a chunk can be undone.

We present a flexible concept to define arbitrary model transformations combined with graphical visualization and user interactivity. In our paper, we focus on applying this concept to monolithic transformations by breaking them up into steps of a certain granularity. The key idea is the integration into a view management, which then serves as a layer on top of the actual transformation execution. The view management maintains generic re-usable visualizations, e. g., highlighting, or automatic layout, and executable fine-granular, or modularized transformations. The visualizations and transformations can be combined in a flexible way while obeying user-interaction. Furthermore, we discuss the question of how interaction can be introduced for a certain transformation and which criteria this transformation has to fulfill.

To provide first evaluations, an implementation of the approach has been based on and integrated into the Eclipse platform as part of the Kiel Integrated Environment for Layout Eclipse Rich Client (KIELER) project¹. Thus, the implementation can be re-used by EMF-based Eclipse projects. A case-study presents an interactive and visualized transformation implementation of the synchronous textual language Esterel to SyncCharts, a synchronous Statecharts dialect. The decision whether to transform atomic Esterel elements one-by-one, undo applied transformations, or to transform the whole model at once, is left to the user. It is also possible to start with one-by-one transformations and then apply the rest of the overall transformation. Besides, we present a prototype of a structurebased editing implementation.

Regarding possible future work, it would be desirable to have a framework that allows the user to easily define explicit model transformations during runtime and combine them with arbitrary visualizations. This would enable users to adapt or create transformations according to their needs. Additionally, further practicability tests should be performed, especially concerning user experiences, to provide profound evaluations.

¹<http://www.informatik.uni-kiel.de/rtsys/kieler/>