

OntoLaw - Ontology Based Legal Management and Information Retrieval System

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Abstract: This manuscript proposes an ontological approach for legal aspects in the Romanian juridical system, aimed to help legal professionals to easily find legislative information. The necessity of creating a legal ontology specific to the Romanian juridical context resides in the fact that, although different state institutions hold various databases storing documents, there is a lack of centralization of these data. Creating a shareable ontology to which all legal institutions would have access might be an up to date solution to this situation. This paper presents the legal ontology OntoLaw, together with a legal management and information retrieval system called OntoLawApp.

Keywords: legal ontology, RDF, SPARQL, legal knowledge base, information system, legal information retrieval.

1. INTRODUCTION

The juridical system is complex and deals with a large number of concepts, specific terms, legislative documents and frequent modifications and annotations. Legal professionals need quick access to information, especially in these modern times, when information is power. Therefore, over the last decades, several initiatives have emerged in order to provide information systems for storing and retrieving legal data and aspects.

The necessity of creating a legal ontology specific to the Romanian juridical context resides in the fact that, although different state institutions hold various databases storing documents, there is a lack of centralization of these data. Moreover, there is no question of interoperability between these systems. This paper presents an ontological approach for the Romanian legal documents and concepts, structured in 2 main components: a legal ontology called OntoLaw and an ontology management and information retrieval system, called OntoLawApp. The purpose of the software application presented in this paper, which accesses and manages data in the legal ontology called OntoLaw, is to help legal professionals to easily find various legislative information related to the functioning of institutions, the administrative territorial organization, the content of the Official Monitor of Romania, the content and details of legislative documents, such as publication date, number, area, issuer, subsequent legislative interventions or Web address where they can be accessed.

The paper is structured into five sections. This introduction is followed by Section 2, which presents an overview on the current state of the art of legal ontologies; Section 3 is dedicated to the architectural design of the OntoLaw ontology and interconnection with information retrieval application; Section 4 presents the design and implementation

of the ontology management and information retrieval system; Section 5 draws the conclusions of our work and addresses some possible future research developments.

2. RELATED WORK ON LEGAL ONTOLOGY

This section presents an overview of the importance and benefits of using ontologies, as well as a state of the art on legal ontologies.

2.1 Overview on ontologies

An ontology is a model of a specific domain or „an explicit specification of a conceptualization” (Gruber, 1993). One of the main purposes of ontologies is sharing and reusing knowledge. Over time, several classifications of ontologies have been proposed. In 1997, Van Heijst classifies the ontologies from the purpose and content point of view in (vanHeijst et al., 1997). Regarding the ontology’s purpose of usage, he found that ontologies are: terminological ontologies - terms used for knowledge representation, information ontologies - specify the storage structure of the data, and knowledge modeling ontologies – the conceptualization of knowledge.

Regarding the contents of ontology, Van Heijst found the next classification: domain ontologies define concepts of one specific domain, generic ontologies define concepts that are general enough to be used across various domains, application ontologies define concepts from a domain that are required for one application and representation ontologies define the concepts that are used to define ontologies. They can also be regarded as meta-ontologies.

Another classification of ontologies was proposed in (Guarino, 1995), based to their level of generality. Guarino identified the following categories: top-level ontologies -

describe very general concepts such as space, time, matter, object, event, action, etc., which are independent of a particular problem or domain; domain ontologies and task ontologies - describe the vocabulary related to a generic domain (such as medicine, or automobiles) or a generic task or activity (such as diagnosing or selling); and application ontologies - describe concepts depending on a particular domain and task.

Over the years, different classifications were proposed: in (Lassila and McGuinness, 2001) - Catalogs, Glossaries, Thesauri, Informal Taxonomies, Formal Taxonomies, Frames, Value restrictions impose, Logic constraints; in (Zajac, 2001) - Engineering Ontologies, Linguistic Ontologies, Ontologies designed for the web or for documentation systems; in (Gomez-Perez et al., 2003) - Lightweight ontologies and Heavyweight ontologies..

2.2 State of the art in legal ontologies

(Bench-Capon and Visser, 1999) discussed the role of ontologies in legal information systems. The authors emphasized different arguments for the relevance of legal ontologies. Besides the main motivation, *knowledge sharing*, they also assess other benefits of using ontologies, such as *verification* of a knowledge base, *software engineering* considerations (e.g., standards for documenting knowledge systems), *knowledge acquisition*, *knowledge reuse* and *domain-theory development*.

