

An introduction to Semantic Web and Linked Data

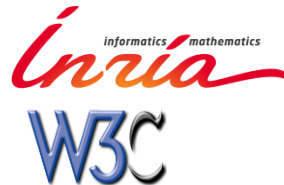
or how to link data and schemas on the web



a W3C tutorial by

Fabien Gandon, <http://fabien.info>, @fabien_gandon

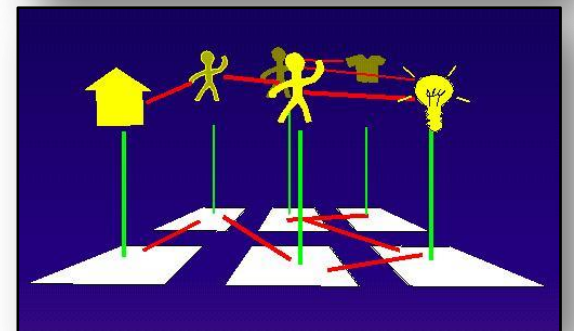
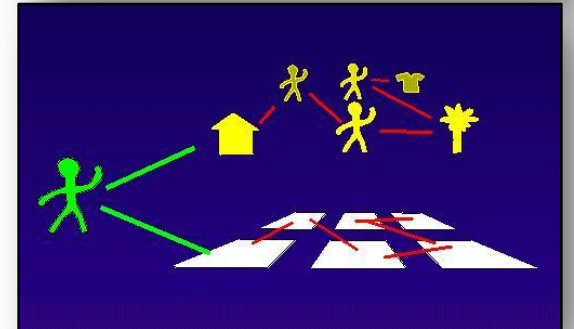
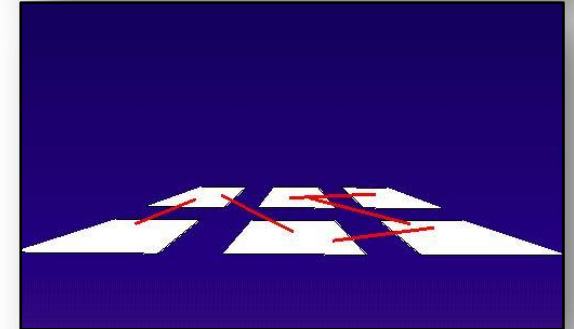
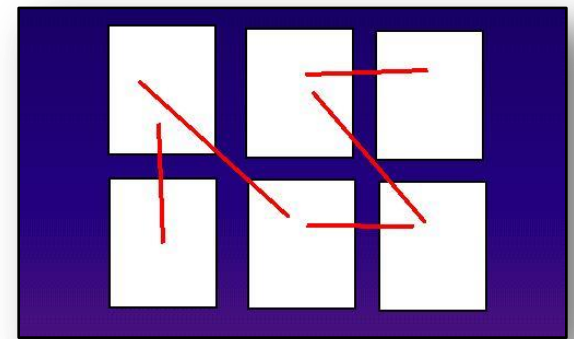
Ivan Herman, <http://www.w3.org/People/Ivan/>



semantic web

mentioned by Tim BL

in **1994** at WWW



[[Tim Berners-Lee](http://www.w3.org/Talks/WWW94Tim/) 1994, <http://www.w3.org/Talks/WWW94Tim/>]



don't read
the sign

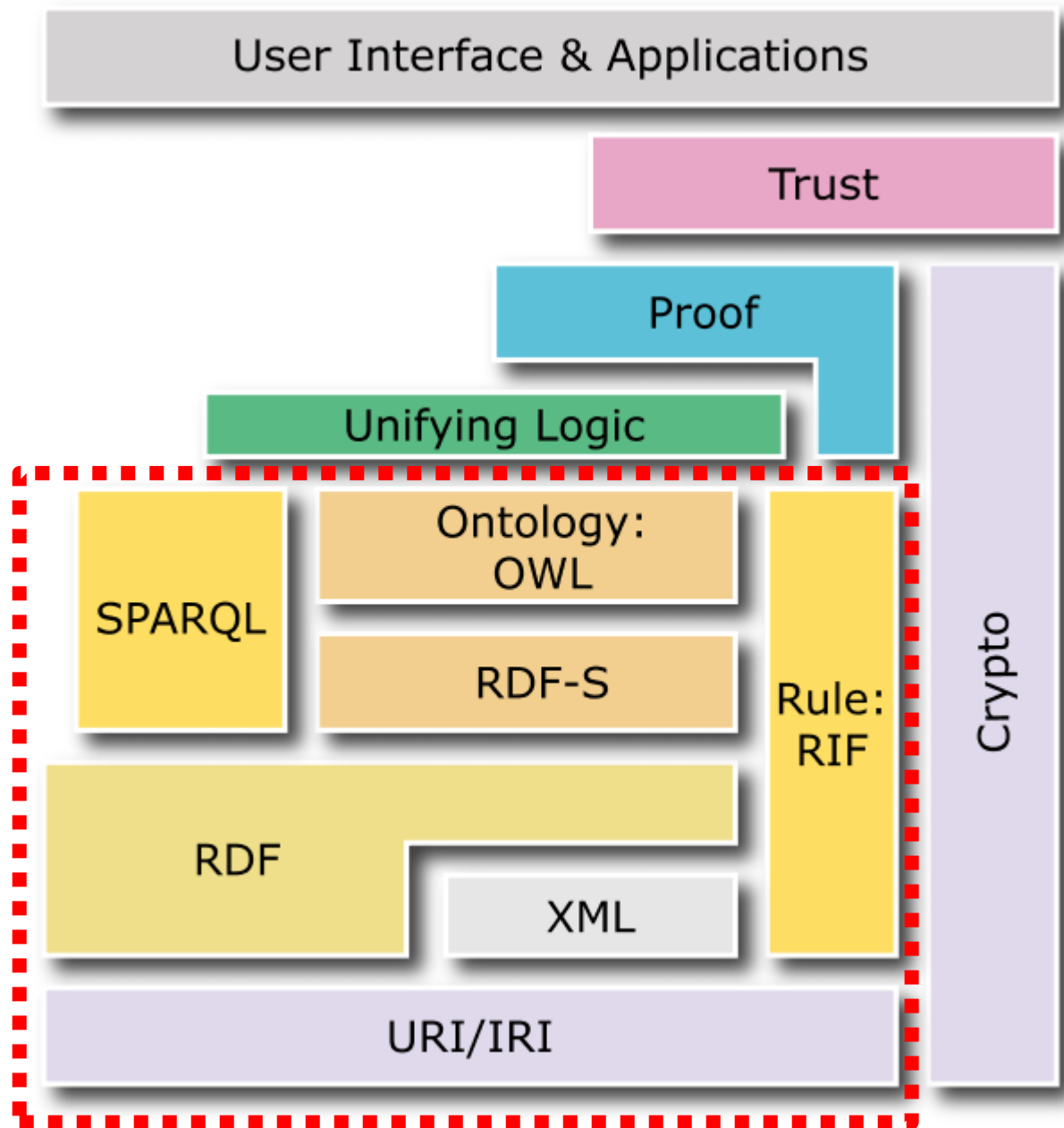


you loose!

we identify and interpret information,

machines don't.





User Interface & Applications

Trust

Proof

Unifying Logic

Ontology:
OWL

RDF-S

Rule:
RIF

Crypto

SPARQL

RDF

XML

URI/IRI

**A WEB OF
LINKED DATA**

RDF stands for

Resource: *pages, dogs, ideas...*

everything that can have a URI

Description: *attributes, features, and
relations of the resources*

Framework: *model, languages and
syntaxes for these descriptions*

R**D****F** is a triple model *i.e.* every piece of knowledge is broken down into



(**s**ubject , **p**redicate , **o**bject)

***doc.html has for author Fabien
and has for theme Music***

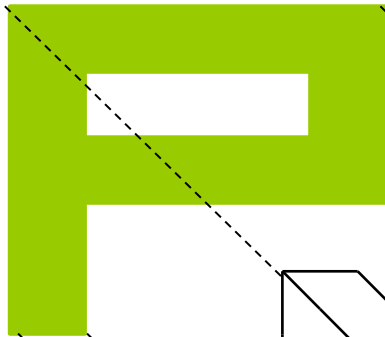
doc.html has for author **Fabien**
doc.html has for theme **Music**

(doc.html , author , Fabien)

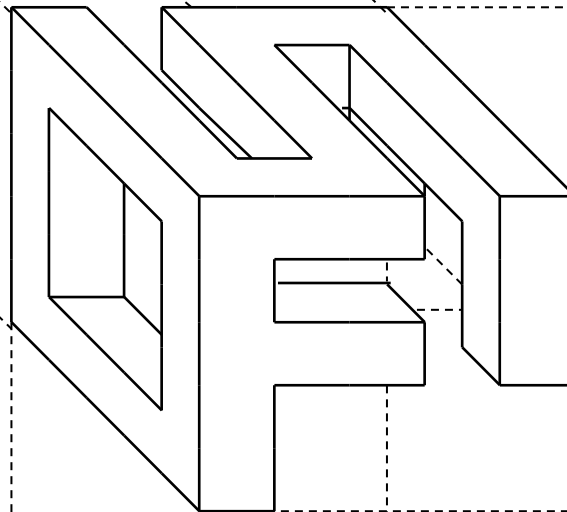
(doc.html , theme , Music)

(subject , predicate , object)

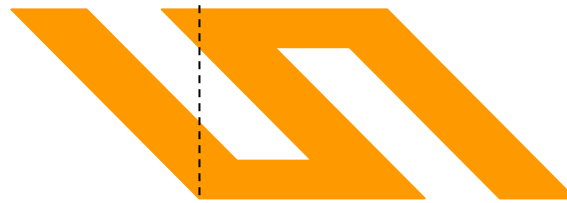
Predicate



Object



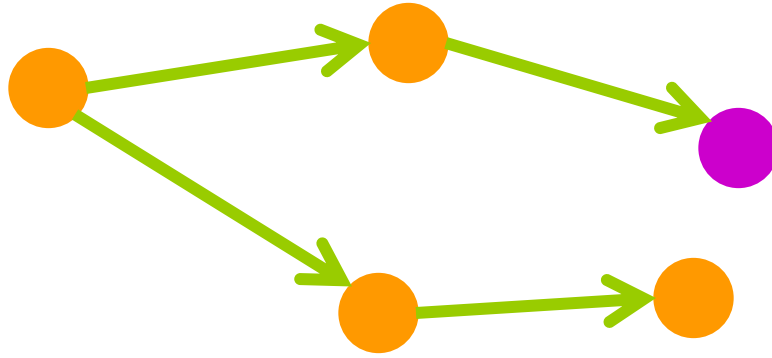
Subject



a triple
the RDF atom



RDF is also a graph model
to link the **descriptions** of resources



RDF triples can be seen as arcs
of a graph (**vertex**, **edge**, **vertex**)

(doc.html , author , Fabien)
(doc.html , theme , Music)

Fabien

author

doc.html

theme

Music



<http://ns.inria.fr/fabien.gandon#me>

The diagram consists of four pink ovals arranged vertically. The top oval contains the URI <http://ns.inria.fr/fabien.gandon#me> in purple. The second oval contains <http://inria.fr/schema#author> in green. The third oval contains <http://inria.fr/rr/doc.html> in orange. The bottom oval contains the word "Music" in purple. A green curved arrow on the left points from the third oval up to the top oval. A green curved arrow on the right points from the bottom oval up to the third oval.

<http://inria.fr/schema#author>

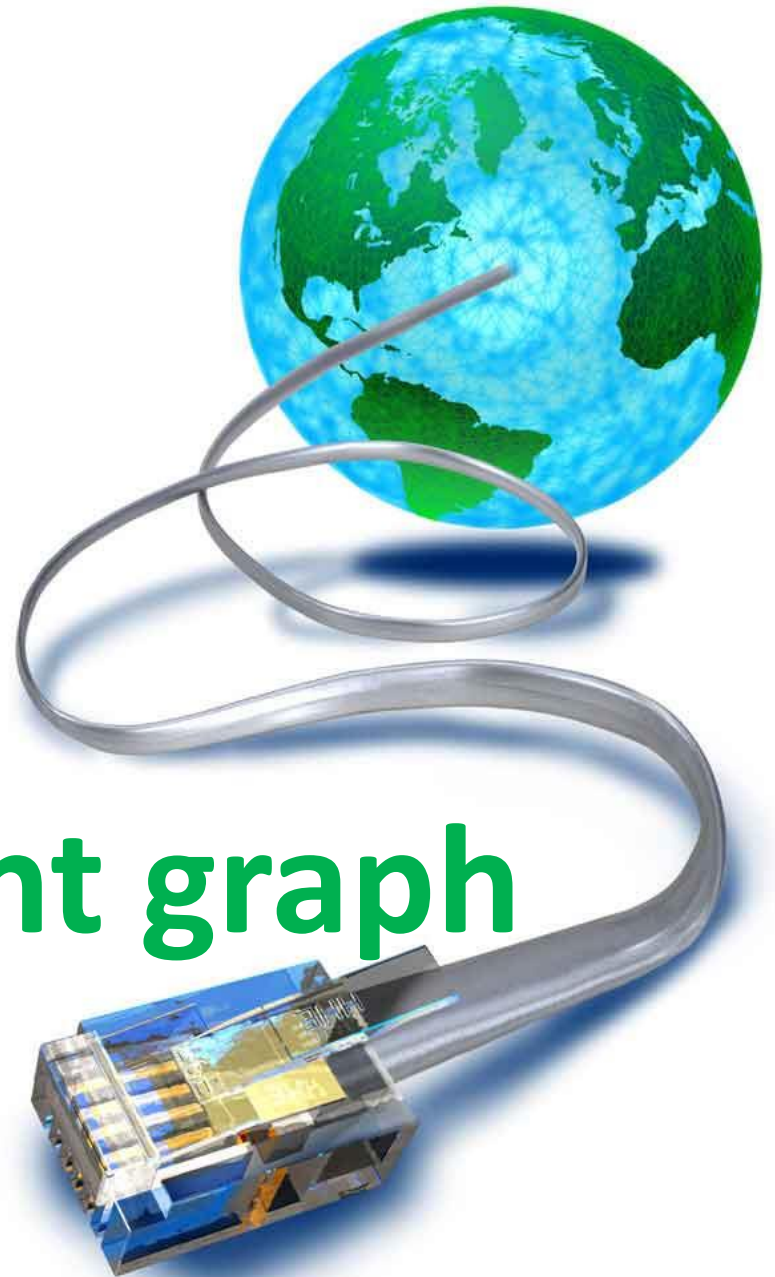
<http://inria.fr/rr/doc.html>

<http://inria.fr/schema#theme>

Music

open and link data in a

global giant graph



in **RDF** values of properties can also be
literals i.e. strings of characters

(doc.html , author , Fabien)
(doc.html , theme , "Music")

```
graph BT; A["http://inria.fr/schema#theme"] --> B["http://inria.fr/rr/doc.html"]; B --> C["http://inria.fr/schema#author"]; C --> D["http://ns.inria.fr/fabien.gandon#me"]; E["Music"] --> A;
```

<http://ns.inria.fr/fabien.gandon#me>

<http://inria.fr/schema#author>

<http://inria.fr/rr/doc.html>

<http://inria.fr/schema#theme>

"Music"

< RDF /> has an XML syntax

```
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-
  rdf-syntax-ns#"
  xmlns:inria="http://inria.fr/schema#" >
```

```
<rdf:Description
  rdf:about="http://inria.fr/rr/doc.html">
  <inria:author rdf:resource=
    "http://ns.inria.fr/fabien.gandon#me"/>
  <inria:theme>Music</inria:theme>
</rdf:Description>
```

```
</rdf:RDF>
```

RDF has other syntaxes
(Turtle, JSON, Triple)

```
@prefix rdf:
    <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix inria: <http://inria.fr/schema#> .

<http://inria.fr/rr/doc.html>
  inria:author
    <http://ns.inria.fr/fabien.gandon#me> ;
  inria:theme "Music" .
```

writing rules for RDF triples

- the subject is always a resource (never a *literal*)
- properties are binary relations and their types are identified by URIs
- the value is a resource or a literal



blank nodes (bnodes)

handy anonymous nodes (existential quantification)

there exist a resource such that... $\{ \exists r ; \dots \}$

```
<rdf:Description rdf:about="http://bu.ch/123.html">
```

```
<author>
```

```
<rdf:Description>
```

```
<surname>Doe</surname>
```

```
<firstname>John</firstname>
```

```
</rdf:Description>
```

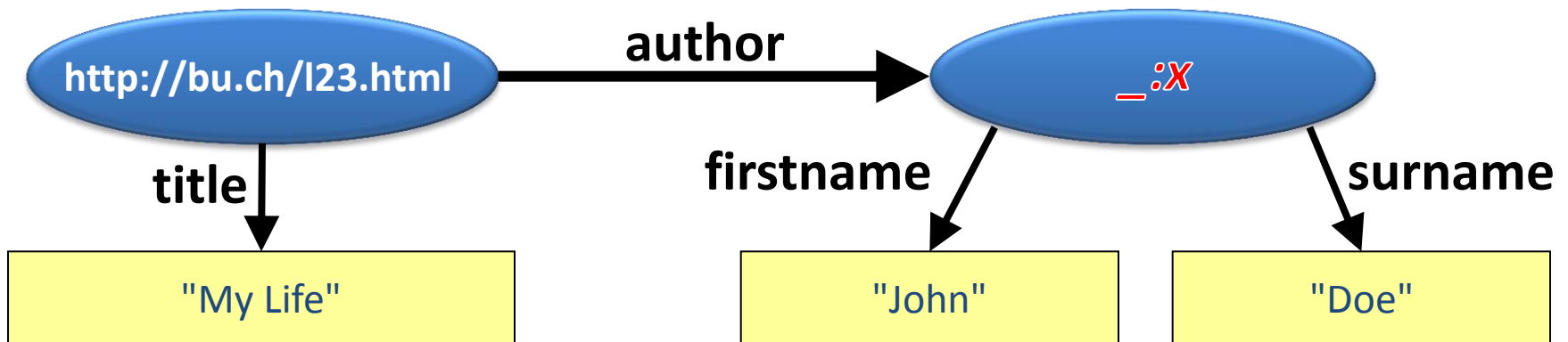
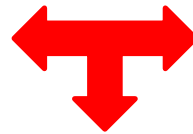
```
</author>
```

```
<title>My Life</title>
```

```
</rdf:Description>
```



```
<http://bu.ch/123.html>  
author  
[surname "Doe" ;  
  firstname "John" . ] ;  
title "My Life" .
```



XML schema datatypes & literals

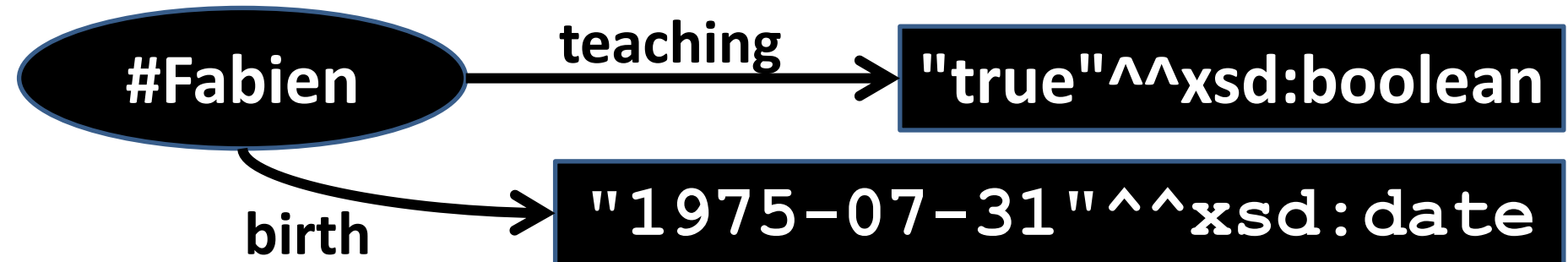
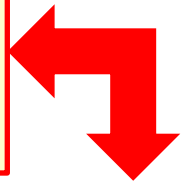
standard literals are xsd:string

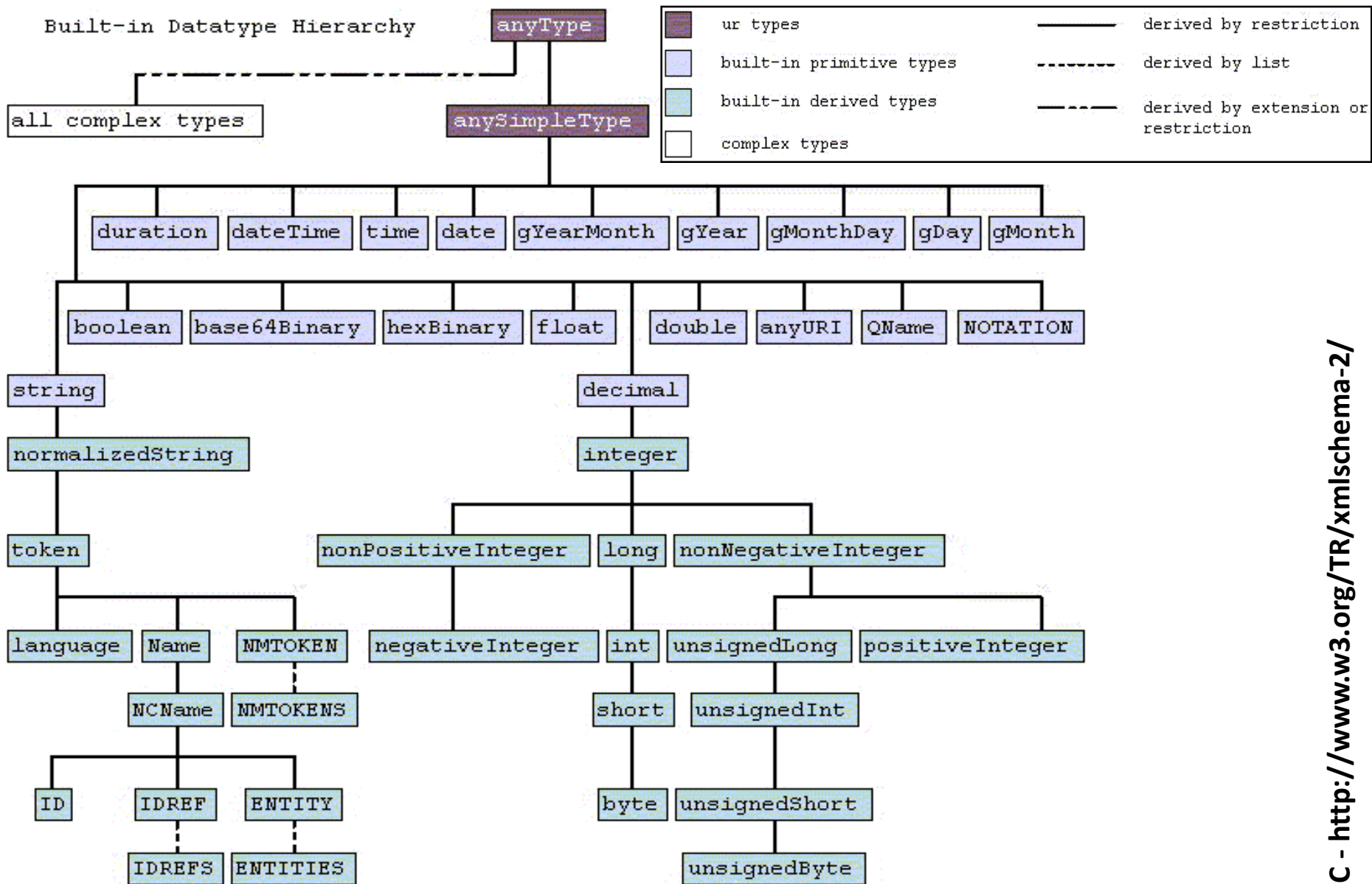
type literals with **datatypes from XML Schema**

```
<rdf:Description rdf:about="#Fabien">  
  <teaching rdf:datatype="http://www.w3.org/2001/XMLSchema#boolean">  
    true</teaching>  
  <birth rdf:datatype="http://www.w3.org/2001/XMLSchema#date">  
    1975-07-31</birth>  
</rdf:Description/>
```



```
#Fabien teaching "true"^^xsd:boolean ;  
        birth "1975-07-31"^^xsd:date .
```





XML Schema datatypes

```
<Book>  
  <title xml:lang='fr'>Seigneur des anneaux</title>  
  <title xml:lang='en'>Lord of the rings</title>  
</Book>
```

```
<Book> title "Seigneur des anneaux"@fr ;  
        title "Lord of the rings"@en .
```

literals with languages and without are disjoint

`"Fabien" ≠ "Fabien"@en ≠ "Fabien"@fr`

langue

typing resources

using URIs to identify the types

```
<urn://~fgandon> rdf:type <http://www.inria.fr/schema#Person>
```

a resource can have several types

```
<urn://~fgandon> rdf:type <http://www.inria.fr/schema#Person>
```

```
<urn://~fgandon> rdf:type <http://www.inria.fr/schema#Researcher>
```

```
<urn://~fgandon> rdf:type <http://www.mit.edu/schema#Lecturer>
```



```
<rdf:Description rdf:about="urn://~fgandon">  
  <rdf:type rdf:resource="http://www.inria.fr/schema#Person" />  
  <name>Fabien</name>  
</rdf:Description>
```

```
<in:Person rdf:about="urn://~fgandon">  
  <name>Fabien</name>  
</in:Person>
```



```
<urn://~fgandon>  
  a in:Person ;  
  name "Fabien" .
```

question:



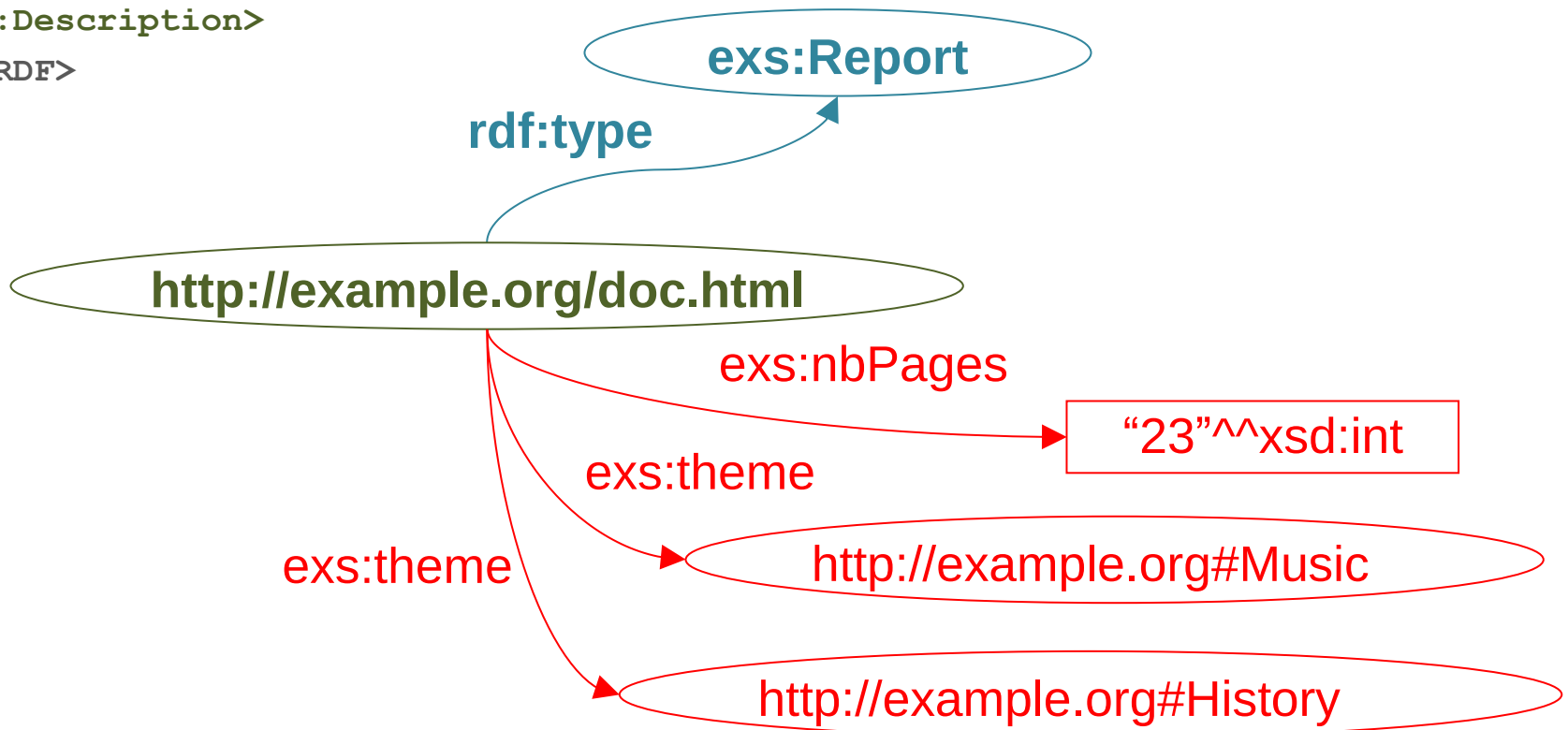
```
<?xml version="1.0"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:exs="http://example.org/schema#">
  <rdf:Description rdf:about="http://example.org/doc.html">
    <rdf:type rdf:resource="http://example.org/schema#Report"/>
    <exs:theme rdf:resource="http://example.org#Music"/>
    <exs:theme rdf:resource="http://example.org#History"/>
    <exs:nbPages rdf:datatype="http://www.w3.org/2001/XMLSchema#int">23</exs:nbPages>
  </rdf:Description>
</rdf:RDF>
```

meaning ?

