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Comprehensive Study on Ontology Vs Database and Ontology Tools

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Abstract — Ontology is a recently populated domain in the field of knowledge sharing and management, especially after the introduction of the Semantic Web and its other supporting technologies. An ontology describes the set of concepts and terms used to define and represented the knowledge area. The aim of this paper is to describe about Ontology, Ontology Languages and describing ontology tools with working of protégé tool. Almost every tool has different concepts and functions, but most of the users are using only one functions, because they are unable to exchange their ontologies from one function tool to another function tool. In addition, making a comparative study of ontology and database.

- Not able reuse of domain knowledge.
- Shareable across the domain.
- Store the corelated data.

Keywords - Ontology, Ontology Language, Ontology Building Tools - protege, Database vs Ontology.

I. INTRODUCTION

Ontologies describes a relations and concepts in a particular domain which is required for knowledge representation and knowledge interchange. Ontology is an explicit specification of conceptualization. It is tree like structure which stores a data. There are many tools and formulation are used to develop the ontology but, in this paper, we can describe the detail working of protégé tool. In addition, making, the paper describe the concept of Ontology, Ontology Language, Ontology building tools and Comparative study of database and Ontology.

II. ONTOLOGY

Ontology is the basic concepts of the Semantic Web. It is a data or an information model that represents knowledge as a set of hypothesis and theory within a domain and the similarity between these concepts. Ontology is an explicit specification of conceptualization. It is tree like structure which stores a data. Semantics is adding meaning to information.

Uses:

- It is used to Sharing the familiar understanding of the structure of information or a data among people.

Structure of Ontology



Figure 2.1 Ontology structure

III. ONTOLOGY LANGUAGES:

In a past few years, a varieties of Ontology languages are introduced by W3C. The following segments tells the most popular and recognized languages which is discovered especially by Wide Web Consortium(W3C).

3.1 KIF: stands for Knowledge Interchange Format, it is a language based on first order logic and it is the language developed in 1992 as a format exchange for multiple knowledge relevant systems.

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3.2 Loom: loom is one of the languages created to develop the ontology with the knowledge representation language executed by researchers in the AI research group at the University of Southern California's Information Sciences Institute. It is created based on the many rules by the production, and offers automatic classifications of concepts in the ontology.

3.3 OWL: OWL is expanded as Web Ontology Language, developed in 2001 by a working group by W3C. A group was described some list of main use cases for the Semantic Web.

3.4 XML: XML is a W3C proposal which is expanded as Extensible Markup Language, it was developed in 1996, It is like a HTML and its design which is used to define data and not to display data. The effect made by a group, XML language is been used to alter and verify SHOE syntax and also some additional ontology languages was constructed on the XML syntax.

3.5 XOL: is expanded as Ontology Exchange Language, was developed by the AI centre of SRI international, in 1999. It is proposed and designed by the US bioinformatics community and with the base of XML language. A group was developed with some advantages that any tool can distribute for the growth of Ontologies using XOL, although it is based on syntax of XML, we can use an XML editor.

3.6 RDF: is expanded as Resource Description Framework, it is formed by the W3C to define Web resources and allows all the detailed description of the semantics of data based on the XML.

IV. ONTOLOGY TOOLS:

- protege
- WebOnto
- OILED
- SWOOP
- WebODE

4.1 Protégé:

Protégé supply a graphic user interface, which is used to describe the ontologies. It also includes deliberate allocation to validate and verify the models are compatible and to infer new information based on the investigation of an ontology. Like Eclipse, Protege is also a framework for which various projects. It is like a plugin with is used to create an ontology.

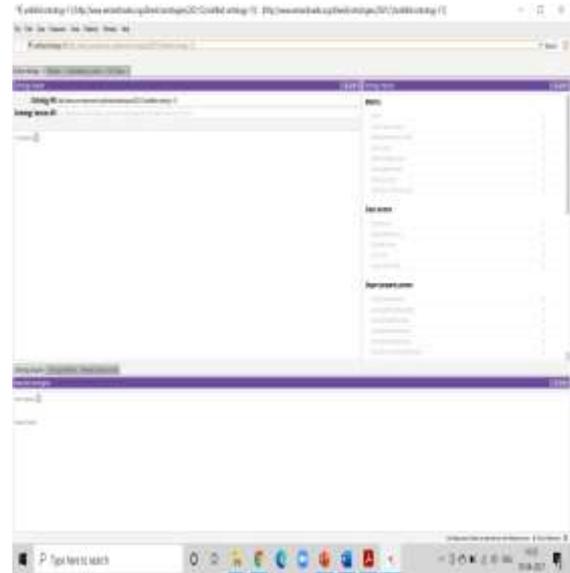


Figure 4.1.1: Main page of protégé.

