Chapter VII

Conceptual Model Driven Software Development (CMDSD) as a Catalyst Methodology for Building Sound Semantic Web Frameworks

Thomas Biskup, Carl von Ossietzky University, Oldenburg, Germany

Nils Heyer, Carl von Ossietzky University, Oldenburg, Germany

Jorge Marx Gómez, Carl von Ossietzky University, Oldenburg, Germany

Abstract

This Chapter introduces Hyperservices as a unified application model for Semantic Web frameworks, and proposes Conceptual Model-Driven Software Development as a means of easy adoption to them. Hyperservices are based on agent societies, provided with structured information by the Semantic Web, and using Web services as a collaboration and communication interface. Afterwards, the WASP model is proposed as a framework for implementing

Hyperservices, also adding personalization rules to modify the agents' perception as well as the HIVE Architecture as Semantic Information Server infrastructure within the WASP framework. For easier adoption of these new models, Conceptual Model-Driven Software Development is proposed. It separates the conceptual aspects from the technical details by automatically generating executable code from models while the implementation details are hidden to the end user, the service developer.

Overview

The Semantic Web and its effects are a mainstream catalyst for current Web development. Its influence is felt across many areas of research and business development: Agent systems, knowledge management frameworks, ontology definitions, and other areas are all refined by new ideas from Semantic Web research (and vice versa). Since many complex topics are now combined with the goal of building the "Next Generation Internet", it becomes more and more important to build sound and flexible frameworks to abstract the implementation details of the underlying technologies.

As underlying technologies are still in a state of flux as far as their implementation details are concerned, it seems to be very important to find a simple yet appropriate meta-model for the overall architecture which can be used to follow a kind of model-driven approach: Model the required system in a meta-level and then derive the actual implementation by transforming the model into executable code (or even directly executing the model). This approach allows both the early adoption of Semantic Web technologies and a continuing evolution of the implementation details.

Research shows that the underlying methodology for defining Semantic Web-oriented frameworks can be defined very well. This chapter will explain the main streams which will be integrated towards the Semantic Web and more importantly show, based on a thorough requirements analysis, how Semantic Web-oriented systems might be structured in a simple meta-model, allowing more detailed specification as research progresses. A new software development methodology, named Conceptual Model-Driven Software Development or CMDSD for short, which is currently under development in our research team, is used to provide a notion of the appropriate meta-models which will allow the early adoption of Semantic Web technologies in standard industrial projects.

The following steps in this chapter will lead to an early-stage meta-model which might be used to connect Semantic Web frameworks in an easy and non-intrusive way with standard projects:

- The main research streams and technologies making up the Semantic Web are identified. Their interrelations and resulting requirements for frameworks and systems are shown.
- An in-depth requirements analysis concerning the architecture of Semantic Web systems and the must-have features of such features provides the groundwork for the definition of the cornerstones of future Semantic Web systems. It will be shown that

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