ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 5, Special Issue 12, April 2018

Aspects for the Web Future: Semantic Web Application and Ontology Language for World Wide Web

A.Sangeetha Devi [1], A.Kalaivani [2], A.Shanmugapriya [3]

Asst. Professor, Department of Science and Humanities, PA College of Engineering and Technology, Pollachi [1]

Asst. Professor, Department of Information Technology, NGM College, Pollachi [2]

Asst. Professor, Department of Electrical and Communication Engineering, Pollachi Institute of Engineering and Technology, Poosaripatti [3]

Abstract: In The World Wide Web (WWW) serves the human with vast amount of data and information. The usage pattern or user base has multiplied many folds since its origin. The web needs to be made Semantic wherein different applications, agents, Web services and the web sites can exchange information to their full potential. This calls for representing the knowledge residing on WWW in a uniform manner understandable by both man and machine. This paper proposes to relate the need for Ontology and relate it to Web ontology language (OWL) and identify its position in making the Semantic Web. The ontological structure using the Web Ontology Language (OWL) which is used for modeling ontologies of context and for supporting Context reasoning is explored in this paper. The Web Ontology Language is designed for use by applications that need to process the content of information instead of just presenting information to humans. OWL facilitates greater machine interpretability of Web content.

Keywords: Semantic Web, Ontology, OWL (Web ontology language).

I. INTRODUCTION

The World Wide Web (WWW) has changed the way people interact/communicate with each Other and the way commerce is done. The WWW is serving human with information on Ecommerce, E-health and many more. The constraint that still limits the utility of the Web is that it is supporting human interaction and most of the information on the web is meant for human consumption only, may it be viewing information making purchases etc. These activities are not particularly well supported by software agents or Web services. The WWW can be made more useful if the information available is made meaningful for the machine to interpret it thereby make the web Semantic. The Semantic web initiative of the World-Wide-Web consortium (W3C) [4] has been active for the past few years and efforts are on to make the current Web contents for machine interpretable.

This paper briefly evaluates the issues with the current web and the need for a common knowledge format which is suitable for both user and machine consumption.

II. ISSUES ENVISAGING CURRENT WEB

The current web has grown manifolds since its origin this growth has not only been in the size of the number of users its serves but also the volumes of pages that it stores. The WWW today supports E-commerce, E-health, E-education and E-governance activities to name a few, each of these need information in different formats to be understandable to the end users. It is also obvious that the data/objects (instances of classes) for E-governance and E-health for a given geographical distribution may be common or identical. Thus the problem arises of data redundancy. Similarly, two car dealers of a same parent supplier need to maintain

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 5, Special Issue 12, April 2018

identical product database thus increasing the volume of data on the web and also leading to redundancy issues. These problems can be addressed by storing the data at a common location and in a common format. Thus it is important to represent knowledge in a format which shall serve not only the user but also enhance the machine interpretation capabilities and based on the user need the results should be generated by querying a common database defined at a specified uniform resource indicator (URI). Thus the need for ontology arises which is discussed in the next paragraph.

III. ONTOLOGY SUPPORT TO THE WWW

Ontology is used to define a common vocabulary for particular domain. This vocabulary will be used to represent knowledge which can be shared by user and it will also be suitable for machine interpretability. Ontology as the term is used in the field of Knowledge representation and it is usually defined as "a representation of conceptualization". An ontology defines the terms that may be used to describe or represent an area of knowledge.
Sharing common understanding of the structure of information or software agents is one of the most common purpose of ontologies, in context of the web, ontologies provide a shared understanding of a domain.

