

License Linked Data Resources Pattern ^{*}

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Abstract. Linked Data resources can be referenced by rights expressions or access control policies. Based on the common model found in six existing rights expression languages and revolving around the n-ary relation pattern, the License Linked Data Resources pattern is presented as a solution to describe existing licenses and ad-hoc rights expressions alike and valid for open and not open scenarios.

Keywords: Ontology design patterns, Linked Data, rights expressions

1 Introduction

Linked Data (LD) assets (RDF triples, graphs, datasets, mappings...) can be object of protection by the intellectual property (IP) law, the database law or its access or publication be restricted by other legal reasons (personal data protection, security reasons, etc.) [1]. Publishing a rights expression along with the digital asset, allows the rightsholder waiving some or all of the IP and database rights (leaving the work in the public domain), permitting some operations if certain conditions are satisfied (like giving attribution to the author) or simply reminding the audience that some rights are reserved. Additionally, LD resources can be conditionally available after the evaluation of access control policies [2], expressing who can act what actions under which circumstances.

After the comparison in [3] of six important rights expressions and policy languages (ODRL, MPEG-21 REL, XACML, ccREL, MPEG-21 MVCO and WAC), enough commonalities were found to extract a common underlying model, which could satisfy all of them. Based on that model, this poster paper describes a content ontology design pattern, named *License Linked Data Resources* (LLDR), to model licensing issues over Linked Data resources.

2 Pattern description

2.1 Intent and requirements

The intent of the content pattern Licence Linked Data Resources is to represent the relation that exists among a rights expression, an action, an agent, a LD

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resource and a condition. In particular, the core idea of the pattern is to model: *a rights expression which allows/prohibits/obliges to make an Action (Right) to an Agent over a LD resource under a condition.*

The LLDR pattern is committed to satisfy the following requirements:

- To keep the structure present in other Rights Expression Languages
- To be able to represent existing known licenses (Creative Commons licenses...)
- To support database rights: extraction and re-utilization
- To support privacy law (personal data handling) and the right to access
- To support IP law rights: reproduction, distribution, and transformation
- To support these right declarations: unconditionally waiving rights, restating that some rights are reserved, and licensing rights subject to conditions
- To support existing licensing practices for RDF resources
- To support these business models: open data business models, non open data business models, and hybrid models.

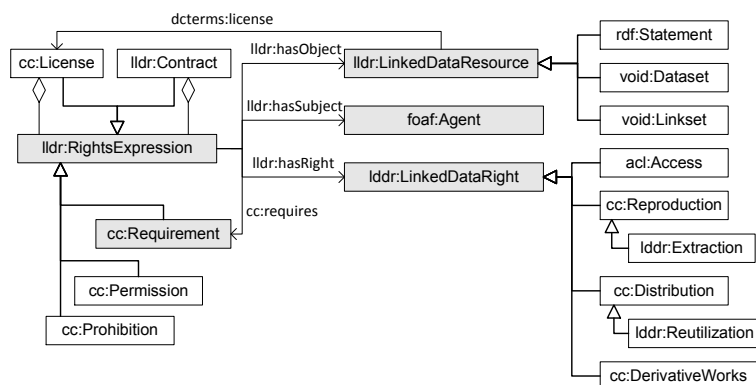


Fig. 1. License Linked Data Resource Pattern

2.2 Solution Description

The most convenient way to represent the information described before is to use the so-called n-ary relation pattern, which addresses these situations: “(a) a binary relationship that really needs a further argument; (b) two binary relationships that always go together and should be represented as one n-ary relation; and (c) a relationship that is really amongst several things” ([4]). One of the proposed patterns for representing n-ary relations consists of introducing a new class for the relation and links to all the participants in the relation. Indeed, the LLDR content pattern is inspired on the third consideration shown in the description of n-ary relations from the W3C Semantic Web Best Practices Group

<i>Prefix</i>	<i>Namespace</i>
void	http://www.w3.org/TR/void/
cc	http://creativecommons.org/ns#
foaf	http://xmlns.com/foaf/0.1/
acl	http://www.w3.org/ns/auth/acl
gr	http://purl.org/goodrelations/v1
dcterms	http://purl.org/dc/terms/

Table 1. Prefixes and namespaces

in [4]. Fig. 1 shows the LLDR pattern, where the core elements of the n-ary relation are grayed, Table 1 shows the namespace of some used vocabularies.

All the relations revolve around the `lldr:RightsExpression` element, this class being the *qualified relation*¹. This class has the direct relations with the `lldr:LinkedDataResource` (a superclass declared to embrace the LD information units of `rdf:Statement`, `void:Dataset` and `void:Linksets`), the `lldr:LinkedDataRight`, the `cc:Requirement` and `foaf:Agent`. Prohibitions, permissions and requirements are rights expressions themselves. The `LinkedDataRights` is a superclass representing the applicable rights to Linked Data resources: IP rights (`cc:Reproduction`, `cc:Distribution` and `cc:DerivativeWorks`), database rights (`lldr:Extraction` and `lldr:Reutilization`) and the mere access (`acl:Access`).

Rights expressions appear naturally in groups and not separately. Common licenses and typical authorizations are actually aggregations of atomic rights expressions. For this reason, `cc:License` and `lldr:Contract` are both subclasses and containers of rights expressions. The aggregation relationship can be represented in OWL using a *partOf-whole relation* pattern, and consequently a `partOf` object property has been declared. As a final requirement, resources must be directly linkable to licenses, as this is a common practice already in use (through a `dcterms:license` or a `cc:license` property), and in which case the rights expression does not need to include a specific resource.

3 Pattern Usage Example

In the following examples, classes are represented with boxes, relations with arrows and individuals with ellipses. Fig. 2 represents how a RDF dataset is attributed a known license. This example is currently in use by the Linked Data community (albeit not massively). Fig. 3 represents how the right of extraction (copying a database) is waived exclusively to `myAgent`. Fig. 4 represents how the access to an important reified statement (the forecast for the stock market price of Google) is offered for 100 €, using the GoodRelations vocabulary.

¹ <http://patterns.dataincubator.org/book/qualified-relation.html>



Fig. 2. Attributing a known license to an RDF dataset

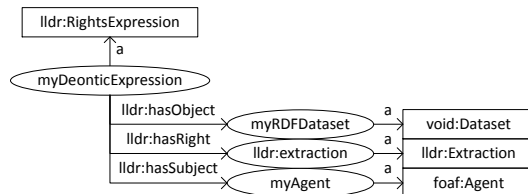


Fig. 3. Waiving a right on a dataset for a friend

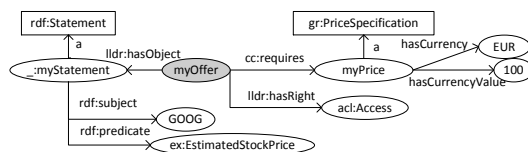


Fig. 4. Offering the access to an important RDF statement

4 Summary and Outlook

The content pattern Licence Linked Data Resources (LLDR) provides a mechanism to represent rights expressions to be applied for Linked Data resources. Having been recently published², the immediate goal is declaring its relationships with the ODRLv2 ontology and studying the compatibility with the key elements of other relevant vocabularies like LiMO, L4LOD or ODRS³.

References

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² <http://oeg-dev.dia.fi.upm.es/licensius/static/lldr.html>

³ <http://data.opendataday.it/LiMo>, http://ns.inria.fr/l4lod/v2/l4lod_v2.htm and <http://schema.theodi.org/odrs/> respectively