An Ontology based on the Methodology Proposed by Ushold and King

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ABSTRACT

A number of methodologies are available in literature for ontology development but as the Ontology engineering field is relatively new, it is still unclear how the existing ontology building methodologies can be applied to develop semantic ontology models. In this work, firstly an overview of various ontology building methodologies and their limitations as compared to some standard software development methodologies are presented. Then the methodology proposed by Ushold and King is selected to build an ontology in e-banking domain. The challenge in this domain is to recognize, communicate and steadily improvise the banking solutions. The ontologies are prospective candidates to assist overcome these challenges and enhance interoperability of banking data and services. The study aims to provide direction for the application of existing ontology building methodologies in the Semantic Web Development processes of e-banking domain specific models which would enable their reusability and repeatability in other projects and strengthen the adoption of semantic technologies in the domain.

KEYWORDS

E-Banking Domain, Ontology Methodology, Protégé, Rule Based Ontology, Semantic Web Rule Language (SWRL), Web Ontology Language (OWL)

INTRODUCTION

The term ‘Ontology’ has its roots in the philosophical domain. The philosophical perspective of Ontology is deeply theoretical and is mainly associated with the study of existence of entities, their relations with each other, grouping the entities, arranging them in a hierarchy, and chalking out their similarities and differences based on certain pre-determined parameters. This theoretical, age old concept has been practically applied in information science and technology in the form of Ontology Engineering. Ontology engineering is an important field of applied ontology. It can be enunciated as an application of philosophical ontology. Ontology Engineering, due to its very nature of dealing with concepts and relationships, can also be compared to conceptual modeling. Ontology engineering aims at providing a direction to solve the interoperability problems brought about by mismatches due to the semantics and the meanings of the concepts involved.

An ontology is a formal, explicit specification of a shared conceptualization. Ontologies are normally related with logical inference to offer a common perceptive of a particular domain. They facilitate the domain to be connecting people, organization and application systems. In nutshell, ontologies communicated are a promising and robust tool to provide assistance to human-machine communication, to realize interoperability between software systems and to make the software systems more robust and resilient.
Ontology engineering, a key component of Web 3.0, is an upcoming field of research. Although the philosophical concept is age old, the practically implemented field of ontology engineering is still an upcoming thing. The ontology development methodologies are still being devised and being researched upon. These development methodologies have not fully matured yet as the case with software engineering models. Since, software development field is a highly matured and developed field, and ontology also being a part of some software, it is a natural instinct to compare software development field with ontology engineering. The software development standards can be kept as yardsticks while evaluating ontology development methodologies. Although a significant number of ontology development methodologies are available, it is still unclear in the current literature how an existing ontology building methodology can be applied to develop semantic ontology models. There are some standard software development methodologies like IEEE1074-1995, ISO 9001:2008 etc. These are the standards for the generation of the process that governs software development and maintenance of the project. The IEEE standard begins with the selection of an appropriate software life cycle model. It does not define a particular life cycle model. The standard describes in detail the software development process, the activities to be carried out and the techniques that can be used for the development of the software. The activities are not presented in time order, since the standard recommends that they be incorporated into a software life cycle, which is selected and established by the user for the project under development. Various activities defined by this methodology include Project Management activities, Pre Development Activities, Development Activities, Post-Development Activities and Integral Activities. This standard serves as both a yardstick as well as a guiding road map to various personnel involved in the software development process like the software developers, project managers, quality assurance, organizers, purchasers, users and maintainers. It is useful where the software is developed in totality or as a standalone entity or is used as an embedded entity into a larger system (IEEE Standard for Developing Software Life Cycle Processes, 1997).

For modeling quality ontologies which are interoperable, reusable and repeatable, it is utmost important have to standard ontology development methodologies which have to be domain independent and generic. Some of the well-known ontology development methodologies are Cyc, TOVE, KAKTUS, METHONTOLOGY, on-to knowledge methodology, methodology by Ushold and King, methodology by Grüninger and Fox, etc.

RELATED WORK

Although, the field of ontology development is still in its infancy and not much work has been done in the banking domain, some significant contributions have been made in the enterprise ontology domain. Kort & Gordijn (Kort & Gordijn, 2007) in their work, presented an ontological solution for assessing the strategic partnership. The ontology facilitates the modeling of networks of enterprises and partnerships which trade with each other. The ontology has been extended to represent investment arrangements and outsourcing constructs.

Énrique et.al. (Bonsón-Ponte, Escobar-Rodríguez, & Flores-Muñoz, 2009) in their work presented a knowledge-sharing system based on OWL for sharing information between various EU banking supervisors.

Lopez et.al (López-Cobo, et al., 2008) demonstrated the importance of semantic technologies, ontologies and in particular semantic web services in commercial banking to boost the performance and increase interoperability of banking services.

Marie et.al (Marie, Escudero, & Rosina, 2011) presented a semantic approach to business rule application development.
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