



# Semantic web: golden era of information

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## Abstract

Semantic Web is the extension of existing web that allows well defined expressions for the meaning of information which can be understood by computers and people both. In this paper we are doing study on semantic and is our review paper. Semantic web is a recommended development project by W3C (World Wide Web Consortium) which focuses on the enhancing of information search by keeping the facts in structured form using eXtensible Mark-up Language (XML) and marked in such a way that it can be understood by the system. To make the development of semantic web promising, new international standard is developed for exchanging of ontologies called OWL Web Ontology language. In XML we just provide tag of the model and store data in the hierarchy without its meaning, that's why the computer cannot be able to process the data but in Semantic Web user can provide with a definition so that the computer can better recognize its meaning and provide with the better displaying of information. A crux of semantic web is that it works on the definition of the ontologies. Ontologies are responsible for re-usability and sharing of information. Semantic Web provides with a shared language which has stored data in the non-ending linking of distinct databases which provides data related to the real world objects. RDF is a common language for semantic web and is responsible for the collection of data on web and assembles different database from diverse sources and SPARQL is there for linking of databases for unifying documents. Thus, semantic web is the well-structured data web that relates all the data that present on the web and understands them to provide the exact display requested by the end user.

**Keywords:** Semantic, Ontology, Web Applications, OWL, RDF, SPARQL

## 1. Introduction

The Semantic Web aims to build a common structure that allows data to be shared and reused through the applications, community boundaries and enterprises. It suggests the procedure how to use RDF as a flexible data model and use ontology to characterize data semantics [1]. Semantic is associated with syntax. The most language syntax is saying something, while semantic is the meaning behind that. In common languages they mimic you without understanding what said but in semantic language, it understands the syntax. The web is a large retrieval system of documents. When web browser sent the request, it demands for a website. The main technique of Semantic web mining is ontology [2]. The request mainly states that we require the document where the request for the document is given. The website reclaims the document and senses it back to browser. This document is read by the language that is called HTML. The HTML language explains the syntax which can be understood by the computer. It communicated the computer how to display the document to your browser. The problem with this system is that in today world, computer blindly believes and gives the information. This is the major issue as computer doesn't stand the meaning of the web pages that they are showing us but blindly respond to the users request without understanding its main meaning. Computer can understand syntax but semantics are lost. Almost all the search engines now use a specific keyword to search for a request sent by the user which would results in extravagant search. If system learns the meaning of the web pages, it can help us what we want instead of giving unwarranted suggestions. This results in passively helping us rather than actively helping us. Web is about document while semantic is about things. Things can be places,

movies, song, images or just any concept anyone can think of. It will miraculously help in finding the required information in a search engine. There is no more need to depend upon the written documents as they understand the meaning of the statement and helps to find perfect match. Information on the semantic web is defined in W3C (World Wide Web Consortium) standard entitled RDF (Resource Description Framework). Ontology is used as a concept in Semantic web framework where Resource Description Framework (RDF) and Web Ontology Language (OWL) is two data representation model defined by W3C. Currently semantic web search engines are in embryonic condition and research is going on to provide better facilities than traditional search engines such as Bing, Ask and Google. Most of the companies such as IBM, H.P., Oracle, Adobe, and Microsoft etc. will provide with the tools or systems using Semantic Web. Web Services (SWS's) assures to give alternate to the obstacles related with dynamic composition, enactment, automated discovery, and related jobs with managing and using service-based systems. One of the obstacle to a wider acceptance of SWS technology is the unavailability of tools for designing SWS specifications. OWL is one of the major SWS description languages [3].

