

An application of rule-based tool in attributive logic for business rules modeling

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Abstract

This paper presents results of the research being conducted in the Department of Applied Computer Science at Faculty of Management, AGH University of Science and Technology and concerning the use of database server for business rules modeling as knowledge based systems in information systems design and development. Our assumption was that most business rules would have complex structure and their interpretation would require new facts to be generated and analyzed, similarly as it happens in expert systems. Another assumption was that the rules would be stored in tables of relational database. Our experience gained so far indicates that the idea of the compilation of possibilities given by SQL language and interface engine based on if-then type rules together with the ability of new facts generation is right.

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1. Introduction

The main weakness of all methods and techniques of organizational modeling for the needs of design and development are limited abilities of presenting “logic” functioning of the described system. Neither structural nor objective analysis can be easily used to describe such a sphere of system activities. Hence, research in order to develop universal tools for modeling organizational behavior were started in the late 1980s (Van Assche, Layzell, & Anderson, 1988). The Business Rule Approach represents a major paradigm shift in business-system design and development. Employing a business-driven approach, the use of business rules has been proven to enhance the effectiveness, flexibility, and efficiency of business systems. The technology is appropriate for any kind of organization, and is especially well suited for development in the Web Services technology (Ross, 2003). The current trend is towards developing standards which enable ordering the methods

of knowledge representation in simulation models and business applications. It must be admitted that currently there is no leading idea of how to deal with the problem of decision modeling in systems which support design and development of information systems. This paper presents results of the research being conducted in the Department of Applied Computer Science at Faculty of Management, AGH University of Science and Technology and concerning the use of database server for business rules modeling as knowledge based systems in information system design.

Business Rules are defined from the business and information system perspective. From the business perspective, a business rule is a guidance showing that there is an obligation concerning conduct, action, practice, or procedure within a particular activity or sphere. Two important characteristics of a business rule are: there ought to be an explicit motivation for it, it should have an enforcement regime stating what the consequences would be if the rule was broken. From the information system perspective, a business rule is a statement that defines or constrains some aspects of the business. It is intended to assert business structure,

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or to control or influence the behavior of the business (Ross, 2003). Most of the work done in this area focuses on identifying and documenting business rules (Rai & Anantaram, 2004), business rules lifecycle (acquisition, deployment and evolution) (Rosca, Greenspan, & Wild, 2002; Rosca & Wild, 2002) and enterprise knowledge relationship to a software system (Wan-Kadir & Loucopoulos, 2004).

The necessity for modeling and developing tools for business rules management is closely connected with the idea of Business Process Management. This conception indicates that it is necessary to create business processes models for the needs of different analyses while it is also necessary to create computer tools supporting such a process, especially when web applications are built. Business rules within a BPM system can be used to support automation of business decisions, to structure loose informal business practices and policies, or to apply rigorous sets of conditions that can help business analysts and domain experts to express the essential requirements of the system behavior. In a process, business rules are the components that implement the decision-making logic.

From the IS design perspective the necessity of extracting system behavior rules from application code gains higher significance. On the coding stage of the information system life cycle this problem is frequently solved by refactoring techniques bounded with Extreme Programming idea. Refactoring consisting, among others, in parameterization of frequently used procedures allows extraction of methods solving the inference problem. Simultaneously, the knowledge base about the needed system behavior can be stored in external data sources. Such approach is characteristic for programming languages according to the programming with knowledge or rule-oriented programming concepts (Hsu et al., 1992; Fowler, 2000). The rule specification as a separate subprocess in information system life cycle is characteristic in the Requirements Engineering. Business rules, as part of requirements gathering and systems analysis have not been ignored by structured analysis, information engineering or object-oriented analysis approaches (Kardasisa & Loucopoulos, 2004). A special importance of business rules specifying in information systems design attaches agile methods of modeling (Ambler, 2002). We can conclude that the business rules concept is not only an idea of information systems organization but the main guideline in computer added IS design. This idea is thoroughly discussed in (Date, 2000). Date propose to specify business processing declaratively, via business rules and get the system to compile those rules into the necessary procedural (and executable) code.

A Business Rules Management (BRM) process cannot be performed without an appropriate tool support. Bajec and Krisper (Bajec & Krisper (2005)) classify BR tools according to the functionality that is required for the support of the BRM process into three groups, each of which provides some of the features, required for the BRM process. The groups are named according to the purpose of

the tools they comprise: BR tools for rule-based IS development, BR tools for the development of knowledge-based applications and BR tools for enterprise-wide business rule management.

In many business situations, the rules are far more complex than the ones that can be easily represented using simple conditional statements. Although it might be possible to represent all possible paths through a moderately complex process with conditional statements, the resulting process map would become very hard to understand. As the complexity increases, it becomes more difficult to represent the necessary logic with conditional statements. To get around this problem, vendors of BPM tools have built sophisticated business rules features into their core product. The overall aim of business rules functionality is usually to enable business users to interact with the system through English-like rule-based statements.

We can describe the ability of the currently available BPM tools to manage rules in terms of three possibilities, each able to handle more complex logic: constraint-based systems, rule systems that manipulate a rule set with a database management system, inference-based systems that can evaluate rules at runtime.

The essential advantage of business rules facilities is simplifying process maps, pushing the complexity into the specialist rule handling functionality. Instead of developing a robust process model that reflects every possible path, business rules are used to provide an incremental process development capability. Given the volatile nature of business processes, it is often difficult to capture all the necessary details prior to implementation. There is a limit to which BRM can be applied to describe real business processes. This limit is determined by the complexity level of rules and the amount of information needed for their realization. As the number and complexity of rules increases, it becomes increasingly difficult to determine the validity and completeness of the overall system (Miers & Harmon, 2005). In our opinion the application usage of sophisticated BR engines can be increased only by the use of artificial intelligence concepts.

At present all significant tools for business processes modeling provide sophisticated mechanisms of formulation and system knowledge exploration in the form of business rules. These are either individual solutions from tools vendors or abilities to link with others tools used for business rules modeling.

Solutions provided by the BRM tool vendors are the extensions of modeling systems or extensions of real applications of ERP systems. Not much concepts and tools is available with respect to be helpful in information system design life cycle.

2. Modeling of business rules in expert system like inference engine

Our assumption was that most business rules would have complex structure and their interpretation would

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