

## Collation of Diverse Ontology Tools

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DOI: <https://doi.org/10.26438/ijcse/v7i2.144147> | Available online at: [www.ijcseonline.org](http://www.ijcseonline.org)

Accepted: 22/Feb/2019, Published: 28/Feb/2019

**Abstract**— Internet is the huge repository to provide a way to obtain the web documents in these recent years. Most of these documents are in a human understandable format that provides a bridge to ingress services from the web. These documents provide knowledge to retrieve information from the web. Information retrieval systems fail in providing a specific format for this knowledge representation. By considering all these criteria, Web 3.0 has stepped ahead to web entail peculiar format to obtain information from web documents called ontologies. Ontology is a knowledge-based conceptualization system that consists of concepts, relations and their properties that provides a semantic relationship between the concepts used for a specific domain. Diverse tools are implemented and introduced in the market to develop these ontologies in order to serve a particular purpose. This paper projects the workflow steps of ontology editors and shows the study of different ontology developments tools along with their comparison to one another.

**Keywords**—Knowledge Representation System, Conceptualization, Ontology, Semantic tools, Uniform Resource Identifier(URI), extensible markup language(XML), Resource Description Framework (RDF).

### I. INTRODUCTION

The web is the huge repository for both textual and no textual information which is preserved documents that include audio, video, images. The retrieval and exchanging this kind of information is crucial at all time. Information retrieval showed a path to solve this problem by reducing inaccuracies in representing the document in the database as well as to answer the user queries precisely and effectively. But knowledge retrieved from these documents is not in a meaningful way in order to furnish the solution web documents need to upgrade with semantic information. In order to obtain meaningful information, the current web has extended a step ahead as the semantic web.

Semantic Web [1] is the structured collection of information and set of logical rules that can be used to draw automated conclusions thus from this precision semantic web is known as representation of knowledge deals with artificial intelligence which possesses various components - Uniform Resource Identifier (URI), extensible markup language(XML), Resource Description Framework (RDF) [2] combinedly forms a meta information layer called ontology that includes cardinality of relationships and their transitivity.

To obtain the structured representation of information in order to build a semantic web (current web and well-defined

meaning), ontologies take the space. For intelligent behaviour of the system machines designed in a way to understand the semantics of web resources. In this context of construction semantic web, ontologies help in automated processes to access information. They provide a structured representation of vocabularies that include different terms and their relationships that encompass users to interpret their meaning.

Ontology helps understanding domain and also retrieves its knowledge in an effective manner. They entirely depend upon concepts that the domain possess and includes that representation of these conceptualizations. In order to provide various applications like semantic between applications, knowledge maintenance and easy representation of software applications, ontologies provide various tools to project knowledge-based repository [3] through graphical user interfaces.

### II. ONTOLOGY

Ontology [4] defines various meanings for explicit specification of shared conceptualization includes representation of machine-readable facts, explicitly defined concepts and constraints, abstract model of phenomena, consensual knowledge by various communities.

**Definition-1:** *Ontology as formal Knowledge Representation System (KRS):  $KRS - \{C,I,P\}$  where C- classes, I- Instances, P-properties.*

Knowledge Representation System (KRS) includes the set of three components namely classes (concepts or topics), instances (examples that belongs to a class) and properties (links between classes and instances to obtain information from an ontology). There are four classes of ontology: static, dynamic, intentional and social.

- ✓ *The static* ontology describes things that exist, their properties and relations.
- ✓ *The dynamic* ontology describes the world in terms of states, state transitions and processes.
- ✓ *Intentional* ontology comprehends the world of agents, things believe, want, prove or confuse and argue about.
- ✓ *The social* ontology includes social settings, permanent organizational structures or shifting networks of alliances and independencies.

Ontology [5, 6] is the formal representation of knowledge of a particular domain that contains a set of concepts and their relationships among themselves. It outlines various properties of a domain to reason it thus the ontology is traditionally known as "explicit specification of a shared conceptualization". Ontology provides a shared vocabulary, which can be used to model a domain that is types of objects, and/ or concepts that exists their properties and relations. It is a backbone to support various types of information management includes information retrieval and sharing on the web.

