**D3.1.1 Review of model-to-model transformation approaches and technologies**

ModelWriter

Text & Model-Synchronized Document Engineering Platform

Project number: ITEA 2 13028

Work Package: WP3

Task: T3.1 - Review of M2M transformation approaches

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1. Introduction
   1. Role of the deliverable

This document consists of a review of model transformation approaches in general and model to model transformation approaches in specific. Also, the document will discuss the selection of the most convenient and widely used transformation approach in the industry for inclusion into the ModelWriter tool. It may be up-dated depending on the further details and requirements we get during the project.

* 1. The List of Technical Work Packages

|  |  |
| --- | --- |
| UC Code | Requirements derived from |
| WP2 | Semantic Parsing and Generation of Documents and Documents Components |
| WP3 | Model to/from Knowledge Base (synchronization mechanism) |
| WP4 | Knowledge Base Design and Implementation |
| WP6 | Architecture, Integration and Evaluation |

* 1. Structure of the document

This document is organized as follows:

Chapter 1 introduces the document.

Chapter 2 reviews the model transformation approaches in different groups and for various uses which are available as the state-of-the-technology.

Chapter 3 compares the available approaches and compares them considering their pros and cons.

Chapter 4 discusses the approach selected for the ModelWriter tool

Annex 1 Demonstration examples of various transformation approaches

* 1. Terms, abbreviations and definitions

|  |  |
| --- | --- |
| Abbreviation | Definition |
| M2M | Model to Model Transformation |
| M2T / M2C | Model to Text or Model to Code Transformation |
| WP | Work Package |
| UC | Use Case |
| KB | Knowledge base |
|  |  |

1. State-of-the-technology

The notion of model transformation is central to model-driven development. A model transformation, which is essentially a program which operates on models, can be written in a general-purpose programming language, such as Java. However, special-purpose model transformation languages can offer advantages, such as syntax that makes it easy to refer to model elements. For writing bidirectional model transformations, which maintain consistency between two or more models, a specialist bidirectional model transformation language is particularly important, because it can help avoid the duplication that would result from writing each direction of the transformation separately.

* 1. Preliminaries

Model transformations and languages for them have been classified in many ways.[1][2] Some of the more common distinctions drawn are:

Number and type of inputs and outputs]

In principle a model transformation may have many inputs and outputs of various types; the only absolute limitation is that a model transformation will take at least one model as input. However, a model transformation that did not produce any model as output would more commonly be called a model analysis or model query.

Endogenous versus exogenous

Endogenous transformations are transformations between models expressed in the same language. Exogenous transformations are transformations between models expressed using different languages [3]. For example, in a process conforming to the OMG Model Driven Architecture, a platform-independent model might be transformed into a platform-specific model by an exogenous model transformation.

Unidirectional versus bidirectional

A unidirectional model transformation has only one mode of execution: that is, it always takes the same type of input and produces the same type of output. Unidirectional model transformations are useful in compilation-like situations, where any output model is read-only. The relevant notion of consistency is then very simple: the input model is consistent with the model that the transformation would produce as output, only.

For a bidirectional model transformation, the same type of model can sometimes be input and other times be output. Bidirectional transformations are necessary in situations where people are working on more than one model and the models must be kept consistent. Then a change to either model might necessitate a change to the other, in order to maintain consistency between the models. Because each model can incorporate information which is not reflected in the other, there may be many models which are consistent with a given model.

* + 1. Level 3 Header

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ATL

Ad hoc

ETL

Atom3

Extend

Higher Order Transformations (HOTs)

QVT

Categories:

M2M

M2T

Eclipse based

Industrial Tooling

1. Comparison
2. Selected approach
3. Conclusion and way forward

References

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Appendixes

Appendix 1

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