WWW to Semantic Web Mapping of a Website

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Abstract- Aim of this paper is to propose an innovation of semantic website that is designed for user conveniences on searching within University of Engineering and Technology (UET) domain. The older search technology using indices and string matching which carries a lot of issues. The new one is faster as it uses logical knowledge-base i.e. ontology mechanism. The emergence of semantic web attracts users to access huge amount of data efficiently and according to their needs and enables computer to enhance its reasoning to respond user queries. An effort is to develop ontology for www to semantic web mapping of website.

Key Words: Semantic Web, Resource Description Framework (RDF), WWW, Ontology, Mapping, Dynamic, Content

1. INTRODUCTION

The word "Semantic is termed for "Meaning" or "Understanding". The major difference between Semantic web and other technologies like Relational Database is that, Semantic web is concerned with meaning and not the structure of Data (Aroma, 2012). ''The Semantic Web is not a separate Web but an extension of the current one, in which information is given well-defined meaning, better enabling computers and people to work in cooperation'' (Tim Berners-Lee, 2001). Semantic web services are modular, self-describing, self-contained applications that are accessible over Internet. Web service Description Language (WSDL) does not contained semantic descriptions, it specify the structure of message components using XML schema constructs.

Nature of semantic web services:

Static --> www --> Semantics Web --> Semantics Web Services

Dynamic --> Web Services -> Semantics Web Services

Syntax is a character strings without meaning while Semantics are meaning of characters strings (Hitzler, 2011). Semantics web architecture and its applications are the next generation in information technology architecture. Mapping deals with physical representation of the matches established by schema matching and the rules of transforming elements of one schema to another.

The Semantic Web improves your application's ability to effectively utilize large amounts of diverse information on the scale of the WWW. This is accomplished through a structured, standardized approach for describing information so as to allow rich information operations. The flexibility and many types of Semantic Web statements allow the definition and organization of information to form rich expressions, simplify integration and sharing, enable inference, and allow meaningful information extractions while the information remains distributed, dynamic, and diverse.

Rest of the paper is organized as follow: section 2 provides an intensive literature review of the semantic web mapping procedures; section 3 discussed the tools and methodologies used for mapping i.e. ontology based system; in section 4 proposed work, while in section 5 conclusion and future work is given and references in last.

2. LITERATURE SURVEY

In order to perform this research we study the relevant material from books, research papers from various journals and conferences, internet and guideline from instructor.

Aroma and Kurian (2012) focused on redefinition through the use of mapping from WSDL services (Web Service Definition Language) towards semantics. The OWL-S (Web Ontology Language for Services) is semantic languages provide support for ontology based approach; can be applied for Semantic Mapping of Concepts.

Edgard et al., (2012) introduced an Eclipse plug-in that was used for the entire conversion process. This architecture utilizes the specificities of the triplification process through a modular structure which encapsulate the stable components apart from the unpredictable and change-prone mapping methodologies. Although these RDB2RDF

mapping processes handle mapping process up to some extends but there need updation.

Ratinan et al., (2012) presented the invention of new website known as the Semantic Web, is called the SIIT Web of Semantics, designed for convenience of user searching within Sirindhorn International Institute of Technology's domain. The newer one faster than the older search technology using indices and string matching mechanism, as this website based on logical knowledge base ontology and written in OWL. Use cases i.e. search, add individuals and visualize individual relations are used.

Vanjulavalli et al. (2012) proposed a comprehensive framework for ontology mapping system Hybrid LCGA applied, Hybrid LCGA signify Latent Class Similarity combined with Genetic algorithm used. The similarity between patterns obtained and patterns in same document are extracted with its respected Probability; it extended for other documents. This algorithm applied using the patterns potential values respective fitness function. Finally, the patterns evaluated with perfect matching with the class to which it belongs. These ontological results are suitable for implementation in E-learning system.

3.0 COMPARISON OF WWW AND SEMANTIC WEB (SW)

Table. 1 Comparison of WWW and SEMANTIC WEB (SW)

FEATURE	WWW	SEMANTIC WEB
Fundamental Component	Unstructured content	Formal statements
Primary Audience	Humans	Applications
Links	Indicate location	Indicate location and meaning
Primary Vocabulary	Formatting instructions	Semantics and logic
Logic	Informal/nonst andard	Description logic
Ingredient	-Content -Presentation	-Content -Formal Semantics -Presentation
Conceptual Perception	Large hyper-linked book	large inter-linked database

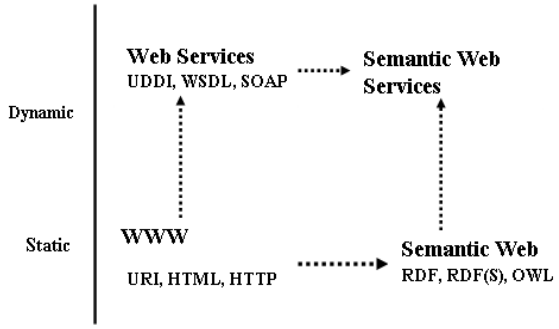

Figure 1: Vision from WWW to Semantic-Web-Services [1]

3.1 TOOL & METHODS

Following are the tools used:

- Eclipse Web Development Environment
- Ontologies Reaoner
- Protégé 4.1 Editor + Plug-in (Graphviz)
- OWL
- SPARQL
- RDF, RDFS
- XML
- Graphviz Protégé Plugin for ontology visualization

3.2 ONTOLOGY MAPPING METHODOLOGY

WSMX is a design time, graphical ontology mapping tool that provides semi-automated mapping creation. Ontology creation is a difficult process includes different type of users and multiple tasks. Most of the tools used in semantic web development are open source and freely available to the developers.