The legal domain is complex and involves a large number of concepts, terms and relationships. In the early times of building legal ontologies, several conceptualizations were proposed for the legal domain based on semantic networks or frames. Hafner's semantic network of legal concepts (Hafner, 1980), the Language for Legal Discourse (LLD) by McCarty (Valente and Breuker, 1999), Stamper's NORMA - Norms and Affordances (Stamper, 1994), and CABALA legal terms semantic network - Consultazione Assistita di Basi di Dati di Leggi Ambientali (Mariani et al., 1992) are just a few examples. Nowadays, the list of ontologies built for the legal domain is rapidly growing.

The Frame-based ontology (FBO) (van Kralingen et al., 1993; van Kralingen, 1997; Visser and Bench-Capon, 1999) and the Functional Ontology of Law (FOLaw) (Valente and Breuker, 1999) aim to provide a proper framework for legal knowledge based systems and focus on modeling normative knowledge, legal concepts and terms, as well as legal acts.

The Computerized Legal Information Management and Explanation (CLIME) project (Boer et al., 2001; Winkels et al., 2002) is aimed at "improving the access and understanding of large bodies of legal information through the Internet" (Winkels et al., 2002). The system has two main components: an information retrieval system and a question answering component. The information retrieval system uses the CLIME domain ontology (ONtology-based Legal INformation Environment) for matching keywords against

terms contained by rules. The question answering application uses the FOLaw framework (Winkels et al., 2002).

The Dutch Penal Law was represented in an ontological approach in (Mommers, 2002). Mommer's ontology consists of 6 basic types: entities, ontological status layers, epistemic roles, relations, acts and facts, and focuses on constitutive relationships.

An important ontological legal initiative in The Netherlands was the e-Court project (Breuker et al., 2003), aimed at semi-automated information management of transcriptions of criminal trial hearings and directed towards information retrieval and metadata generation and specification. Two legal ontologies have been set up within the e-Court project: the LRI-Core ontology (Breuker, 2007), to support knowledge acquisition, and OCL.NL Ontology of Dutch Criminal Law for supporting information retrieval contained in hearing session documents (Breuker, 2007). The ontology is referred to as CRIME.NL in (Breuker et al., 2007).

In France, a legal ontology was proposed by (Lame, 2005). The Ontology of French Law was built for the search and retrieval of legal information. It was based on a terminological analysis of a corpus of 57 codes of French Law and it contains more than 118,000 terms and relations among them.

Two of the most recent and modern legal ontology initiatives are the LKIF Core Ontology and the LEX-IS Ontology. LKIF stands for Legal Knowledge Interchange Format, which was developed during the Estrella Project (<http://www.estrellaproject.org>) in order to "enable the translation between legal knowledge bases written in different representation formats and formalisms" and to act "as a knowledge representation formalism that is part of a larger architecture for developing legal knowledge systems" (Hoekstra et al., 2007; Boer et al., 2007). The LKIF Core Ontology contains "basic concepts of law" and is part of a generic architecture to enable the interchange of knowledge (LKBS). Thus, LKIF-Core is directed at supporting legal inference, knowledge acquisition and knowledge exchange.

The LEX-IS Ontology (Lex-is Ontology, 2006) builds a legal framework for EU legislative information in order to facilitate the access and use of such information and the interaction between legal institutions. It contains the type and content of EU legislation, treaties, regulation, directives, decisions organized in thematic areas along with their interrelations.

In the past years, significant advances have been made in the area of legal ontologies. In the beginning, ontologies for the juridical domain captured the specifics of a certain country. Recent projects have evolved and intend to capture a bigger picture, correlating all legal aspects across EU. However, in Romania, there has been only one attempt to model legal aspects in an ontology so far, which focused mainly on juridical vocabulary. In what follows, this paper presents OntoLaw - a legal information retrieval system based on an ontological model of Romanian legal concept and documents.

