

Supporting the Interoperability between Domain-specific Agent Modeling Languages with Horizontal Model Transformations

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Abstract

In Agent-oriented software engineering, domain-specific modeling languages (DSMLs) are developed mostly for the implementation of multi-agent systems (MAS) according to model-driven engineering (MDE) principles. These DSMLs both support MAS modeling and code generation with the help of their accompanying integrated development environments. The conventional approach, currently followed in the development of these MAS DSMLs, requires the definition and the implementation of new model-to-model and model-to-text transformations from scratch in order to make the DSMLs functional for each different agent execution platform. Inside this approach, MAS DSML designers should repeat all time-consuming and troubled steps of preparing vertical transformations which are required between the related DSMLs and new agent execution platforms. In this project, an alternative approach, which considers the construction of the interoperability between MAS DSMLs for a more efficient way of platform support extension, is developed. The feasibility of using this new interoperability approach instead of the conventional approach is exhibited by discussing and evaluating the MDE required for the application of both approaches. Use of the approaches is also exemplified with a case study which covers the model-driven development of an agent-based stock exchange system. In comparison to the conventional approach, evaluation results show that the interoperability approach requires both less development time and effort considering design and implementation of all required transformations. Due to working in the same abstraction level, tasks for mappings entities and implementing model transformations become more convenient and effortless comparing with the construction of the chain of model-to-model and model-to-text transformations needed inside the conventional approach in order to enrich the platform extensibility of MAS DSMLs.

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Project Team:

Assoc. Prof. Dr. Geylani KARDAS (Principal Investigator)

Asst. Prof. Dr. Moharram CHALLENGER (Researcher)

Emine BIRCAN (Researcher) (M.Sc. Student)

Baris Tekin TEZEL (Researcher) (Ph.D. Student)

Sercan DEMIRCI (Researcher) (Ph.D. Student)

Related Publications:

1. Kardas, G., Bircan, E. and Challenger, M. (2017) "[Supporting the platform extensibility for the model-driven development of agent systems by the interoperability between domain-specific modeling languages of multi-agent systems](#)", Computer Science and Information Systems, vol. 14, no. 3, pp. 875-912, DOI: 10.2298/CSIS170113034K.
2. Bircan, E. (2017) "*Horizontal Transformations between Platform Independent Metamodels of Software Agents*", M.Sc. Thesis, Ege University, 91 pages.
3. Bircan, E., Challenger, M. and Kardas, G. (2016) "[Interoperability of MAS DSMLs via Horizontal Model Transformations](#)", In proceedings of the 4th Workshop on Model Driven Approaches in System Development (MDASD 2016), held in conjunction with 2016 Federated Conference on Computer Science and Information Systems (FedCSIS 2016), September 11-14, 2016, Gdansk, Poland, IEEE Conference Publications, pp. 1555-1564, DOI: 10.15439/2016F196.