Working with protégé: Active ontology Tab:

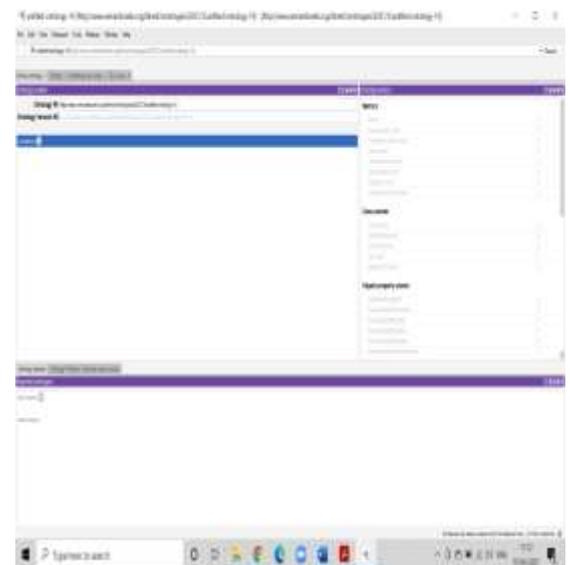


Figure 4.1.2: Active ontology Tab

The figure displays the drop-down on the taskbar which is the currently active ontology, in this tab all the edits take place by the developer. When working on a single ontology this concept of the active ontology is not a concern.

This study however, applied the principle of Biometric Fingerprint system to develop an application specific to the workforce of higher Institutions of learning using the Federal Polytechnic, Ilaro as a case study in order to curb the manipulations of manual attendance system and encourage commitment, hard work and discipline for improve service delivery.

Entities Tab

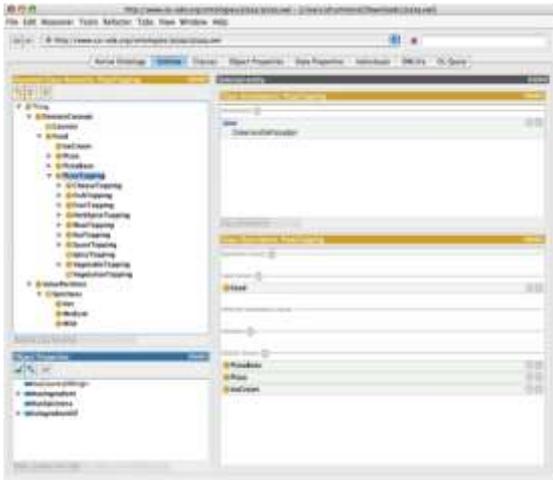


Figure 4.1.3: Entities Tab

The Entities tab is the main workhorse of the ontology editor. Using this tab, we can look at all of the properties, classes, and individuals in an ontology. As we have observed each tab is consists of several visibility which can be split, removed, resized, floated and layered. The selection model of the entities tab: when a class or property or individual is chosen in the trees on the left side of the tab, the right pane will be changed to display the selection immediately.

Individual by class

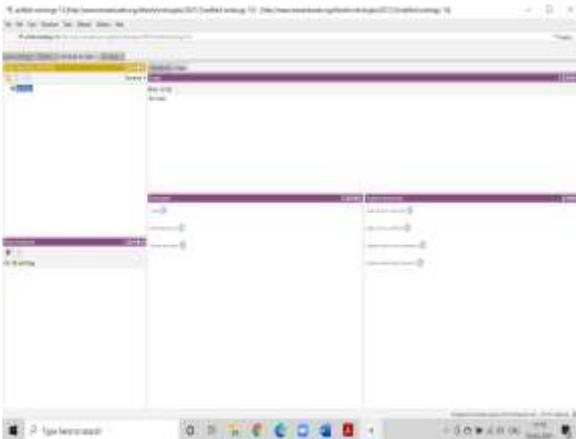


Figure 4.1.4: Individual by class

Class Annotations



Figure4.1.5: Class Annotations

we can annotate any named thing like (ontologies, classes, properties etc).

In OWL we are allowed more control over annotations which can also be added to arbitrary axioms.

e.g: **subClassOf(A, B)**.

Usages



Figure 4.1.6: Usages

In the usage tab all of the visibility are on the tabs by default and many are not listed in the View menu. We can insert and delete views which we need to create own custom interfaces.

4.2 WebOnto

WebOnto is the famous ontology editing tools. It is introduced by the Knowledge Media Institute (KMI) of the Open University in England. The main characteristic is creation of new ontologies, automatic generation of instance editing forms and stability checking management of ontologies using a graphical interface.



Figure 4.2.1: The initial WebOnto page.

4.3 OILED

OILED is introduced by the University of Man-chester. The main usage and functions of OILED tool is checking and creating of large-scale ontologies.

