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Ontology Development Tools and Languages: A Review

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ABSTRACT

Semantic web is used to extract the information that is not easily extracted by the current web / existing web. Ontology is the major technology for the development of semantic web. There are different tools and languages which are used to construct/design the ontology. This paper describe semantic web, how semantic web is different from the current web / existing web, tools and languages used for the development of semantic web and main functions of these tools and languages. In the end the basic features and limitations / drawback of these tools and languages are given.

Keywords: Web, Ontology, Semantic Web etc.

1. INTRODUCTION

World Wide Web is mainly used for the purpose of access data when we need it anywhere and at any time this data available in the form of interlinked hypertext language. When we search the information in the web it provides us the search result in a irrelevant information and in different formats. To avoid these limitations of the web we use a powerful web that is called semantic web. Semantic is design by using a powerful technology that is called ontology. Ontology mainly describes the relationships of the entities. There are many languages and tools which are useful when we construct ontology or we design semantic web with the help of ontology. These tools and languages provide a platform for constructing ontology in an efficient and easy manner.

1.1 WEB: The Web was invented in 1989 by Sir Tim Burner-Lee. When we want to access data from anywhere and at any then we need a mechanism that is called the web or the World Wide Web. Data is in the form of interlinked hypertext language. It makes interaction between human and network.

1.2 SEMANTIC WEB: There is huge size of information in the web and it spread such information in different sources which makes the users search more time while it searches information and organizing them from different sources manually. Web can give user all needed information butsometimes it gives irrelevantinformation to user. To prevent user from such types of problems we use new edition of the web which is called semantic web. Semantic web provide a knowledge based ontology. Semantic web is a web of linked data. Sematic web mainly related to meaningbut others web is related to structure. We used semantic web it gives a common frame work which makes data to be shared and reused across the applications.

1.3 ONTOLOGY: When user surf on the web user need a powerful tool which having capability of efficient search and having the capability of interpret the huge heterogeneous information. Such types of information we found in different formats. These formats are difficult to understand for user and when we understand the relationship between these formats and the data. To solve such types of problems we use ontology. The most exact definition is given by Tom Gruber. Tom Gruber ontology as: "Ontologyis aformal, explicit specification of a shared conceptualization ''. Ontologies uses keyword based mechanism while performing the searching process. Ontologies are search in efficient manner than theother methods.

2. TOOLS FOR ONTOLOGY CONSTRUCTION:

There are many software tools which are used when we want to develop ontology for any domain. These tools help to construct ontology, organize ontology and analyze ontology. There are many editing tools which helps us for easily editing the ontology. These tools make the editing very efficient. Some ontology editing /constructing tools are follows:

PROTEGE: Protégé can run on various platforms likes IBM, Solris, Windows, MacOCX, Linux etc. Protégé is open source and freely available tool of ontology editing /construction. In protégé we can construct ontology in various formats like XML Schema, OWL, RDF etc. Protégé tool working mainly based on java.

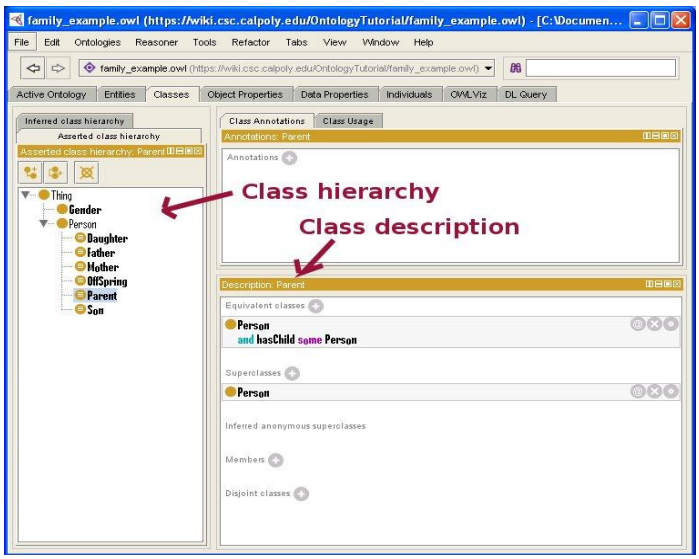

FIG. 1 Snapshot of Protege

By using protégé we can create ontology, we can manipulate ontology and we can visualize ontology. In this we can construct tables and diagram by using the widgets. When classes are manually constructed in the protégé is called asserted hierarchy and when classes automatically computed by reasoned then it is called inferred hierarchy.