3. ONTOLOGY BASED LEGAL MANAGEMENT AND INFORMATION RETRIEVAL SYSTEM

The necessity of creating a legal ontology specific to the Romanian juridical context resides in the fact that, although different state institutions hold various databases storing documents, there is a lack of centralization of these data. Moreover, there is no question of interoperability between these systems. Thus, OntoLaw provides the general framework for establishing a common, integrated legal platform designed for all institutions, storing information such as documents, governmental regulations and official monitors, useful for all legal institutions. The legal ontology OntoLaw is the core of the integrated system we propose. The main benefit of creating an ontological legal model is the fact that it can be easily shared and reused among various applications developed for the juridical domain. Moreover, the ontology can be extended and adjusted according to the needs of all legal institutions or to the latest modifications in Romanian legal documentation and classification. Besides the ontology development component, we also present the architecture and development of a legal management and information retrieval system, connected to OntoLaw. The novelty of this platform is that each institution can extend the ontology with its specific own data. Thus, correlated information can be extracted from several institutions, through Web-based applications connected to the legal ontology. Figure 1 depicts the overall architecture of the ontology based legal management and information retrieval system proposed in this paper.

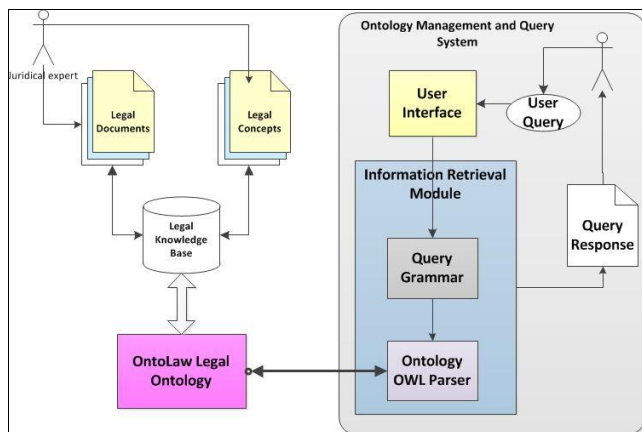


Fig. 1. Overall architecture of the ontology based legal management and information retrieval system.

The legal ontology OntoLaw gathers concepts and legal documents specific to the juridical Romanian domain. The legal management and information retrieval system (OntoLawApp) is a Web-based application, connected via Internet to OntoLaw, which allows users to query the legal ontology in order to easily find legislative information. The ontology can be queried in a specific subset of natural language, based on a specific RDF based grammar integrated in the information system.

3.1. Developing the legal ontology OntoLaw

According to (Noy, 2001), ontology development must undergo the following stages: Determine the domain and the purpose; Considering the reuse of existing ontologies; Identifying the main concepts; Defining the classes and their hierarchy; Defining properties; Defining the main properties; Creating instances

In what follows, we discuss how each of these stages applied for developing OntoLaw.

Determining the domain and the purpose

The domain of the OntoLaw ontology designed for this project is the legal or juridical Romanian domain. It gathers concepts and documents issued by legal institutions. The purpose of the final application is to help legal professionals and lawyers to easily find information about the functioning of various institutions, territorial administrative organization, the emergence of legal publications, legal documents and details of their content, such as publication date, number, area, issuer, annexes, Web address where they can be accessed, etc. The application will be able to query the ontology through a specific subset of natural language questions, designed according to a predefined RDF-based grammar. Below are a few examples of questions the application will be able to answer:

What documents (the type of document can be specified) of the X domain, issued by Y, have appeared in Z?

What additional documents have been issued in order to modify/update/approve/reject document X?

What institutions are financed from state budget or local / own revenues?

What type of financing does a specific institution have?

What institutions are subordinated to the Government / Ministry X?

What county is the territorial district of military tribunal X?

Display details of a specific document or Official Monitor

The ontology will be managed by special users who can add or delete instances. These users are specialists in law and aim to develop a comprehensive, complete juridical knowledge base. The main purpose of OntoLaw is to provide a proper framework for managing the Romanian legal documents in a structured manner, easily published, shared and reused. This will enable all legal institutions to access a common, unified set of knowledge. Moreover, it will be easier to keep track of the changes which occur in legal documents. By accessing OntoLaw, all legal specialist will find an up to date knowledge base and will be able to follow the entire history of modifications for any specific law, ordinance and so on.