question:

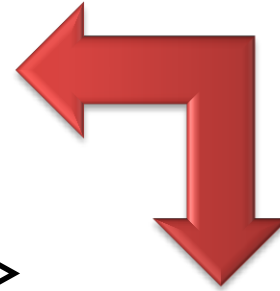


```
<?xml version="1.0"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:exs="http://example.org/schema#">
  <rdf:Description rdf:about="http://example.org/doc.html">
    <rdf:type rdf:resource="http://example.org/schema#Report"/>
    <exs:theme rdf:resource="http://example.org#Music"/>
    <exs:theme rdf:resource="http://example.org#History"/>
    <exs:nbPages rdf:datatype="http://www.w3.org/2001/XMLSchema#int">23</exs:nbPages>
  </rdf:Description>
</rdf:RDF>
```

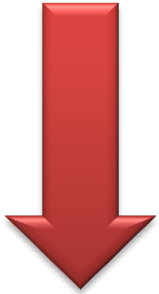


bags = unordered groups

```
<rdf:Description rdf:about="#">
  <author>
    <rdf:Bag>
      <rdf:li>Ivan Herman</rdf:li>
      <rdf:li>Fabien Gandon</rdf:li>
    </rdf:Bag>
  </author>
</rdf:Description>
```



```
<#> author [
  a rdf:Bag ;
  rdf:li "Ivan Herman" ;
  rdf:li "Fabien Gandon" . ] .
```



```
<#> author _:a
_:a rdf:_1 "Ivan Herman"
_:a rdf:_2 "Fabien Gandon"
```



sequence

ordered group of resources or literals

```
<rdf:Description rdf:about="#partition">
  <contains>
    <rdf:Seq>
      <rdf:li rdf:about="#C"/>
      <rdf:li rdf:about="#C"/>
      <rdf:li rdf:about="#C"/>
      <rdf:li rdf:about="#D"/>
      <rdf:li rdf:about="#E"/>
    </rdf:Seq>
  </contains>
</rdf:Description>
```

```
<partition>
  contains [
    a rdf:Seq ;
    rdf:li "C" ;
    rdf:li "C" ;
    rdf:li "C" ;
    rdf:li "D" ;
    rdf:li "E" .
  ] .
```



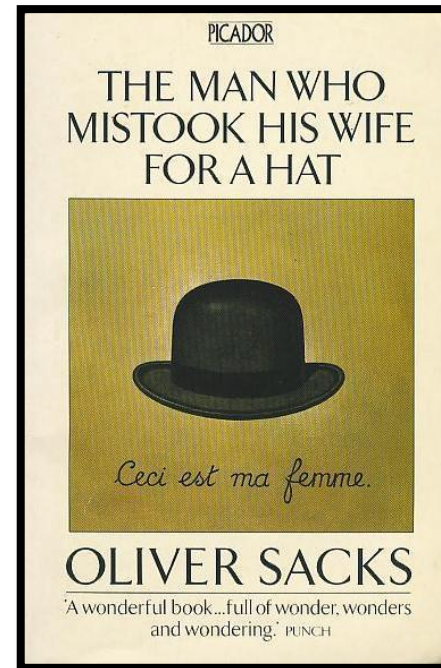
alternatives

e.g. title of a book in different languages

```
<rdf:Description rdf:about="#book">
  <title>
    <rdf:Alt>
      <rdf:li xml:lang="fr">l'homme qui prenait sa femme
                                pour un chapeau</rdf:li>
      <rdf:li xml:lang="en">the man who mistook his wife
                                for a hat</rdf:li>
    </rdf:Alt>
  </title>
</rdf:Description>
```

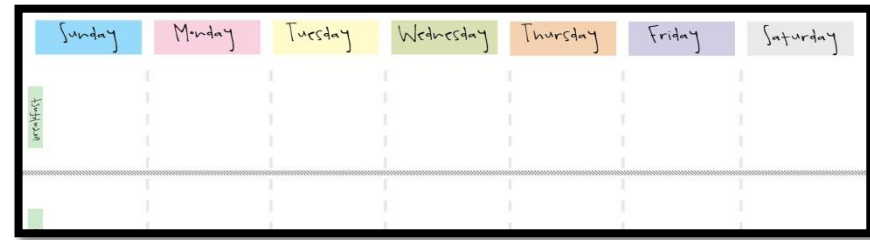


```
<#book>
  title [
    a rdf:Alt ;
    rdf:li "l'homme..."@fr ;
    rdf:li "the man..."@en .
  ] .
```

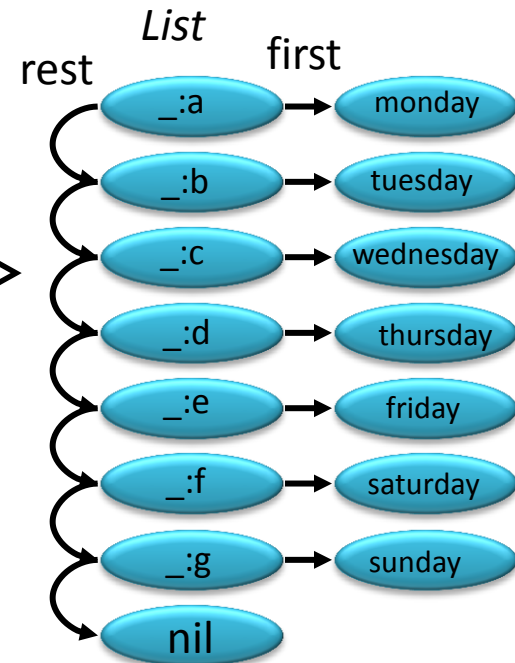


collection

exhaustive and ordered list



```
<rdf:Description rdf:about="#week">
  <dividedIn rdf:parseType="Collection">
    <rdf:Description rdf:about="#monday"/>
    <rdf:Description rdf:about="#tuesday"/>
    <rdf:Description rdf:about="#wednesday"/>
    <rdf:Description rdf:about="#thursday"/>
    <rdf:Description rdf:about="#friday"/>
    <rdf:Description rdf:about="#saturday"/>
    <rdf:Description rdf:about="#sunday"/>
  </dividedIn>
</rdf:Description>
```



```
<#week> dividedIn
  ( <#monday> <#tuesday> <#wednesday>
    <#thursday> <#friday> <#saturday> <#sunday>
  ) .
```


dc:creator

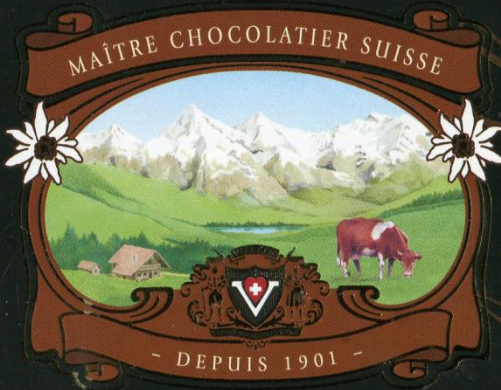


rdf:label



Chocolat Noir

Eclats de Noisettes



Dunkle Schokolade mit
Haselnussplittern
Dark Chocolate with
Hazelnuts Chips



NET WT. 3.5 oz
100g e

All Natural
- sans additif artificiel, sans arôme artificiel -

ex:weight



ex:ingredients



CHOCOLAT NOIR AUX ECLATS DE NOISETTES (10%)
Ingrédients : sucre, pâte de cacao, éclats de noisettes, beurre de cacao, fraction de beurre. Emulsifiant (lécithine de soja). Arôme naturel de vanille. Cacao : 50 % minimum dans le chocolat. Traces éventuelles de lait, d'amandes, de noix de pécan, de noix, d'œufs, de gluten et de pistaches. Fabriqué en Suisse.

DUNKLE SCHOKOLADE MIT HASELNUSSPLITTERN (10%)
Zutaten: Zucker, Kakao­masse, Haselnuss­plittern, Kakaobutter, Butterfraktionen. Emulgator (Sojalecithin). Natürliches Aroma von Vanille. Kakao: 50 % mindestens in der Schokolade. Eventuell Spuren von Milch, Mandeln, Pekannüssen, Nüssen, Eiern, Gluten und Pistazien. Hergestellt in der Schweiz.

CIOCcolato AMARO CON NOCCIOLE SPEZZATE (10%)
Ingredienti: zucchero, pasta di cacao, noccioline spezzate, burro di cacao, frazioni di burro. Emulsionante (lecitina di soia). Vaniglia naturale sapore. Cacao: 50 % minimo nel cioccolato. Eventuali tracce di latte, di mandorle, di noci american, di noci, di uova, di glutine e di pistacchio. Prodotto in Svizzera.

DARK CHOCOLATE WITH HAZELNUTS CHIPS (10%)
Ingredients: sugar, cocoa mass, hazelnuts chips, cocoa butter, butter fat. Emulsifier (soya lecithin). Natural vanilla flavour. Chocolate contains: cocoa solids 50% minimum. Possible traces of milk, almonds, pecan nuts, walnuts, eggs, gluten and pistachio nuts. Made in Switzerland.

CHOCOLATE NEGRO CON TROCITOS DE AVELLANAS (10%)
Ingredientes: azúcar, pasta de cacao, trocitos de avellanas, manteca de cacao, mantequilla derretida. Emulsionante (lecitina de soja). Natural sabor vainilla. Cacao: 50% mínimo en el chocolate. En su caso, trazas de leche, almendras, nueces de Pecan, nueces, huevos, gluten y pistachos. Importado para España y Portugal por: Comercial Masoliver SA, C/ Punta, 18 17857-Begudá, Sant Joan les Fonts (Girona) España. Producido en Suiza.

CHOCOLATE PRETO COM PEDAÇOS DE AVELÃS (10%)
Ingredientes: açúcar, pasta de cacau, pedaços de avelãs, manteiga de cacau, manteiga derretida. Emulsionante (lecitina de soja). Natural sabor baunilha. Cacau: mínimo 50% no chocolate. Vestígios eventuais de leite, amêndoas, nozes de Pecan, nozes, ovos, gluten e pistachos. Importado em Espanha e Portugal por: Comercial Masoliver SA, C/ Punta, 18 17857-Begudá, Sant Joan les Fonts (Girona) Espanha. Produzido em Suíça.

MÖRK CHOKLAD MED HASELNÖTSBITAR (10%)
Ingredienser: socker, kakao­massa, haselnöts­bitar, kakaosmör, smält smör. Emulgeringsmedel (sojalecitin). Naturligt vanilj smak. Kakao : minst 50 % i chokladen. Eventuella rester av mjölk, mandlar, pecan nötter, nötter, ägg, gluten, pistasch. Tillverkad i Schweiz.

شوكولاتة غامقة مع البندق (10%)
المكونات : سكر، زبدة الكاكاو ، مسحوق حليب كامل الدسم ، قطع البندق ، حب الكاكاو ، مسحوق حليب منزوع الدسم ، زبدة صالحة ، مسحوق حليب مخفف ، مسحوق حب الشمر ، المستحلبات (لستين الصويا) ، نكهات. كاكاو: 50% على الأقل في الشوكولاتة. آثار محتملة للزبدة والجوز والبندق ومنتجات البندق. المستورد في الجزائر: مؤسسة قوماك: حي العمراني رقم 53 - بابا حسن - الجزائر - صنع في سويسرا المورد: شركة فورج للتوزيع حمام سوسة تونس الهاتف: 73 277 418

ЧЕРНЫЙ ШОКОЛАД С ДРОБЛЕННЫМИ ЛЕСНЫМИ ОРЕХАМИ (10%)
Ингредиенты: Сахар, какао-масса, орехи лесные дробленые, масло какао, молоко обезжиренное, сливки. Эмульгатор: лецитин соевый. Натуральный ванильный ароматизатор. Содержание какао-продуктов в шоколаде: не менее 50%. Возможно незначительное содержание молочный, миндаля, грецкого ореха, грецкого ореха, яичного порошка, глютена и фисташки. Не содержит ГМО. Вес нетто: 100 г. Хранить в сухом прохладном месте. Изготовлено и упаковано: Вилларс Маэтр Шокولاتье С.А. По де ла Фондери 2, 1701 Фрибург, Швейцария. Дата производства и срок годности см. на упаковке. По истечению срока годности не рекомендуется употреблять в пищу.

Импортер: "Центр-Имекс", Москва, Микло-Макс 22, "Р.Т.С.Групп", Москва, Б.Овчинниковский 12-1-33. Эксклюзивный дистрибьютор в РФ: ООО "БОНА", юр. адрес: 119017, г. Москва, Старомосковский пер., д. 9, стр. 1. Телефон: (495) 137 72 72, факс: (495) 956 67 95. Произведено в Швейцарии.

100 g contiennent / enthalten / contengono / contain / contiennent / innehåller / 100 غرام تحتوي على / 100 гр продукта содержится
Energie / Energie / Energia / Energy / Energia / Energia / الطاقة / Эн. ценность 2100 kJ 500 kcal
Proteïnes / Eiweiss / Proteine / Protein / Proteinas / Proteinas / Proteiner / بروتينات / Белки 5 g / 100 g
Glucides / Kohlenhydrate / Carboidrati / Carbohydrate / Hidratos de carbono / Carbohidratos / Kohhydrate / سكريات / Углеводы 52 g / 100 g
- Dont sucrés / Ohne Zucker / Di cui zăchăți / Of which sugars / De los azúcares / Dos quais açúcares / Socker / من سكر العنكر / Сахар 41 g / 100 g
Lipides / Fett / Grassi / Fat / Lípidos / Lípidos / Lipids / دهنيات / Жиры 34 g / 100 g
- Acides gras saturés / Gesättigte Fettsäuren / Acidi grassi saturi / Saturated fat / Saturados / Saturat / Mättade / أحماض دهنية مشبعة / Насыщ. жирн 17 g / 100 g
- Acides Gras trans / Trans-Fettsäuren / Acidi grassi trans / Trans fatty acid / Ácidos grasos trans / Ácidos grasos trans / Trans fettsyra / أحماض دهنية غير مشبعة / Транс-жирные кислоты 0 g / 100 g
Fibres / Fæser / Fibre / Fibres / Fibras / Fibers / Fibras / البعيف / Волокна 7 g / 100 g
Sodium / Natrium / Sodio / Sodium / Sodio / Sodio / Натрий / Натрий 0,005 g / 100 g

A consumer de préférence avant tin : / Mindestens haltbar bis Ende : Da consumarsi preferibilmente entro : Best before end : Consumi preferibilmente antes del fin de : Consumi preferibilmente antes del fin de : / Bäst före : / من الأفضل استهلاكه قبل : / Употребить не позднее:

rdf:about



10.2010
L2799 07:21

rdf:type



7 610036 002836
VILLARS MAÎTRE CHOCOLATIER S.A. RTE DE LA FONDERIE 2, 1701 FRIBOURG - SUISSE
www.chocolat-villars.com
Poids Net : 100g e



http://my_domain.org/my_path/my_type

openmodel

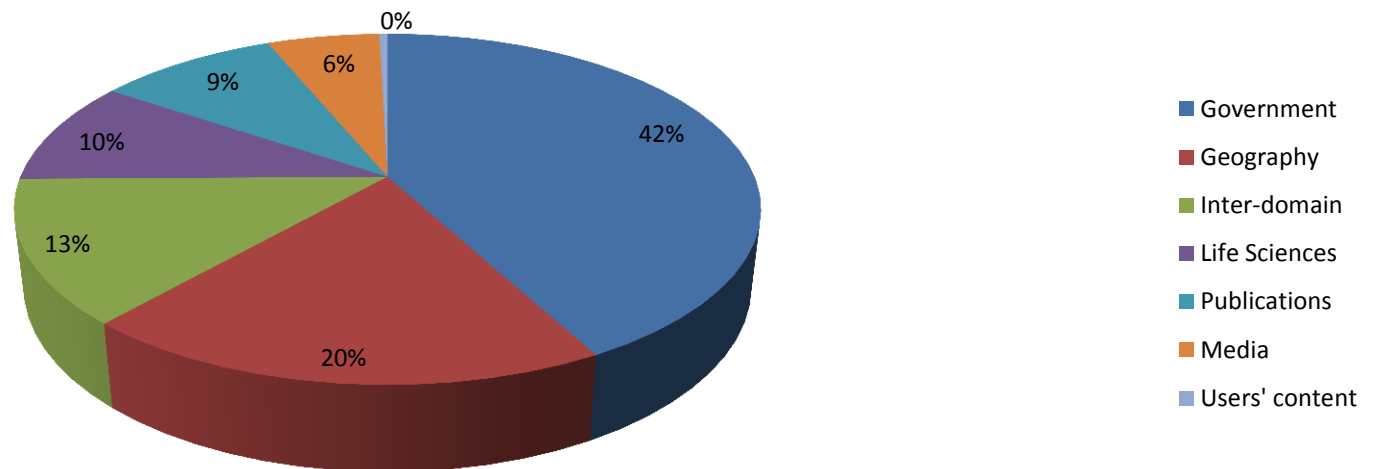
- extensible vocabulary based on URIs
- anyone can say anything about anything



link
to the world

thematic content

Domains	Number of datasets	Number of Triples	%	Out links	%
Media	25	1 841 852 061	5,82 %	50 440 705	10,01 %
Geography	31	6145 532 484	19,43 %	35 812 328	7,11 %
Government	49	13 315 009 400	42,09 %	19 343 519	3,84 %
Publications	87	2 950 720 693	9,33 %	139 925 218	27,76 %
Inter-domain	41	4 184 635 715	13,23 %	63 183 065	12,54 %
Life Sciences	41	3 036 336 004	9,60 %	191 844 090	38,06 %
Users' content	20	134 127 413	0,42 %	3 449 143	0,68 %
	295	31 634 213 770		503 998 829	



data.ratatouille.com



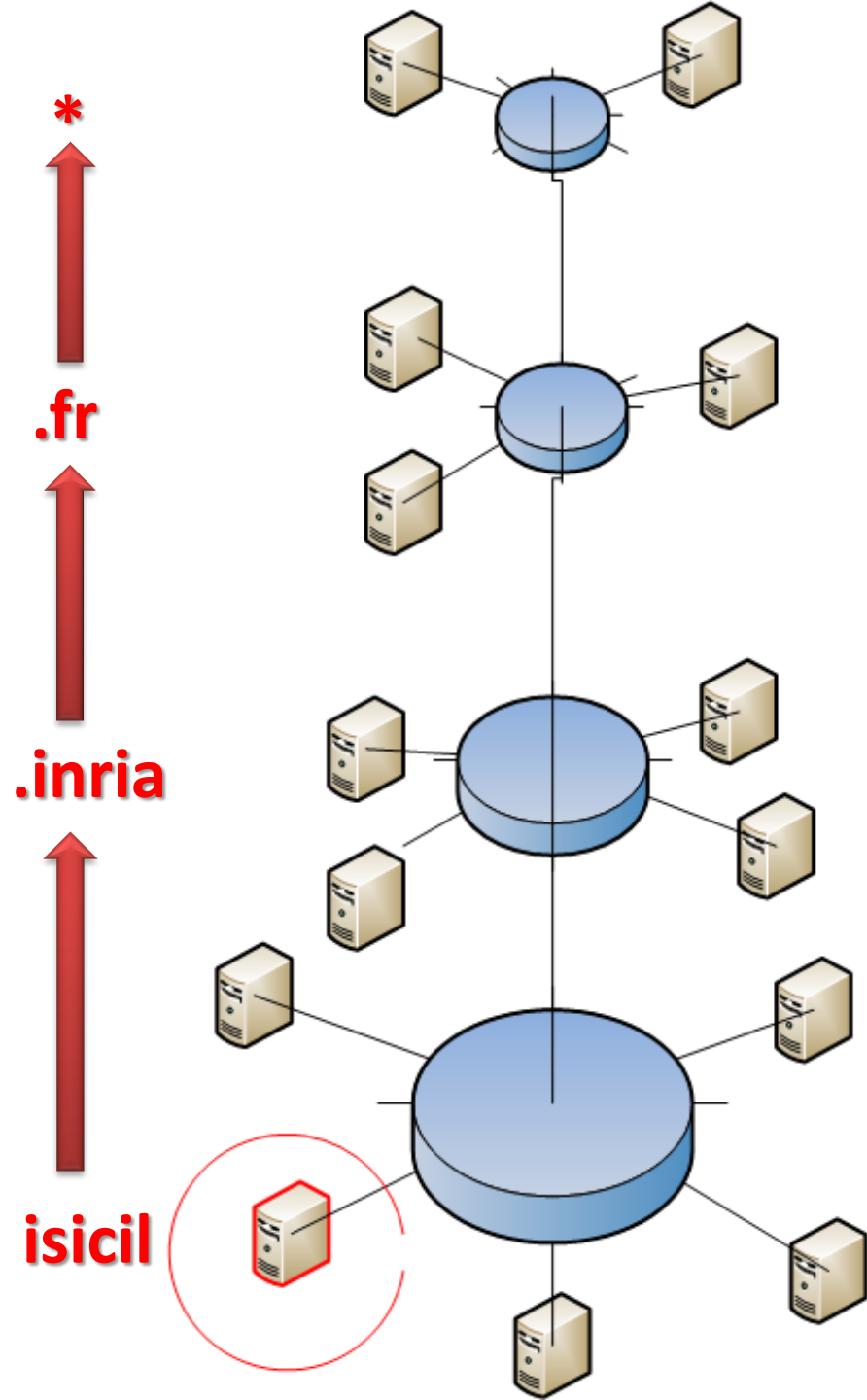
- Use **RDF** as data format
- Use **URIs** as names for things
- Use **HTTP URIs** so that people can look up those names
- When someone **looks up** a URI, provide useful information (RDF, HTML, etc.) using **content negotiation**
- Include **links to other URIs** so that related things can be discovered



DNS

he who controls the name
controls the access

ex. bit.ly & Libya



dir.w3.org



Community Directory

About

View by Directory

View by Category

View Statistics

Main page

Contents

All pages

Recent changes

Administration

User groups

Manifest

Concept schemes

Ontologies

Named queries

SPARQL query

Toolbox

What links here

Related changes

Login

Lookup...

DIRECTORY OF LINKED DATA SUPPLIERS AND DEPLOYMENTS

Enter the Directory

This is a **beta** Web application and is intended as an open directory listing of vendors, government authorities and Open Government deployments worldwide. The goal of this directory is to better connect suppliers and consumers of [Linked Data](#). This application was developed by the W3C Government Linked Data Working Group per our charter.

Regardless of W3C affiliation, we invite independent consultants, SMEs, multi-national corporations and academic research groups to enter their details. At this time a username & password is required to enter your details. Please email support at 3roundstones dot com with subject "Directory". Thanks.

Anyone can browse the details contained in this directory of Linked Data vendors, researchers and deployments.

Step #1: To get started **add your organization to the directory**

Step #2: Click on the "Edit" tab (found on the top of your Organization's page) to add a product, service, or project. You may enter as many products, services and projects as you wish.

Step #3: Click on the "View" tab (found on the top of your Organization's page) and click on the 'Add deployment' link located on the right.

If you have any feedback or questions, please email [team-gld-chairs at w3 dot org](mailto:team-gld-chairs@w3.org).

We used [Callimachus](#), an open source framework for creating Linked Data applications. All data in this Directory is available as RDF. [Download the bulk RDF](#).

License

This resource was last modified at 12:35 am, 10 Nov 2011

Powered By
Callimachus



Apple's



Monday 1 February 2010



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TOP NEWS STORY

Top Israeli officers reprimanded

Israel reveals it has reprimanded two top officers over the use of white phosphorus shells in Gaza, its first such admission of errors.

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Iraqi female bomber kills dozens

US to resume Haiti victim airlift

S Lanka military chiefs dismissed

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- China accuses US over Taiwan deal
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- Beyonce is queen of Grammy Awards

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- Obama to unveil \$3.8tn US budget
- Nigerian oil pipeline sabotaged
- China accuses US over Taiwan deal

Sport

[Edit](#) [x](#)



Live - Transfer deadline day

Cairo delight at African Cup win

Latest updates from first F1 test

- Transfer trio boost Celtic squad
- Ferguson praises 'maturing' Nani
- Terry left to sweat on captaincy
- Geremi completes Newcastle exit
- Benitez dismisses Juventus deal

Travel

from lonely planet

[Edit](#) [x](#)

Spotlight

[x](#)

[» AEROSPACE](#)



Singapore air show eyes military sales

After a bad year for airlines, manufacturers at the Singapore air show have higher hopes for sales of military hardware than civilian aircraft.

- Gloom ahead of Asia's largest air show
- Planemakers eye depressed cargo market
- 'Manage flights' to cut emissions

Business & Money

[Edit](#) [x](#)

[» MARKET DATA MON, 1 FEBRUARY 2010](#)
12:37:42 GMT

Dow Jones	10067.33	▼	-53.13
Nasdaq	2147.35	▼	-31.65
FTSE 100	5188.53	▲	0.01
Dax	5604.08	▼	-4.71
Cac 40	3729.43	▼	-10.03

15 minute delay | [Terms and Conditions](#)

[» STERLING EXCHANGE RATES](#)

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Sindice - Data Web Services

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Searching on about 37.71 million documents.

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Silicon Valley
May 18-22

LinkedDataPlanet
CONFERENCE & EXPO • SPRING 2008

ESTC2008
2nd ANNUAL EUROPEAN SEMANTIC TECHNOLOGY CONFERENCE

XTECH
CONFERENCE

XTech: May 6-9, Dublin, Ireland

SemTech: May 18-22, San Jose, California

SINDICE BLOG

[Feed](#)

[Sindice Beta 1 index](#)

JUN 20, 2008

The Sindice Beta 1 index is now online! Apart from the exciting geek wizardries (e.g. [More →](#))

[An Exciting Hard Hat area](#)

MAY 30, 2008

As you might have noticed by the look of the site we're now in a very exciting transition phase. Here is a short summary of the ma... [\(More →\)](#)

[Sindice in use](#)

FEB 20, 2008

Sindice is really meant to be used by your project, and for us it could't



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Creative Commons is a nonprofit that offers a flexible copyright for creative work.



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music, sounds, speeches...



Images

photos, illustrations,
designs...



Video

movies, animations,
footage...



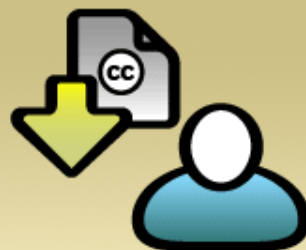
Text

books, blogs, essays...



Education

lesson plans, course
packets, textbooks...



Find

Music, photos, and more



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Creative Commons offers [a flexible range of protections and freedoms](#) for authors and artists. We have built upon the "all rights reserved" of traditional copyright to create a voluntary "some rights reserved" copyright. We're a nonprofit. All of our tools are free.

