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Modeling Web Service to Knowledge Base Sharing

Thesis submitted as a partial fulfillment of the requirements for the degree of Master of Science in Computer and Information Sciences.

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I certify that this work has not been accepted in substance for any academic degree and is not being concurrently submitted in candidature for any other degree.

Any portions of this thesis for which I am indebted to other sources are mentioned and explicit references are given.

Senan Abdullah Ali Ghallab

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To: My Parents,

To: The embassy of YEMEN in Egypt.

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ABSTRACT

In this thesis, modeling web service to knowledge base sharing representation schemes is presented. The inference mechanism implementation using XML and OWL files associated tool is described. This work has concentrated on issues in update knowledge as a web service by associated tools to build an inference engine to directly reason and explain on this representation.

Obviously, using web service in knowledge base sharing enhances performance of transferring the expertise of users. The proposed tool, Knowledge Base Web Service (KBWS) represents by many modules, use web service to knowledge base sharing by using WebML. User of KBWS tool can build new knowledge; share and update that knowledge base using web services techniques.

This tool share Knowledge Base Web Methods (KBWM), these methods can be use from another web application. XML files built with new structure as a dataset of the knowledge in this tool, to easier parsing of that knowledge among users.

Methodology of the work depend on sharing the knowledge bases through share the web methods, share the knowledge and build new web applications that share the web methods on the tool.

Previously developed knowledge bases for agriculture, medicine and many domains have been applied using the proposed tool. Agriculture domain is applied (the knowledge bases taken from the Central Laboratory for Agriculture Expert System (CLAES)); the results are briefly outlined in the thesis.

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Chapter One

Introduction

1.1 Intrudoction

The World Wide Web (WWW) become save metadata in many areas like business & trading and a lot of personalization for the people. Exploiting web service characteristics to knowledge base sharing make transferring the knowledge bases among users of knowledge bases systems (KBSs) easier, [Zhengping Wu andAlfred C 2005].

Web service as a software system designed to support interoperable Machine to Machine interaction over a network [Brian Shields et al, 2007]. Web services are frequently just Web applications that can be accessed over a network, such as the Internet, and executed on a remote system hosting the requested services [Tung-Hsiang Chou, 2006]. These definitions encompass many different systems, but in common usage the term refers to clients and servers that communicate XML messages that follow the SOAP standard [Adam twardoch, 2003].

Web Services is the future "big thing" in software development. Every business will eventually become both a supplier and consumer of Web Services (WS). WS will completely change the way we conduct business and other web applications, far beyond the impact we've seen with e-commerce [Adam twardoch, 2003]. The Semantic Web languages used for ontology representation still present a complex syntax, long declarative description, hyperlinks and reference to external resources that make the code very difficult to read e.g. (XML, OWL, other semantic web languages). Web Service Description Language (WSDL) is an XML-based service description on how to communicate using web service [David Booth et al, 2003, 2004].

Knowledge base is Needless domain; usage of web service in knowledge base domain will achieve a lot of ambitions in information systems domain [J. Davies et al, 2003]. Sharing knowledge means that every user can create, update and save knowledge.

Exploiting web service characteristics to define, share and update the knowledge bases among users is one of the thesis goals. The proposed tool in this work called Knowledge Base Web Service (KBWS).

1.2 Problem definition

Using web service to sharing knowledge base is multipurpose. This fact motivates us to exploit web service characteristics and find an acceptable solution for problem of knowledge base acquisition, administration, reasoning and explanation the knowledge among the users as a web service, how the processes been sharable among users, how they can do their work in a more efficient manner?.

Analyzing this problem reveals the following points:

- Knowledge acquisition: that explain how the users share and acquire the knowledge in many domains can simultaneously.
- Knowledge administration the: Controlling and maintaining the knowledge among users as a web service.
- Knowledge reasoning: reason the knowledge through many functions among users.
- Knowledge explanation: An expert system that can interpret the results of knowledge bases reasoning processes.

1.3 Thesis objectives

The main objective of this thesis is to develop a generic tool for knowledge base sharing that can be used as a web service and exhibits higher level of standardization, portability and explanations facilities as well.

1.4 Thesis contribution

As a lack of web service technology to share knowledge bases among users through network, this approach applies a new tool that can share the knowledge bases and execute more than one process among users simultaneously. This work concern of exploiting web service technique characteristics to develop processes of knowledge base sharing such as: updating, explanation and reasoning through World Wide Web (WWW).

1.5 Thesis orgnization

The thesis is divided into seven chapters, after this introductory chapter. There are the following chapters:

Chapter (2) presents an overview of web service, knowledge base, relation between web service and knowledge base, semantic web languages, protégé categories, ontology, ontology tools, elicitation and re-elicitation, and explanation process. Chapter (3) reviews knowledge representation & reasoning using standard web Languages like Extensible Markup Language (XML), Ontology Web language (OWL) and others. Chapter (4) presents Software tools for knowledge representation and related works for the systems that's using web service to knowledge representation and explanation. Chapter (5) presents Knowledge Base Web Service Sharing Proposed Tool (KBWS) that introduces the design and implementation aspects of the designed tool: a tool for acquiring knowledge and automatic generation of knowledge base sharing as a web service.

Chapter (6) demonstrates a real case study to build a knowledge base for knowledge base sharing to representing, extracting, reasoning and explanation the knowledge base as a web service. Evaluation of the generated knowledge base is done through comparing it with the manual system. Finally, chapter (7) includes conclusion remarks and future work.

The thesis also contains appendix which divide to four sections which are:

Appendix (A): Rules & Ontology in XML file

Appendix (B): Ontology in XML file

Appendix (B*): Ontology in OWL file

Appendix (C): Web Methods