

# Automatic Generation of Owl for Domain Based Applications

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**Abstract-** Semantic Web is a web of data that are logically related and allows us to represent semantics of data in the form of ontologies. Today's web represents data in the form of HTML/XML which doesn't provide semantic relationships among resources on the web. To transform current web data into semantic web there is a big challenge to generate OWL form of data. It is also challenging task for developers to understand ontologies and construct new ontologies in terms of time, efforts, maintenance, domain specific knowledge and skills. Paper represents an algorithm to build ontology data from the basic knowledge of domain application in terms of classes, properties, attributes etc.

**Keywords-** OWL, Ontology, Semantic Web, UML (Unified Modeling Language)

## I. INTRODUCTION

Semantic Web is an emerging area and to work with semantic data is the most challenging aspects of in the field of semantic web research. Creation, interaction and sharing of semantic data is necessary to make integration among semantic web developers, humans that should be able to access semantic data information and non-experts users.

To integrate semantic web with current web, there is a need to access semantic information easily over the web through Web browsers. There are number of tools available as Ontology editor and few of them are also providing conversation of RDF or XML data to OWL form. There is a big issue that how to generate OWL file directly from set of number of Classes, Attributes, Properties, Objects and Individuals which are available before we develop any web application. This paper proposed a new approach for generating ontologies from UML based data convert it into OWL file.

A. *Objective* - To introduce an algorithm that helps to non-experts users who are not familiar with semantic web and its representation for how to create ontologies for a domain based applications. Introduced algorithm that will generate OWL file from the basic knowledge of UML fundamentals.

## II. METHODOLOGY AND PROPOSED WORK

To create new ontology structure for any domain, basic knowledge of that domain is must. In this case use UML concepts before developing ontology. For any developer it is necessary to define classes, objects, properties, sub

properties, relationships among classes. These things are going to be used in creation of ontology as defined below in the flow diagram.

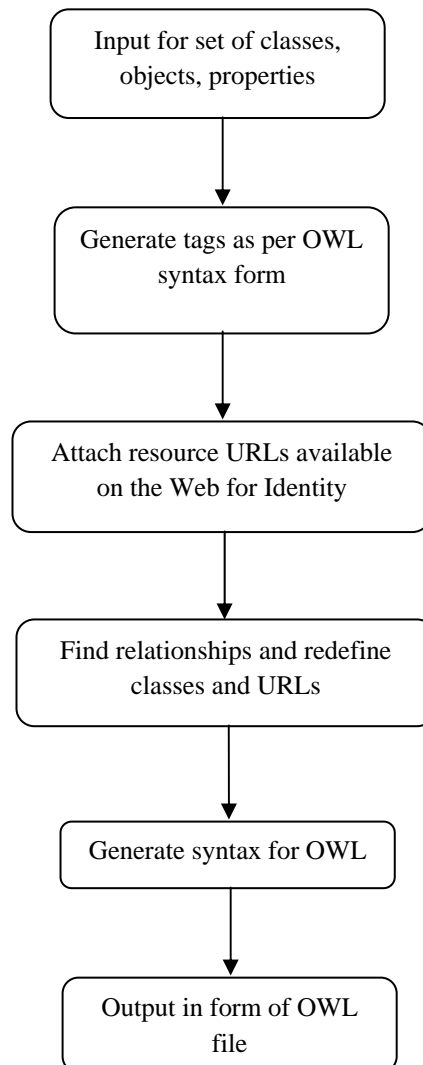


Fig. 1 Flow to Generate OWL File

- Steps to generate OWL from existing set of ontologies for specific domain:
  1. Analyze and study the structure of existing owl and ontologies.
  2. Identify XML-tags in OWL and relate with input matrices

3. Perform reverse engineering and try to extract information like set of classes, attributes, properties, objects, individuals and relationships among these data.
4. Regenerate OWL file from extracted information.
5. Follow the steps of above algorithm to generate new OWL file.

For example, take one web application student portal that stores information regarding student of university. For this type of application, as per algorithm first identify set of classes, properties, attributes, individuals etc.

Here we can take one small part of application for the statement: "Student takes courses" and "Courses offered by university. As per flow diagram, generate OWL for the same.

1. Identify inputs as shown in figure 1:  
**Classes:** Student, Course, University  
**Properties:** takes, offered by  
**Individuals:** i.e. name of students and name of courses.
2. Generate tags as per OWL syntax:  

```
<owl: Class rdf: ID="Student"/>
<owl: Class rdf: ID="Course"/>
<owl: Class rdf: ID="University"/>

<owl: ObjectProperty rdf: ID='takes'>
<rdfs: domain rdf: resource='#Student'/>
<rdfs: range rdf: resource='#Course'/>
</owl: ObjectProperty>

<owl: ObjectProperty rdf: ID='offeredby'>
<rdfs: domain rdf: resource='#University'/>
<rdfs: range rdf: resource='#Course'/>
</owl: ObjectProperty>
```
3. Attach resource URLs available on the web for identity:  

```
<rdf:RDF
xmlns: owl = "http://www.w3.org/2002/07/owl#"
xmlns: rdfs="http://www.w3.org/2000/01/rdf-
schema#"
xmlns : rdf="http://www.w3.org/1999/02/22-rdf-
syntax-ns#"
xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
>
</rdf:RDF>

<owl:Ontology rdf : about ="Student">
<owl: versionInfo>$Id : Student.owl, v1.02015/4/1$
</owl: versionInfo>
<rdfs:comment>An Ontology for Student
Information</ rdfs:comment>
</owl:Ontology>
```
4. Find relationships and restrictions on classes and properties:

There are no sub-class relationships. OWL allows inverse property as here 'offeredby' is inverse property of 'offers', which is described as follows:

```
<owl: InverseFunctionalProperty rdf:ID= 'offers'>
<rdfs: domain rdf: resource='#University'/>
<rdfs: range rdf: resource='#Course'/>
</owl: InverseFunctionalProperty>

<owl: ObjectProperty rdf: ID='offeredby'>
<inverseOf rdf: resource= 'offers'/>
</owl: ObjectProperty>
```

Here, there is a need to redefine owl syntax defined in step 2 for object property.

5. Combine OWL data generated in steps 2, 3 and 4 to generate final output as Student.owl file.

During analysis and design of any web application, developer must define list of classes, attributes and properties as required. Using this information, we can store the number of classes, related attributes, properties and individuals in a database, then generate xml file based on given data.

UML fundamentals can further be used for designing classes and its hierarchy. We can generate XML schemas and then OWL class tags same as set of attributes and properties. For the set of individuals there is a need for updating database and therefore OWL file, which is again issue of how to handle changeable ontology.

### III. CONCLUSION

Semantic Web represents set of data and information in the form of semantic data structure that is OWL. To generate ontologies for any new domain specific web application, developer requires lots of effort to describe ontologies for a particular domain and also needs support of domain expert. To minimize this effort some of tools available for ontology editor and creation but it require data in xml or RDF form which is again require basic knowledge of RDF structure. This paper proposed algorithm that is able to generate ontology from set of UML classes, properties, attributes. This can be help any user to develop new ontology or able to edit existing ontology without deep knowledge of semantic web languages.

### IV. FUTURE WORK

To implement proposed algorithm to generate OWL file for a specific domain based applications. There is a need to develop a tool with GUI that is easy to use for non-expert users to create, edit or share ontology.

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