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CONVERSION OF FILM FESTIVALS AND SALAD ONTOLOGIES INTO RELONTOUML MODEL

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Abstract.
In this article, two ontologies are presented and converted to the RelOntoUML model. One ontology describes a film festival, the other salads. The ontology, UML model and their literature are presented first in the article. Then the film festival and salad ontologies are detailed and converted into RelOntoUML model. Based on the conversion, it can be concluded that the modeling of RelOntoUML was successful for both systems.

Keywords: ontology, uml, relational database, filmfestival, salad

1. Introduction

System modeling is an important task, especially in software development. Based on these, software developers understand the structure of the system to be built, an aid to them during the development. However, modeling is not only important in the implementation phase, but also in the design phase. In this way, both the employees and the customer have a better understanding of the software, because often it is not clear to the customers themselves exactly what software they want.
Ontology [1] is the representation of knowledge. It consists of classes, subclasses, properties, and individuals. Properties can be different properties, the datatype property associates a class or entity with a data type, while the object property associates two classes or two entities. Annotations can also belong to ontology elements, which describe metadata. You can also create your own elementary data types.
The UML [2] model is a commonly used model known to software developers. It contains a number of diagrams, the class diagram being one of the best known of which it consists of classes. Classes contain methods and properties.
One of the most commonly used modeling of database modeling is the relational model [3]. In a relational database, tables form a relation. The row in the table is a record, the columns are the field types, and the intersection of the row and column is a field, that is, a value.
Over the years, a number of publications have been published describing the conversion of each model. In the following, the google scholar search results are presented.

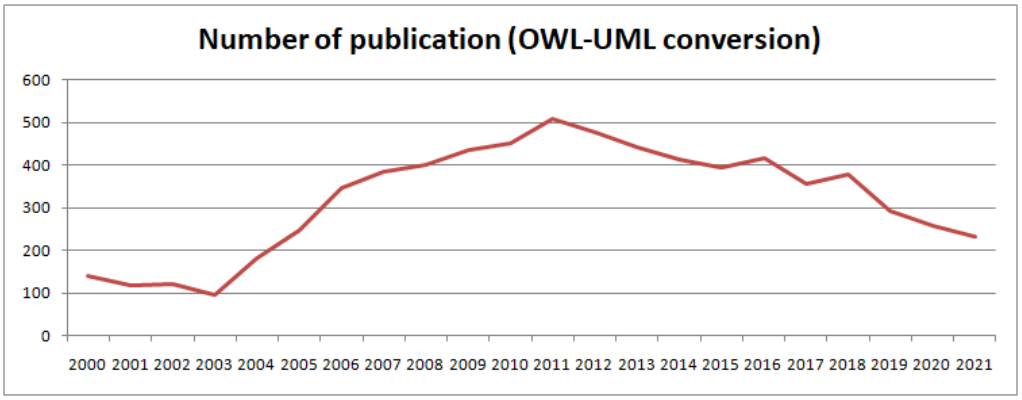

Figure 1.: Number of publication (OWL-UML conversion)

Figure 1 shows the number of publications related to the OWL-UML conversion by year. Most publications were born in 2011 and fewest in 2003. The number of publications per year increased from 2000 to 2011 and then decreased from 2011.

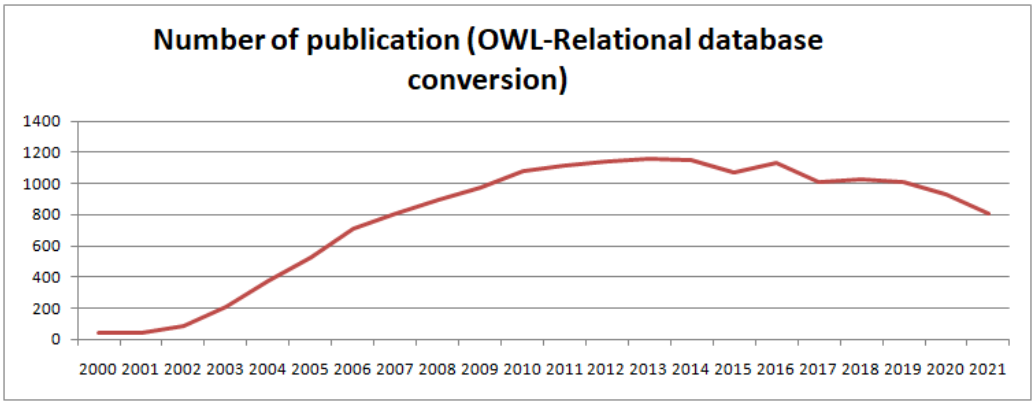

Figure 2.: Number of publication (OWL-Relational database conversion)

Figure 2 shows the publications related to the OWL-Relational database conversion in annual breakdown. From 2000 to 2013, the number of publications increased here as well, then from 2013 it started to decrease. There are more articles on OWL-Relational database conversion than an OWL-UML conversion.