Reusing existing ontologies

There are numerous ontologies already established in law, as presented in Section 2. The only Romanian legal ontology found was developed by (Burciu and Elita, 2010), which was created using the RDF format and contains a vocabulary of legal terms. Their purpose was to semantically annotate juridical texts and to assess its use for automatic translation. For this project, we chose to develop a new ontology, called OntoLaw.

Identifying the main concepts

Before creating the ontology, its main concepts and terms must be established. In our case, for OntoLaw some of the terms identified are: act, law, notification, statement, constitution, decision, decree, judgment, order, regulation, emergency ordinance, order, report, understanding, agreement, addendum, resolution, protocol, treaty, economics, education, environment, health, social protection, transport, tourism, institution, executive authority, legislative authority, specialized body, ministry, judicial authority, tribunal, court, council, mayor, publication, approved, completed, rejected, amended, issue, promulgate, funding, number, year, title, etc.

The next steps involve a thorough classification of these terms, in order to create the OntoLaw ontology.

Defining the classes and their hierarchy

According to (Uschold and Gruninger, 1996) there are three possible methodologies for developing the hierarchy of classes. The "top-down" approach begins by defining the most general concepts and then focuses on their specialization. The "bottom-up" development process begins by defining specific classes, namely the "leaves" of the hierarchy. Afterward, the leaves are grouped to obtain general concepts. The combined development process uses both approaches mentioned above. When using this methodology, the ontology engineer first defines a set of general concepts and several specific concepts, and then develops a middle layer which links the top and low level concepts.

None of these three methods is better than the other. The ontology engineer decides upon one of the three development approaches based on his personal vision of the subject matter and on the specificities of the domain to be modelled. OntoLaw was developed using the "top-down" development process. First, we identified the top level concepts, which are represented in the diagram in Figure 2.

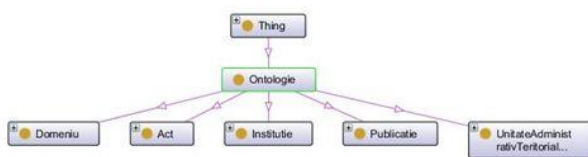


Fig. 2. OntoLaw main concepts architecture.

The main concepts of OntoLaw are the following: Domain (Domeniu), Document (Act), Institution (Institutie), Publication (Publicatie), Territorial Administrative Unit (UnitateAdministrativTeritoriala). Each of these classes has several subclasses and associated properties.

Through specialization from these general concepts, we obtained the hierarchy of classes illustrated by Figures 3 and 4.

OntoLaw is designed on a three layer architecture. The top level concepts depicted in Figure 2 are extended by a middle layer, making the transition to the specific leaves of the ontology, as can be seen in Figures 3 and 4. For example, the *Document (Act)* class is divided into *InternalDocument (ActIntern)* and *ExternalDocument (ActExtern)*. Each of these classes has several subclasses, identifying various types of documents which fall into each category: *EUDecision*, *Convention*, *Law*, *Methodology*, *Instruction*, *Communique*, *Decree* and so on. Each of them has associated properties, restrictions and instances. The *Domain (Domeniu)* class has the following middle layer classes: *PublicAdministrationDomain*, *EconomicsDomain*, *EducationDomain*, *EnvironmentDomain*, *AdministrativeTerritorialOrganizationDomain*, *SocialProtectionDomain*, *HealthDomain*, *TransportDomain*, *TourismDomain*. Each of these classes has an average of 6-7 subclasses. The *Institution (Institutie)* class has the following subclasses: *NationalInstitution*, divided into *LocalInstitution* and *CentralInstitution* and *ExternalInstitution*, divided into *InternationalInstitution* and *EuropeanInstitution*. These classes form the middle layer of the *Institution* class. Some leaves of this class are: *Ministry*, *PublicInstitution*, *ExecutiveAuthority*, *LegislativeAuthority*, *Court*, *CourtOfAppeal*, *Courthouse*, *Council*, *CityHall*, etc. The *Publication (Publicatie)* class has only one main subclass, the *RomanianOfficialMonitor*. The *AdministrativeTerritorialUnit* class contains all 42 territorial units of Romania as instances, divided into *Bucharest*, the capital, and *County*.

