

Proposal of Visual Modeling and Verification of Business Rules Using HADEs Environment

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Abstract: Business Rules allow for defining statements that describe some aspects of the business and precise what can be done in a specific situation. Our work concerns the efficient design and verification of the rule bases. In our previous research the HADEs framework for visual design and verification of the rule bases was developed. This framework provides an on-line verification during integrated hierarchical design process. The main goal of this paper is to propose the HADEs tools as effectively tool for Business Rules modeling.

Keywords: Business Rules, XTT2, visual modeling, BPMN

Business Rules (BR) [1] constitute an approach deriving from Artificial Intelligence. They play important role in business applications and can have a substantial impact on business operation from product development to marketing.

Working on BR modeling, at least the following features of BR must be taken into account: 1) *Unsupported rule modeling*. There are no dedicated tools for rules modeling. The rules are usually designed using textual editors, spreadsheets, etc. 2) *Hard rule maintenance*. Many applications provide the hard-coded BR in the source code, databases, spreadsheets and other hard to manage locations. 3) *Rule semantics defined by SBVR (Semantics of Business Vocabulary and Business Rules)*.

Our research concerns the representation and verification of the rule bases in the RBS (*Rule-Based Systems*) [2]. The result of our research is the SKE (*Semantic Knowledge Engineering*) [3] methodology, which derives from the HEKATE (*Hybrid Knowledge Engineering*) research project [4]. It aims at providing an integrated process for design, implementation, and analysis of the RBS supported by HADEs (*HEKATE design environment*) [5] framework. The main features of this methodology are: 1) *Supported rule modeling*. The HADEs framework provides a set of dedicated tools which support the visual design. 2) *Easy rule maintenance*. The HADEs-based design process consists of three stages. The transitions between stages are formally defined and automatically performed. The modification made in one stage can be automatically propagated into the following stages. 3) *Formal rule semantics*. As the SKE methodology provides a formal rule language, the semantics of the rules is precisely defined [6].

The SKE approach can be applied to a wide range of intelligent systems [7]. In this context, two main areas have been identified: control systems, in the field of intelligent control, and Business Rules [8] and Business Intelligence systems, in the field of Software Engineering.

HADEs supports a complete hierarchical design process for the creation of knowledge bases. The whole process consists of three stages: conceptual, logical and physical design and is supported by a number of tools providing the visual design and automated implementation.

In the Conceptual Design the ARD+ (*Attribute Relationships Diagrams*) [4] method is used for building a graph defining functional dependencies between attributes on which the rules are built. This stage is supported by the following visual tools: HJED (*HEKATE Java Editor*) [5] and HQED (*HEKATE Qt Editor*) [5].

The Logical Design aims at rules designing by using the visual XTT2 (*Extended Tabular Trees version 2*) [9] method. This method is supported by the HQED editor, which is a successor of the Mirella tool [10]. HQED provides GUI and mechanisms for rule visual modeling as well as for integration with other systems. The HQED-based modeling is supported by *Limited Quality Analysis* [11] mechanisms, which increases the quality of a rule base.

The physical implementation (PI) is generated automatically according to the XTT2-based model. HQED allows for generating the PI in the HMR format (*HEKATE Meta Representation*), which can be directly interpreted by the HEART tool (*HEKATE Run Time*) [12]. HEART is a dedicated inference engine for XTT2-based Expert Systems [13]. It allows for storing and exporting models in HMR files, and verifying HMR syntax and logic. HEART has communication and integration facilities, which allow for integration with others tool (e.g. HQED, Wiki [14]).

The important feature provided by HQED is a plugin interface which allows for integrating HADEs environment with other tools. In the context of using HADEs for BR modeling, the HQED tool is being integrated with Oryx editor. The dedicated TCP/IP-based communication protocol has been developed. Currently only a simple communication is supported, where the XTT2 model can be sent to HQED for editing and then again imported to BPMN diagram. This simple communication allows for exploiting the HADEs advantages, during BR modeling.

The future works in this research involve the extension of the presented methodology towards BR. There are considered two directions of research in this context: The first one includes the extension of the XTT2 formalization aiming at providing more rule types into XTT2. The second one concerns the integration of the HADEs framework with other BP or BR modeling tools such as Drools [15] and translation BPMN diagrams to the XTT2 rules [16, 17].

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Propozycja wizualnego projektowania i weryfikacji reguł biznesowych w środowisku HADES

Streszczenie: Reguły biznesowe pozwalają na zdefiniowanie niektórych aspektów działania przedsiębiorstwa i postępowania w danej sytuacji. Badania mają na celu stworzenie efektywnej metody projektowania i weryfikacji reguł biznesowych. Dotychczas opracowano zintegrowane środowisko wizualnego projektowania i weryfikacji reguł. Projektowanie reguł składa się z trzech faz podczas których wytwarzany model jest nieustannie monitorowany pod kątem poprawności składniowej i logicznej. Głównym celem tego artykułu jest pokazanie, w jaki sposób wytworzone środowisko projektowania reguł może zostać użyte do projektowania reguł biznesowych.

Słowa kluczowe: Reguły biznesowe, XTT2, BPMN

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