The ontology description shall help in the knowledge representation in more than one way and are listed as follows:

- It shall define a common structure of the information usable for both man and machine.
- It will enable reusability thus avoiding redundancy
- It will separate the operational knowledge and the domain knowledge thus clearly specifying how knowledge is represented or stored and how it is fetched
- By defining classes, objects and their relationship it shall demonstrate the domain assumptions explicitly
- Enhance the analysis domain capabilities by proper inference of relationships

Ontologies describe basic concepts in a domain, the classes, properties and also show the relationship between them thus it makes Knowledge reusable. It needs to describe the following concepts:

- Classes in many domains of interest as Windows with respect to house or relate it to computer operating system.
- The relationship that may exists among the things
- The properties of the classes and their objects

IV. ONTOLOGY AND SEMANTIC WEB

The term "ontology" has a long history in philosophy, in which it refers to the subject of existence. In the context of knowledge management, ontology is referred as the shared understanding of some domains, which is often conceived as a set of entities, relations, functions, axioms and instances. There are several reasons for developing context models based on ontology:

- **Knowledge Sharing**. The use of context ontology enables computational entities such as agents and services in pervasive computing environments to have a common set of concepts about context while interacting with one another.
- **Logic Inference.** Based on ontology, context-aware computing can exploit various existing logic reasoning mechanisms to deduce high-level, conceptual context from low-level, raw context, and to check and solve inconsistent context knowledge due to imperfect sensing.
- **Knowledge Reuse.** By reusing well-defined Web ontologies of different domains (e.g., temporal and spatial ontology), we can compose large-scale context ontology without starting from scratch.

Semantic Web is an effort that has been going on in the W3C to provide richer and explicit descriptions of Web resources. The essence of SW is a set of standards for exchanging machine understandable information. Among these standards, Resource Description Framework (RDF) provides data model specifications and XML-based serialization syntax, Web Ontology Language (OWL) enables the definition of domain ontologies and sharing of domain vocabularies. OWL is modeled through an object-oriented approach, and the structure of a domain is described in terms of classes and properties. From a formal point of view, OWL can be seen to be equivalent to description logic (DL), which allows OWL to exploit the considerable existing body of DL reasoning including class consistency and consumption, and other ontological reasoning. We

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 5, Special Issue 12, April 2018

believe that Web ontology and other Semantic Web technologies can also be employed in modeling and reasoning about context information in pervasive computing environments.

V. SEMANTIC WEB ARCHITECTURE AND THE ONTOLOGY LAYER

To make the Web more appropriate for Machine consumption Tim Berners-Lee the creator of the Web had proposed the idea of semantic web in 2001 as "The Semantic Web will bring structure to the meaningful content of web pages, creating an environment where software agents roaming from page to page can readily carry out sophisticated tasks for users"[6] The architecture of semantic web suggested by Tim Berners-Lee has been the basis for research by many researchers today. The major issues encompassing the architecture are that there is no clear definition on the functionality of the various layers, the layers are also a combination of Functionality and technology and there is no precise definition to the various layers and there intended meanings. It is important that we have a look of The Sematic Web architecture and the purpose of ontology layer and understand the need of a ontology language to model Web Ontologies.

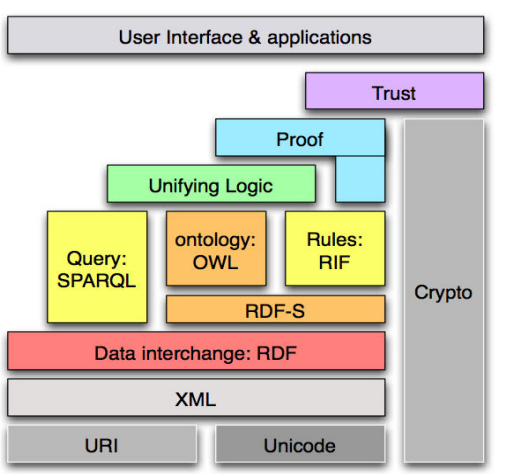

Fig1. Semantic Web Layered Architecture

The Semantic web architecture Fig.1 show us that there are various layers described which support various functionalities and technologies to render machine understandability. The basic functionality of each layer is briefly explained so as to give a foundation to understand the need of ontology language.

The functionality of each layer with reference to the above layered architecture is thus as explained

A. Function of XML, XML schema and namespaces:

XML, XML Schema and Namespaces, which are the components of layer 2, aim to be a baseline for structuring data on the web but without semantics. It is a mechanism used to describe data in a way that can be understood by the upper layers and can be interoperable.

B. Function of RDF and RDF-S:

The function of RDF and RDF-S(Resource Descriptive Framework-Schema)is to provide metadata to upper technologies placed on the layers on the top of layer 3, in which that metadata can be exchanged and reused between these technologies or between these technologies and other applications.

