Towards Ontological Commitments with $\Omega$-RIDL Markup Language

Damien Trog, Yan Tang, and Robert Meersman

Semantics Technology and Applications Laboratory (STARLab)
Department of Computer Science
Vrije Universiteit Brussel
Pleinlaan 2, B-1050 BRUSSELS 5, Belgium
{dtrog,ytang,meersman}@vub.ac.be

Abstract. In the DOGMA (Developing Ontology-Grounded Methods and Applications) ontology engineering approach, ontology construction starts from an uninterpreted base of elementary fact types, called lexons, which are mined from linguistic descriptions. Applications that ontologically commit to such a lexon base are assigned a formal semantics by mapping the application symbols to paths in this lexon base. Besides specifying which concepts are used, we restrict how they may be used and queried with semantic constraints, or rules, based on the fact-based database modeling method NIAM/ORM. Such ontological commitments are specified in the $\Omega$-RIDL language. In this paper we present the $\Omega$-RIDL Markup Language and illustrate with a case from the field of Human Resources Management.

1 Introduction

The emergence of ontology-based application, such as the Semantic Web [1], has marked the importance of using domain ontologies in applications. These ontology-based applications are an extension of traditional ones, within which the information (or rather ‘concepts’) is explicitly defined. Many other ontology-based applications interweave domain ontologies and applications [25,31]. An application needs to communicate with existing domain ontologies. This communication layer between the application and the ontology is also called commitment layer [24]. How to formally commit application (e.g. rules and symbols) to domain ontologies is still a complicated problem.

Guarino asserts that “specifications of the tasks that define the semantic interpretation of the domain knowledge” should not be considered as an ontology [11]. It should “concern more than one particular task”. Further, Guarino stresses that “ontologies belong to the knowledge level and they may depend on particular points of view. We must observe however that it is exactly the degree of such dependence which determines the reusability and therefore the value of an ontology”. He then gives the definition of ontology as “an ontology

$\Omega$-RIDL: Ontology Reference and IDea Language.
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is an explicit, partial account of a conceptualization . . . it is a logical theory that constrains the intended models of a logical language”. The ontological commitments are often task dependent. Based on Guarino’s discussion, we argue that the ontological commitments should not be considered at the ontology level. Rather, the commitment layer resides at the application layer in this sense.

Inspired by tried-and-tested principles from conceptual database modeling, DOGMA\footnote{Acronym for Developing Ontology-Grounded Methods and Applications\cite{20,24}.} is designed as a methodological framework for ontology engineering.

In DOGMA an ontological commitment serves several purposes:

- Selection from the base of elementary binary facts (also called lexons).
- Axiomatization of lexons by applying semantic constraints.
- Interpretation of lexons by mapping application symbols.
- Conceptual querying of heterogeneous data sources.

In this paper, we focus on the illustration of these purposes by introducing the commitment language $\Omega$-RIDL and its markup language format $\Omega$-RIDL ML\footnote{The latest version of the $\Omega$-RIDL schema can be downloaded from: http://www.starlab.vub.ac.be/website/omega-ridl}. We construct the paper as follows: in Sect.\,2 we give the background of DOGMA and the RIDL language. In Sect.\,3 the syntax and semantics of $\Omega$-RIDL ML is explained. In Sect.\,4 we discuss the advantages and the limitations of $\Omega$-RIDL and compare our work with others. We end the paper with conclusions and future work in Sect.\,5.

\section{Background}

In this section, we introduce the DOGMA approach to ontology engineering followed by a discussion of the RIDL language.

\subsection{DOGMA Approach to Ontology Engineering}

A classical definition of ontology, which is given by Gruber, describes an ontology as an explicit specification of a conceptualization\footnote{For instance, we can reuse conceptual database modeling methods to model ontologies\cite{24,16,8}.}. Conceptualization is defined by Guarino as the intended models, within which a set of logical axioms are designed to account for the intended meaning of a vocabulary\cite{12,10}. Within the context of information systems and knowledge management, an ontology is considered as a “particular knowledge base, describing facts assumed to be always true by a community (of domain experts), in virtue of the agreed-upon meaning of the vocabulary used”\cite{12}. Hence, ontologies are actually knowledge based resources that represent agreed domain semantics.

In the context of information systems, the fact that one often considers databases as a kind of knowledge based resources leads to reuse database engineering principles for ontology engineering\footnote{On the one hand, conceptual database modeling approach to ontology engineering leads to using database modeling methods to model ontologies\cite{24,16,8}.}.

\begin{thebibliography}{99}
\bibitem{20} Acronym for Developing Ontology-Grounded Methods and Applications\cite{20,24}.
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