2.2 TOPBRAID COMPOSER: The first version of the Top Braid composer was release in 2011 and available in three editions: Maestro Edition, Standard Edition and Free Edition. In the maestro edition there are all features of the SE and having some extra features like SPARQL Motion, Top Braid Live, Ensemble, and EVN etc.

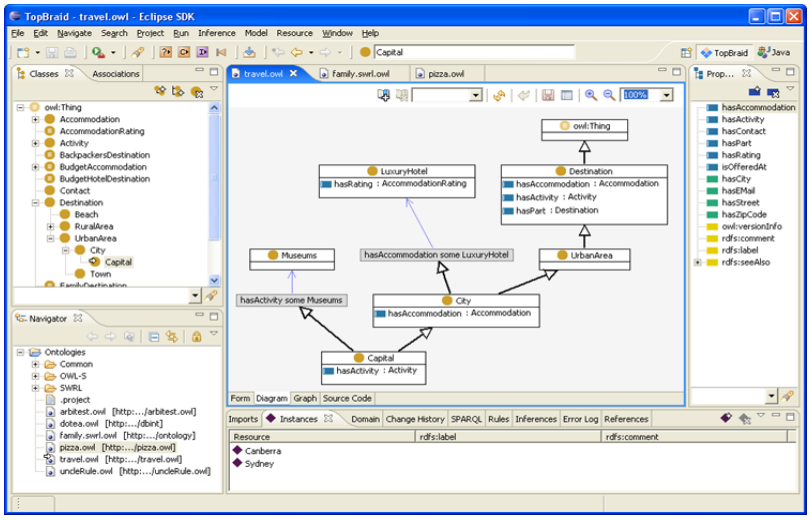

FIG. 2 Snapshot of Topbraid Composer

In the standard edition there is all features of the FE and having some extra features like graphical viewers, advanced refactoring, import facilities etc. The Free Editions introduction version which has a basic set of its features. In this we have two framework namely extensible and flexible. In this there is a graphical editor which helpful in designing ontology easily.

2.3 NEON: Neon is a open source and multi-platform environment tool for ontology editing /construction. It is mainly based on eclipse platform. It can be extensible by using plugins.

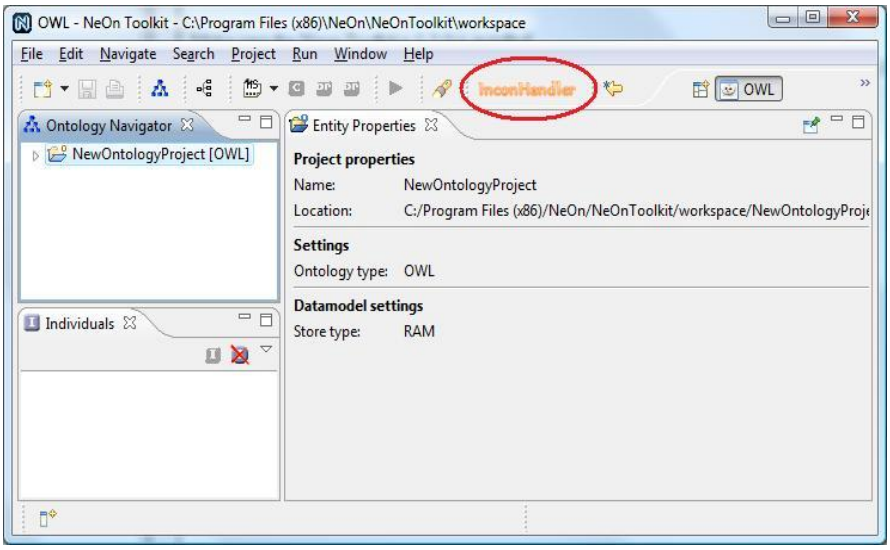

Fig. 3 Snapshot of Neon Toolkit

These plugins has the capacity that they can cover whole life cycle of the ontology engineering. The main features are visualization, XML editing, import to F-Logic, export to F-Logic etc.

