XTT Rule Design and Implementation with Object-Oriented Methods*

Grzegorz J. Nalepa

Institute of Automatics,
AGH University of Science and Technology,
Al. Mickiewicza 30, 30-059 Kraków, Poland
gjn@agh.edu.pl

Abstract. In the paper certain knowledge and software engineering methods integration issues are discussed. The principal idea is to consider an effective design and implementation framework for rule design with UML, and implementation with Java. The solution proposed in the paper consists of using a custom knowledge engineering design method for rules in the design stage. The rulebase is then transformed to UML behavioral diagrams, which can be considered a visual encoding. The rule implementation involves the serialization to Java (or other OOPL) language using classes representing the decision tables grouping rules. The approach presented in the paper is aimed at overcoming the semantic gap present in the classic software engineering approach.

The paper is organized as follows. In the first section a brief introduction to the main challenges of using OOM with knowledge engineering methods are outlined, including the declarative nature of knowledge representation methods, and the semantic gap in the software engineering process. The second section of the paper presents the motivation for the research, including the development of knowledge-based methods for software design and verification. Then, in the third section the principles of the HeKatE methodology. Main goals of the methodology are to deliver

- rule-based design methods for knowledge-based systems, that could be effectively integrated into business applications,
- UML-based integration of these methods at the design level,
- OO interface at the runtime level,
- formal verification of application logic with continuous quality control during the application development cycle.

The core of the methodology is the XTT^2 rule representation and design method discussed in this section. The fourth section is dedicated to the presentation of the approach, including the UML-based representation f rule prototypes, as well

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as the XTT^2 decision tables and trees structure, using structure and behavioral diagrams. At the runtime level the rulebase is serialized (encoded) into a class-based representation, allowing for execution. In the next section the UML representation details are given. The sixth section is dedicated to the presentation of the OO serialization. The last section gives an evaluation of the approach, and outlines the future work, including bidirectional UML translation, as well as possibility of an on-line model verification.