Chapter 4.18

Application of Semantic Web Technology in E-Business:
Case Studies in Public Domain Data Knowledge Representation

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INTRODUCTION

In the E-Business and particular in the eGovernment domain special focus is often given to the demand side, i.e. the everyday practice and reality of citizen and business contacts with government and businesses. Information services available on-line from public administration are the first stage for e-government. This stage has drawn a great amount of effort from many countries worldwide in order to satisfy the demand for readily available information. The implementation of an information system that will serve this demand is not always an easy task. This is due to the inherent difficulties that exist in the public administration domain. There are many complicated services with numerous executional

paths, depending on the type of process. In many cases divergent and conflicting legislation may exist for the same case, which complicates the search effort for the average citizen. As a result, it may be difficult for a citizen to find, based on the relevant legislation the correct information regarding the formal documents and the procedure that must be followed for a certain service.

To solve this problem, the authors have chosen the semantic web technologies, and propose an infrastructure that could simplify the procedure. The main objective of this chapter is to present a flexible and scalable framework of an information system for such complex cases and to show the advantages of the semantic web technologies application to E-Business. Examples of two real cases in Greece are given. The first case that has attracted the authors' attention is the case of getting an operation license

for any kind of an enterprise. The second case is that of finding the benefits entitled to a citizen based on his/her specific profile.

BACKGROUND

Several information technologies exist for the creation of web-based E-Business applications. The use of Semantic Web (Berners-Lee, Hendler, & Lassila, 2001) and Semantic Web Services (Fensel, Bussler, & Maedche, 2002) technologies to enable the interoperability of systems and applications is gaining momentum worldwide.

The state-of-the art technology in a web environment is adding semantic meaning to web recourses. Currently these resources are usually only human understandable: the mark-up (HTML) only provides information for textual and graphical information intended for human consumption. Semantic Web aims for machine understandable information that can be processed and shared by both computers and humans. Tim Berners-Lee (2001) provides the definition of the Semantic Web as "an extension of the current one [Web], in which information is given well-defined meaning, better enabling computers and people to work in cooperation."

An E-Business information system can be implemented in several different ways. For example a set of business rules could be modeled using simple if – then rules in any programming language. Process modeling using a workflow system is also an option. Relational databases using SQL queries could also be selected for the implementation. The semantic technology is not a competitor of the above-mentioned technologies since they apply to different types of applications for different reasons but there are some areas of overlapping. It is not an easy task to design the relational database or the workflow system to represent a complex scenario. In simpler cases the relational model or if-then rules can be used. But in complicated cases an ontology

model provides more flexibility and robustness in design and implementation. The advantage of semantic technology over the above-mentioned technologies lies on the fact of creating machine-readable data capable of modeling complex cases. The same information can be shared not only among humans but also among clever agents in the web. Another major advantage is the fact that information using semantic technologies can be distributed anywhere in the web. Ontologies can be imported, merged with others, populated and expanded in a distributed way. This kind of scalability is perhaps the most important advantage of the semantic technology. More details about the relation of ontologies to formalisms currently used in software engineering can be found in (Tran, Lewen, & Haase, 2007).

OWL Web Ontology Language

Data representation in a semantic web environment is given in layers as shown in Figure 1 (McGuinness & van Harmelen, 2004). These layers include XML (W3C, 2008), RDF (Resource Description Framework) (Manola F. & Miller, 2004), Ontology (OWL) (Dean, 2004), and Logic. OWL is an ontology language for the Semantic Web, developed by the World Wide Web Consortium (W3C) Web

Figure 1. Semantic web "layer cake"
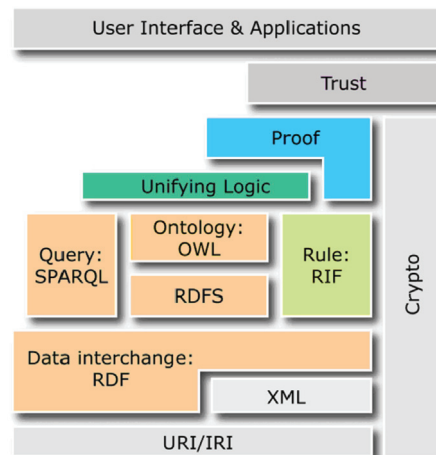
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