## 2. Semantic Web Standards (Languages)

### A. RDF

The Resource Description Framework is a structure to represent information across the web. RDF is based on abstract syntax which is distinct from XML tree. Normative documentation of RDF comes under area of:

- XML serialization syntax

- Formal semantics
- this document

This is an XML-based standard knowledge representation format for substituting arbitrary information. Data is presented on the web in one form or other form such as E-mail, archives, cookies, and ordinary documents. RDF contains all the similar data from such sources when requested and shows to the display. RDF is responsible for unification of data by categorizing databases in which SPARQL is responsible for linking of those files for retrieval. RDF uses the RFC3066 standard for language tags for literals in natural languages [4].

## B. OWL

OWL is a grouping of mark-up languages which uses the concept of processing of information instead of presenting them and is for the use of web applications. This document describes the OWL web ontology language. The Web Ontology Language extends RDF and RDFS. OWL is used when the information displayed to user need to be processed rather than just presented in front of the end users. OWL can be used to dynamically connect the meaning of terms and relations among them. The data is structured in the hierarchical form with their explicit meaning so that data can easily be understood by the all software. This illustration of terms and their interrelation is known as ontology. OWL offers with a facility of clear and coherent meaning and semantics, thus accentuates some languages like XML, RDF and RDF-S to represent machine interpretable content on web. OWL has three sub-languages:

- OWL Lite
- OWL DL
- OWL Full

In 2004, OWL first version came and it was developed by W3C OWL Working Group. Extension of the language (OWL) was developed in 2009 and referred as OWL 2. OWL describes classes of objects and enables inference.

## 3. Semantic Web Applications

Semantic web application inherits Open-ended, Diverse and semi-structured information. Semantic web collects the diverse data from the eclectic sources on the web and integrate them to form a new knowledge that focuses on the information required by the end-user and displays them to provide required information.



Fig. 1: Extraction of knowledge

Fig. explains that on giving input, data is integrated from various diverse data sources. After generating input various operations are performed. These operations can be aggregation, inference, query or the combinations of them. This results in generation of the new knowledge and output is produced.

Example

- Social Networking
- Information syndicate
- Library Data

- University records
- Banking details
- Network security and configuration

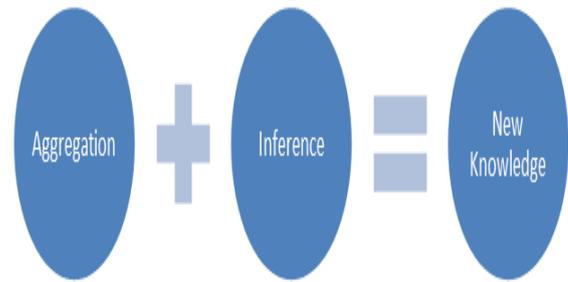


Fig. 2: Generating new knowledge

Fig. 2 describe that RDF is responsible for automatic aggregation of data from various sources into the same packet. Then useful information is extracted from the aggregated packet of data. This generates the new knowledge.