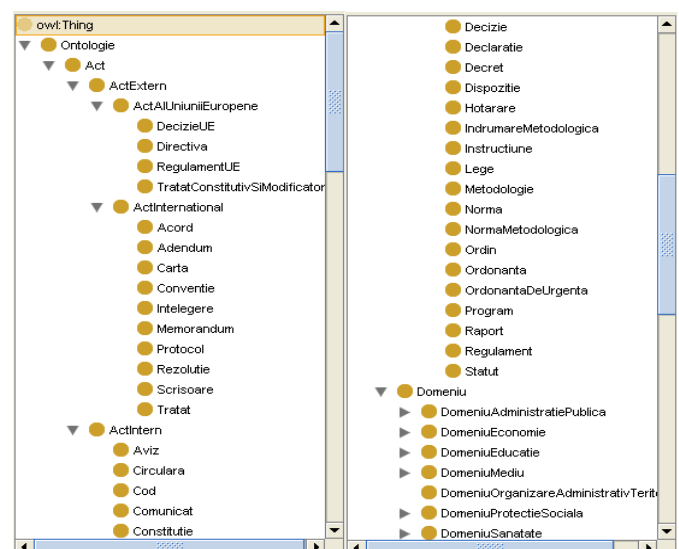


Fig. 3. OntoLaw class hierarchy.

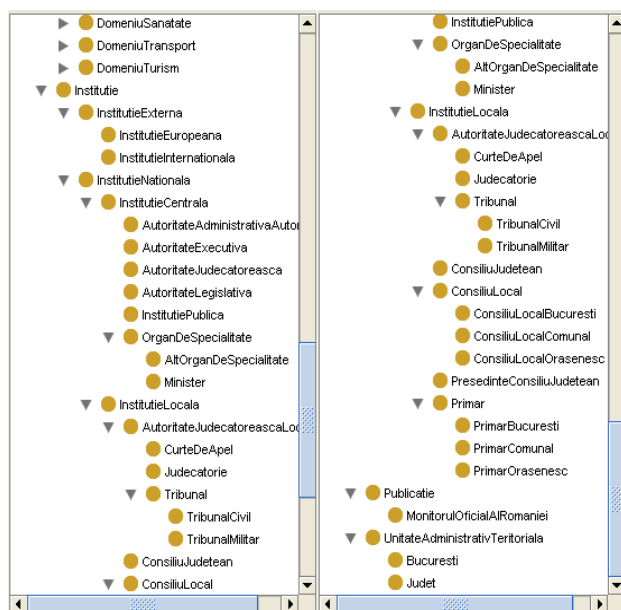


Fig. 4. OntoLaw class hierarchy.

Figure 5 presents an overall graph of OntoLaw, emphasizing the relationship among the main classes of the ontology.

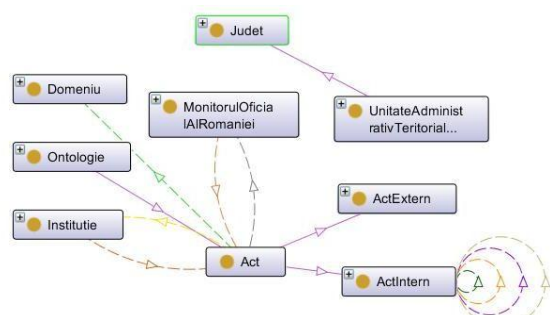


Fig. 5. OntoLaw overall graph.

Defining properties

This step is always closely related to the previous step. When defining a class, the ontology engineer takes into consideration the properties and restrictions which must be set for each class. There are 2 types of properties available when developing an ontology with Protege: data properties and object properties (Nov, 2001).

Table 1 depicts the main data properties defined for the OntoLaw classes.

Table 1. OntoLaw data properties.

Data property	Domain	Data type
Web address	Institution, Document	string
year	Document, Publication	string
completed	InternalDocument	boolean
dateMonitor	RomanianOfficialMonitor	date
financing	NationalInstitution	string – possible values: state budget, local budget, own revenues
modified	InternalDocument	boolean
numberMonitor	RomanianOfficialMonitor	int
number	Document	int
republished	Law, Decision, Order, Ordinance, etc. (InternalAct subclasses)	boolean
title	Documents	string

Object properties define the relationships, interconnections and restrictions among the classes of an ontology. Table 2 illustrates the main object properties of the OntoLaw legal ontology.