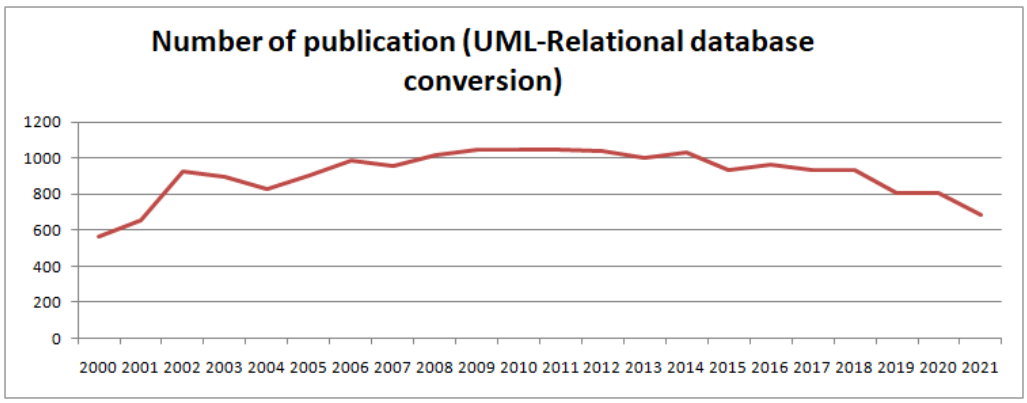

Figure 3.: Number of publication (UML-Relational database conversion)

Figure 3 shows the number of publications related to UML-relational database conversion. Most of the articles on the topic were written between 2008 and 2012. After 2012, the number of published articles on the topic began to decrease.

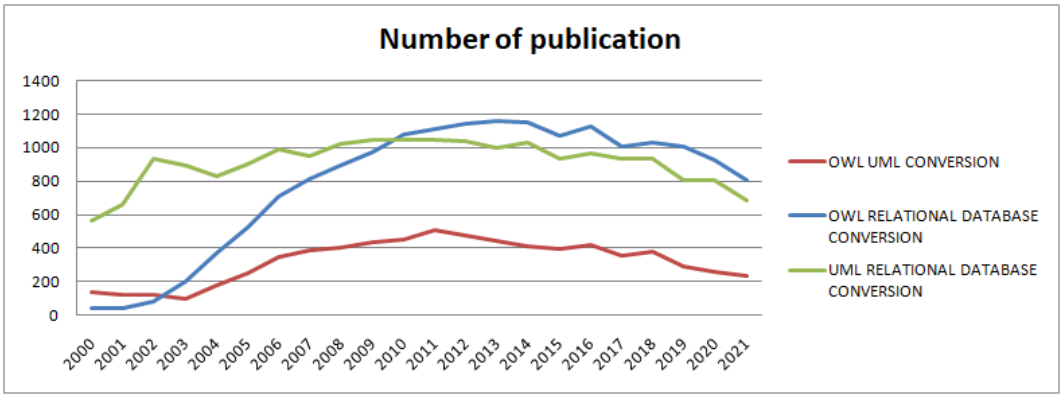

Figure 4.: Number of publication

Figure 4 summarizes the number of publications in a diagram: OWL-UML, OWL-relational database, UML-relational database conversions. According to the figure, the number of articles increased in all topics until 2009 and decreased in 2016 in all topics. The number of papers in connection with OWL-UML conversion is less than with UML-relational database and OWL-relational database. About the same number of articles were written about OWL relational database conversion and UML relational database.

The next chapter introduces the transformation of a film festival and a salad ontology into RelOntoUML [4] model, which combines relational database, ontology, and UML modeling.

2. Transformation of an ontology describing a film festival and salad into a RelOntoUML model

Filmfestival [5] presents a film festival. The film festival itself ('FilmFestival'), 'Event', 'Person', 'Genre'. The ’Person' includs 'Director', and 'Actor' and 'Place'. Each class also has its own characteristics, such as the associated actor ('hasActor'), including the female actor ('hasActress'), the male actor ('hasMaleActor'), the associated director ('hasDirector'), ('isDirectedBy') and its genre ('hasGenre'). The place also includes properties such as maximum capacity (‘maximumAttendeeCapacity’), ‘smokingAllowed’ and ‘adjacentPlace’. The 'Actor' also has properties, such as 'isActorIn', if the actor is a female actor ('isActressIn'), or a male actor ('isMaleActorIn') and the actor has the Oscar awards ('oscarAwards'). The system also includes individuals such as the ‘Event’, (‘Glastonbury Festival 2017’), (‘Ham Festival 2017’), (‘London Movie Festival 2017’).