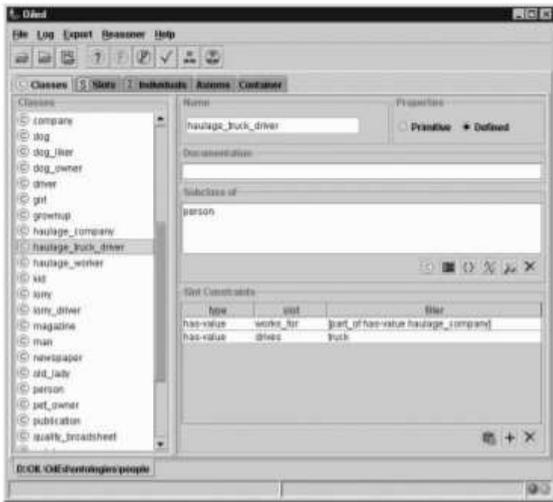


Figure 4.3.1: OilEd Class Panel

4.4 SWOOP

SWOOP expanded for Semantic Web Ontology Overview and Perusal. It is an easy and scalability OWL ontology editor and browser written in Java. Its main characteristic is editing, creation, merging and differentiation of ontologies. The main functions SWOOP is to bring in all ontologies from OWL, RDF, XML and text formats.

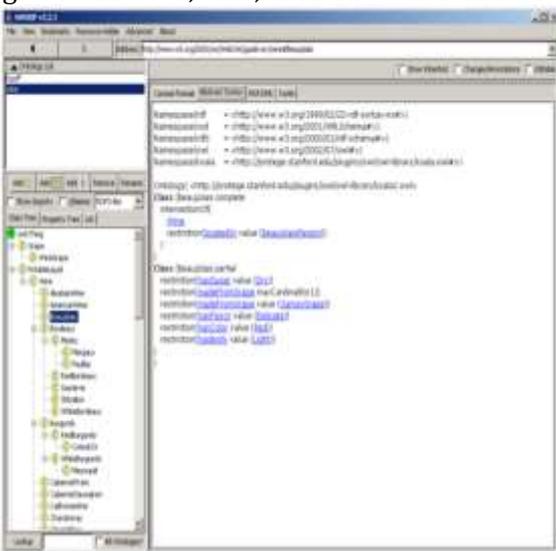


Figure 4.4.1: The initial SWOOP page.

4.5 WebODE

WebODE is introduced by the Ontological Engineering Group from the AI Department of the Computer Science of University at Madrid. Web ODE supplies helpful to most of the tasks involved in the ontology growth process such as navigation, merge, ontology edition, documentation, reasoning, etc... WebODE supplies bring in and bring out all facility for the ontologies of XML format.

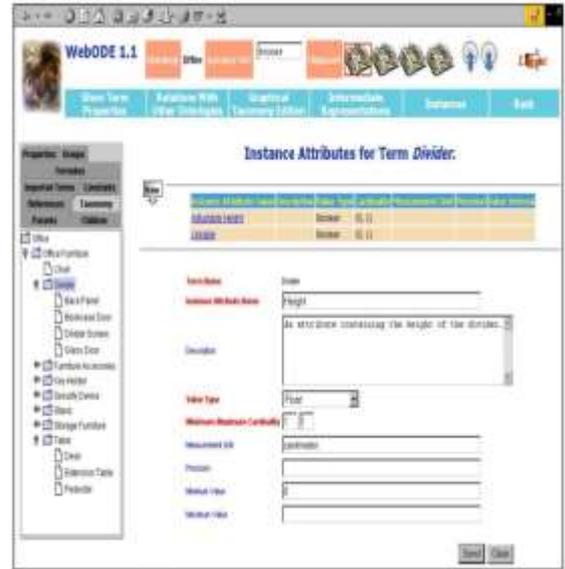


Figure 4.5.1: The initial WebODE page.

V. Comparison of Ontology Tools

Table 5.1: comparison of the ontology tools

Features/Tools	Protégé	Web Onto	OILED	SWOOP	Web ODE
Availability of Tools	independent	independent	Open Source & Independent	Open Source & Independent	Independent
Storage Capacity	DBMS and Files	Files	Files	Files	DBMS
Tools Architecture	Standalone	Client and Server	Standalone	Standalone	N-Tire
Tools Query	Yes	Y/N	No	No	No
Property/Graphical class	Yes	Yes	No	Yes	Yes

**VI. ONTOLOGY vs DATABASE
Ontology creation**

In the case of Ontology creation, the following steps are included,

- Step 1: Creating entities.
- Step 2: Creating Sub domain for the entities with we created.
- Step 3: Creating an instance for the sub domain.
- Step 4: Adding description for the instance.

Database creation

In the case of databases creation, the following steps are included,

- Step 1: Creating Database
- Step 2: Creating table with in the database.
- Step 3: Creating the attributes with we need in the table.
- Step 4: Declare the data type and Constrains with we need.

Item	Ontology	Database
Creation Period	A thousand years ago	A thousand year ago
Knowledge Description	OWA	OWA
Design concepts and methods	Used by existence ontologies	Used from scratch
Optimization	Ontology patterns	Normal forms
Syntax	RDF, OWL languages	Entity-relationship model

Table 6.1: Evolution difference

Ontology	Database
Classes	Database
Sub classes	Table name
Instance	Attributes
Add Description	Values

Table 6.2: Basic difference

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VII. CONCLUSION

This paper describes about the Ontology, Ontology Languages, Ontology Tool- protégé, working of protégé and the comparative study of ontology and database. There are many numbers of differences and likeness can be founded between ontologies and databases.