C. Function of ontology layer:

The main function of layer is the provision of semantics which produces a web of meaning. Ontologies are helpful to clearly represent objects and also the relationship between them it may be direct or inverse relationship. Using ontologies helps machines process meaning and facilitate sharing of information.

D. Function of Rules layer:

It is supposed to be used as a framework for making new inferences how these inferences should be expressed for the implementation of the Semantic Web.

E. Function of proof:

This layer is incorporated to verify why the results generated by the agents should be believe d or in other words the authenticity of the agent behavior is corroborated.

F. Function of Trust:

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com

International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 5, Special Issue 12, April 2018

The functions of this layer is to provide a mechanism for trust and confidence between Information sources and information users (man or machine).

G. *Function of Communicating agent layer (CAL):*

CAL needs to perform the interoperability functions between various horizontal layers (Unicode to Proof) and the vertical layer crypto. This layer is a issue of research whether it should be a layer or a agent.

Thus we have understood for a search agent to retrieve semantics based information from the web it is important that the future web documents should be stored in a format where the ontology is clear and in order to create such documents we need a language which shall enable ontology definition. Thus the ontology layer in the Fig.1 incorporates web Ontology Language(OWL).

.

VI. CONCLUSION

Despite the need being felt to make today's web more machine interpretable and knowledge extractable there is a lot desired to make the semantic web a reality. This paper prompts the importance of the ontological definition of the Web contents which will not only keep the contents human usable but also add the feature of machine interpretability and after a meaningful interpretation the related contents can be integrated for a more optimal consumption. It is also observed that OWL will play a dominant role in the future for defining ontologies for supporting context reasoning and knowledge sharing. OWL shall thus play a significant role in turning the WWW to the Semantic Web and enable machine interpretability and human understandability

REFERENCES

[1] Net user stats can be referred at URL: http://internetworldststs.com/stats.htm last visited on 16-11-2010.
[2] T.R. Gruber, "towards principle for the design of ontologies used for knowledge sharing", International journal of human and computer studies, Vol.43, 1995
[3] OWL web ontology language Use case and requirements: W3C recommendations dated 10 February 2004
[4] M.A. Mussen,Dimensions of knowledge sharing and reuse.Computers and Biomedical research 25:435-467
[5] T.R. Gruber A translation approach to portable Ontology Specification. Knowledge Acquisition 5:199-220
[6] Tim Berners-Lee, James Hendler, Ora Lassila, "The Semantic Web", Scientific American, May 2001.
[7] Tim Berners-lee. Semantic Web Road Map. W3C Design Issues. URL http://www.w3. org/DesignIssues/Semantic.html, Oct. 1998.
[8] Rajiv pandey,Sanjay Dwivedi "Interoperability between semantic Web Layers: a Communicating Agent Approach" IJCA Dec 2010
[9] Haytam T.Al-feel,magdy Koutb,Hoda suoror. "Semantic Web on Scope: a new architectural model for the Semantic web", Journal of Computer Science 4(7):613-624,2008
[10] Ontology Definition Metamodel –OMG adopted Specification.ptc/06-10-11 dated October 2006
[11] http://www.w3.org/TR/2009/PR-owl2-primer- 20090922/OWL 2 Web Ontology Language Primer W3C Proposed Recommendation 22 September 2009.
[12] Ogden, C. & Richards, I. ((1923)). The Meaning of Meaning: A Study of the Influence of Language upon Thought and of the Science of Symbolism. Orlando, FL: Harcourt Brace Jovanovich.
[13] Ullmann, S. ((1972)). Semantics: An Introduction to the Science of Meaning. Oxford: Basil Blackwell.
[14] Westerinen, A. & Tauber, R. Ontology development by domain experts (without using the "O" word). Applied Ontology, 12: 299–311. doi:10.3233/AO-170183. ((2017) a).
[15] Westerinen, A. & Tauber, R. Integrating GoodRelations in a domain-specific ontology. Applied Ontology, 12: 323–340. doi:10.3233/AO-170184, ((2017) (b).