Table 2. OntoLaw object properties

Object property	Inverse property	Domain	Values
hasIssued	issuedBy	Institution	Domain
approve	approvedThrough	Law	Ordinance, Emergency Ordinance
hasPublished	publishedIn	Romanian Official Monitor	Document
hasInTerritorialJurisdiction	-	Military Court	Administrative Territorial Unit
coordinates	isCoordinatedBy	Executive Authority, Ministry	Public Institution
subordinates	isInSubordination	Executive Authority	Public Institution, Specialized Body
subordinates	isInSubordination	Ministry	Public Institution, Specialized Body
completedBy	Completes	Internal Document	Internal Document
fromDomain	-	Document	Domain
exercisesControlOver	isUnderControl	Legislative Authority	Autonomous Administrative Authority
modifies	modifiedBy	Internal Document	Internal Document
promulgatesLaw	promulgatedByDecree	Decree	Law
reject	rejectedBy	law	Ordinance, Emergency Ordinance

Figure 6 presents the lists of the main data and object properties of the OntoLaw legal ontology.

The screenshot displays the Visual Studio Code interface with the 'Object Properties' and 'Datatype Properties' panels open. The 'Object Properties' panel on the left lists various attributes and their values for the selected class. The 'Datatype Properties' panel on the right lists the data types for these properties.

Object Properties	Datatype Properties
emis ↔ emisDe	adresaWeb
aproba ↔ aprobataPrin	anul
aprobataPrin ↔ aproba	completat
aPublicat ↔ publicatin	dataMonitor
areInCircumscripțieTeritoriala	finantare
areInCoordonare ↔ esteInCoordonarea	modificat
areInSubordine ↔ esteInSubordine	numarMonitor
areInSubordonare ↔ esteInSubordonarea	numarul
completatPrin ↔ completeaza	republicat
completeaza ↔ completatPrin	titlu
dinDomeniul	
emisDe ↔ emis	
esteInCoordonare ↔ areInCoordonare	
esteInSubordine ↔ areInSubordine	
esteInSubordonare ↔ areInSubordonare	
esteSubControlul ↔ exercitaControlAsupra	
exercitaControlAsupra ↔ esteSubControlul	
modifica ↔ modificatPrin	
modificatPrin ↔ modifica	
promulgataLegea ↔ promulgataPrinDecret	
promulgataPrinDecret ↔ promulgataLegea	
publicatin ↔ aPublicat	
respinge ↔ respinsaPrin	
respinsaPrin ↔ respinge	

Fig. 6. OntoLaw properties.

After this step in the development of the legal ontology, the ontological model can be verified in order to check for inconsistencies. Examples of common inconsistencies are: incompatible definitions of domains and ranges of values for transitive, symmetric or inverse properties, improper cardinality of properties; requirements for property values may conflict with restrictions on the scope and range of values defined. We have used the Pellet reasoner (Pellet Reasoner, 2012) in order to check for inconsistencies in the OntoLaw legal ontology. All consistency tests were successfully passed.

Creating instances

The last step in developing an ontology is creating the appropriate instances for the hierarchy of classes. Creating an instance of a class involves the following steps: Select a class to be instantiated; Define the specific instance; Assign values to the class specific properties.

The number of instances of an ontology is much larger than the number of classes, and sometimes there may be hundreds of thousands of instances. The instances of the legal ontology created for this project were entered manually. After completing the knowledge base, the ontology module was checked again with the Pellet reasoner, and no inconsistencies were detected.

The next section presents the design and implementation of the OntoLawApp, a Web-based application for managing and querying the OntoLaw legal ontology.

4. THE DESIGN AND IMPLEMENTATION OF ONTOLAWAPP – ONTOLOGY BASED LEGAL INFORMATION RETRIEVAL SYSTEM

OntoLawApp is a Web-based information system designed to manage and query the OntoLaw legal ontology. It is a ontology based legal management and information retrieval system, using the RDF data format for storing the knowledge base.