Weblog

[At Sundance](#) I'll be on a panel on Digital Rights Management tomorrow at high noon at the Sundance Film Festival. Digital Rights Management (DRM) is a key issue for any company that

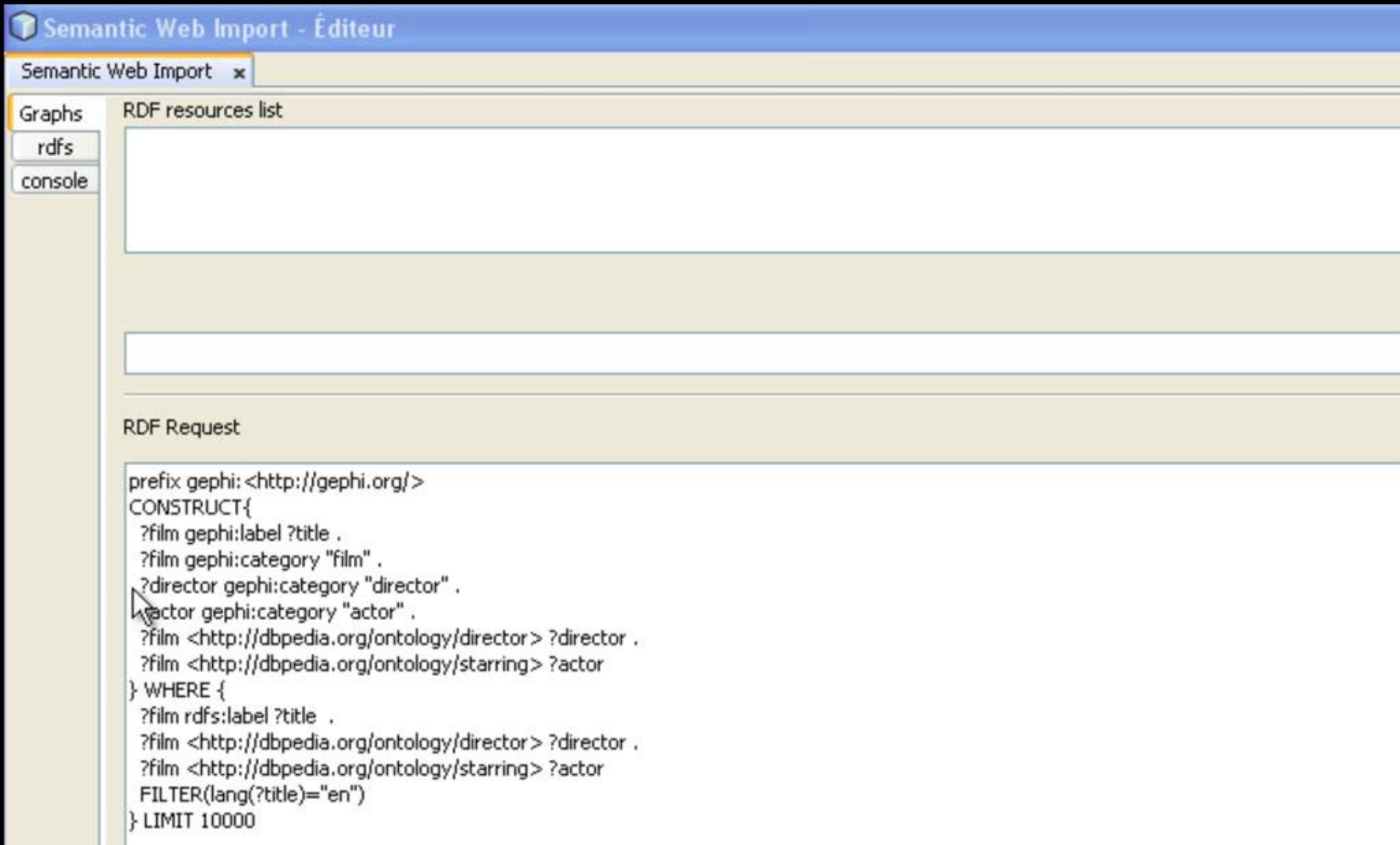
Recent Features



Magnatune

JAN 2005 [Magnatune](#) provides "Internet music without the guilt." Based in Berkeley, California, Magnatune is a record label with a 21st Century [business model](#), offering consumers a unique mix of free and paid music. One of the first for-profit companies to adopt Creative Commons' copyright licenses into its strategy, Magnatune has

Plugin Gephi



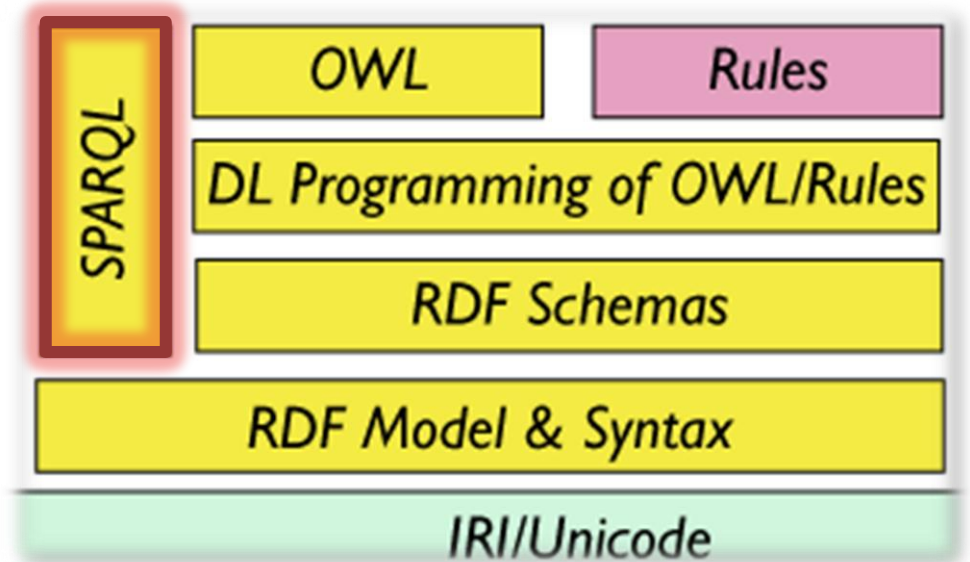


RDF 1.1 ?

- standardize Turtle syntax
- standardize a JSON syntax
- named graphs



query with SPARQL
SPARQL Protocol and RDF
Query Language



SPARQL in 3 parts

part 1: query language

part 2: result format

part 3: access protocol



SPARQL query

SELECT . . .

FROM . . .

WHERE { . . . }

example

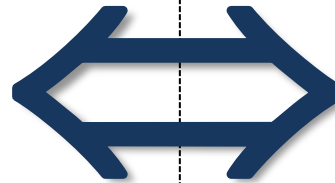
persons at least 18-year old

```
PREFIX ex: <http://inria.fr/schema#>
SELECT ?person ?name
WHERE {
    ?person rdf:type ex:Person .
    ?person ex:name ?name .
    ?person ex:age ?age .
    FILTER (?age > 17)
}
```

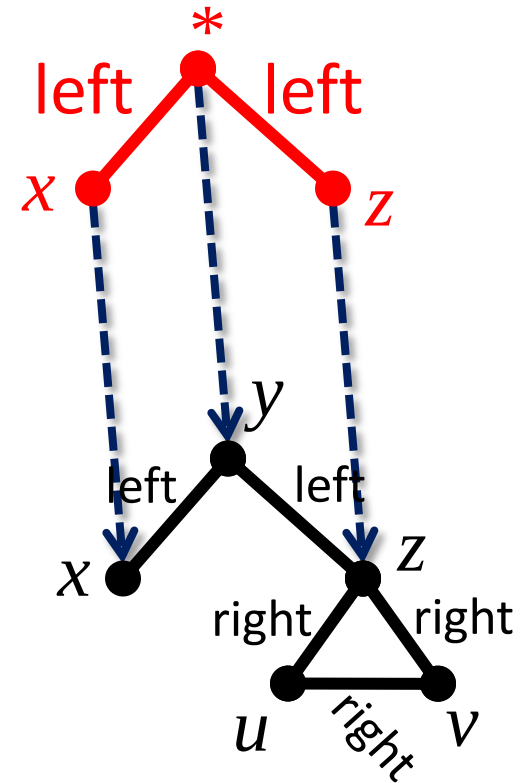


left(x,y)	right(z,v)
left(y,z)	right(z,u)
	right(u,v)

$\models$



left(x,?p) left(?p,z)



graph mapping / projection

classical three clauses:

- Select: clause to select the values to be returned
- Where: triple/graph pattern to match
- Filter: constraints expressed using test functions (XPath 2.0 or external)



SPARQL triples

- triples and question marks for variables:

```
?x rdf:type ex:Person
```

- graph patterns to match:

```
SELECT ?subject ?property ?value  
WHERE { ?subject ?property ?value }
```

- a pattern is, by default, a **conjunction** of triples

```
SELECT ?x WHERE  
{ ?x      rdf:type      ex:Person .  
  ?x      ex:name       ?name . }
```



question:



- Query:

```
SELECT ?name WHERE {  
  ?x name ?name .  
  ?x email ?email .  
}
```

- Base:

```
_ :a name "Fabien" x2  
_ :b name "Thomas"  
_ :c name "Lincoln"  
_ :d name "Aline"  
_ :b email <mailto:thom@chaka.sn>  
_ :a email <mailto:Fabien.Gandon@inria.fr>  
_ :d email <mailto:avalandre@pachinko.jp>  
_ :a email <mailto:bafien@fabien.info>
```

- Results ?

prefixes

to use namespaces:

```
PREFIX mit: <http://www.mit.edu#>
```

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
```

```
SELECT ?student
```

```
WHERE {
```

```
  ?student mit:registeredAt ?x .
```

```
  ?x foaf:homepage <http://www.mit.edu> .
```

```
}
```

Base namespace : **BASE** <...>





SPARQL result

**failure/ success
values found**

result formats

- a **binding** i.e. list of all the selected values (SELECT) for each answer found;
(stable XML format ; e.g. for XSLT transformations)
- RDF **sub-graphs** for each answer found
(RDF/XML format ; e.g. for application integration)
- JSON (eg. ajax web applications)
- CSV/TSV (eg. export)



example of binding

results for previous query in XML

```
<?xml version="1.0"?>
<sparql xmlns="http://www.w3.org/2005/sparql-results#">
  <head>
    <variable name="student"/>
  </head>
  <results ordered="false" distinct="false">
    <result>
      <binding name="student">
        <uri>http://www.mit.edu/data.rdf#ndieng</uri></binding>
      </result>
      <result>
        <binding name="student">
          <uri>http://www.mit.edu/data.rdf#jdoe</uri></binding>
        </result>
      </sparql>
```


simplified syntax

triples with a common subject:

```
SELECT ?name ?fname
```

```
WHERE {
```

```
  ?x a Person;
```

```
    name ?name ;
```

```
    firstname ?fname ;
```

```
    author ?y . }
```



```
SELECT ?name ?fname
```

```
WHERE {
```

```
  ?x rdf:type Person .
```

```
  ?x name ?name .
```

```
  ?x firstname ?fname .
```

```
  ?x author ?y .
```

```
}
```

list of values

```
?x firstname "Fabien", "Lucien" .
```

blank node

```
[firstname "Fabien"] Or [] firstname "Fabien"
```

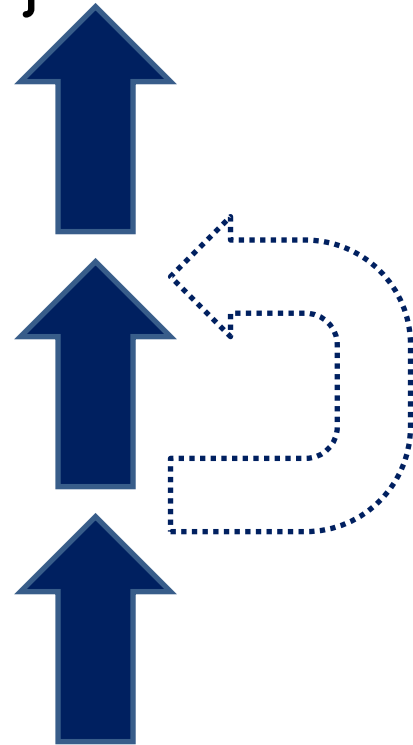
source

```
PREFIX mit: <http://www.mit.edu#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
FROM http://www.mit.edu/data.rdf
SELECT ?student
WHERE {
  ?student mit:registeredAt ?x .
  ?x foaf:homepage <http://www.mit.edu> .
}
```

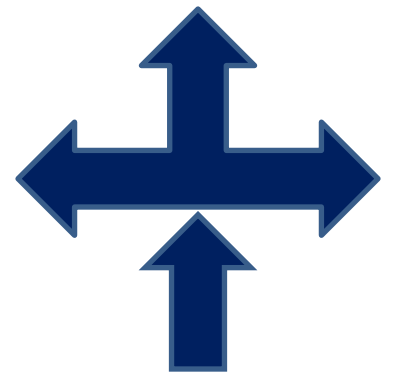
optional part

```
PREFIX mit: <http://www.mit.edu#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?student ?name
WHERE {
  ?student mit:registeredAt ?x .
  ?x foaf:homepage <http://www.mit.edu> .
  OPTIONAL { ? student foaf:name ?name . }
}
```

possibly unbound



union

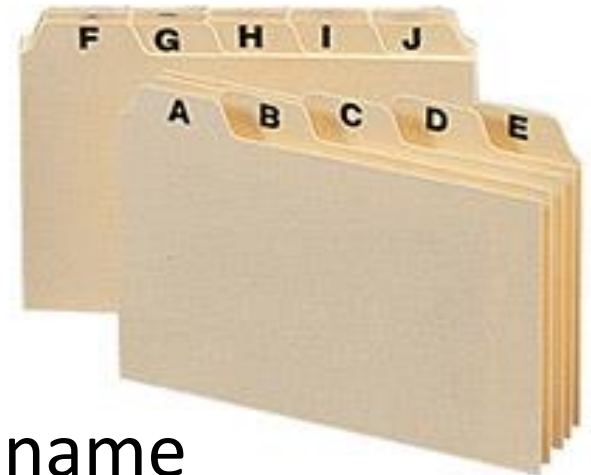


alternative graph patterns

```
PREFIX mit: <http://www.mit.edu#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?student ?name
WHERE {
  ?student mit:registeredAt ?x .
  {
    ?x foaf:homepage <http://www.mit.edu> .
  }
  UNION
  {
    ?x foaf:homepage <www.stanford.edu/> .
  }
}
```

sort, filter and limit answers

```
PREFIX mit: <http://www.mit.edu#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?student ?name
WHERE {
  ?student mit:registeredAt ?x .
  ?x foaf:homepage <http://www.mit.edu> .
  ?student foaf:name ?name .
  ? student foaf:age ?age .
  FILTER (?age > 22)
}
ORDER BY ?name
LIMIT 20
OFFSET 20
```



students older than 22 years sorted by name
results from number #21 to #40

operators

- Inside the FILTER:
 - Comparators: `<`, `>`, `=`, `<=`, `>=`, `!=`
 - Tests on variables: `isURI(?x)`, `isBlank(?x)`, `isLiteral(?x)`, `bound(?x)`
 - Regular expression `regex(?x, "A.*")`
 - Attributes and values: `lang()`, `datatype()`, `str()`
 - Casting: `xsd:integer(?x)`
 - External functions and extensions
 - Boolean combinations: `&&`, `||`
- In the where WHERE: `@fr` , `^^xsd:integer`
- In the SELECT: `distinct`

other functions (v 1.1)

isNumeric (Val) test it is a numeric value

coalesce (val,..., val) first valid value

IRI (Str) /URI (Str) to build an iri/uri from a string

BNODE (ID) to build a blank node

RAND () random value between 0 and 1

ABS (Val) absolute value

CEIL (Val) , FLOOR (Val) , ROUND (Val)

NOW () today's date

DAY (Date) , HOURS (Date) , MINUTES (Date) ,

MONTH (Date) , SECONDS (Date) ,

TIMEZONE (Date) , TZ (Date) , YEAR (Date)

to access different parts of a date

MD5 (Val) , SHA1 (Val) , SHA256 (Val) ,

SHA384 (Val) , SHA512 (Val) hash functions

string / literal functions (v1.1)

STRDT(value, type) build a typed literal

STRLANG(value, lang) build a literal with a language

CONCAT(lit1,...,litn) concatenate a list of literal

CONTAINS(lit1,lit2), **STRSTARTS**(lit1,lit2),
STREND(lit1,lit2)

to test string inclusion

SUBSTR(lit, start [,length]) extract a sub string

ENCODE_FOR_URI (Str) encodes a string as URI

UCASE (Str), **LCASE** (Str) uppercase and lowercase

STRLEN (Str) length of the string

Aggregates

`group by + count, sum, min, max,
avg, group_concat, or sample`

ex. average scores, grouped by the subject, but
only where the mean is greater than 10

```
SELECT (AVG(?score) AS ?average)  
WHERE { ?student score ?score . }  
GROUP BY ?student  
HAVING (AVG(?score) > 10)
```

question:



```
PREFIX ex: <http://www.example.abc#>
SELECT ?person
WHERE {
    ?person rdf:type ?type .
    FILTER(! ( ?type = ex:Man ))
}
```

minus

subtract a pattern

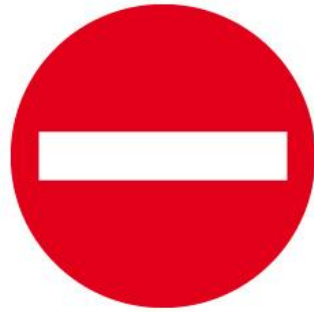


```
PREFIX ex: <http://www.example.abc#>

SELECT ?person
WHERE {
  { ?x rdf:type ex:Person }
  minus { ?x rdf:type ex:Man }
}
```

not exist

check the absence of a pattern



```
PREFIX ex: <http://www.example.abc#>

SELECT ?person
WHERE {
  ?x ex:memberOf ?org .
  filter (not exists
    { ?y ex:memberOf <Hell> })
}
```

if... then... else



```
prefix foaf: <http://xmlns.com/foaf/0.1/>
select * where {
  ?x foaf:name ?name ; foaf:age ?age .
  filter (
    if (langMatches( lang(?name), "FR" ) ,
      ?age>=18 , ?age>=21) )
}
```

test a value is in / not in a list

```
prefix foaf: <http://xmlns.com/foaf/0.1/>
select * where {
    ?x foaf:name ?n .
    filter ( ?n in ( "fabien", "olivier",
                     "catherine" ) )
}
```



values

pre-defined bindings

```
select ?person where {
```

```
  ?person name ?name .
```

```
VALUES (?name)
```

```
  { "Peter" "Pedro" "Pierre" }
```

```
}
```



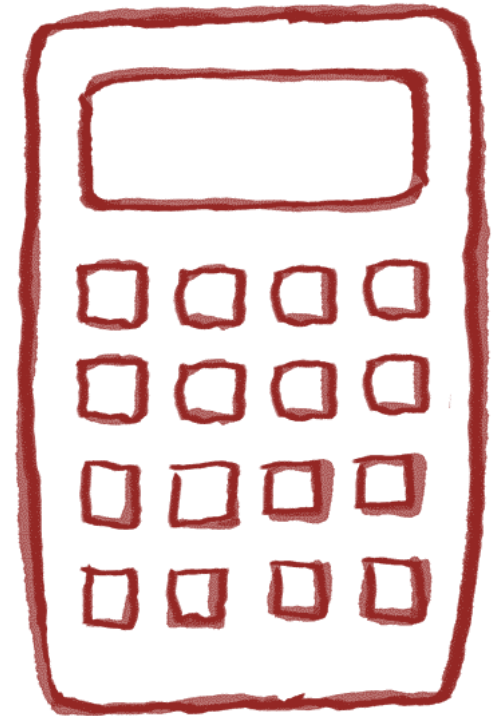
paths

/	: sequence
	: alternative
+	: one or several
*	: zero or several
?	: optional
^	: reverse
!	: negation
{min,max}	: length

```
prefix foaf: <http://xmlns.com/foaf/0.1/>
select ?friends_fab where {
  ?x foaf:name "Fabien Gandon" ;
  foaf:knows+ ?friends_fab ;
}
```


select expression

```
select ?x (year(?date) as ?year)
where {
  ?x birthdate ?date .
}
```



subquery / nested query



```
select ?name where {  
  {select (max(?age) as ?max)  
    where { ?person age ?age }  
  }  
  ?senior age ?max  
  ?senior name ?name  
}
```

construct RDF as result

PREFIX mit: <http://www.mit.edu#>

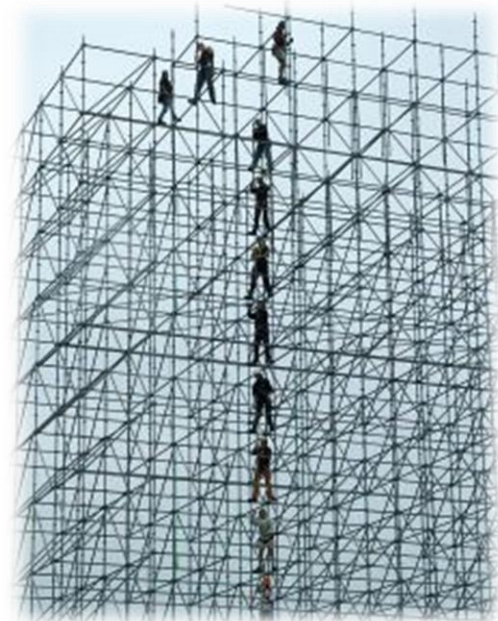
PREFIX corp: <http://mycorp.com/schema#>

CONSTRUCT

{ ?student rdf:type corp:FuturExecutive . }

WHERE

{ ?student rdf:type mit:Student . }



free description



```
PREFIX mit: <http://www.mit.edu#>
```

```
DESCRIBE ?student
```

```
{ ?student rdf:type mit:Student . }
```

or

```
DESCRIBE <...URI...>
```



SPARQL protocol

exchange queries and their
results through the web





e.g. DBpedia

SPARQL Explorer for <http://dbpedia.org/sparql>

SPARQL:

```
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX dc: <http://purl.org/dc/elements/1.1/>
PREFIX : <http://dbpedia.org/resource/>
PREFIX dbpedia2: <http://dbpedia.org/property/>
PREFIX dbpedia: <http://dbpedia.org/>
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
```

Results: Browse

Go!

Reset

Powered by [OpenLink Virtuoso](#) and [dbpedia](#)



Confidence:

Contextual score:

Prominence (support):

No 'common words'
Default disambiguation
Show best candidate

You should know

example in biology...

The screenshot displays the Gate 2.2 build 1350 software interface. The title bar reads "Gate 2.2 build 1350". The menu bar includes "File", "Options", "Tools", and "Help". On the left, a sidebar lists "Gate", "Applications", "Language Resources", "GATE document_0001E" (selected), "Processing Resources", and "Data stores". The main window has tabs for "Messages", "GATE document_0001E", "Text", "Annotations", "Annotation Sets", "Print", and a toolbar icon. The "Text" tab is active, showing a paragraph of biological text. To the right, a panel titled "Default annotations" lists checkboxes for "Concept" (red), "Playrole" (green), "Sentence" (yellow), "SpaceToken" (blue), "Split" (magenta), and "Token" (cyan). Below this, "Original markups ann" lists a checkbox for "paragraph" (red). At the bottom, tabs for "Annotations Editor", "Features Editor", and "Initialisation Parameters" are visible. The status bar at the bottom left indicates "loaded in 1.467 seconds".

Gate 2.2 build 1350

File Options Tools Help

Gate

Applications

Language Resources

GATE document_0001E

Processing Resources

Data stores

Messages GATE document_0001E

Text Annotations Annotation Sets Print

Keratinocyte and hepatocyte growth factors in the lung: roles in lung development, inflammation, and repair
Ware, Lorraine B., and Michael A. Matthay. Keratinocyte and hepatocyte growth factors in the lung: roles in lung development, inflammation, and repair. *Am J Physiol Lung Cell Mol Physiol* 282: L9247L940, 2002; 10.1152/ajplung.00439.2001. A growing body of evidence indicates that the epithelial-specific growth factors keratinocyte growth factor (KGF), fibroblast growth factor (FGF-10), and hepatocyte growth factor (HGF) play important roles in lung development, lung inflammation, and repair. The therapeutic potential of these growth factors in lung disease has yet to be fully explored. KGF has been best studied and has impressive protective effects against a wide variety of injurious stimuli when given as a pretreatment in animal models. Whether this protective effect could translate to a treatment effect in humans with acute lung injury needs to be investigated. FGF-10 and HGF may also have therapeutic potential, but more extensive studies in animal models are needed. Because HGF lacks true epithelial specificity, it may have less potential than KGF and FGF-10 as a targeted therapy to facilitate lung epithelial repair. Regardless of their therapeutic potential, studies of the unique roles played by these growth factors in the pathogenesis and the resolution of acute lung injury and other lung diseases will continue to enhance our understanding of the complex pathophysiology of inflammation and repair in the lung. acute lung injury; acute respiratory distress syndrome; epithelial growth factor

Default annotations

- ☐ Concept
- ☐ Playrole
- ☐ Sentence
- ☐ SpaceToken
- ☐ Split
- ☐ Token

Original markups ann

- ☐ paragraph

Annotations Editor Features Editor Initialisation Parameters

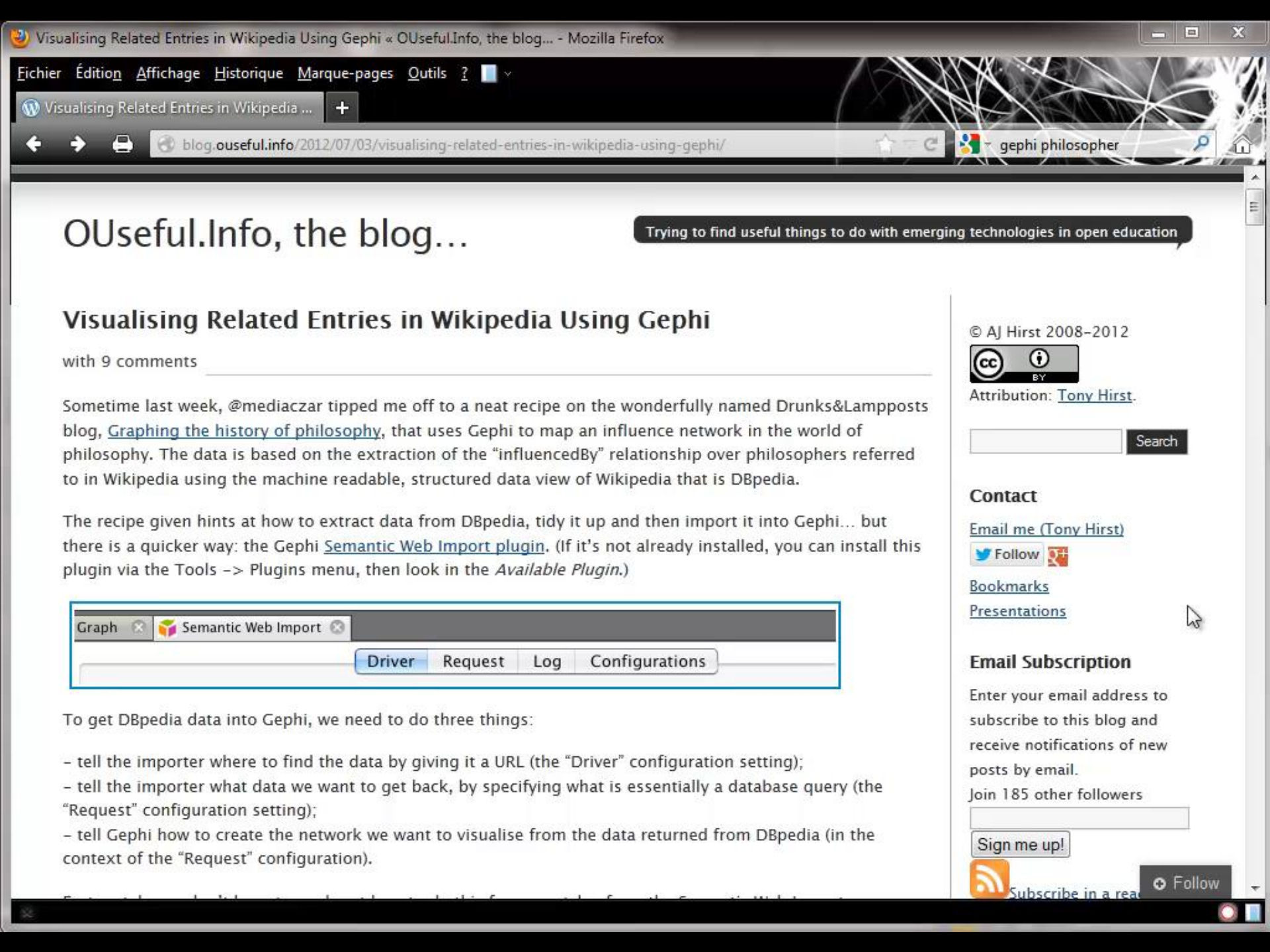
loaded in 1.467 seconds



Examples:

[demo](#) -- contact@dbpedia.fr





OUUseful.Info, the blog...

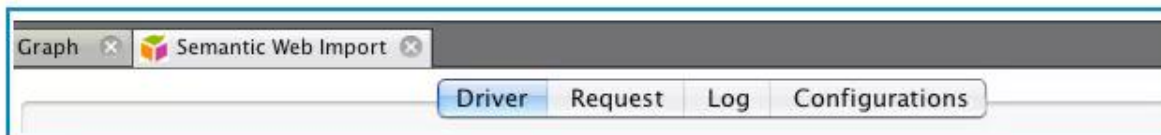
Trying to find useful things to do with emerging technologies in open education

Visualising Related Entries in Wikipedia Using Gephi

with 9 comments

Sometime last week, @mediaczar tipped me off to a neat recipe on the wonderfully named Drunks&Lampposts blog, [Graphing the history of philosophy](#), that uses Gephi to map an influence network in the world of philosophy. The data is based on the extraction of the "influencedBy" relationship over philosophers referred to in Wikipedia using the machine readable, structured data view of Wikipedia that is DBpedia.

The recipe given hints at how to extract data from DBpedia, tidy it up and then import it into Gephi... but there is a quicker way: the Gephi [Semantic Web Import plugin](#). (If it's not already installed, you can install this plugin via the Tools -> Plugins menu, then look in the *Available Plugin*.)



To get DBpedia data into Gephi, we need to do three things:

- tell the importer where to find the data by giving it a URL (the "Driver" configuration setting);
- tell the importer what data we want to get back, by specifying what is essentially a database query (the "Request" configuration setting);
- tell Gephi how to create the network we want to visualise from the data returned from DBpedia (in the context of the "Request" configuration).

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Contact

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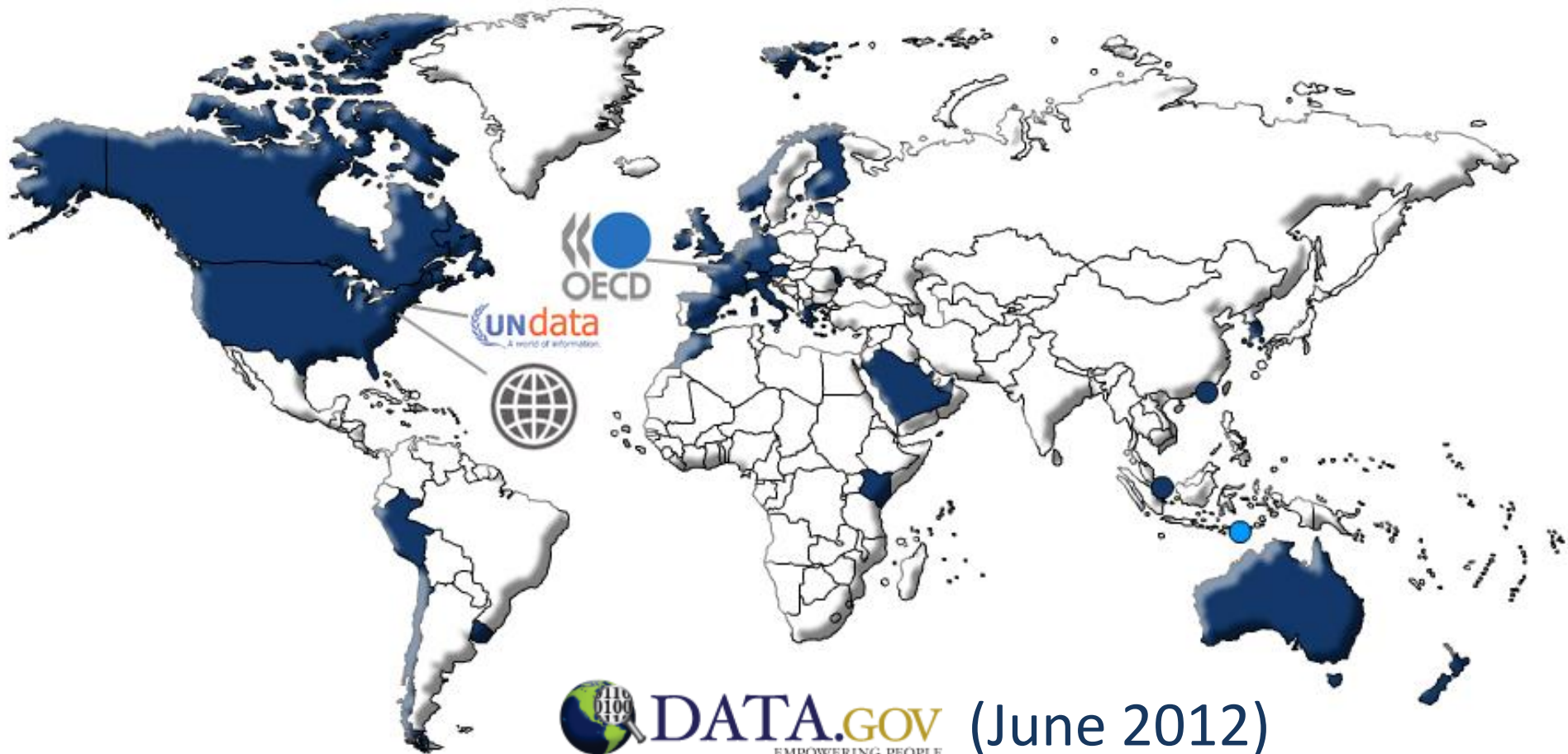
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DATA.GOV (June 2012)
EMPOWERING PEOPLE

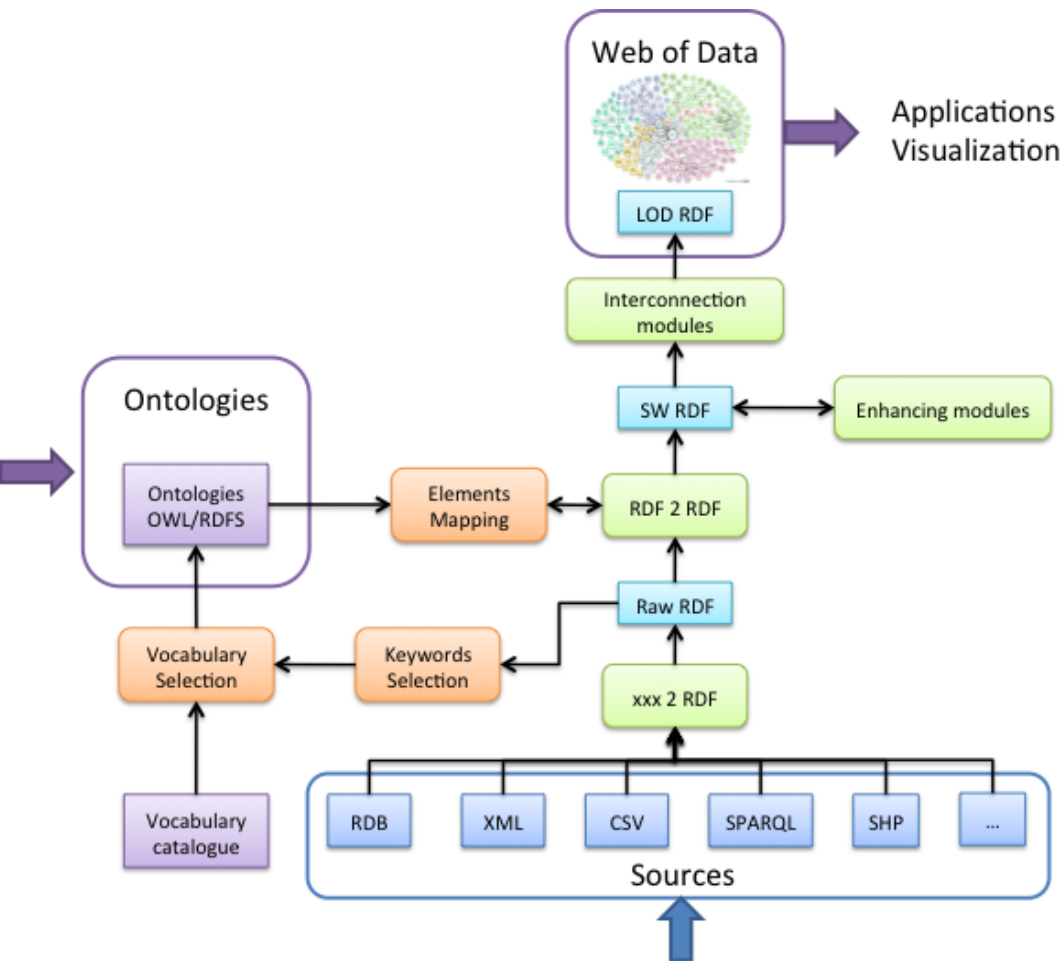
publication

process



demo

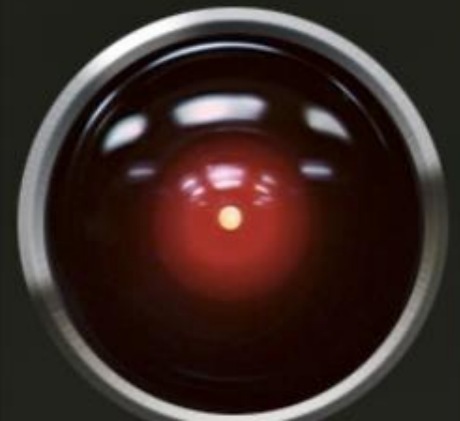
- one-click setup
- import raw data
- transform to RDF
- publish on the web
- query online





DataLift-win.zip

HAL 9000



Test on DBpedia



- Connect to:

<http://dbpedia.org/snorql/>

or

<http://fr.dbpedia.org/sparql>

or ...

<http://wiki.dbpedia.org/Internationalization/Chapters>

- Query:

```
SELECT * WHERE {  
    ?x rdfs:label "Paris"@fr .  
    ?x ?p ?v .  
}  
LIMIT 10
```




Linked Data Platform

REST like access to LD resources & containers

HTTP for accessing, updating, creating and deleting resources from linked data servers.

```
PUT http://data.inria.fr/people/fab HTTP/1.1
```

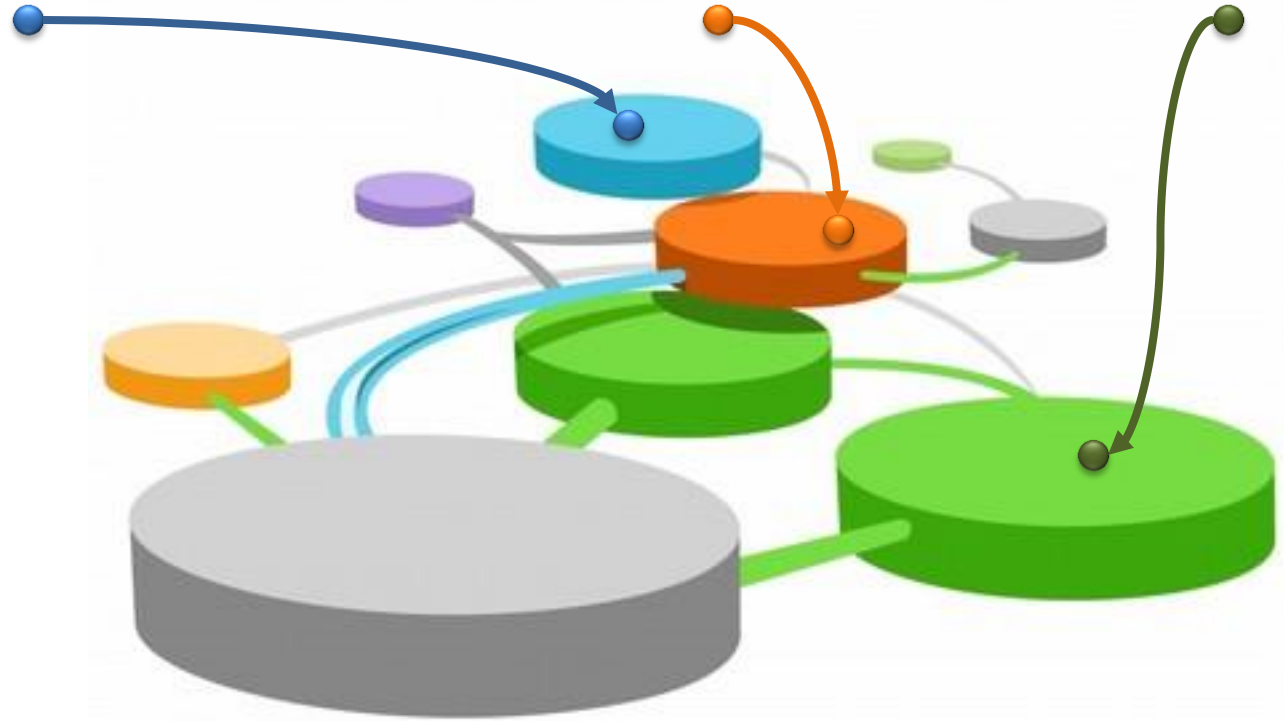
```
Host: data.inria.fr
```