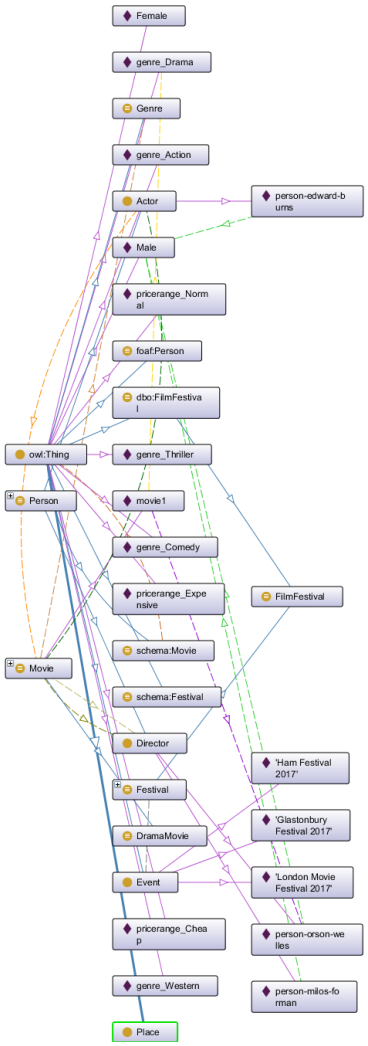

Figure 5.: Visualization of FilmFestival in OntoGraf

During the conversion, the 'owl: Thing' is the main class, which contains the following subclasses: 'FilmFestival = dbo: FilmFestival', 'Event', 'Festival = schema: Festival', 'Person = foaf: Person', 'Genre ',' Movie = schema: Movie ',' Place 'as direct child classes. The third level has the following classes: 'Actor', 'Director', 'DramaMovie'. The following individuals are included in the system: 'Glastonbury Festival 2017', 'Ham Festival 2017', 'London Movie Festival 2017', 'person-edward-burns', 'person-milos-forman', 'person-orson-welles', 'movie1'.

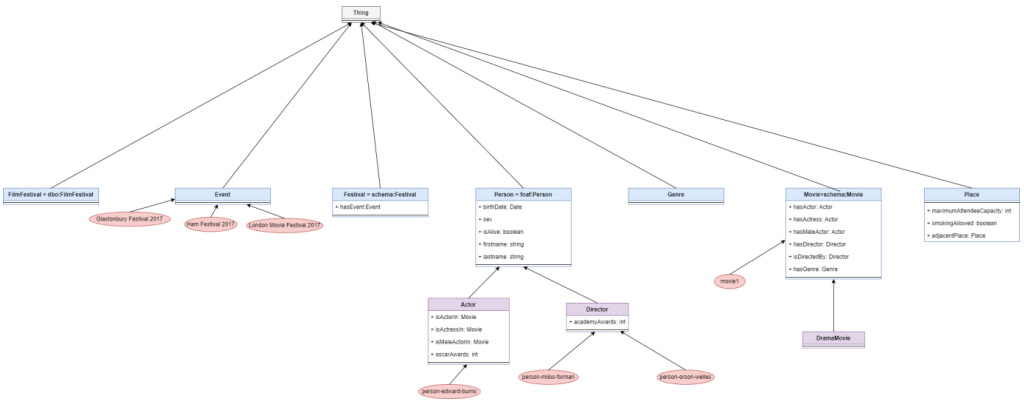

Figure 6.: Visualization of FilmFestival in RelOntoUML

The Funny Salad [6] ontology is an ontology representing salads. The hierarchy of this ontology class consists of 4 levels. Some classes and individuals in the ontology also contain properties. The main class of ontology is ‘owl: Thing’. The second level contains the following classes: 'country', 'food'. At the third level, there are the following classes that are descendants of ‘food’: ‘salad’, ‘saladIngredient’, ‘saladTopping’, ‘spices’. At the fourth level are the following classes: 'funnySalad', 'namedSalad', 'crackedWheat', 'oliveOil', 'herbTopping', 'nutTopping', 'cinnamon', 'pepper', 'salt'.

