A Domain Specific Modeling Language for Semantic Web enabled Multi-agent Systems

The Scientific and Technological Research Council of Turkey (TUBITAK) Academic Research Funding Program Directorate (ARDEB) Electrical, Electronics and Informatics Research Grant Committee (EEEAG) and Slovenian Research Agency (ARRS) funded bilateral research project (TUBITAK ARDEB Grant no: 109E125)

Received TUBITAK Project Performance Award in 2017

TÜBİTAK

Abstract

Software agents are considered to be autonomous entities which contain intelligence that serves for solving their selfish or common problems, and to achieve certain goals. These agents constitute Multi-agent Systems (MAS). However, the autonomous, responsive, and proactive natures of agents make the development of agent-based software systems more complex than other software systems. Furthermore, the design and implementation of a MAS may become even more complex and difficult to implement when considering new requirements and interactions for new agent environments like the Semantic Web. Both domain-specific modeling and the use of a domain-specific modeling language (DSML) may provide the required abstraction, and hence support a more fruitful methodology for the development of MASs. Within this context, a DSML has been developed for the design and implementation of MAS with including all of its components and supporting software tools in this project. In addition to the classical viewpoints of a MAS, the proposed DSML includes new viewpoints which specifically support the development of software agents working in the Semantic Web environment. At first, a metamodel and an abstract syntax were defined for the DSML. Later, both graphical and textual concrete syntaxes were developed. Upon completion of the formal definition of the semantics, operational semantics was derived via model transformations in order to provide the real implementation of the designed MAS models. Codes for the agent software can be automatically achieved as the result of applying model to code transformations. All required tools for MAS modeling and developing software according to the DSML were also constructed in this project.

Start Date: March 1, 2010

End Date: March 1, 2013

Total Budget: 129.144 TL (~$86,000)

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Related Publications:

1. Challenger, M., Kardas, G. and Tekinerdogan, B. (2016) "*A systematic approach to evaluating domain-specific modeling language environments for multi-agent systems*", Software Quality Journal, vol. 24, no. 3, pp. 755-795, DOI: 10.1007/s11219-015-9291-5.

2. Challenger, M., Mernik, M., Kardas, G. and Kosar, T. (2016) "*Declarative specifications for the development of multi-agent systems*", Computer Standards & Interfaces, vol. 43, pp. 91-115, DOI: 10.1016/j.csi.2015.08.012.

3. Challenger, M. (2016) "A Domain-specific Modeling Language for Semantic Web enabled Multi-agent Systems", Ph.D. Dissertation, Ege University, 186 pages.

4. Getir, S., Challenger, M. and Kardas, G. (2014) "*The formal semantics of a domain-specific modeling language for semantic web enabled multi-agent systems*", International Journal of Cooperative Information Systems, vol. 23, no. 3, pp. 1-53, DOI: 10.1142/S0218843014500051.

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