Procedure of developing a new ontology involves following steps:

- Establishing the scope and aim of the ontology
- identifying the entities that are specific to the domain
- Organization of entities into hierarchy
- Define entities
- Add properties of the entities

Describe and identify relationships (Cardoso and Smeth, 2006).

4. PROPOSED WORK

Aim of this paper is to mapping UET's web site that is using www.uet.edu.pk website that is designed using HTML Java Script and Cascading Style Sheet (CSS) to semantic website. For this

purpose software requirements are Eclipse's jdk 1.6, XML and RDF, Jena framework.

We create ontology for the UET website to establish relationships between classes of individuals ontology specific rules use cases for semantic web and define Mechanism for Mapping a WWW site to Semantic Website (In progress).

The basic components of OWL include *classes, properties,* and *individual*

Class is the basic building block of OWL ontology. A class is a concept in a domain. Classes usually constitute a taxonomic hierarchy (a subclass-superclass hierarchy).

Classes are defined using the owl:Class element. OWL comes with two predefined classes: owl: Thing and owl:Nothing.owl:Thing is the most general class, which contains everything; owl: Nothing is an empty class. Every class you define is a subclass of owl: Thing and a superclass of owl: Nothing. Examples of classes in an Admission domain might include Student.

```
<owl:Class rdf:ID="StudentId">
 <rdfs:subclassOf rdf:resource="#Student"/>
</owl:Class>
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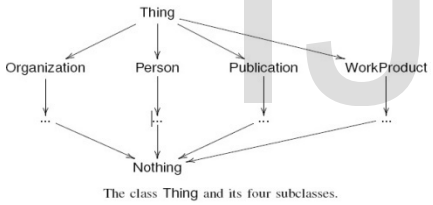

Figure 2 : Ontology for the UET Domain

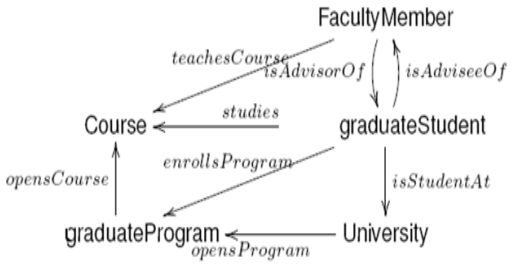

Figure 3: Relationship for the classes of individuals of UET Domain

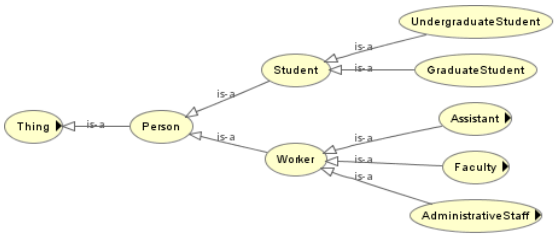

Figure 4: An Example of UET Ontology Schema Derived using Protégé

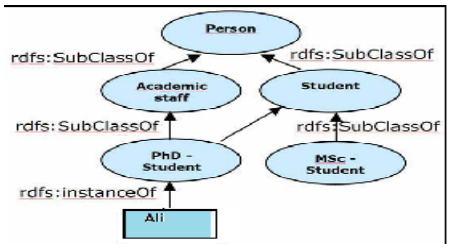

Figure 5: An Example of UET Ontology RDF Schema

4.2 Conflicts of Semantics Annotation in Web Services

1. Domain Interoperability (Attribute level different descriptions for semantically similar attributes)

Naming Conflict: Naming Conflict occur when two attributes that are semantically alike might have different names (synonyms) when two attributes that are not related semantically may have same name (homonyms) (Cardoso and Smeth 2006).

Data Representation Conflict: two attributes semantically similar may have different data types/ representations

Data Scaling Conflicts: When two attributes semantically similar might be represented using different precisions

2. Entity Definition (Entity Level different descriptions for Semantically similar entities)

Naming Conflicts: semantically alike entities might have different names (synonyms) semantically non-related entities may have same name (homonyms)

Schema Isomorphism Conflict: Semantically similar entities may have different no. of attributes

3. Abstraction Level Incompatibility: Similar entities / attributes are represented at different level of abstraction

Generalization Conflict: Semantically similar entities are represented at different level of generalization in two web services.

Aggregation Conflict: Semantically similar entities are represented at different level of aggregation in two web services.

Attribute Entity Conflicts: Semantically similar entity modeled as an entity in one service and as another entity in another web service.

5. CONCLUSION AND FUTURE RECOMMENDATIONS

Our proposed technique is more efficient and less time consuming, this technique can be incorporated in web development methodologies to upgrade them to semantic web. Semantic Web Human readable and machine understandable contents in html as well as in owl format respectively. Semantic heterogeneity of individuals is automatically removed.

Implementation of semantic web to www.uet.edu.pk website. In order to increase user satisfaction results can be ranked. Spelling correction for input in the search form Development and the Editor tool can be enhance. Development of plug-in in Eclipse for www to semantic web mapping to save time to develop a new semantic website.

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