2.4 APOLLO: Apollo allows us to construct ontology by using basic primitives like relation, classes, functions instances etc. In Apollo we can also inherit the onlogies and the classes of this ontology. Apollo is based on the open knowledge based connectivity protocol.

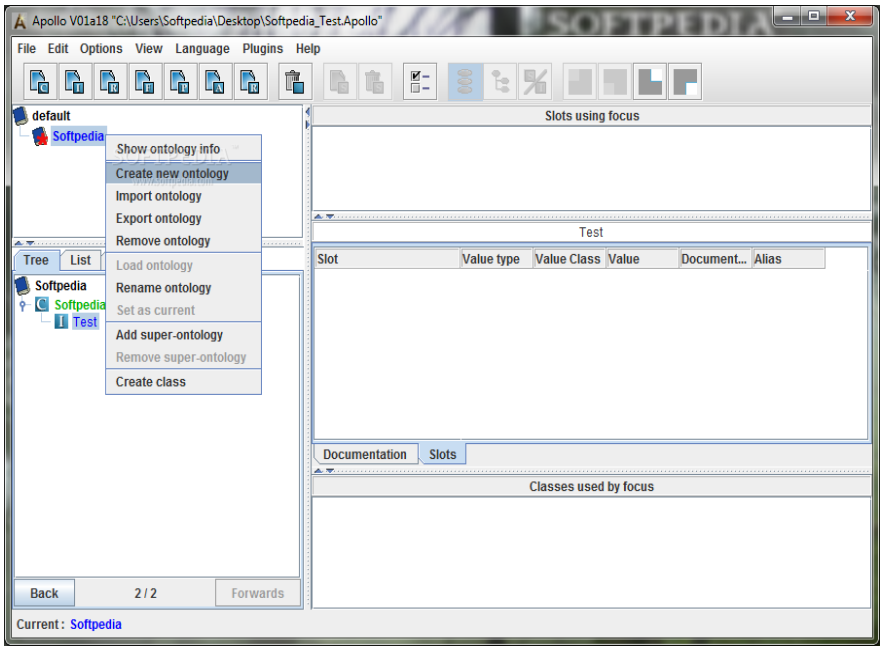

FIG. 4 SNAPSHOT OF APOLLO

In this classes contain template as well as non-template slots which is used for the generate instances. Internal model of the Apollo is depending on the frame based system which uses the OKBC protocol. It is not support multiuser capabilities, graph view, information extraction etc. It is needed when we want to consistency checking in a strong type manner.

2.5 SWOOP: Swoop is stands semantic web ontology overview and perusal. Swoop tool is also a open source tool for ontology editing/constructing. Swoop tool allows us to comparison between entities and the relationship of different ontologies. In the swoop we can import ontologies from text formats, XML, OWL and RDF. Swoop supports reasoned like RDFS, PELLET etc.