```
Content-Type: text/turtle
```

```
<fab> a foaf:Person ;  
      rdfs:label "Fabien" ;  
      foaf:mbox <fabien.gandon@inria.fr> .
```



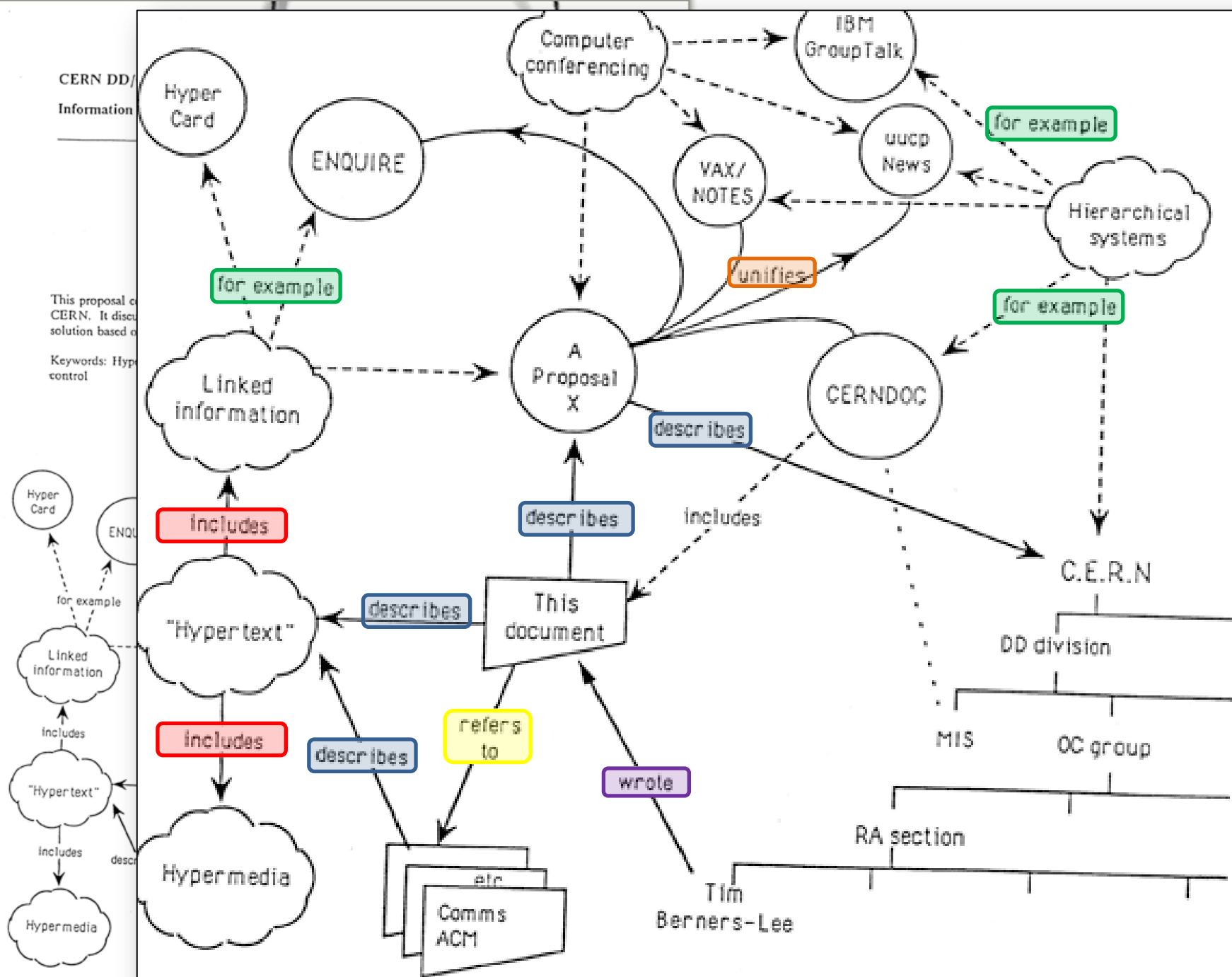
a little semantics in a world of links



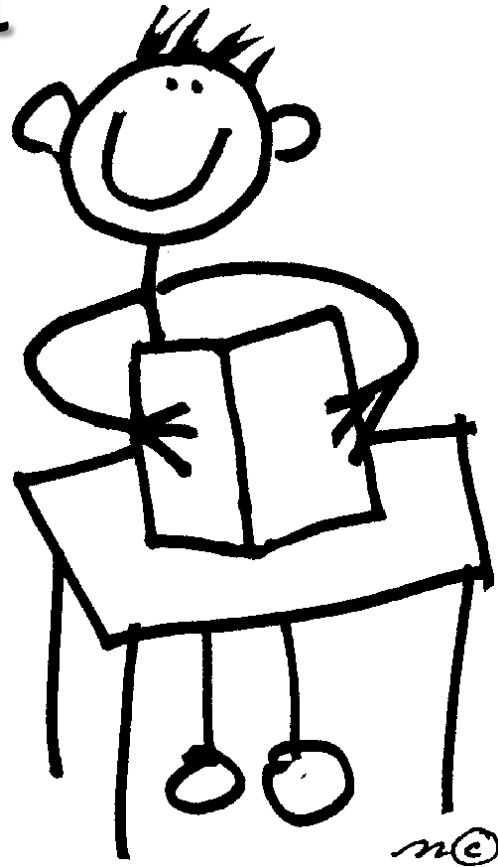
semantic web: linked data and semantics of schemas

CERN DD/
Information

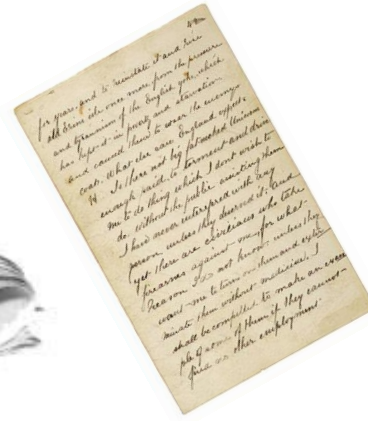
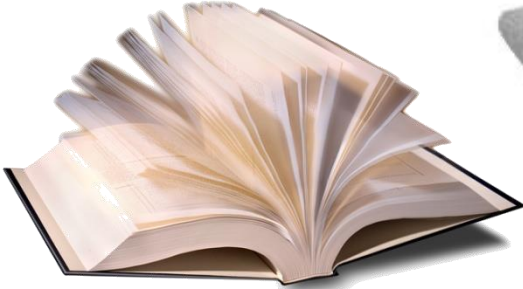
This proposal of
CERN. It disc
solution based o
Keywords: Hyp
control



what is the last
document
you read?



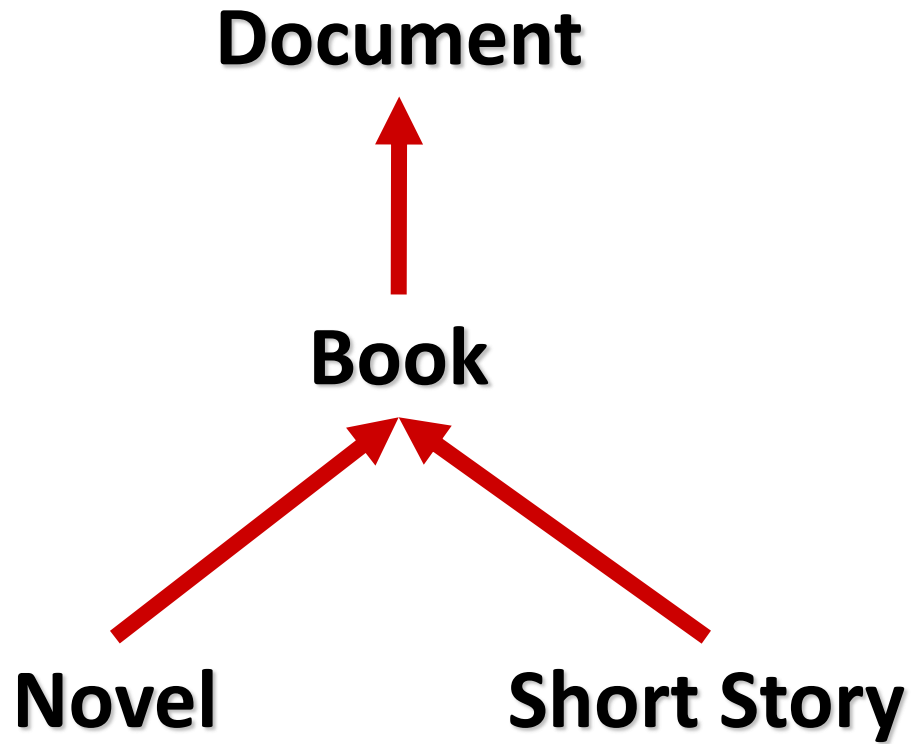
documents



your answer relies on a
shared ontology



**sub
type**



sub
type

"document"

#12

#21 $\Rightarrow$ #12

"book"
"livre"

#21

#47 $\Rightarrow$ #21

#48 $\Rightarrow$ #21

#47

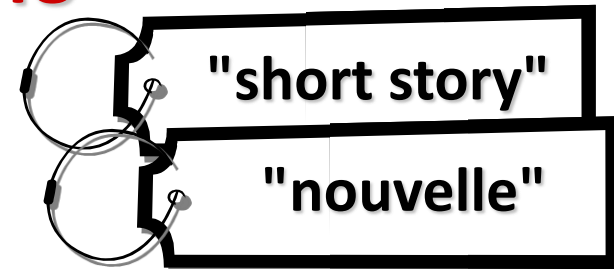
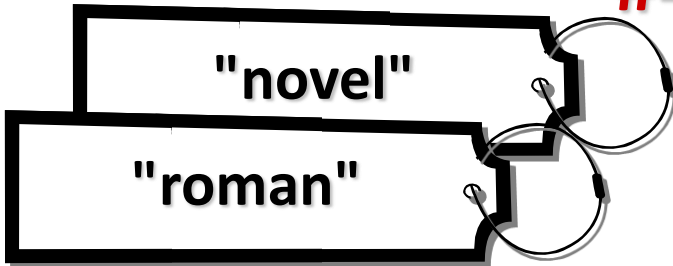
#48

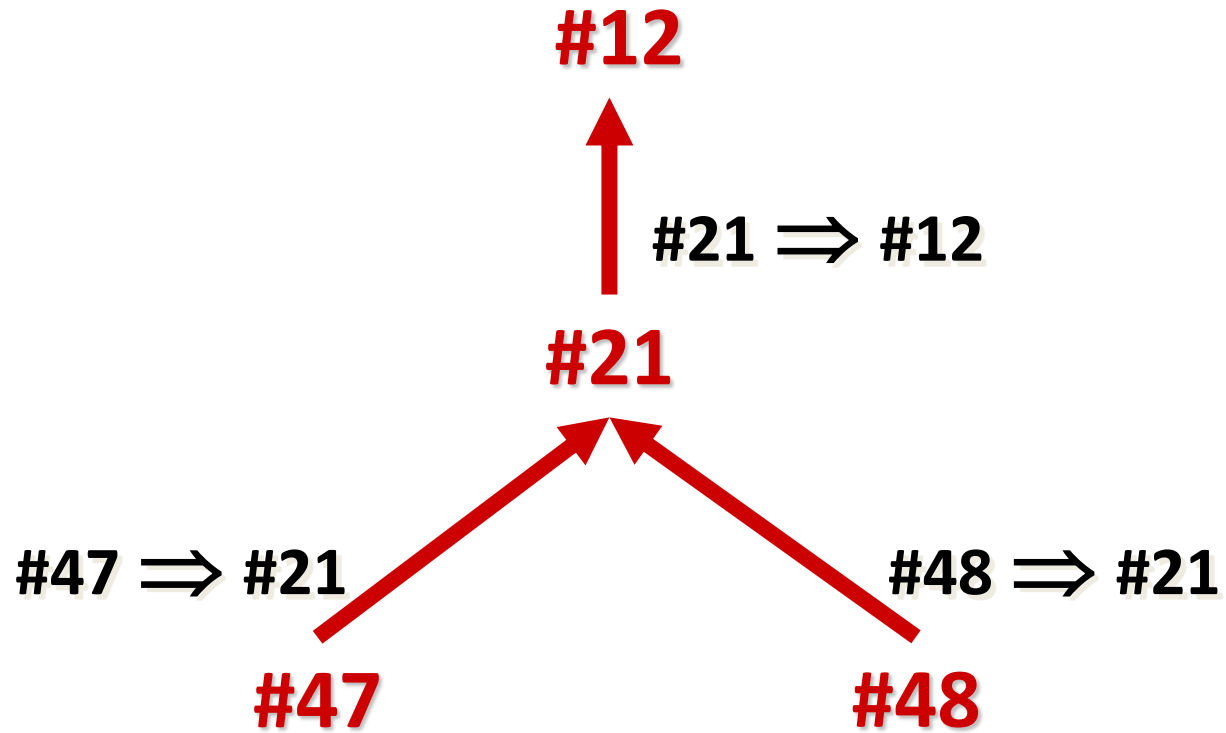
"novel"

"roman"

"short story"

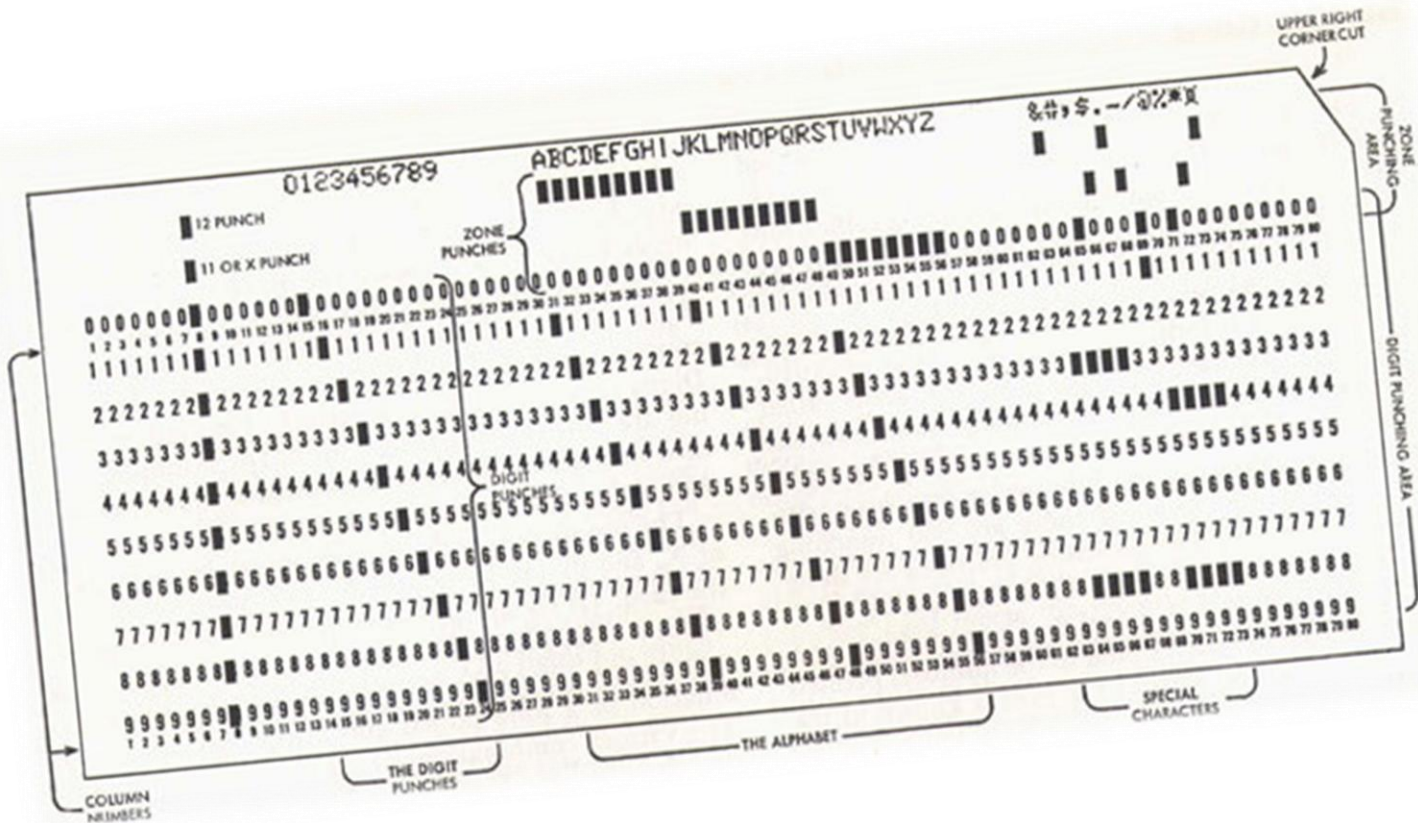
"nouvelle"

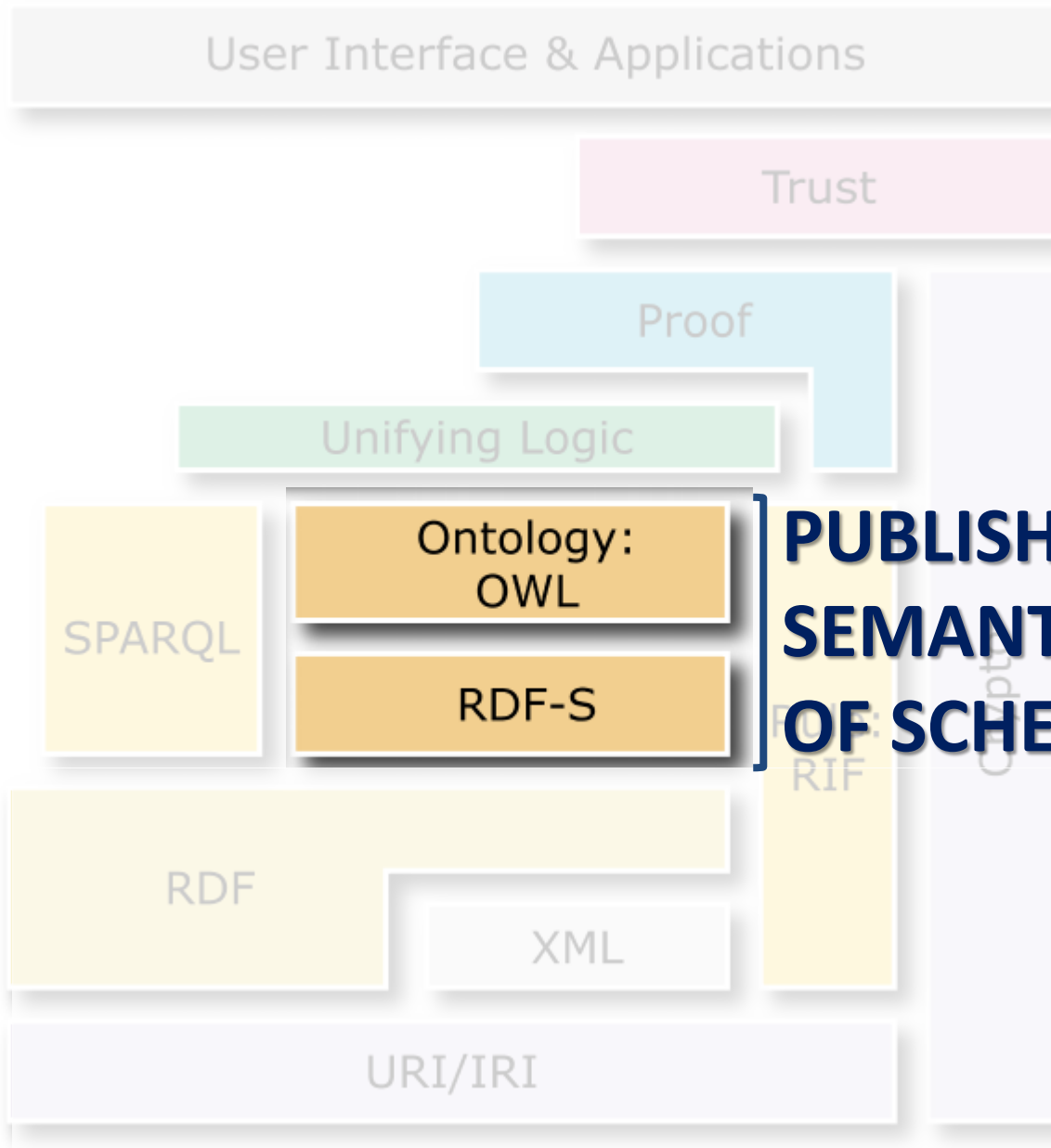




ontological
knowledge formalized

languages to formalize ontologies





**PUBLISH
SEMANTICS
OF SCHEMAS**

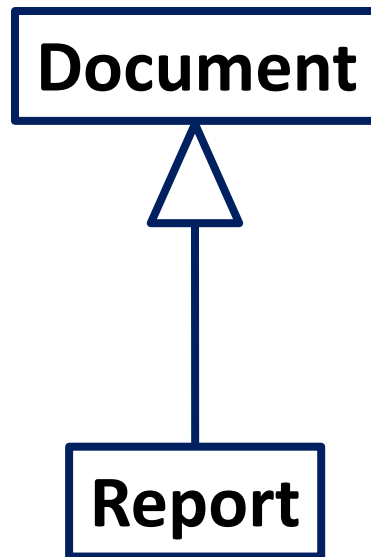
RDFS means **R****D****F** Schema



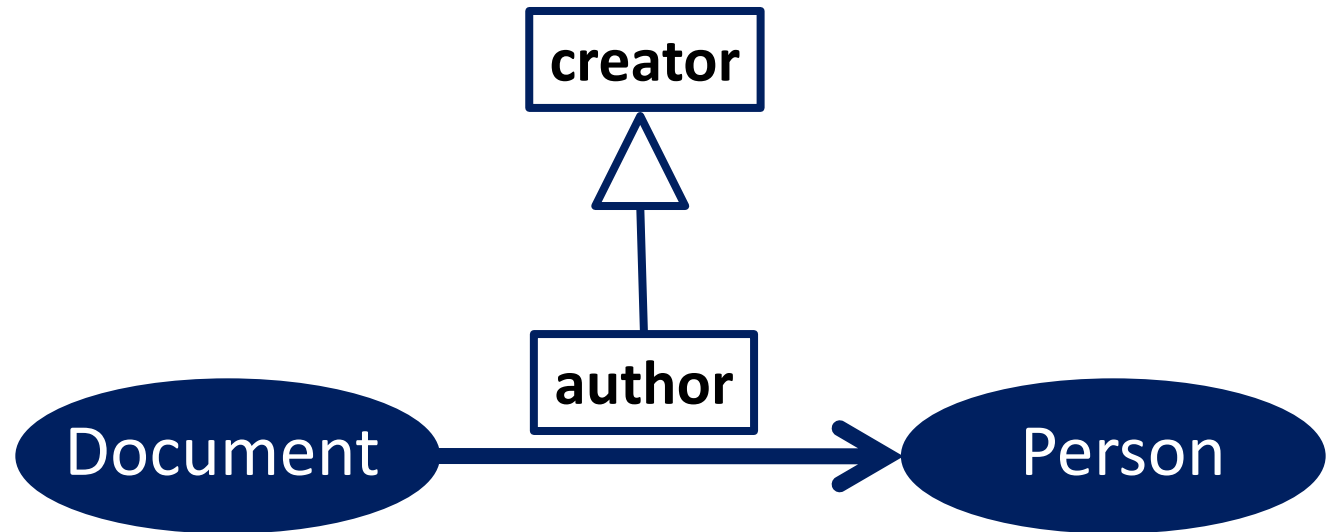


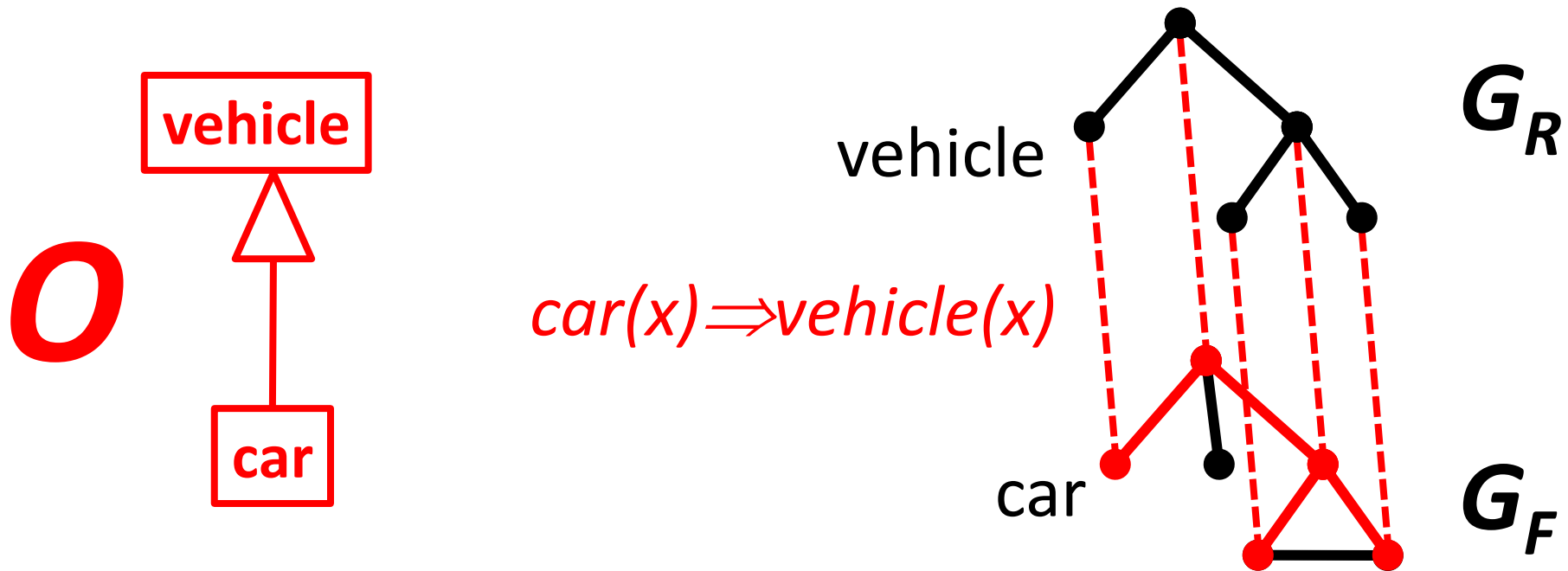
RDFS provides primitives to *Write*
lightweight ontologies

RDFS to define classes of resources
and organize their hierarchy



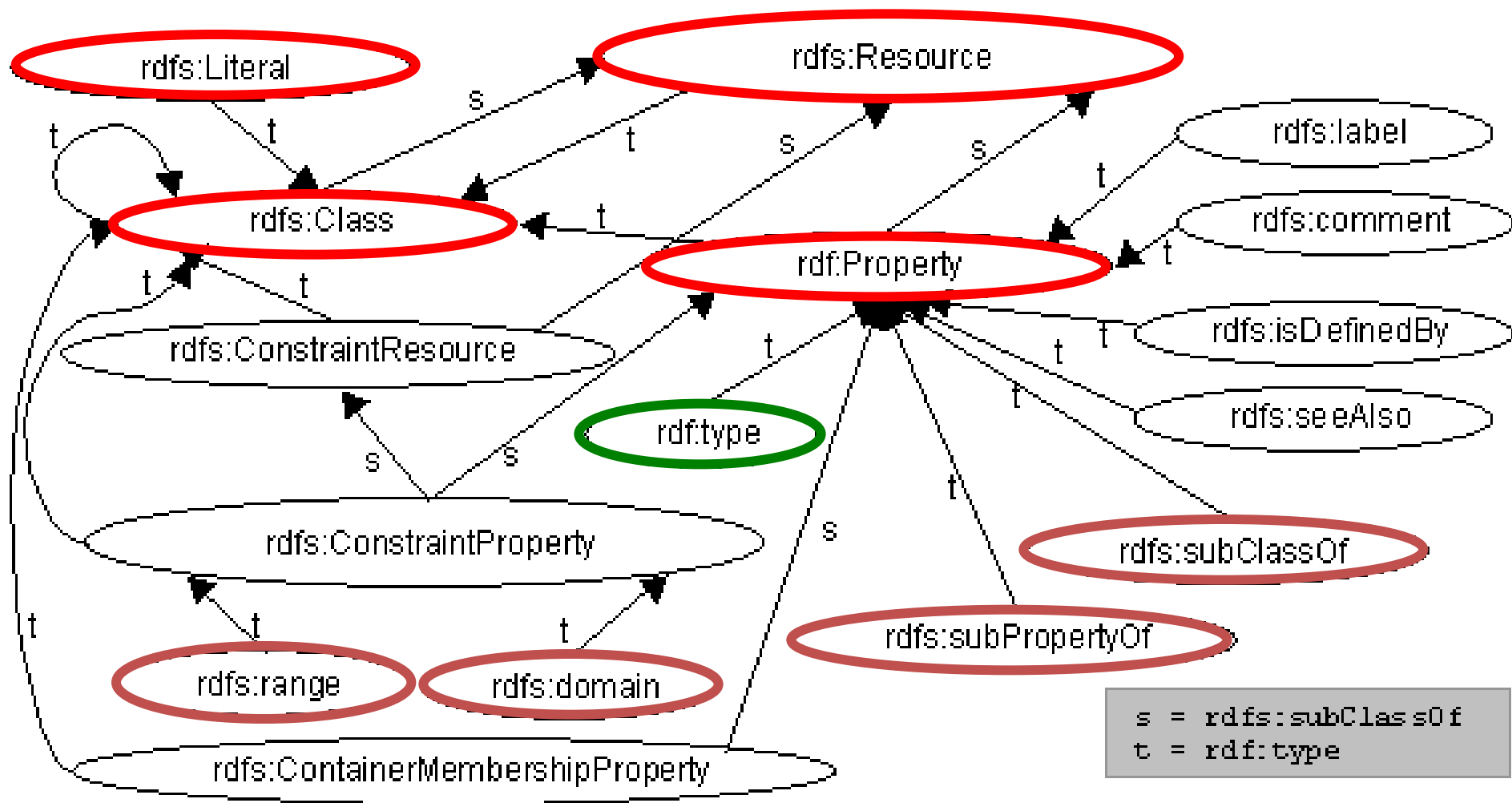
RDFS to define relations between resources, their signature and organize their hierarchy





$$F \wedge O \rightarrow R \Leftrightarrow G_F \leq G_R$$

mapping modulo an ontology



an old schema of RDFS

W3C <http://www.w3.org/TR/2000/CR-rdf-schema-20000327/>

example of RDFS schema

```
<rdf:RDF xml:base="http://inria.fr/2005/humans.rdfs"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns="http://www.w3.org/2000/01/rdf-schema#">
  <Class rdf:ID="Man">
    [ <subClassOf rdf:resource="#Person"/>
      <subClassOf rdf:resource="#Male"/>
      <label xml:lang="en">man</label>
      <comment xml:lang="en">an adult male person</comment>
    ]
  </Class>
```



<Man> a Class ; subClassOf <Person>, <Male> .

example of RDFS properties

```
<rdf:RDF xml:base    ="http://inria.fr/2005/humans.rdfs"
  xmlns:rdf  ="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns      ="http://www.w3.org/2000/01/rdf-schema#>

<rdf:Property rdf:ID="hasMother">
  <subPropertyOf rdf:resource="#hasParent"/>
  <range rdf:resource="#Female"/>
  <domain rdf:resource="#Human"/>
  <label xml:lang="en">has for mother</label>
  <comment xml:lang="en">to have for parent a female.
  </comment>
</rdf:Property>
```



```
<hasMother> a  rdf:Property ;
  subPropertyOf <hasParent> ;
  range <Female> ; domain <Human> .
```

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns="http://inria.fr/2005/humans.rdfs#"
  xml:base="http://inria.fr/2005/humans.rdfs-instances" >
```

```
<rdf:Description rdf:ID="Lucas">
  <rdf:type
rdf:resource="http://inria.fr/2005/humans.rdfs#Man"/>
  <hasMother rdf:resource="#Laura"/>
</rdf:Description>
```

```
<Man rdf:ID="Lucas">
  <hasMother rdf:resource="#Laura"/>
</Man>
```



<Luca> a Man; hasMother <Laura> .

example of RDF using this schema

rdfs:label

a resource may have one or more labels in one or more natural language

```
<rdf:Property rdf:ID='name'>
  <rdfs:domain rdf:resource='Person' />
  <rdfs:range rdf:resource='&rdfs;Literal' />
  <rdfs:label xml:lang='fr'>nom</rdfs:label>
  <rdfs:label xml:lang='fr'>nom de famille</rdfs:label>
  <rdfs:label xml:lang='en'>name</rdfs:label>
</rdf:Property>
```



```
<name> a rdfs:Property ;
  range rdfs:Literal ; domain <Person> ;
  label "nom"@fr, "nom de famille"@fr, "name"@en .
```

rdfs:comment & rdfs:seeAlso

comments provide definitions and explanations in natural language

```
<rdfs:Class rdf:about='#Woman'>
  <rdfs:subClassOf rdf:resource="#Person"/>
  <rdfs:comment xml:lang='fr'>une personne adulte du
                                sexe féminin</rdfs:comment>
  <rdfs:comment xml:lang='en'>a female adult person
</rdfs:comment>
</rdfs:Class>
```



```
<Woman> a rdfs:Class ; rdfs:subClassOf <Person> ;
  rdfs:comment "adult femal person"@en ;
  rdfs:comment "une adulte de sexe féminin"@fr .
```

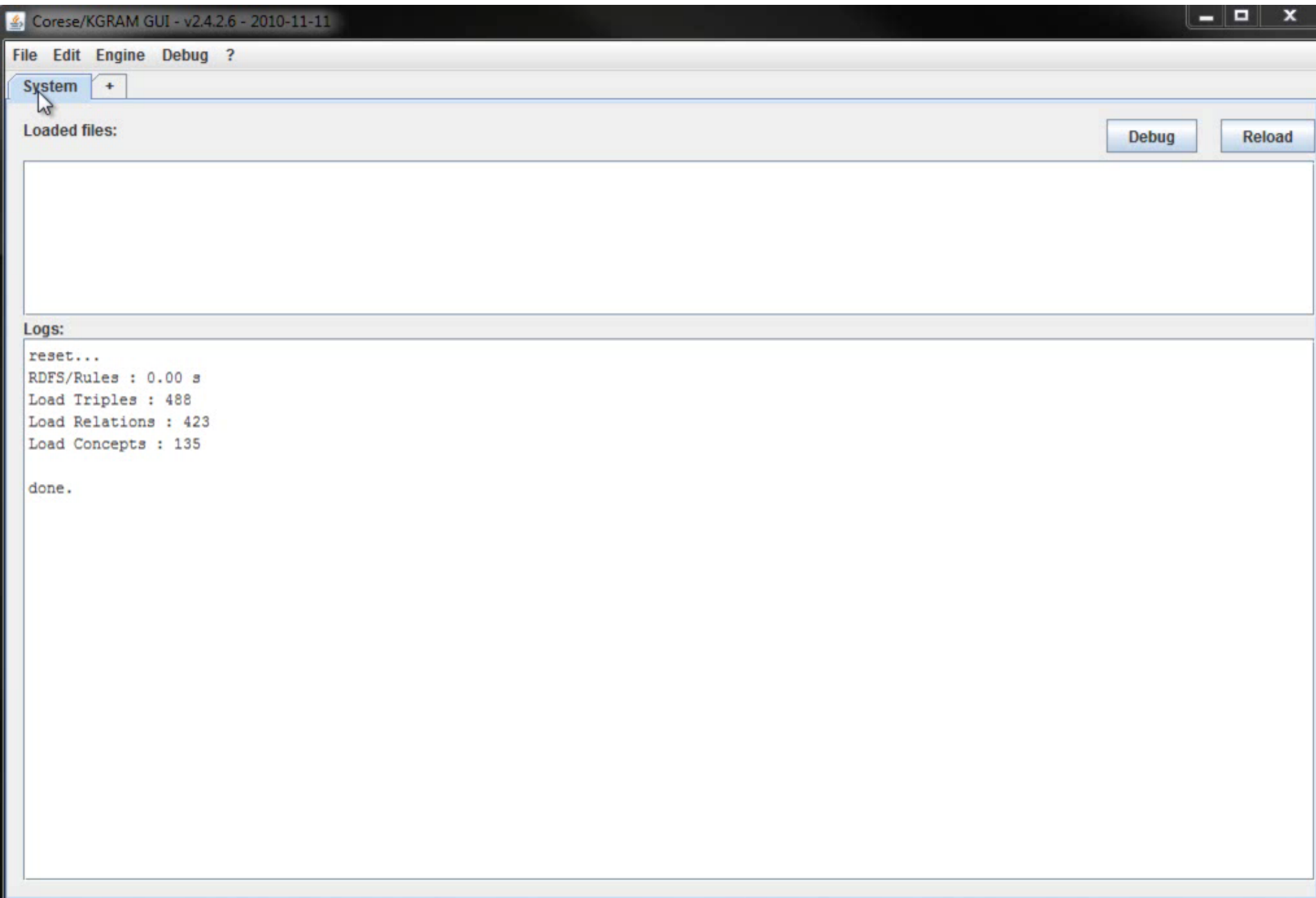
see also...

```
<rdfs:Class rdf:about='#Man'>
  <rdfs:seeAlso rdf:resource='#Woman' />
</rdfs:Class>
```



```
<Man> a rdfs:Class ; rdfs:seeAlso <Woman> .
```

CORESE/ KGRAM [Corby et al.]

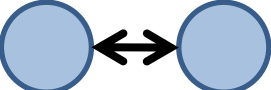


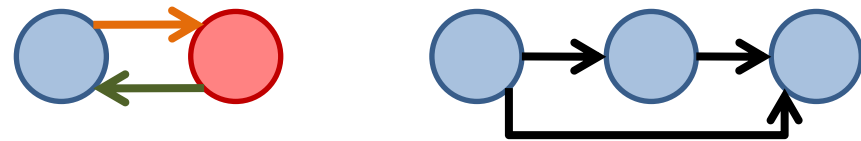
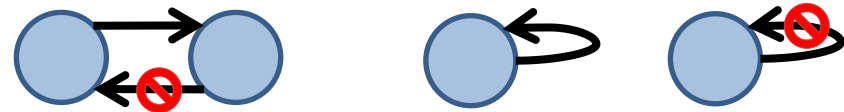


OWL provides **additional**
primitives for
heavyweight ontologies

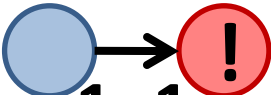


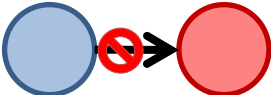
OWL in one...

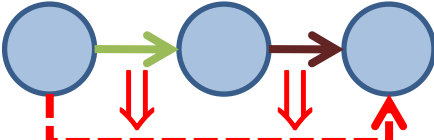
 algebraic properties



 disjoint properties

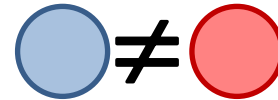
 qualified cardinality

 individual prop. neg

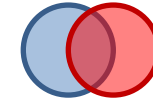
 chained prop.



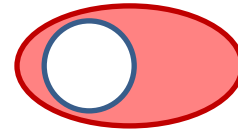
union



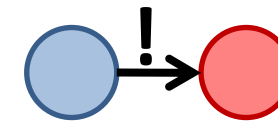
disjunction



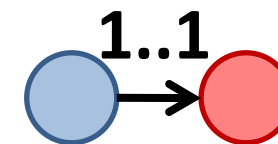
intersection



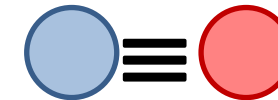
complement



restriction



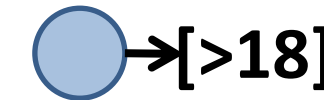
cardinality



equivalence



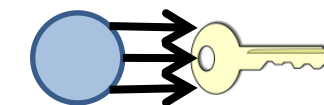
enumeration



value restrict.



disjoint union

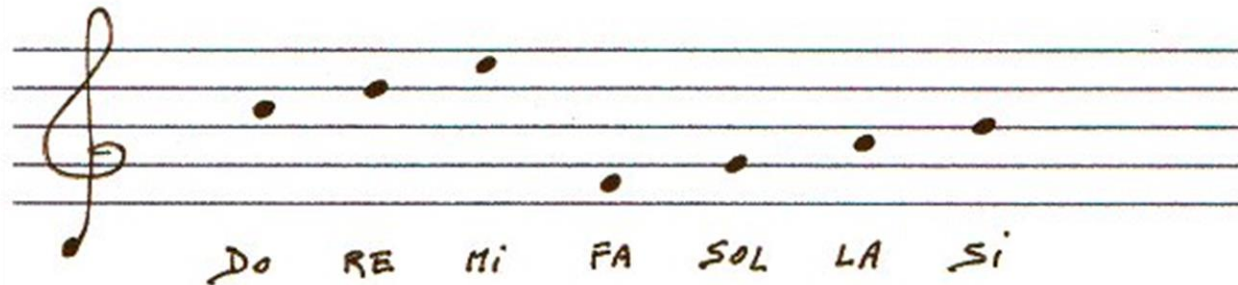


keys

enumerated class {a,b,c,d,e}

define a class by providing all its members

```
<owl:Class rdf:id="EyeColor">  
  <owl:oneOf rdf:parseType="Collection">  
    <owl:Thing rdf:ID="Blue"/>  
    <owl:Thing rdf:ID="Green"/>  
    <owl:Thing rdf:ID="Brown"/>  
    <owl:Thing rdf:ID="Black"/>  
  </owl:oneOf>  
</owl:Class>
```



classes defined by union



of other classes

```
<owl:Class>  
  <owl:unionOf rdf:parseType="Collection">  
    <owl:Class rdf:about="#Person"/>  
    <owl:Class rdf:about="#Group"/>  
  </owl:unionOf>  
</owl:Class>
```

classes defined by intersection

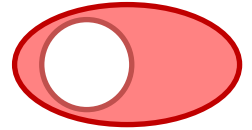
of other classes

```
<owl:Class rdf:ID="Man">  
  <owl:intersectionOf rdf:parseType="Collection">  
    <owl:Class rdf:about="#Male"/>  
    <owl:Class rdf:about="#Person"/>  
  </owl:intersectionOf>  
</owl:Class>
```

complement and disjunction

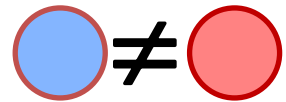
complement class

```
<owl:Class rdf:ID="Male">  
  <owl:complementOf rdf:resource="#Female"/>  
</owl:Class>
```

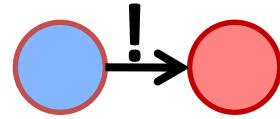


declare a disjunction

```
<owl:Class rdf:ID="Square">  
  <owl:disjointWith rdf:resource="#Round"/>  
</owl:Class>
```

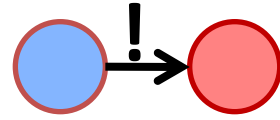


restriction on all values



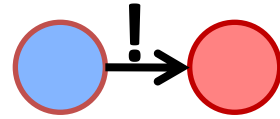
```
<owl:Class rdf:ID="Herbivore">
  <subClassOf rdf:resource="#Animal"/>
  <subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#eats" />
      <owl:allValuesFrom rdf:resource="#Plant" />
    </owl:Restriction>
  </subClassOf>
</owl:Class>
```

restriction on some values



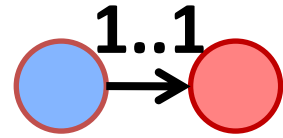
```
<owl:Class rdf:ID="Sportive">
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hobby" />
      <owl:someValuesFrom rdf:resource="#Sport" />
    </owl:Restriction>
  </owl:equivalentClass>
</owl:Class>
```


restriction to an exact value



```
<owl:Class rdf:ID="Bike">
  <subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#nbWheels" />
      <owl:hasValue>2</owl:hasValue>
    </owl:Restriction>
  </subClassOf>
</owl:Class>
```

restriction on cardinality



how many times a property is used for a same subject but with different values

- Constraints: minimum, maximum, exact number
- Exemple

```
<owl:Class rdf:ID="Person">
  <subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#name" />
      <owl:maxCardinality>1</owl:maxCardinality>
    </owl:Restriction>
  </subClassOf>
</owl:Class>
```