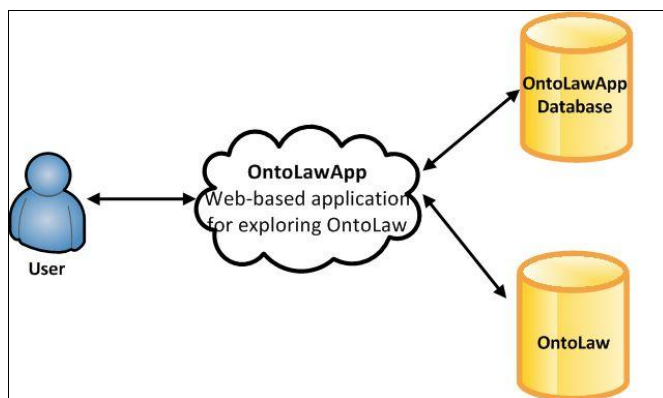


Fig. 7. Overview of OntoLawApp.

The OntoLaw Database registers users and their associated privileges. There are 3 levels of privileges: user, power user and administrator.

4.1 OntoLawApp functionalities and components

The main functionalities of OntoLawApp are:

- Browse through the ontology classes and instances
- Add and remove *Document* and *OfficialMonitor* instances to the ontology
- Query the ontology using a set of predefined questions

- Query the ontology in a specific subset of natural language, according to a specific RDF based grammar integrated in the information system.

Figure 8 represents the UML use-case diagram (UML Standard, 2013) for OntoLawApp.

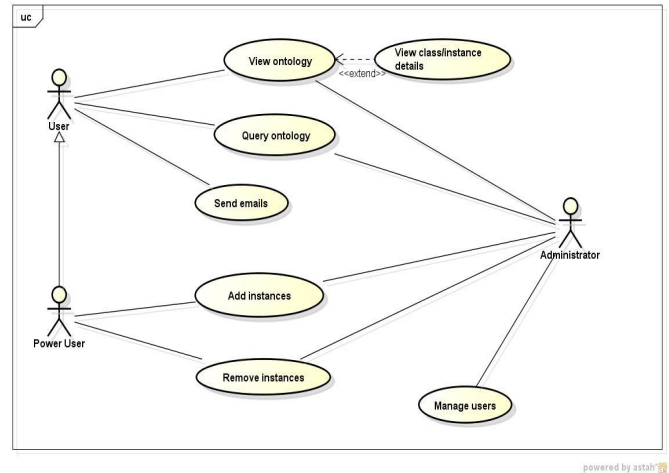


Fig. 8. OntoLawApp use-case diagram.

Figure 9 presents an overview of the internal structure of the application, incorporating the main packages and modules which were used.

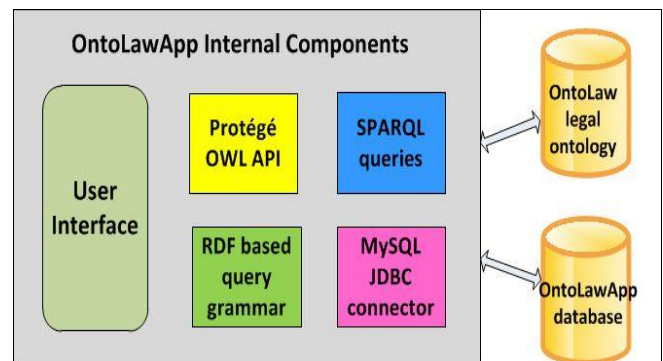


Fig. 9. OntoLawApp internal components.

The database connection is provided by the JDBC MySQL connector (JDBC Connector, 2012). The Protege OWL API (Bechofer, 2007) was used to connect OntoLawApp to its knowledge base OntoLaw. The ontology is queried using SPARQL (Antoniou and Harmelen, 2008). In order to use a specific subset of natural language processed queries, we have defined a dedicated RDF-based grammar, which comprises the main vocabulary terms and phrase topic used in Romanian to formulate questions.

4.2 Exploring the OntoLaw ontology through OntoLawApp

OntoLawApp aims to help legal professionals, though a friendly experience, to easily find various legislative information related to the functioning of institutions, the administrative territorial organization, the content of the Official Monitor of Romania, the content and details of legislative acts, such as publication date, number, area, issuer,

subsequent legislative interventions or Web address where they can be accessed.

The application has 3 modules: the ontology exploration module, the information system query module and the administration module. The *ontology exploration module* provides the users the possibility to browse through the classes and the instances of the ontology. When a user selects an instance of the ontology, all available details will be prompted, together with all the relations that particular instance has with other instances. This part of the OntoLawApp is dedicated to offering extensive sets of information regarding the instances of the OntoLaw legal ontology: legal documents, laws, legal institutions, official monitors, etc.