## 3. Advantage

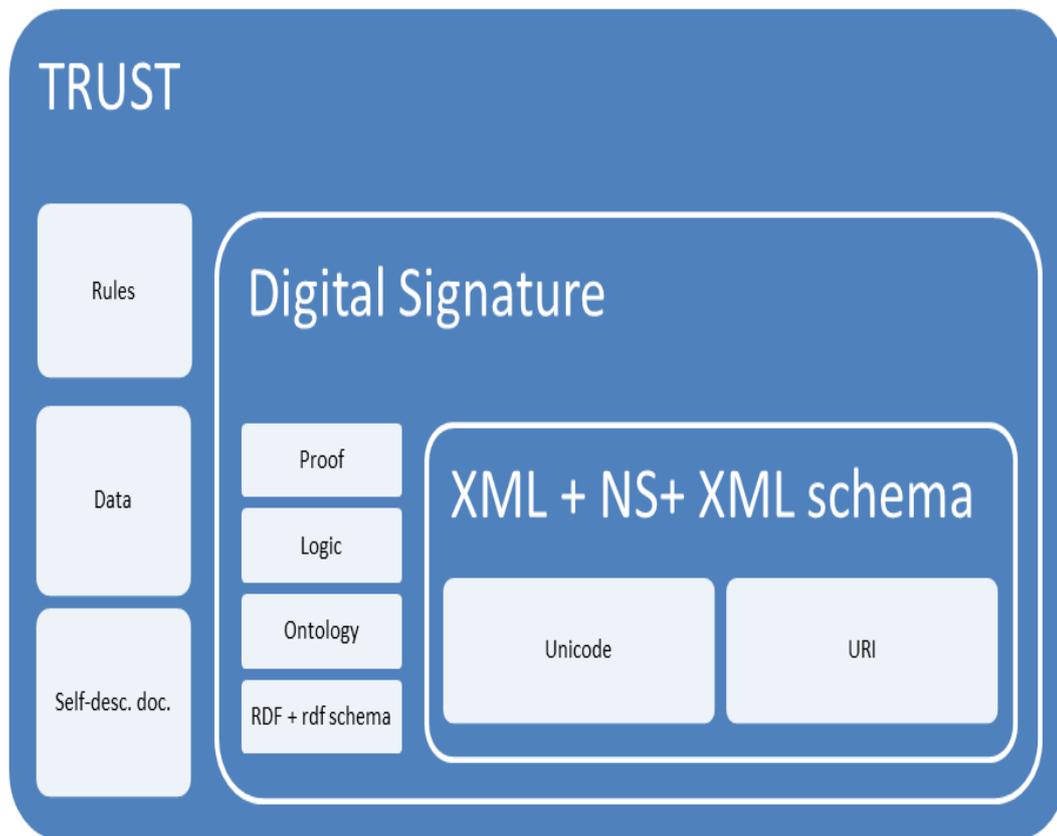
In semantic, if information is present on an application and is required by another application then it integrates the information and sharing of information takes place between several applications. Due to the mutual sharing of information between different data sources, this results in increase reusability of code and thus helps in cost control and minimization of the risk evolved in development i.e. flexibility of information is acquired as system can adapt as requirement evolve. This is achieved due to the open access of information in semantic web.

Semantic web mechanisms on the standard of negligible or minimal risk adoption strategy in which reusability of information takes place whenever requirement is found. Semantic web technology gives the required flexibility of expression and the easily available tools for querying and inference that simplify the typical problems found during the process of embedding topologies [5].

## 4. Architecture of Semantic Web

Architecture of semantic web is a model that is described within a certain context. This model is generalization of a real world representation. It determines the components necessary to device the semantic web system, the features of these components, the connections between the components, and the relationships with external entities.

The layered semantic architecture is an architectural pattern that is broadly accepted now days to present conceptual Semantic Web Architecture. Usually in a layered architecture, the components of the system are placed in a layered structure in which every level provided a group of elements contributing to related services. There are two types of semantic architecture that are open and closed. In the open architecture, the top levels can use all or subgroup of services from all the bottom levels. In the closed architecture a top level can use only service from the immediate lower level. The both type of layered architecture below level cannot use services from its above levels. A widely used layered architecture is ISO/OSI (International Standards / Open Systems Interconnect) architecture [6].



**Fig. 3:** Architecture of Semantic Web

## 5. Conclusion

Today World Wide Web (WWW) is searching for its advancement. Semantic web fulfills its present need and provide the web with the evolvable approach of information. This is done due to the control open software building blocks which can be shared by different application in the web. It collects the diverse data from the various information building blocks available on the semantic web and integrates them to create a new knowledge or enabling new application and focuses on the information required by the end-user and displays them to provide required information. This is made possible by three main components of Sematic Web that are RDF, OWL and SPARQL. OWL is the language which is made to make the existence of Sematic Web possible. It is the language in which Sematic web is developed. RDF is responsible for the collection of information from various data sources and SPARQL is responsible to link those databases to make non-ending database providing with the similar set of information. This makes re-usability of information and helps in cost control and provide with the requires suggestions instead of blind suggestions.

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