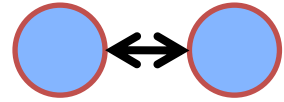
types of properties

- `ObjectProperty` are relations between resources only
e.g. `hasParent(#thomas,#stephan)`
- `DatatypeProperty` have a literal value possibly typed
ex: `hasAge(#thomas,16^^xsd:int)`
- `AnnotationProperty` are ignored in inferences and used for documentation and extensions

algebraic properties

- **Symmetric** property, $xRy \Rightarrow yRx$

```
<owl:SymmetricProperty rdf:ID="hasSpouse" />
```

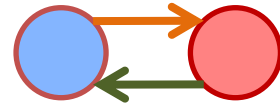


- **Inverse** property, $xR_1y \Leftrightarrow yR_2x$

```
<rdf:Property rdf:ID="hasChild">
```

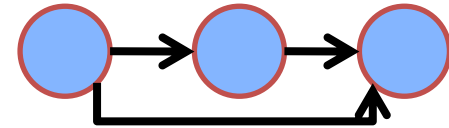
```
  <owl:inverseOf rdf:resource="#hasParent"/>
```

```
</rdf:Property>
```



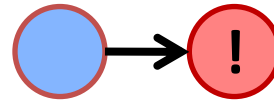
- **Transitive** property, $xRy \ \& \ yRz \Rightarrow xRz$

```
<owl:TransitiveProperty rdf:ID="hasAncestor" />
```



- **Functional** property, $xRy \ \& \ xRz \Rightarrow y=z$

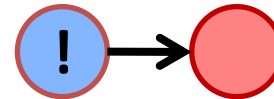
```
<owl:FunctionalProperty rdf:ID="hasMother" />
```



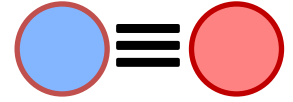
- **Inverse functional** property, $xRy \ \& \ zRy \Rightarrow x=z$

```
<owl:InverseFunctionalProperty
```

```
  rdf:ID="hasSocialSecurityNumber" />
```



equivalencies and alignment



- equivalent classes : `owl:equivalentClass`
- equivalent properties: `owl:equivalentProperty`
- identical or different resources:
`owl:sameAs`, `owl:differentFrom`

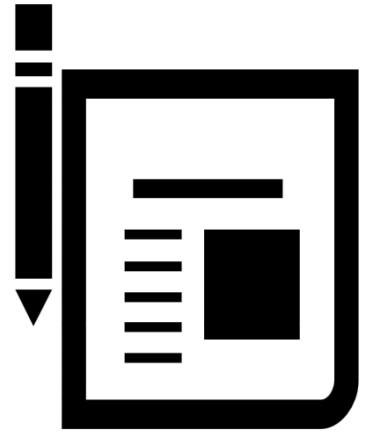
document the schemas

description of the ontology

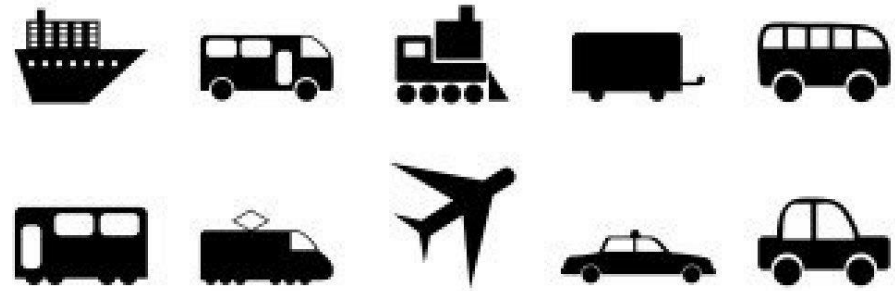
`owl:Ontology, owl:imports, owl:versionInfo,
owl:priorVersion, owl:backwardCompatibleWith,
owl:incompatibleWith`

versions of classes and properties

`owl:DeprecatedClass, owl:DeprecatedProperty`



OWL profiles



EL: large numbers of properties and/or classes and polynomial time.

QL: large volumes of instance data, and conjunctive query answering using conventional relational database in LOGSPACE

RL: scalable reasoning without sacrificing too much expressive power using rule-based reasoning in polynomial time



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- FOAF

...



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Not finding your favourite one? [Suggest a new vocabulary to add to LOV!](#)

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Metadata:

Property	Value
Creator	Bernard Vatant , Pierre-Yves Vandenbussche
Publisher	Mondeca
SPARQL Endpoint	http://lov.okfn.org/endpoint/lov
RDF dump File	http://lov.okfn.org/dataset/lov/lov.rdf
Last modified	2012-09-10
Status	Work in progress



Help us and suggest a new vocabulary !

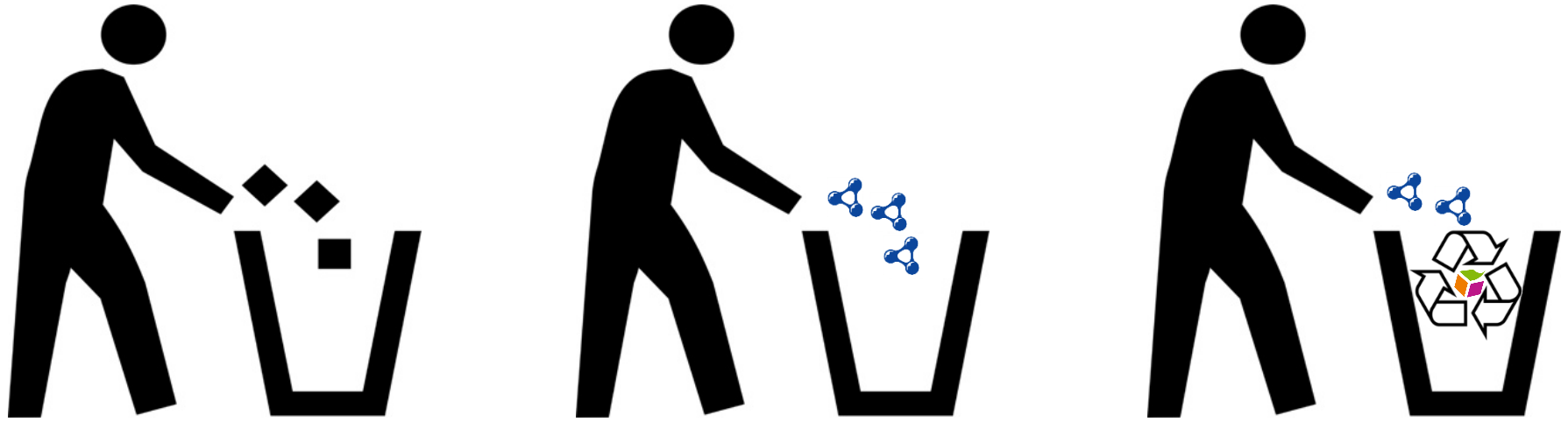
Vocabulary spaces (285):

Classifying vocabularies is a brand new challenge for Library Science, and no existing classification scheme seems to fit the need so far. Unless we missed something, and in that case we are open to suggestions from the librarian community.



VoCamp

campers for vocabulary hackers



semantic waste separation

the web is a garbage can,

the semantic web will be a semantic garbage can.



Apple's



Clipboard: Paste, Clipboard

Font: Calibri, 11, Bold, Italic, Underline, Text Color, Fill Color, Font Style (B, I, U), Font Color (A, B), Font Background Color (A, B)

Alignment: Left, Center, Right, Justify, Indent, Decrease Indent, Increase Indent, Wrap Text, Merge Cells, Unmerge Cells

Number: General, Text, Percentage, Decimal, Fraction, Scientific, Date, Time, Accounting

Styles: Conditional Formatting, Format as Table, Cell Styles

Cells: Insert, Delete, Format

Editing: Sort & Filter, Find & Select

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															

Discovery Hub (Inria, Alcatel Bell Lucent)

Discovery Hub.



Rule Interchange Format (RIF)

core and extensions



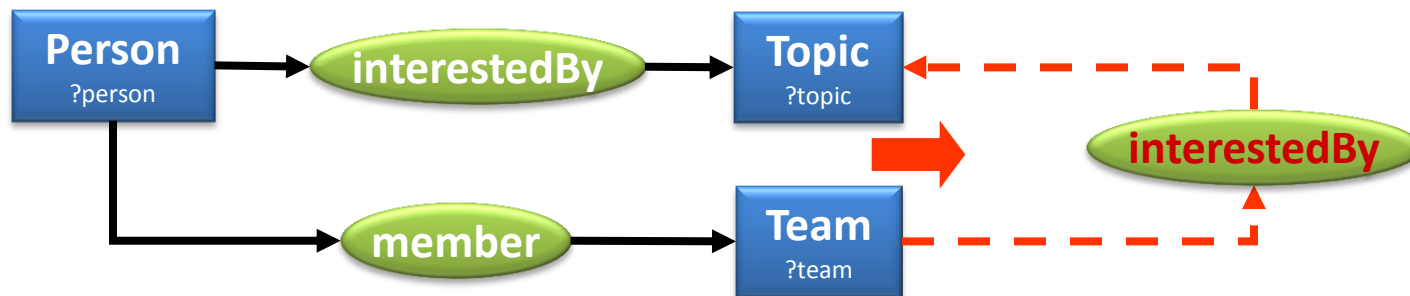
***rule:** if a member of a team is interested in a topic then the team as a whole is interested in that topic*

?person interestedBy ?topic

?person member ?team

→

?team interestedBy ?topic



e.g. infer new relations

question: forward chaining



IF

?x ex:activity ?y

?x ex:in ?z

THEN

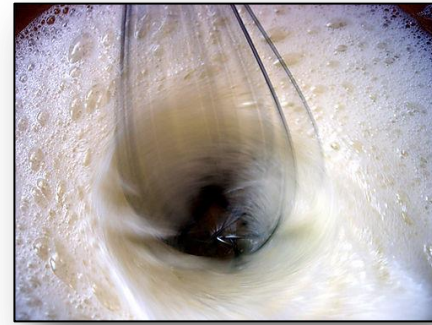
?z ex:activity ?y

ex:Fabien ex:activity ex:Research
ex:Fabien ex:in ex:WimmicsTeam
ex:WimmicsTeam ex:in ex:INRIASophia
ex:INRIASophia ex:in ex:INRIA
ex:WimmicsTeam ex:activity ex:Research
ex:INRIASophia ex:activity ex:Research
ex:INRIA ex:activity ex:Research



RIF Core

subset shared by most systems: add only



employee1 [function-> "executive"
 bonus -> 10]

**ForAll ?emp (?emp [bonus -> 15] :-
 ?emp [function -> "executive"])**

employee1 [function -> "executive"
 bonus -> 10
 bonus -> 15]

RIF Core

monotonic Horn clause on frames

`conclusion :- hyp1 and hyp2 and hyp3 ...`

- IRI as constants
- frames as triplets
- lists
- existential quantification in condition
- class membership and equality in condition



RIF **BLD** (Basic Logic Dialect)

still monotonic : no changes.

- conjunction in conclusion
- fonctions, predicates and named arguments $f(?x)$
`Maganer(?e) :- Exists ?g (manage(?e ?g) )`
- disjunction in condition
- equality in conclusion
- sub-classes



RIF **PRD** (Production Rules Dialect)

full production rules in forward chaining

- add, delete, modify, run
- instantiate frames (`new`)
- negation as failure (`ineg`)
- no longer monotonic



```
Forall ?customer ?purchasesYTD
(If And( ?customer#ex:Customer
        ?customer[ex:purchasesYTD->?purchasesYTD]
External(pred:numeric-greater-than(?purchasesYTD 5000)) )

Then Do( Modify(?customer[ex:status->"Gold"]) ) )
```

(from PRD Rec. Doc.)

RIF, RIF, RIF,...



- DTB (Datatypes and Built-Ins) : data types with their predicates and functions
- FLD: how to specify new dialects extending BLD
- **SWC : syntax and semantics to combine RIF, RDF graphs, RDFS and OWL (RL)**

SKOS knowledge

thesauri,
classifications,
subjects,
taxonomies,
folksonomies,
... controlled
vocabulary



natural language expressions to refer to concepts

inria:CorporateSemanticWeb

skos:prefLabel "corporate semantic web"@en;

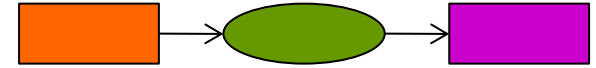
skos:prefLabel "web sémantique d'entreprise"@fr;

skos:altLabel "corporate SW"@en;

skos:altLabel "CSW"@en;

skos:hiddenLabel "web semantique d'entreprise"@fr.

relations



between concepts

inria:CorporateSemanticWeb

skos:broader w3c:SemanticWeb;

skos:narrower inria:CorporateSemanticWiki;

skos:related inria:KnowledgeManagement.

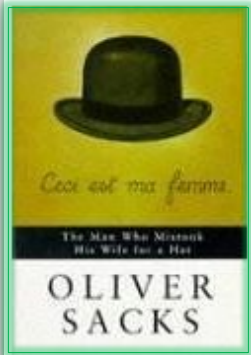
notes

inria:CorporateSemanticWeb

```
skos:scopeNote "only within KM community";  
skos:definition "a semantic web on an intranet";  
skos:example "Nokia's internal use of RDF gateway";  
skos:historyNote "semantic intranet until 2006";  
skos:editorialNote "keep wikipedia def. uptodate";  
skos:changeNote "acronym added by fabien".
```

many data

buried and dormant in web pages



The Man Who Mistook His Wife for a Hat (Picador) (Paperback)

by [Oliver Sacks](#) (Author)

★★★★★ (19 customer reviews)

RRP: £8.99

Price: £6.99 & eligible for **Free UK delivery** on orders over £15 with Super Saver Delivery. [See details and conditions](#)

You Save: £2.00 (22%)

Availability: In stock.

Note: this item will be delivered in time for Christmas in the UK. For orders from our third-party sellers, please refer to the seller's page for delivery information. For destinations outside the UK, please see [last-order dates](#). Dispatched from and sold by Amazon.co.uk.

Product details

Paperback: 256 pages

Publisher: Picador; New Ed edition (7 Nov 1986)

Language English

ISBN-10: 0330294911

ISBN-13: 978-0330294911

Product Dimensions: 19.7 x 13.1 x 1.9 cm

Average Customer Review: ★★★★★ (19 customer reviews)

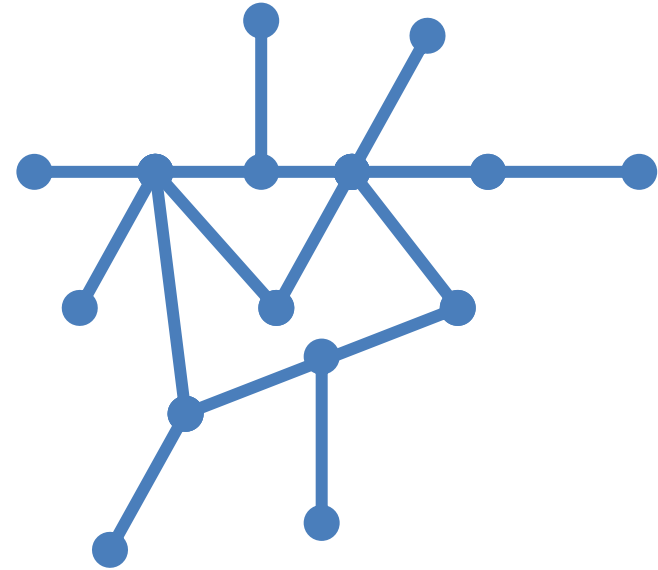
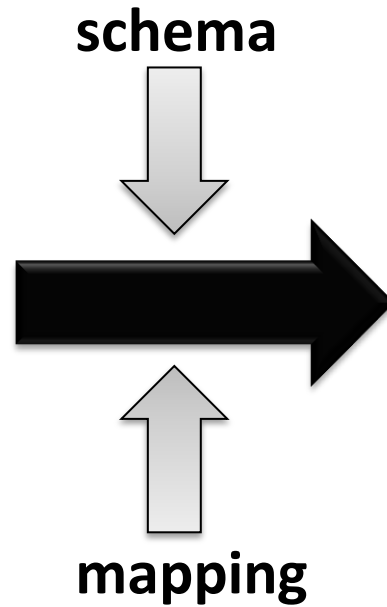
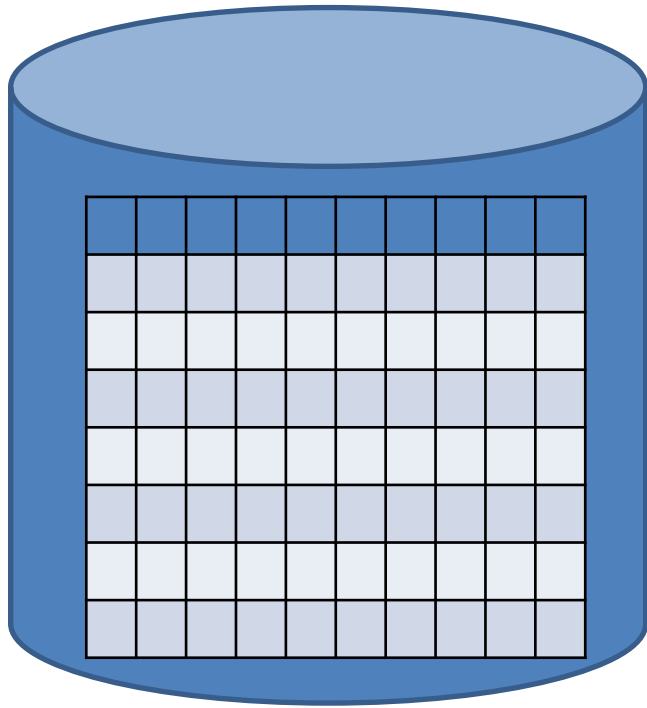
Amazon.co.uk Sales Rank: 1,107 in Books (See [Bestsellers in Books](#))

Popular in these categories:

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#1 in [Books](#) > [Science & Nature](#) > [Medicine](#) > [Medical Sciences A-Z](#) > [Psychiatry](#)
#1 in [Books](#) > [Health, Family & Lifestyle](#) > [Psychology & Psychiatry](#) > [Neuropsychology](#)

(Publishers and authors: [Improve Your Sales](#))

Other Editions: [Hardcover](#) | [Paperback](#) (Large Print e.) | [All Editions](#)



R2RML

a standard transformation of a
relational database in RDF

direct mapping

- cells of a line $\Rightarrow$ triples with a shared subject
- names of columns $\Rightarrow$ names of properties
- each value of a cell $\Rightarrow$ one object
- links between tables

name	fname	age
doe	john	34
did	sandy	45

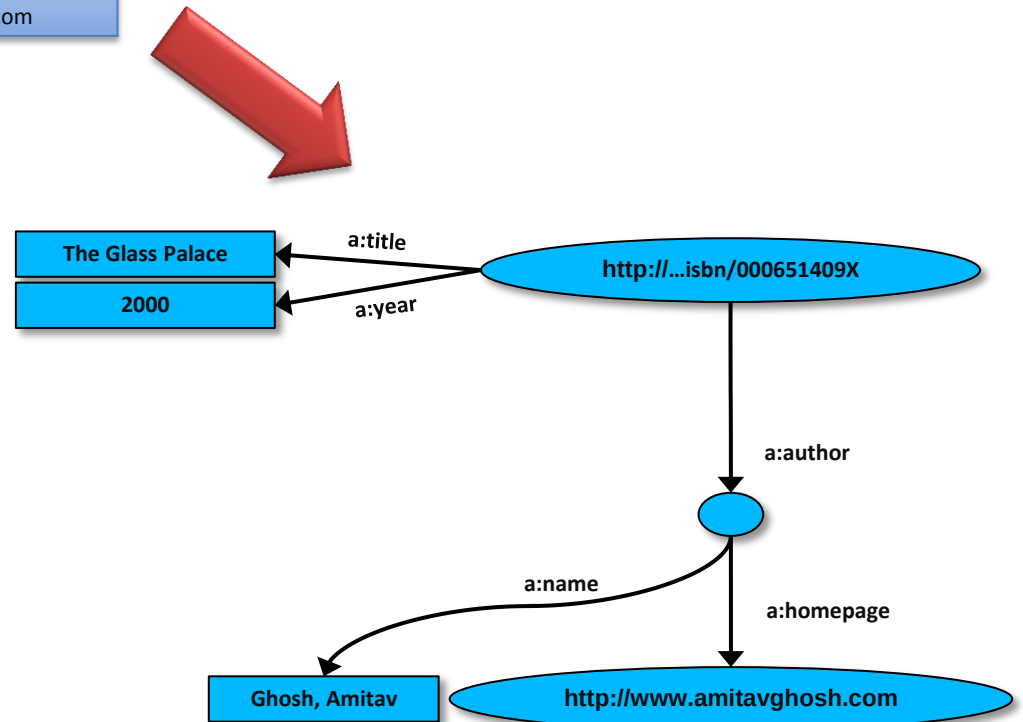


```
#s1 :name "doe"  
#s1 :fname "john"  
#s1 :age "34"  
#s2 :name "did"  
#s2 :fname "sandy"  
#s2 :age "45"  
#s3 ...
```

example of mapping

ISBN	Author	Title	Year
0006511409X	id_xyz	The Glass Palace	2000

ID	Name	Homepage
id_xyz	Ghosh, Amitav	http://www.amitavghosh.com

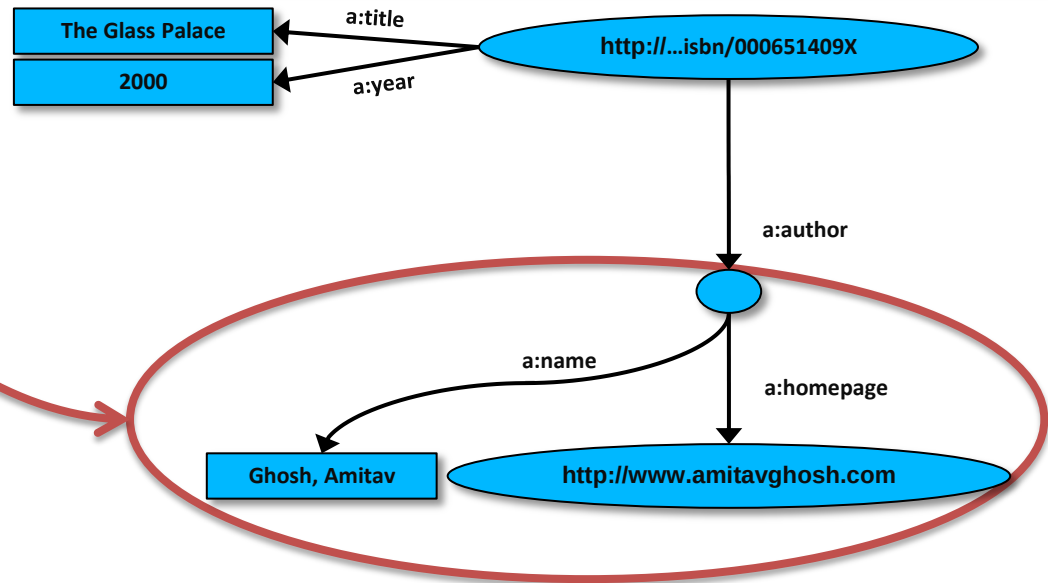


(1) transforming table of persons

ISBN	Author	Title	Year
0006511409X	id_xyz	The Glass Palace	2000

ID	Name	Homepage
id_xyz	Ghosh, Amitav	http://www.amitavghosh.com

```
:P_Table rdf:type rr:TriplesMap ;  
  rr:subjectMap [  
    rr:termtype "BlankNode" ;  
    rr:column "ID" ;  
  ] ;  
  rr:predicateObjectMap [  
    rr:predicateMap [  
      rr:predicate a:name  
    ] ;  
    rr:objectMap [  
      rr:column "Name"  
    ]  
  ] ;  
  rr:predicateObjectMap [  
    rr:predicateMap [  
      rr:predicate a:homepage  
    ] ;  
    rr:objectMap [  
      rr:column "Homepage" ;  
      rr:termtype "IRI"  
    ]  
  ]  
]
```

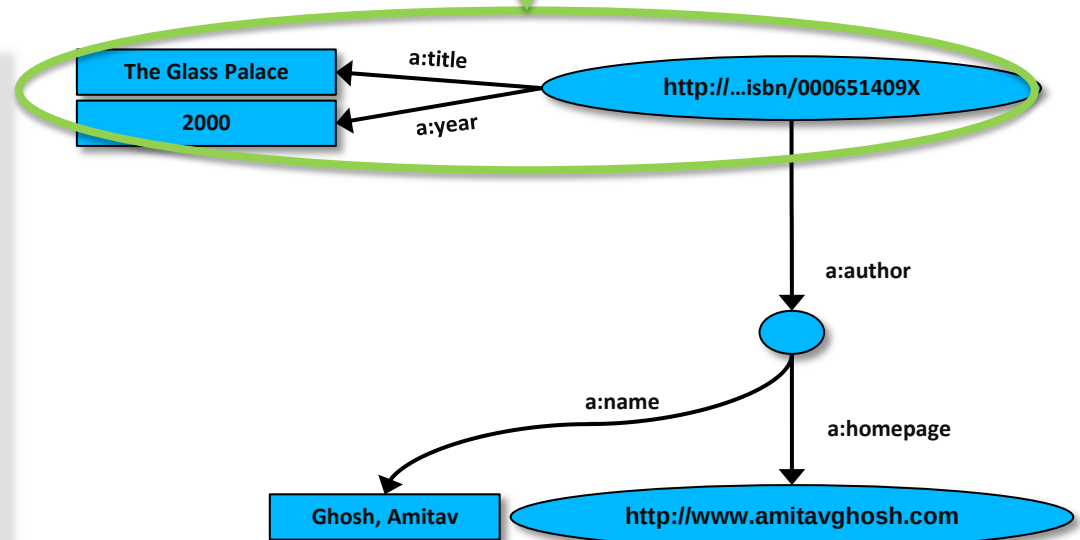


(2) transforming table of books

ISBN	Author	Title	Year
0006511409X	id_xyz	The Glass Palace	2000

ID	Name	Homepage
id_xyz	Ghosh, Amitav	http://www.amitavghosh.com

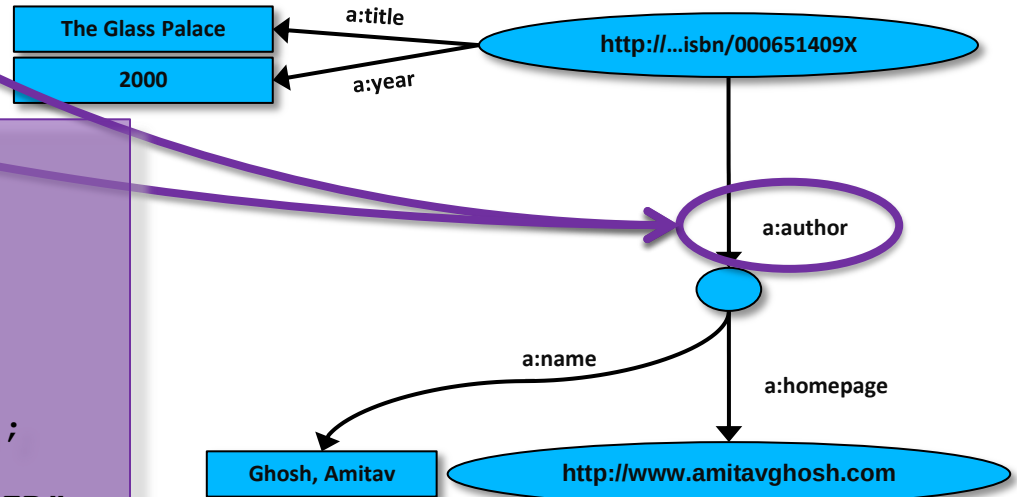
```
:B_Table rdf:type rr:TriplesMap ;
  rr:subjectMap [
    rr:template "http://...isbn/{ISBN}";
  ];
  rr:predicateObjectMap [
    rr:predicateMap [
      rr:predicate a:title
    ];
    rr:objectMap [
      rr:column "Title"
    ]
  ];
  rr:predicateObjectMap [
    rr:predicateMap [
      rr:predicate a:year
    ];
    rr:objectMap [
      rr:column "Year" ;
    ]
  ];
];
```



(3) linking tables

ISBN	Author	Title	Year
0006511409X	id_xyz	The Glass Palace	2000

ID	Name	Homepage
id_xyz	Ghosh, Amitav	http://www.amitavghosh.com



```
:B_Table a rr:TriplesMap ;
...
rr:refPredicateObjectMap [
  rr:refPredicateMap [
    rr:predicate a:author
  ];
  rr:refObjectMap [
    rr:parentTriplesMap :P_Table ;
    rr:joinCondition
      "{child}.Author = {parent}.ID"
  ]
]
```

schema.org = **bing** + **Google** + **YAHOO!** + **Яндекс** + **Yandex**

schemas to improve index, search and display e.g:

- **Creative works**, Book, Movie, MusicRecording, Recipe, TVSeries ...
- **Embedded non-text objects**, AudioObject, ImageObject, VideoObject
- **Event**
- **Organization**
- **Person**
- **Place**, LocalBusiness, Restaurant ...
- **Product**, Offer, AggregateOffer
- **Review**, AggregateRating

The screenshot shows a search results page for 'Recipes'. On the left, there is a sidebar with a table of ingredients and checkboxes for 'Yes' and 'No'. Below this, there are sections for 'Any cook time' and 'Any calories' with links to filter results. The main content area displays three recipe cards for 'Chicken Cacciatore'. Each card includes a title, a star rating, the number of reviews, the cook time, a brief description, and a link to the full recipe.