The *information system query module* retrieves information from the OntoLaw legal ontology, using a specific subset of natural language. The query system is built around on a dedicated RDF triples based grammar and has 3 components:

- The first component contains several predefined parameterized questions, as follows:
 - What documents (the type of document can be specified) of the X domain, issued by Y, have appeared in Z?
 - What additional documents have been issued in order to modify/update/approve/reject document X?
 - What institutions are financed from state budget or local / own revenues?
 - What type of financing does a specific institution have?
 - What institutions are subordinated to the Government / Ministry X?
 - What county is the territorial district of military tribunal X?
- The second component accepts a specific subset of natural language questions as input from the user. The only restriction is that questions must map a certain pattern, according to the RDF triples used by the OntoLawApp.

The application will interpret the questions and provide the answers to the users after browsing the ontology. The RDF grammar used for parsing the ontology is designed to interpret the Romanian language syntax and specific legal vocabulary, based on the OntoLaw legal ontology. When a user launches a question in a specific subset of natural language, the application uses a string processor class to map the question to a RDF triple from the ontology (Dobrica et al., 2012). First, the subject and the predicate of the triple are identified, and the associated objects are retrieved. For example, if a user introduces the question: “What documents were published in the Official Monitor 18/2011?” (in Romanian), the following elements are identified and mapped: Official Monitor 18/2011 – subject, published –

predicate. Afterward, the corresponding triples are looked for in the ontology and the objects are retrieved as the answer to the questions (Decree 3/2011, Law 1/2011), as seen in Figure 10.

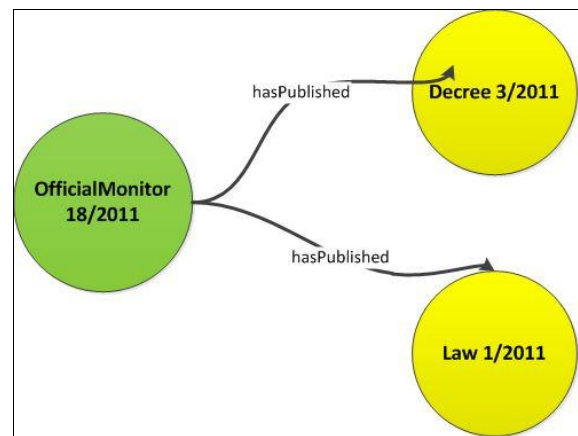


Fig. 10. RDF-triple based queries.

The questions must be compliant with a specific grammar, which was established based on the instances and data/object properties of the OntoLaw legal ontology. Moreover, synonyms were taken into account for a higher degree of accuracy.

The *administration module* handles the management of users, as well as the Document and Official Monitor instances. Only users having power user or administrator privileges can access this section of the application. Instances are added through dedicated forms, containing all the attributes defined in OntoLaw for storing documents and official monitors, and are added to the ontology using several packages from Protege OWL API.

5. CONCLUSIONS

The juridical system deals with large amounts of concepts, terms and documents. Not to mention the frequent modifications which occur in legislation and Official Monitor. In Romania, one problem legal professionals are confronted with is a lack of centralization of these data, which makes it difficult for them to rapidly find the information they are looking for. This manuscript proposes an ontological approach for legal aspects in the Romanian juridical system, aimed to help legal professionals to easily find legislative information related to the functioning of institutions, the administrative territorial organization, the content of the Official Monitor of Romania, the content and details of legislative documents, such as publication date, number, area, issuer, subsequent legislative interventions or Web address where they can be accessed. Creating a shareable ontology to which all legal institutions would have access might be an up to date solution to this situation. This paper presents the legal ontology OntoLaw, together with a legal management and information retrieval system called OntoLawApp. OntoLawApp connects to the OntoLaw ontology and retrieves information, as specified by the user in a specific subset of natural language. The application uses a

triples based RDF grammar in order to interpret the questions and find the answer.

In order to enhance the ontological approach development for the juridical system in Romania, we propose the following research aspects and developments:

- Develop an ontological semantic common reference model for the annotation, sharing and interconnection legal information.
- Explore the Linked Data approach for legal purposes.
- Develop mapping and alignment tools in order facilitate the integration of existing legal information systems.

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