Relationship notations

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Refined Design principles of Identity Relationship Management

• Provable
  The existence of a given relation must be provable.

• Constrainable
  either part of the relation must be able to set a constraint on the use of the relationship.

• Mutable
  relationships might change, or be forever (A was made by B).

• Revocable
  The ending and revocation of relations.

• Delegable
  Changing the actors.

• Scalable
  be able to scale up to the very top of the view.

See WG Doc on Identity Relationship Management
https://kantarainitiative.org/groups/irm/
The onward journey

• Relationship Manager
  - Hard for the entities in a relation to manage their relation themself.
  - Need for a managing ‘instance’ to orchestrate.

• Relationship Notation
  - Standardized method to represent relationships.
Notation 'Language'\

- Notations
  - A system of [...] used to represent and express [...] facts.

- Language
  - A system of [...] used to represent and express [...] facts.

'Notation Language' is a 'tautology'
On Entity Relations

• Entity relation models are quite common in DB Design
• Q: Why do we need something new?
• A: Disconnected Entities!
On ER Models

- Graphical Notation
- Great for humans
- Hard for machines
Requirements Relation Notation

• Support the six design principles.
• Machine-interpretable and human-understandable.
• Support disconnected and remote entities, concepts and domains.
• Standard oriented.
Symbols, Objects and concepts

- Allow sender and receiver to 'understand'

  *This lightbulb is made by ACME Corporation*

  subject  predicate  object

  *lightbulb:A  is_made_by  Corporation:ACME*

- What means 'lightbulb' or 'is_made_by'?
Graphs

• Graph Theory
• Describes a relation between a subject and an object.
• Nodes (vertices, points)
• Edges (lines, arcs)
A Graph Notation

```xml
@prefix lb: <http://notationexamples.irm/lightbulb#> .
@prefix co: <http://notationexamples.irm/company#> .
@prefix pre: <http://notationexamples.irm/relations#> .

# three lightbulbs made by two different companies

lb:A pre:is_made_by co:ACME .
lb:B pre:is_made_by co:ACME .
lb:C pre:is_made_by co:BCME .
```

Uniform Resource Identifier
Resource Description Framework

• W3C Specification from 1999
• making statements about uniquely identifiable resources in the form of 'subject-predicate-object', also known as 'triple'.
• URI (IRI) bounds it to namespaces
• Namespaces can serve as 'concept domain'}
Vocabularies and Ontologies

- **OWL (Web Ontology Language)**
- **Built on top of RDF**

```plaintext
01 @prefix lb: <http://notationexamples.irm/lightbulb#> .
02 @prefix co: <http://notationexamples.irm/company#> .
03 @prefix pre: <http://notationexamples.irm/relations#> .
04 @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
05 @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
06 @prefix owl: <http://www.w3.org/2002/07/owl#> .
07
08 # three lightbulbs made by two different companies
09
10 lb:A pre:is_made_by co:ACME .
11 lb:B pre:is_made_by co:ACME .
12 lb:C pre:is_made_by co:BCME .
13
14 #describing the predicate 'is_made_by'
15 pre:is_made_by rdf:type rdf:Property .
16 pre:is_made_by rdf:comment "the relation between a product and its producer" .
17 pre:is_made_by rdf:type owl:SymetricProperty .
18 pre:has_produced owl:inverseOf pre:is_made_by .
```
Query Language

• SQL is widely known
• SPARQL is the equivalent for 'triplestore' systems, aka 'Graph-Databases'
• Allows for implicit and explicit queries

```
$ cat lb.rq

PREFIX lb: <http://notationexamples.irm/lightbulb#>
PREFIX co: <http://notationexamples.irm/company#>
PREFIX pre: <http://notationexamples.irm/relations#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>

SELECT ?lightbulb WHERE {?lightbulb pre:is_made_by co:ACME .}
```

<table>
<thead>
<tr>
<th>lightbulb</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb:A</td>
</tr>
<tr>
<td>lb:B</td>
</tr>
</tbody>
</table>
Query Language vs Notation

- SPARQL as query language, RDF/OWL as notation
  - standardized
  - machine interpretable (and still human readable with the help of ontologies)
  - supports disconnection (by caching the remote ontological definitions)
  - with the use of ontologies, it can provide any of the identified principles for IRM
Thank you!

Join the Working Group

https://kantarainitiative.org/groups/irm/