Ingredients	Yes	No
tomatoes	☐	☐
fettuccine	☐	☐
marinara sauce	☐	☐
crushed red pepper	☐	☐
capers	☐	☐
penne	☐	☐
oregano	☐	☐

Any cook time
[Less than 15 min](#)
[Less than 30 min](#)
[Less than 60 min](#)

Any calories
[Less than 100 cal](#)
[Less than 300 cal](#)
[Less than 500 cal](#)

Recipes
[More](#)

Easy Chicken Cacciatore - Chick
★★★★★ 7 reviews - 55 mins
An easy chicken cacciatore recipe with oregano. Serve this chicken cacciatore over fettuccine.
Ingredients: onion, bell pepper, olive oil, tomato sauce
southernfood.about.com/od/skilletchicken/

Mom's Chicken Cacciatore
★★★★★ 299 reviews - 67 mins
Chicken pieces simmer in a tomato sauce. This recipe is a mainstay is best served with pasta.
Ingredients: pepper, chicken, tomato sauce
allrecipes.com/recipe/mom

Emeril's Chicken Cacciatore
★★★★★ 41 reviews - 1 hr 40 min
Food Network invites you to try this Emeril's recipe.
Ingredients: chicken, flour, olive oil, onion, tomato sauce
www.foodnetwork.com > Recipes > Chicken

Chicken Cacciatore
★★★★★ 117 reviews - 15 mins
'Not only is this satisfying meal, it's also a great way to use up leftovers.
Susan Adair from Muncie, IN
Ingredients: onion, bell pepper, tomato sauce
allrecipes.com/recipe/chic

RDFa 1.1: example on schema.org

```
<div vocab="http://schema.org/" typeof="Product">
  
  <span property="name">Dell UltraSharp 30" LCD Monitor</span>

  <div rel="hasAggregateRating" >
    <div typeof="http://schema.org/AggregateRating">
      <span property="ratingValue">87</span>
      out of <span property="bestRating">100</span>
      based on <span property="ratingCount">24</span> user ratings
    </div>
  </div>

  <div rel="offers" >
    <div typeof="http://schema.org/AggregateOffer">
      <span property="lowPrice">$1250</span>
      to <span property="highPrice">$1495</span>
      from <span property="offerCount">8</span> sellers
    </div>
  </div>
  (...)
</div>
```

PS: RDFa Lite = vocab + typeof + property + about + prefix.

GRDDL opens formats

by allowing us to declare RDF extraction algorithms inside XML documents



```
<head profile="http://www.w3.org/2003/g/data-view">
```

```
<title>The man who mistook his wife for a hat</title>
```

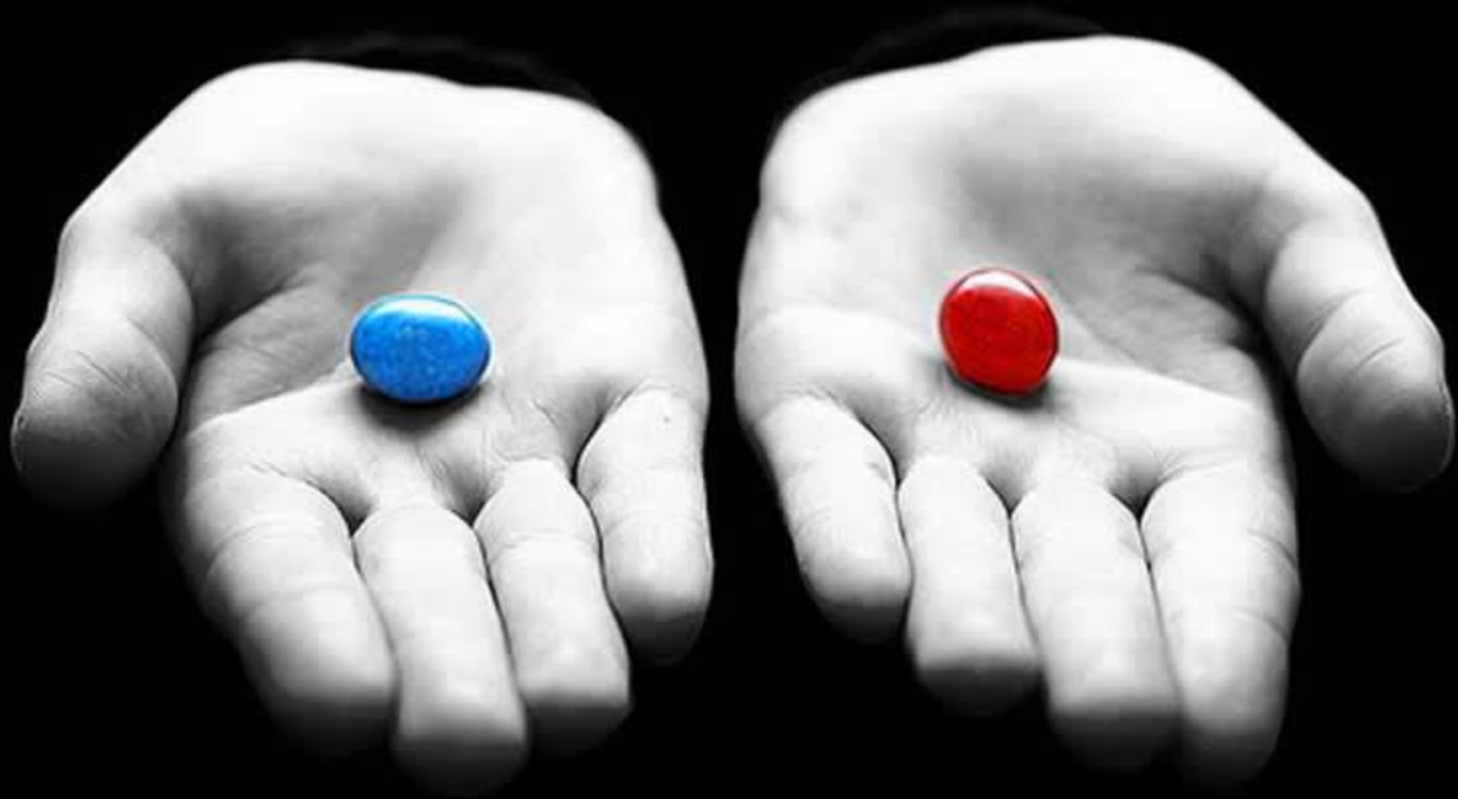
```
<link rel="transformation"
```

```
href="http://www.w3.org/2000/06/ dc-extract/dc-extract.xsl" />
```

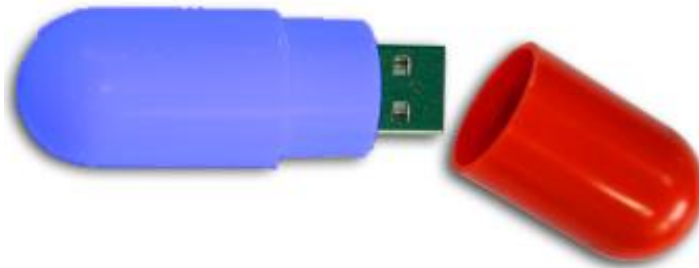
```
<meta name="DC.Subject" content="clinical tales" />
```

```
...
```

pages || data



page && data





Tantek's Thoughts - Mozilla Firefox

FichierÉditionAffichageHistoriqueMarque-pagesScrapBookOutils?



http://tantek.com/



using microformats

Homepageinriamy bookmarkletsnice bookmarkletsGooglePages jaunesMichelinDico CNRSLe Grand Robert & C...

Addresses (4)Contacts (36)Events (5)LocationsTagspaces (76)BookmarksResourcesOptions

Tantek's Thoughts

Tantek's Thoughts

CSS examplesfaveletsblog archivesite map

Identity facets

XFN FRIENDLY

more thoughts

wiki
twitter / faves
pownce
technorati / faves

events

upcoming (+subscribe)
pownce events (+subscribe)

media - photos & videos

flickr / photos
revver (videos)
bliptv - videos

OpenIDs

myopenid, lj

Projects

microformats to-do changes
hCard
hCalendar
hReview
XOXO
GMPG
XFN 1.1
XMDP
Technorati

Open as possible means public domain plus a strong community

1/1 7:46 PM

tags:  open  microsoft  ie  msie  iemac
 publicdomain  standards  licenses  freedom

My journey implementing and/or iterating/improving/creating "open" standards began almost 10 years at Microsoft when I was assigned the area of CSS support in Internet Explorer for Macintosh. Along the way I've learned a lot about the longterm value of open standards, open source, and open content, and as a result the plethora of "open" licenses out there. Having seen real difficulties that different "open" projects have had working together due to license (or even philosophical definition of "freedom") incompatibilities, limitations, friction, barriers to developing derivative materials to help "open" projects, and even FUD used inside many corporations to limit use of "open" resources, it led me inexorably to one conclusion.

* Blogs that link here

2,464 blog reactions

 Technorati

Technorati search

☒ this blog ☐ all blogs

Top Tags

on Tantek's Thoughts

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sanfrancisco tx travel
video heard
microformats
navlopomo sxsw2007 sxswm
sxswm2007 sxswmusic
sxswmusic2007
upcoming:event=95527
videobloggingweek2007 vlog
vloanpost

Terminé

ronan luce - Yahoo! Search Results - Mozilla Firefox

Fichier Édition Affichage Historique Delicious Marque-pages ScrapBook Outils ?

http://search.yahoo.com/search?fr=smg18p=ronan+luce&webSear Google Images

Where Are All The RDF-based Semantic... New report places Semantic Web 'On t... ronan luce - Yahoo! Search Results Home | OpenCalais

Yahoo! MyYahoo! Mail Welcome, **fabien_gandon** [Sign Out] Help

Web | Images | Video | Local | Shopping | more

mi Search Options Customize

Start typing to see suggestions.

Explore concepts:

- ronan "Renan Luce"
- ronan luce LETTRE
- ronan luce youtube
- ronan luce repenti

Search Assist Settings Help

1 - 10 of 239,000 for ronan luce (About) - 0.02 s | SearchScan BETA On

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 **See luce tagged videos on UnCut Video**
See what is everybody watching, view **luce** tagged videos on UnCut Video ... Browse videos tagged with **luce**. Matching videos (3) | Page 1 of 1. LA LETTRE - **RONAN LUCE** ...
uncutvideo.aol.com/tags/luce - [Cached](#)

 **WireImage.com - The Largest Entertainment Photo & Video Archive**
French Singer **Ronan Luce** Exclusive Portrait session. 12/18/2007 - Indiana Bar. Paris, France ... COVERAGE* French singer Renan **Luce** poses for an exclus...
www.wireimage.com/ItemListings.aspx?igi=299436&nbc1=1 - 104k - [Cached](#)

 **WireImage: Listings**
WireImage is the leading provider of entertainment, sports and news ... French Singer **Ronan Luce** Exclusive Portrait session. December 18

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main details ▾

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- [official sites](#)
- [memorable quotes](#)

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Overview

User Rating: ★★★★★★☆☆☆☆ 7.2/10 [105,573 votes](#) »MOVIEmeter: Ⓜ Up 9% in popularity this week. See [why](#) on [IMDbPro](#).Director: [Michael Bay](#)Writers ([WGA](#)): [David Weisberg](#) (story) & [Douglas Cook](#) (story) ...
[See more](#) »Contact: View [company](#) contact information for The Rock on [IMDbPro](#).Release Date: 7 June 1996 (USA) [See more](#) »Genre: [Action](#) | [Adventure](#) | [Thriller](#) [See more](#) »Tagline: Alcatraz. Only one man has ever broken out. Now five million lives depend on two men breaking in. [See more](#) »Plot: A group of U.S. marines, under command of a renegade general, take over Alcatraz and threat San Francisco Bay with biological weapons. A chemical weapons specialist and the only man to have ever escaped from the Rock are the only ones who can prevent chaos. [Full summary](#) » | [Full synopsis](#) »Plot Keywords: Spoiler alert! Rollover or vote to view plot [See more](#) »Awards: Nominated for Oscar. Another 7 wins & 6 nominations. [See more](#) »

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```

<html xmlns="http://www.w3.org/1999/xhtml" dir="ltr" lang="en-US"
      xmlns:fb="https://www.facebook.com/2008/fbml">

<head prefix="og: http://ogp.me/ns# fb: http://ogp.me/ns# YOUR_NAMESPACE:
      http://ogp.me/ns/apps/YOUR_NAMESPACE#">
  <meta property="fb:app_id" content="YOUR_APP_ID" />
  <meta property="og:type" content="YOUR_NAMESPACE:recipe" />
  <meta property="og:title" content="Stuffed Cookies" />
  <meta property="og:image" content="http://example.com/cookie.jpg" />
  <meta property="og:description" content="The Turducken of Cookies" />
  <meta property="og:url" content="http://example.com/cookie.html">
  <script type="text/javascript">
    function postCook()
    {
      FB.api('/me/YOUR_NAMESPACE:cook' +
        '?recipe=http://example.com/cookie.html','post',    (...)    });    }
  </script>
</head>

<body>
  (...)
  <form>
    <input type="button" value="Cook" onclick="postCook()" />
  </form>
</body>
</html>

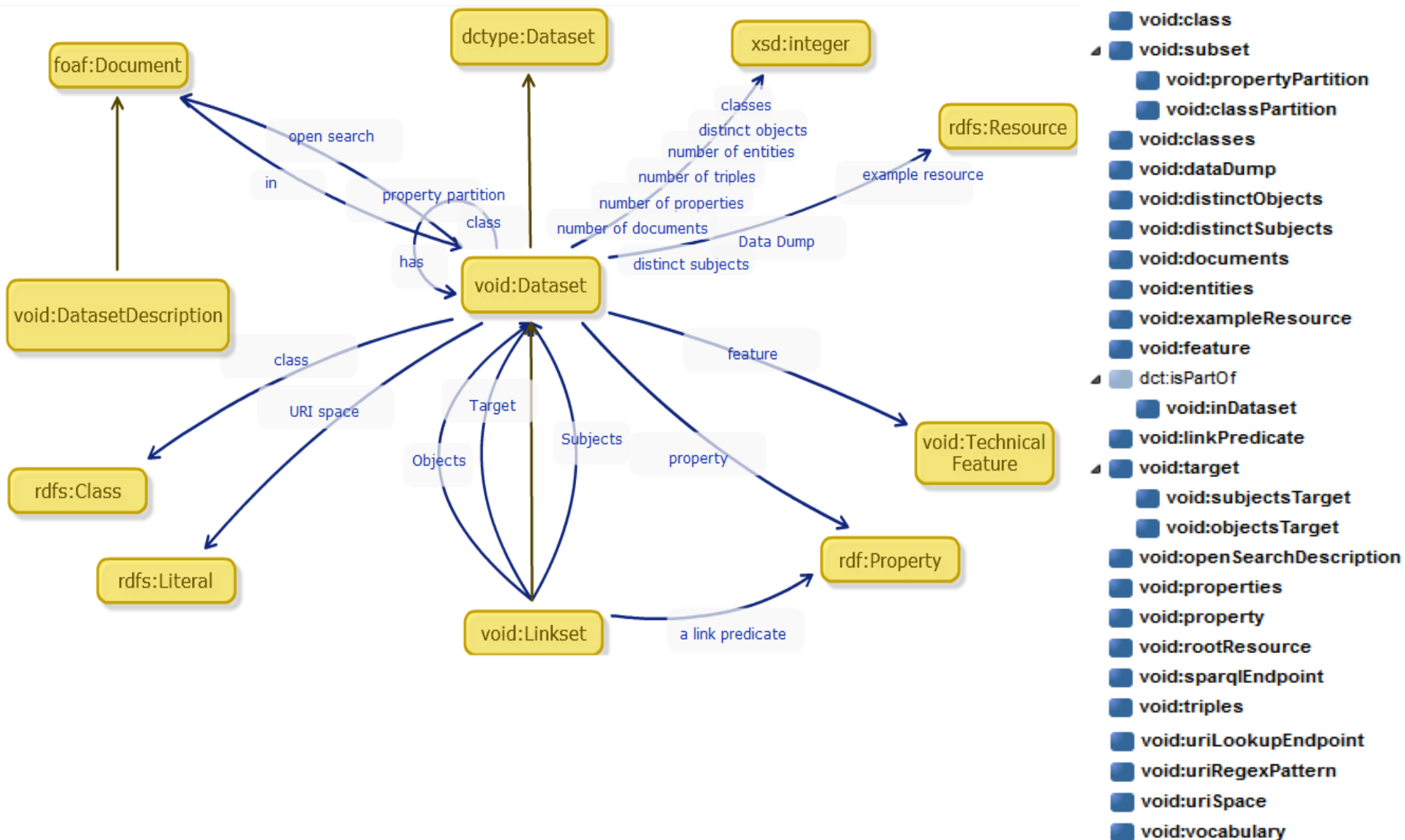
```

code inside the page



Capli's

VoID: describing datasets and linksets

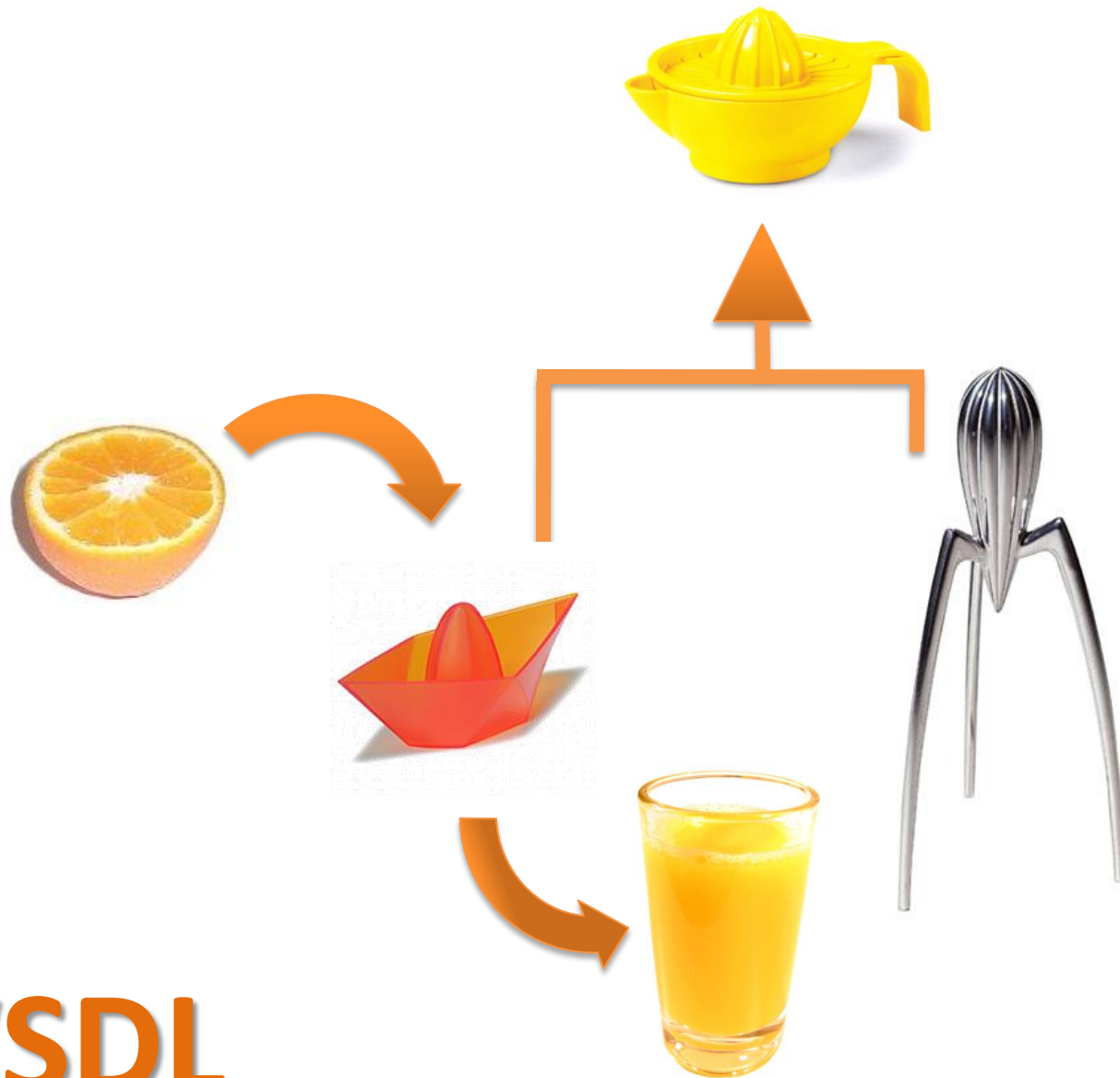


```
:DBpedia a void:Dataset;  
void:sparqlEndpoint <http://dbpedia.org/sparql>;  
void:feature :RDFXML ;  
void:subset :DBpedia2Geonames ;  
void:uriLookupEndpoint <http://lookup.dbpedia.org/api/search.asmx/KeywordSearch? QueryString=> ;  
dcterms:modified "2008-11-17"^^xsd:date;  
dcterms:title "DBPedia";  
dcterms:description "RDF data extracted from Wikipedia";  
dcterms:publisher :DBpedia_community;  
dcterms:license <http://creativecommons.org/licenses/by-sa/3.0/>;  
dcterms:source <http://dbpedia.org/resource/Wikipedia>.
```

```
:Geonames a void:Dataset;  
void:sparqlEndpoint <http://geosparql.appspot.com/query>;  
void:triples "107983838"^^xsd:integer ;  
dcterms:subject <http://dbpedia.org/resource/Location> .
```

```
:DBpedia2Geonames a void:Linkset ;  
void:linkPredicate owl:sameAs ;  
void:target :DBpedia ;  
void:target :Geonames .
```

e.g. DBpedia dataset



SAWSDL

semantic annotation of WSDL (W3C Rec. 2007)

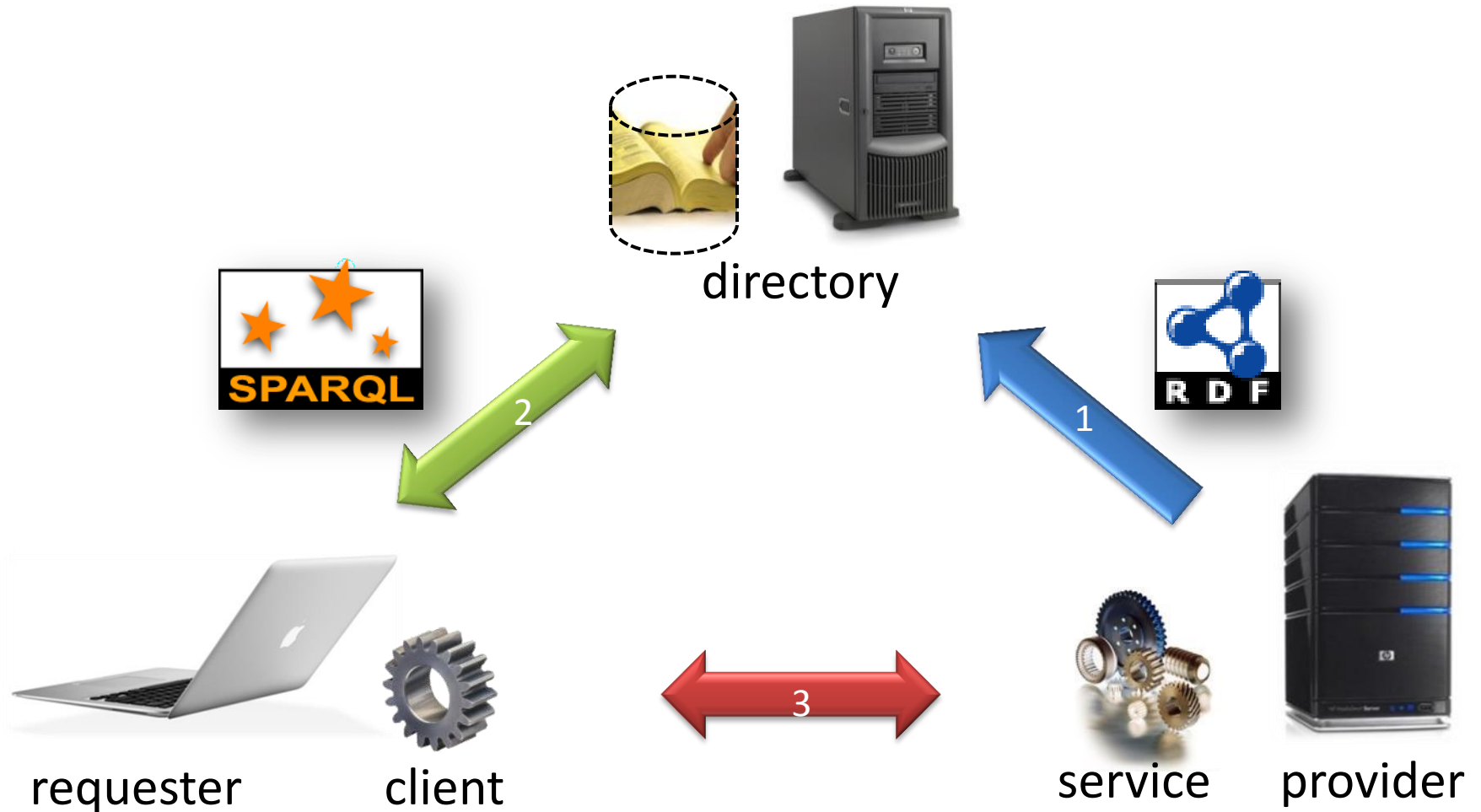
SAWSDL...



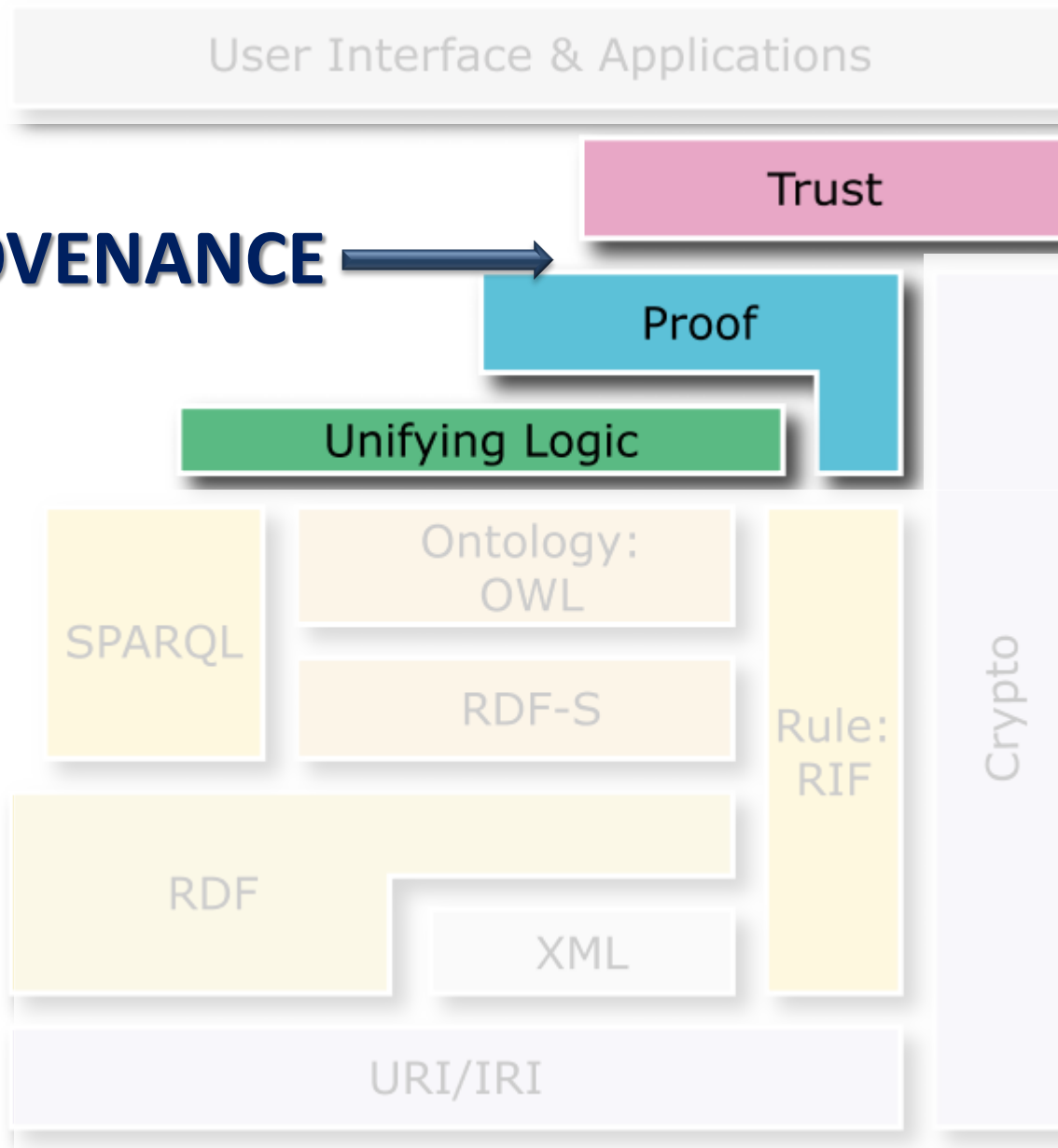
```
1 <xs:complexType name="searchIn">
2   <xs:sequence>
3     <xs:element name="Query"
4       type="query:query"
5       minOccurs="1"
6       maxOccurs="1"
7       sawSDL:modelReference="http://model.core.weblab.eads.com#SPARQL-Query" />
8   </xs:sequence>
9 </xs:complexType>
```