**Definition-2:** *Ontology as an explicit specification of a conceptualization:  $Ont - \{C,R,A,O,P\}$  where C-concepts, R-relations, A-Attributes, O-Occurrences, P- Principles.*

An Ontology (Ont) is an explicit specification of a conceptualization which is the combination of Concepts (abstract terms that are organized in taxonomies), Relations (links between non-hierarchical concepts), Attributes (pre-defined data types like STRING, INTEGER, BOOLEAN etc.), Occurrences (concrete Instances of abstract concepts), Principles (rules that are valid in the modeled domain).

### III. TYPES OF ONTOLOGY TOOLS

Without effective tool implementation, it will be more complicated to develop certain ontologies for a specific domain. The evolution of these ontologies urges for use of the various software tools. There are huge repositories of tools from open source to licensed that are available in the web market. These tools employ in various phases of ontology life cycle including creation, development and maintenance.

Ontologies provide an interface between users and machines. Ontology is a shared conceptualization of the world. They

define mixed peculiarities that combines high-level schemas and assertional aspects, entities, attributes, interrelationships between entities, domain vocabulary and factual knowledge, which are connected in a Semantic manner. Fig.1 depicts the flow of actions to be performed by the ontology tool. Ontologies have changed their application from logical inference to the semantic web. For furnishing and organizing information of heterogeneous content, Ontologies provide specific tools. The three major uses of ontologies are:

- ✓ To assist in communication between humans;
- ✓ To achieve interoperability and communication among software systems;
- ✓ To improve the design and the quality of software systems.

Ontology tools [7] assists in providing an efficient environment with interfaces to build ontologies. These tools aim at conceptualization, implementation, consistency checking and documentation. Based on these factors, Ontology tools formed into groups- development, evaluation, merge and alignment, ontology-based annotation, querying and inference engines, learning tools. Based on the ontology language, these tools fall into two groups.

- ✓ Basic origin tools, which are knowledge model maps directly to an ontology language.
- ✓ Integrate test suits whose main characteristic is that they have an extensible architecture and independent of the knowledge model.

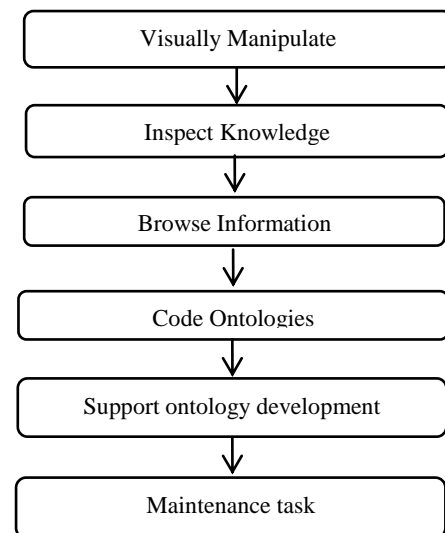


Figure 1. Flow chart of Ontology Tool

Table 1. Types of ontology tools

Tool Name	Developers	Availability	Import format	Export format	Multi-user	Ontology storage	Semantic Web Architecture
<b>Protege 2000</b>	SMI standard university	Open source	XML, RDF(s), XML Schema	XML, RDF(s), XML schema, Flogie, CLIPS, JAVA, HTML	Limited	File and DBMS (JDBC)	Standalone- client-server
<b>Apollo</b>	KMI Open University	Open source	OCML, CLOS	OCML, CLOS	No	Files	Standalone
<b>Onto-edit</b>	Onto-prise	Software license	XML, RDF(s), Flogie, DAML+OIL	XML, RDF(s), Flogie, DAML+OIL	No	DBMS	Eclipse - client/server
<b>Swoop</b>	MND (university of maryand)	Open source	OWL, XML, RDF	RDF(s), OIL, DAML		As HTML models	Web-based and client-server
<b>Neon tool kit</b>	Neon technologies foundation	Open source					Eclipse - client/server
<b>Top brand composer</b>	Top quadrant	Software license	RDFa, WOL, XML(s),RDF(s), XHTML, UML,GRDDL, RDB with D2RQ	HTML, UML, XSD,Excel,RD B, oracle database, RDF file, XML file,text file		DBMS	Standalone Eclipse plug-in