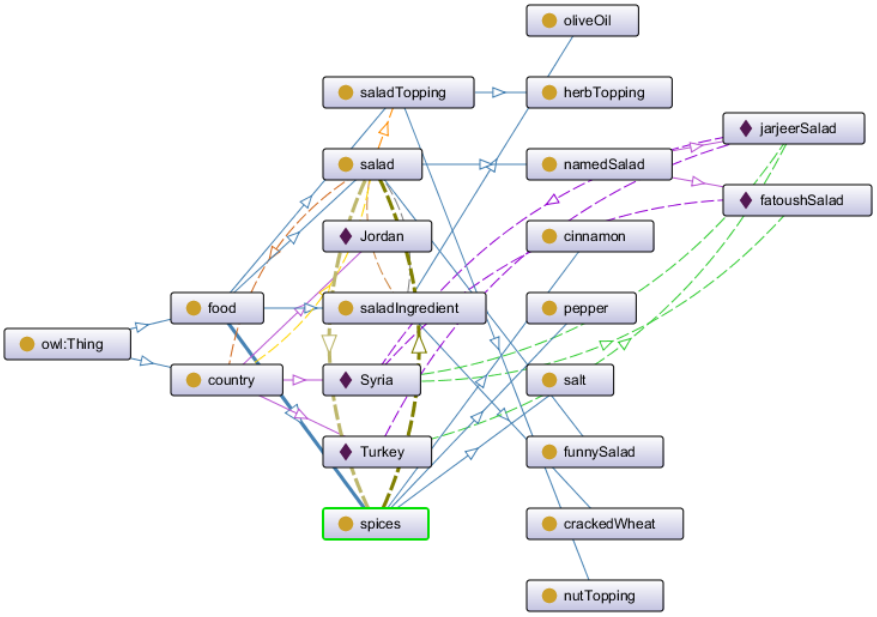

Figure 7:. Visualization of Funny Salad in OntoGraf

The system has the following property: class 'country': '+ isCountryOfOrigin: salad'. 'salad' class: '+ hasCountryOfOrigin: country', '+ hasIngredient: saladIngredient', '+ hasSpices: pieces -> hasIngredient', and '+ hasVegetables: -> hasIngredient'. -> means that the given property is derived from another property (property-alpropety relationship). The system also contains individuals, and some of the individuals also contain child individuals. For example, the ‘Syria’ entity has the following properties: ‘+ isCountryOfOrigin: jarjeerSalad’, ‘+ isCountryOfOrigin: fatoushSalad’. The ‘Turkey’ entity contains the following property: ‘+ isCountryOfOrigin: jarjeerSalad’. While ‘fatoushSalad’ has the following property: ‘+ hasCountryOfOrigin: Syria’. The ‘jarjeerSalad’ entity contains the following properties: ‘+ hasCountryOfOrigin: Syria’, ‘+ hasCountryOfOrigin: Turkey’. It can be seen that individual properties also link two entities or an individual to a data type property, eg integer, boolean.

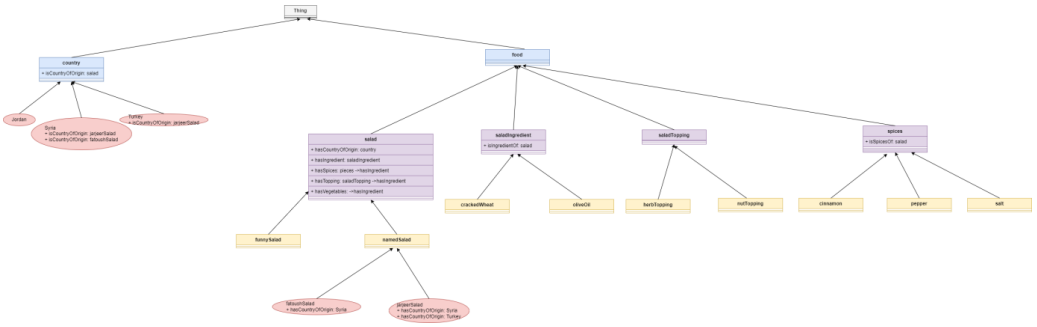

Figure 8.: Visualization of Funny Salad in RelOntoUML

3. Summary

In this paper, the conversion of two ontologies to the RelOntoUML model is presented, which is a proprietary model. First the ontology, UML, relational modeling are introduced. Then the google scholar search engine is used to search with the following keywords and analyze the results as ‘owl-uml conversion’, ‘owl-relational database conversion’, ‘uml-relational database conversion’.
Then the Filmfestival and FunnySalad ontologies are presented and the RelOntoUML model is detailed. Based on the results obtained, RelOntoUML modeling is a visually transparent modeling environment useful for software developers.

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