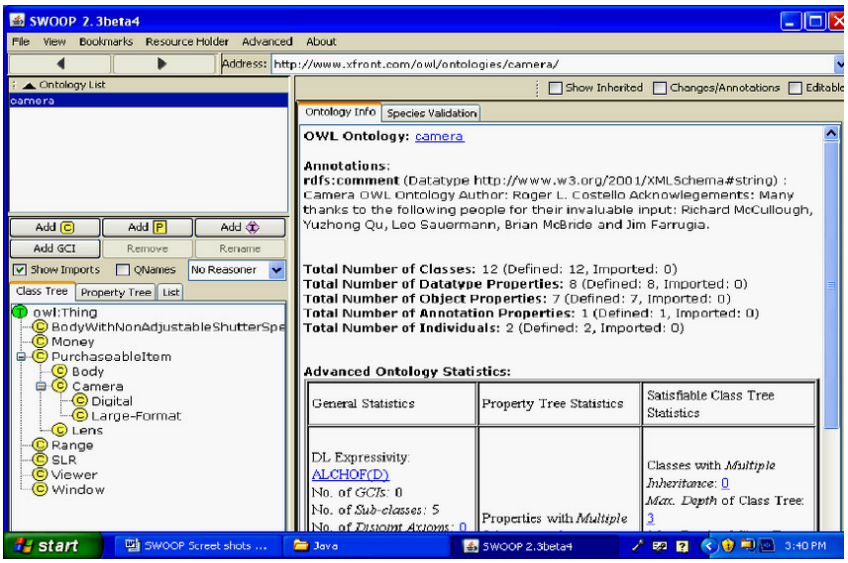

Fig. 5: Snapshot of Swoop

In the swoop there are many advance features likes partitioning of ontology, re-calculate rank, pellet query, repairing and split of ontology,control the version etc. In the swoop navigation is easy because there are hyperlinked capabilities in interface of the swoop.

3. ONTOLOGY CONSTRUCTION LANGUAGES:

There are many languages which are used when we want to construct / edit the ontology. These languages providea platform which is helpful in constructing /editing ontology in an efficient and easy manner. These languages are mainly based on the java platform. Some languages which are helpful in the constructing ontology are follows:

3.1 DAML+OIL: DAML+OIL is stands for the Darpa Agent Markup language and ontology Inference layer. It is used to describe the structure of the domain. When it is describe the structure of the domain then it used description logic style model theory. DAML+OIL used an object oriented mechanism todescribe the domain in to classes and properties. In this we can perform some relations on the entities like Unique, Transitive, Inverse, Symmetric, Intersection, Union etc. `

3.2 ONTOLOGY INTERCHANGE LANGUAGE: Ontology Interchange Language is mainly used three elements: Web Standard, Frame Based System and Description logic. Ontology interchange language is used for the semantic interoperability between the web resources. In the ontology interchange language there are some layers like heavy OIL, core OIL, instance OIL, standard OIL etc. It provides us modeling primitive which is used in frame based and used for description logic orientedontologies.

3.3 WEB ONTOLOGY LANGUAGE: Web ontology language is used for the processing of the information of the web. It provide high level integration of data between domains and communities. Web ontology language has three sub languages:Owl DL, Owl Full and Owl lite. Owl DL is uses description logic for the representation of relation between the objects and their properties. Owl Full provides us sentaticfreedom of RDF and provide the high expressiveness. Owl Lite is provide simple constraints and the classification hierarchy.

3.4 RESOURCE DESCRIPTION FRAMEWORK: RDF is developed to describe the web resources. RDF provide the mechanism for the explicitly representation of the business models, services and processes. Data models we use in RDF are equivalent to semantic network formalism. In RDF models we use three elements: Predicate, Resource and objects. RDF data models contain three types of the objects: statements, resources and properties. In this instances are related to other instances by using properties and properties are sets by using their range and domain. It is a framework which is used for the representing metadata about the resources and used to describe the semantic information about the web resources. In this when we want to identify the resources then we used uniform resource identifiers.

3.5 RDF SCHEMA: RDF Schema provides a mechanism which is used to define the relationships between the attributes and the resources. RDF Schema is mainly used for the representation format in so many tools and for many projects like

Mozilla, Amaya, protégé etc. In this Boolean combinations of the classes are not possible. In this there is local scope for the properties. It is used to describe RDF vocabularies. In this we cannot perform some relations on the entities like Inverse, Union, Transitive, Intersection, Symmetric, Unique etc.

3.6 SHOE: SHOE is stands for the simple hypertext markup language ontology extension. SHOE defined the different namespace while naming eachontology. It is mainly used to distribute internet agents. SHOE is used to maximize interopratibilty by using locality to inference rule, shared ontologies, prevent from contradictions, prefixed naming etc. It can manage the web with its changing nature by using backward compatibility scheme.

CONCLUSION

In the generation of the web expansion of the sematic web is very necessary because current web/existing web have many limitations.Any domain having a large no. of information sources which want to exchange data can implement by using semantic web. This paper presented the difference between current web and semantic web. This paper also reviews some popular tools and languages for ontology construction.

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