#### A. Protege

Protégé [8] [9] is a free, open-source platform that gives a growing user community with a collection of tools to construct domain models and knowledge-based applications with ontologies. It is basically present in the two outlines: Web Protégé and Protégé desktop. In web protege, the environment is created for the web that makes it easy to create, upload, modify, and share ontologies for collaborative viewing and editing. While in the Protégé desktop, ontology editing environment is enriched with full support for the OWL 2 web ontology language. The entire tool can be modified to supply domain-friendly support for creating knowledge models and entering data. It can also be extended by a plug-in architecture and Java-based API.

#### B. Apollo

Apollo [8] is a user-friendly knowledge modelling application based on the basic primitives, such as classes, instances, functions, relations etc. Apparently, it is not bounded to any knowledge representation language and can be redesigned to support different storage formats. Its internal model is a frame system based on the OKBC protocol. Its user interface has an open architecture and written in Java programming language. It has many features such as full consistency check during editing, open design based on views, special dialogue for creation of anonymous instances and java based user-interface.

#### C. OntoEdit

OntoEdit is a graphical interface that provides an ontology engineering environment to support the development and maintenance of ontologies. Its extensible and flexible

environment gives a plug-in architecture and utilized for editing and querying ontologies, and includes functions for conjunctive ontology building, inferencing, handling of domain lexicons that make use of Its ontology editor which exports ontologies in various formats. It has two variants - OntoEdit Free and OntoEdit Professional, each with a collection of specifications.

#### D. Swoop

Swoop is hypermedia-based OWL ontology editor and browser. SWOOP validates OWL and offers various OWL presentation syntax views. This tool provides the comparison, editing and merging of ontologies. They can be constrained based on their logic-based definitions, related properties and instances. SWOOP does not follow a methodology for constructing ontology. SWOOP's interface has hyperlinked capabilities so that navigation can be unadorned and uncomplicated. This tool can help to search concepts across multiple ontologies. An ontology search algorithm used by SW that combines keywords with DL-based in order to find corresponding concepts.

#### E. TopBraid

The TopBraid Composer is a visual modelling environment for creating and maintaining domain models and ontologies in the semantic web standards. It supports knowledge-based framework that provides visual editing support as well as interoperability with UML, XML Schema and databases. It is purely based on the Eclipse platform and the Jena API. It supports various reasoning and consistency checking mechanisms. A TopBraid composer can be operated in a single user mode working with ontologies stored as files or in

a database. The TopBraid Composer is available in three editions:

- ✓ Free Edition (FE) is an introductory version which only consists of a core set of features.
- ✓ Standard Edition (SE) includes all characteristics of FE and graphical viewers, import facilities, advanced re-factoring aid.
- ✓ Maestro Edition (ME) includes all features of SE plus support for TopBraid live, EVN and many other capable user features.

#### F. Neon toolkit

The neon toolkit is the ontology engineering environment developed and maintained by Neon Technologies foundation. This tool is an open source and multi-platform ontology which supports the development of ontologies in F-logic and OWL/RDF. It provides comprehensive support for ontology engineering life-cycle. This toolkit is purely based on the Eclipse platform and covers a wide variety of ontology engineering activities like annotations, development, evaluation, documentation, standard, matching, etc.

### IV. CONCLUSION

The ontology describes a huge repository that related to a specific domain to retrieve the information from the web in an efficient manner. This work defines Ontology as Knowledge representation system and explicit specification of a conceptualization. It also explores a deep study and comparison of various ontological tools. These tools help in obtaining information from web documents in triplet format.

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