```
1 <wsdl:definitions>
2   ...
3   <wsdl:portType name="Search">
4     <wsdl:operation name="search"
5       sawSDL:modelReference="http://model.core.weblab.eads.com#Search">
6       <wsdl:input message="tns:searchIn"></wsdl:input>
7       <wsdl:output message="tns:searchout"></wsdl:output>
8       <wsdl:fault name="SearchException" message="tns:searchException"></wsdl:fault>
9     </wsdl:operation>
10  </wsdl:portType>
11  ...
12 </wsdl:definitions>
```

services annotated and searched **semantically**

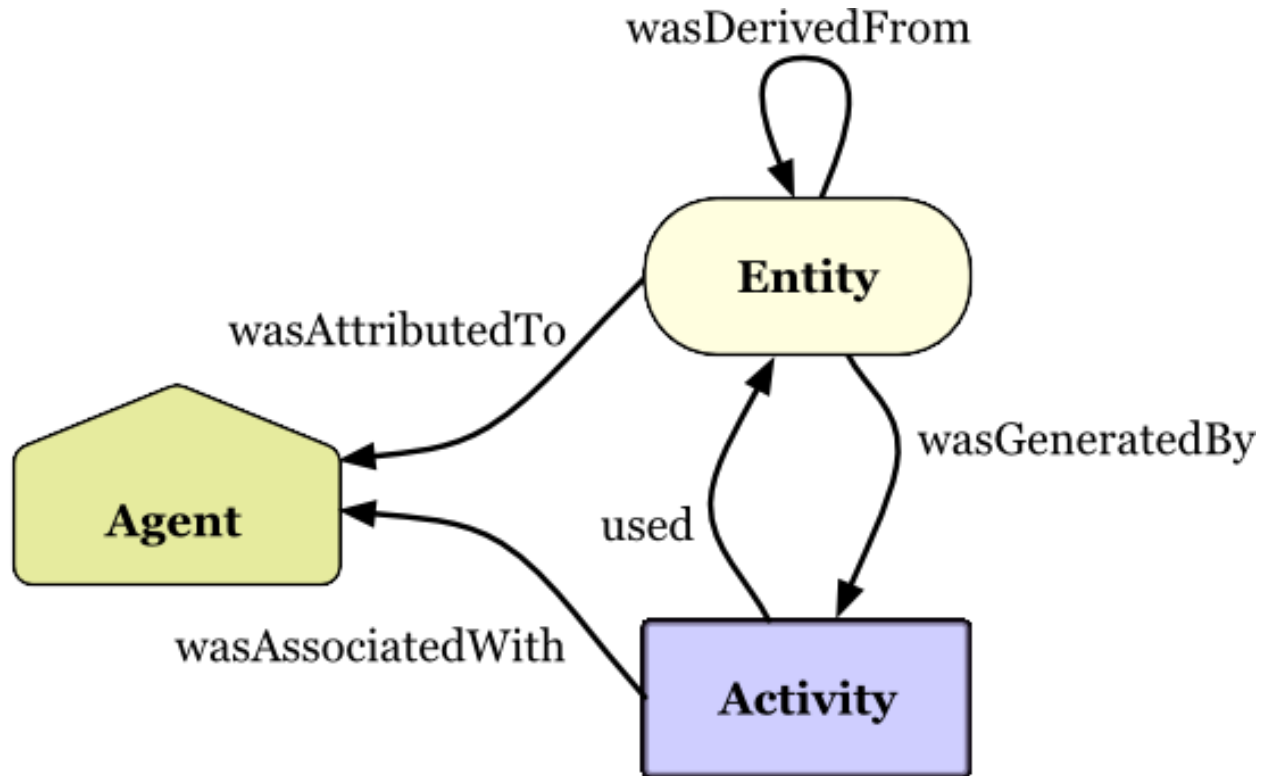


PROVENANCE

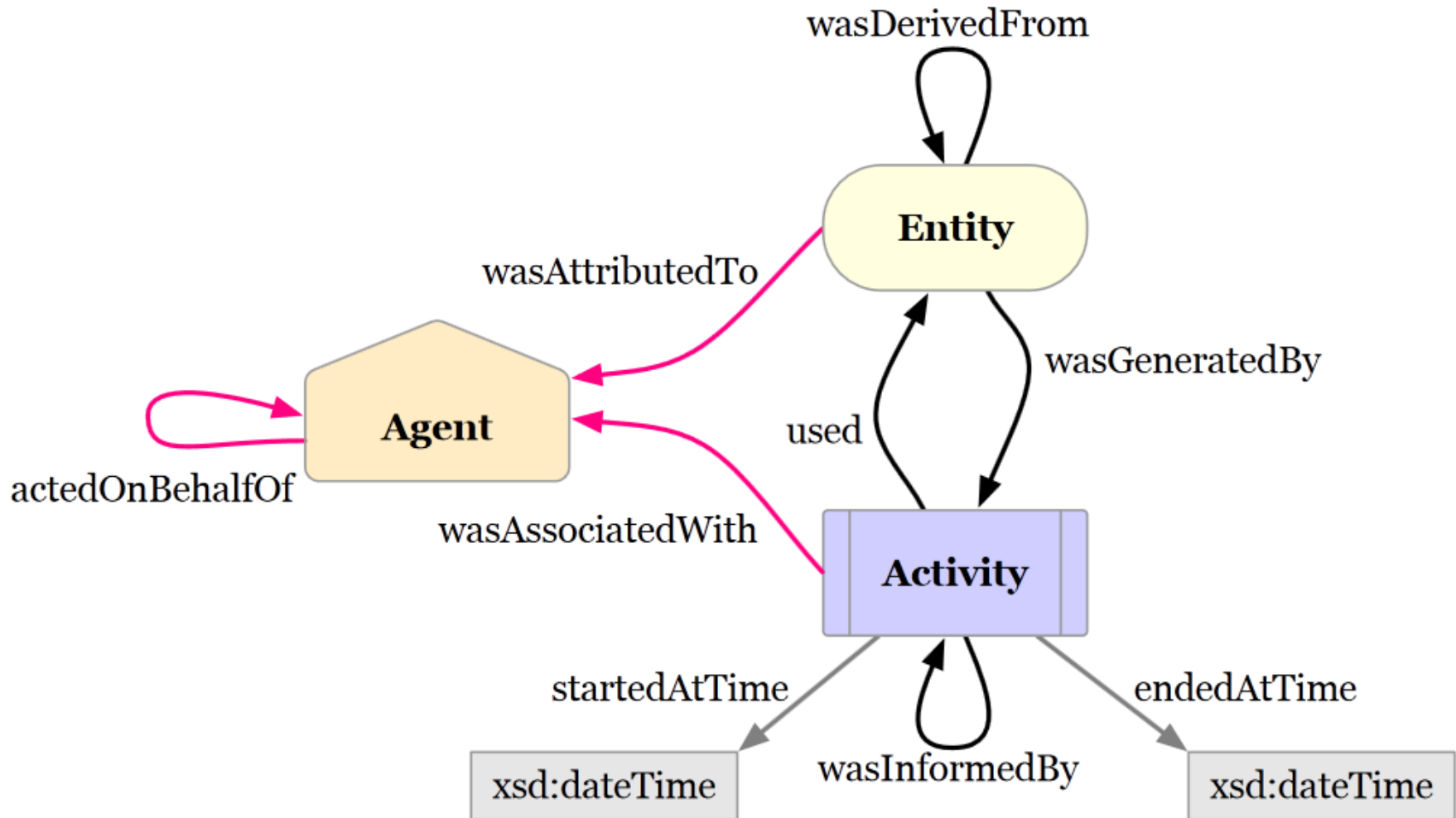


Provenance: PROV-DM & PROV-O

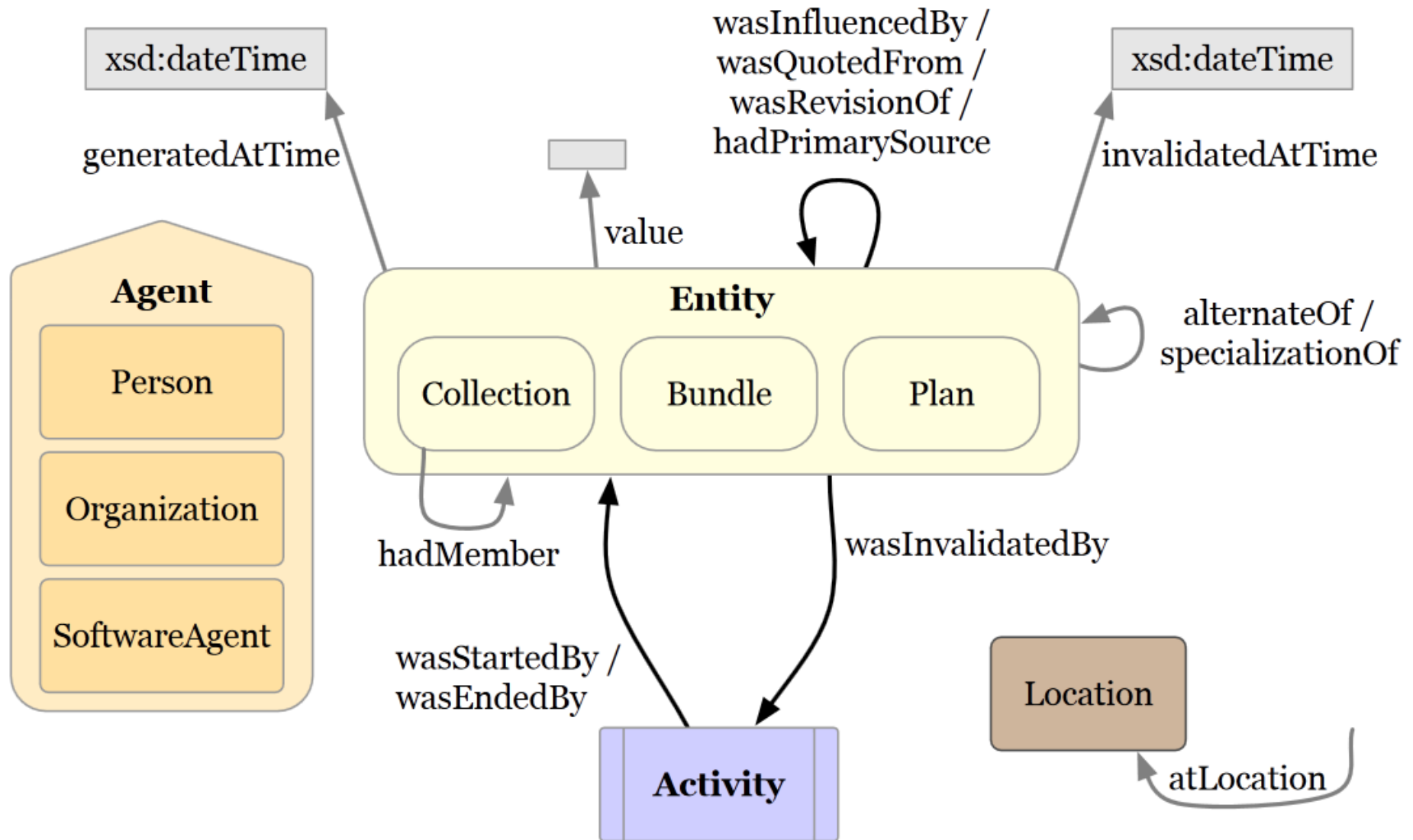
describe entities and activities
involved in providing a resource



PROV-O provenance ontology

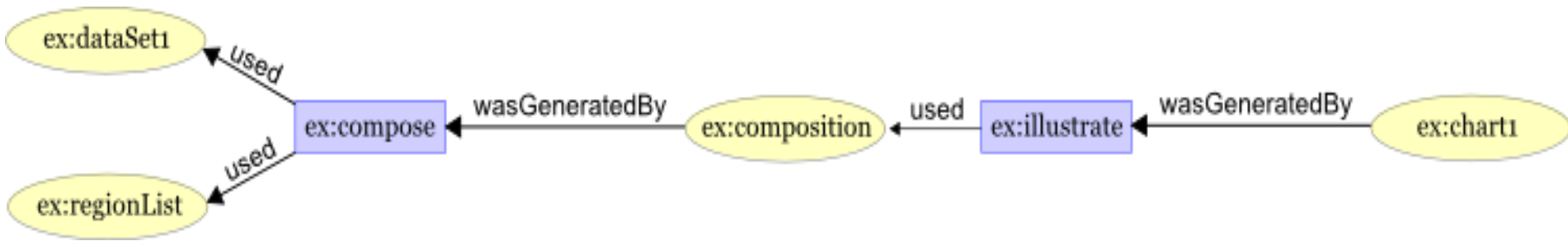


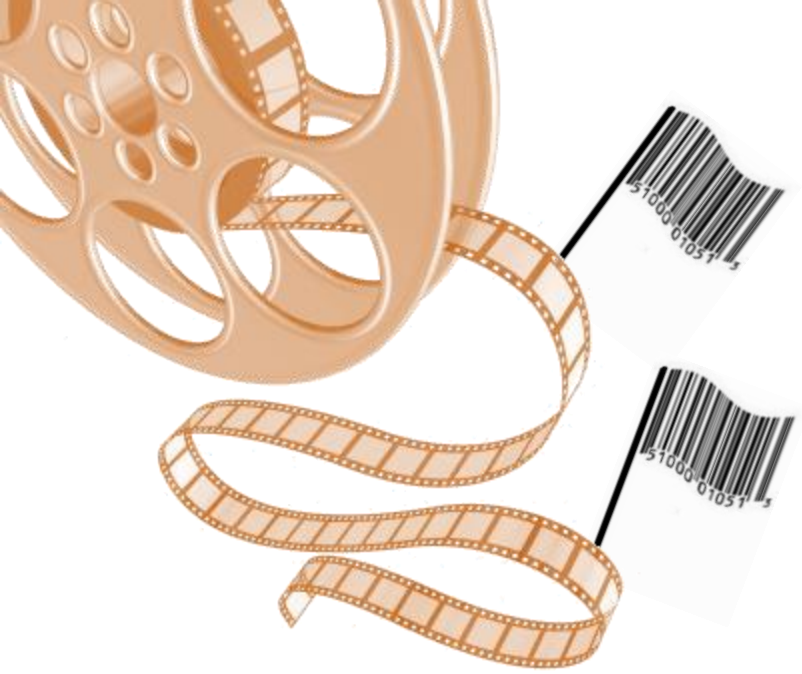
PROV-O provenance ontology



PROV-DM & PROV-O: primer example

```
ex:compose    prov:used ex:dataSet1 ;  
              prov:used ex:regionList .  
ex:composition prov:wasGeneratedBy ex:compose .  
ex:illustrate  prov:used ex:composition .  
ex:chart1     prov:wasGeneratedBy ex:illustrate .
```





- semantic description of multimedia resources [Media Annotation]
- pointing to internal elements of multimedia resources [Media Fragment]

annotating multimédia elements

multimedia fragment

- part of the URL after the #

`http://www.example.com/example.ogv#track=audio&t=10,20`

- dimensions:

- temporal:

`t=10,20 / t=npt:,0:02:01.5 / t=clock:2009-07-26T11:19:01Z`

- spatial:

`xywh=pixel:160,120,320,240 / xywh=percent:25,25,50,50`

- track:

`track=1 / track=video&track=subtitle / track=Wide`

- named:

`id=chapter-1`

- fragments are not sent with the URL but encoded in the HTTP request

ontologies for multimedia descriptions

ontology for Media Resources 1.0

```
<video.ogv> a ma:MediaResource ;  
    ma:hasTrack <video.ogv#track=audio>,  
                <video.ogv#track=subtitle>;  
    ma:hasSubtitling <video.ogv#track=subtitle> ;  
    ma:hasSigning <video.ogv#xywh=percent:70,70,90,90> .
```

```
<video.ogv#track=audio> a ma:AudioTrack ;   
    ma:hasLanguage [ rdfs:label "en-GB" ] ;  
    ma:hasFragment <video.ogv#track=audio&t=10,20> .
```

```
<video.ogv#track=audio&t=10,20> a ma:MediaFragment ;   
    ma:hasLanguage [ rdfs:label "fr" ] .
```

```
<video.ogv#track=subtitle> a ma:DataTrack ;   
    ma:hasLanguage [ rdfs:label "es" ] .
```

```
<video.ogv#xywh=percent:70,70,90,90> a ma:MediaFragment ;   
    ma:hasLanguage [ rdfs:label "bfi" ] .
```

Time line



some pointers

- W3C standards

<http://www.w3.org/standards/semanticweb/>

- SW Tools

<http://www.w3.org/2001/sw/wiki/Tools>



- Linked Data Book

<http://linkeddatabook.com/editions/1.0/>

- W3DevCampus

W3DEV➔CAMPUS

<http://www.w3devcampus.com/>

- EUCLID material

<http://www.euclid-project.eu/>



le doggy-bag *de la présentation*





impossible
to predict every
usage



avoid building
black boxes



make conceptualizations
explicit



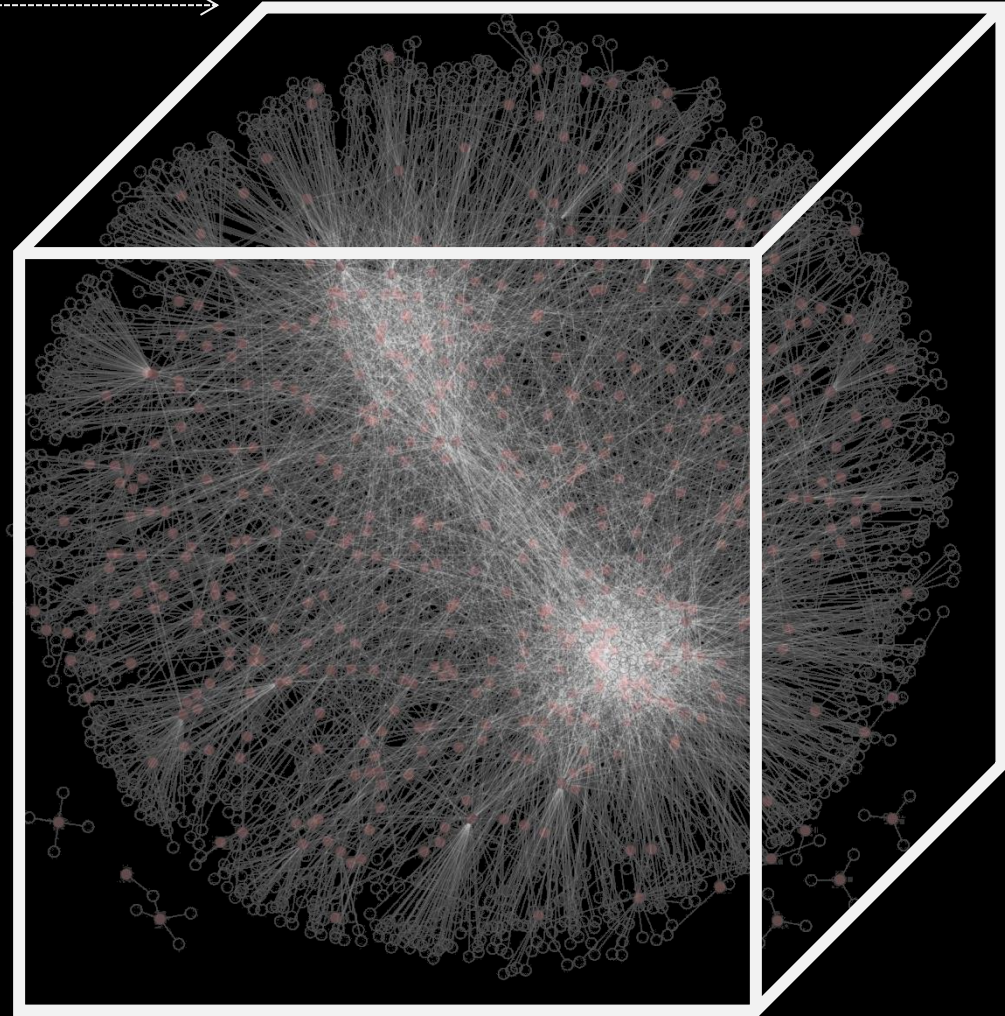
open your data
to those who could use them

W3C ©

66 FOAF primitives

3 475 908 348 references ⁽²⁾

 $\longleftrightarrow$ *x 52 millions* $\longrightarrow$



“a small tree ruling a big graph”⁽¹⁾

(1) Franck Van Harmelen, ISWC 2011

(2) Libby Miller, 2009



[C. Welty, ISWC 2007]

“semantic web”

and not

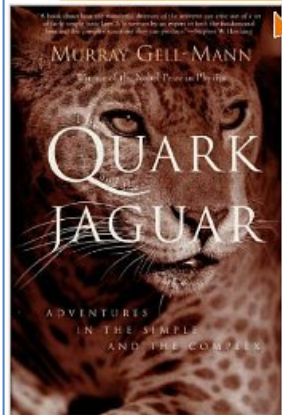
“semantic web”



[J. Hendler, ISWC 2007]

“a lightweight ontology
allows us to do
lightweight reasoning”

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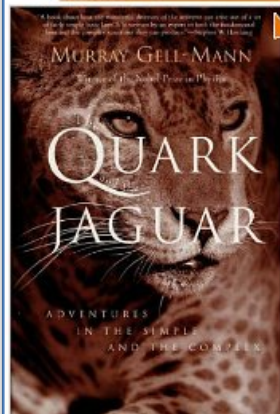
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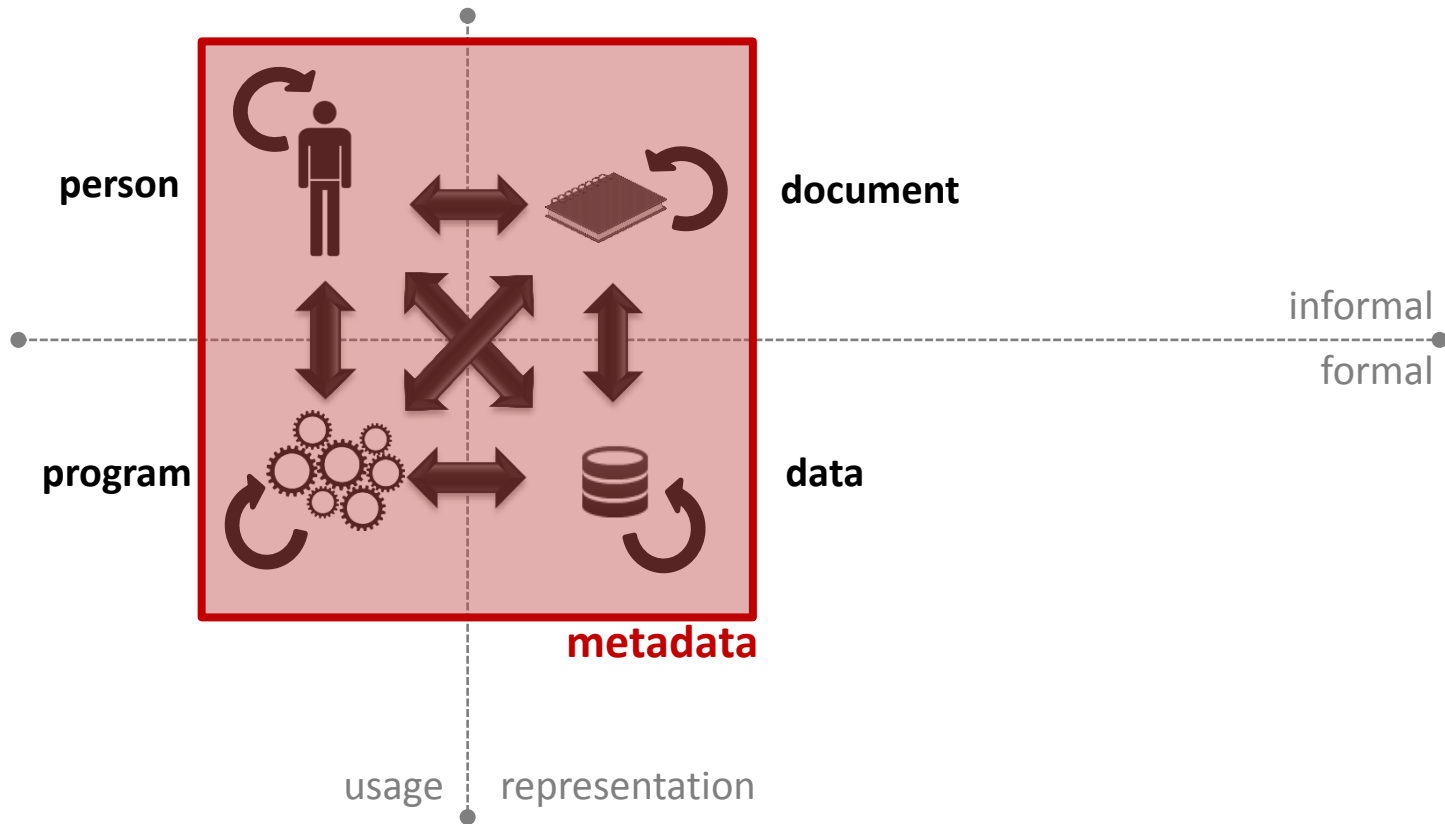
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[4 star:](#)  (8)
[3 star:](#)  (7)
[2 star:](#)  (4)
[1 star:](#)  (2)

Average Customer Review

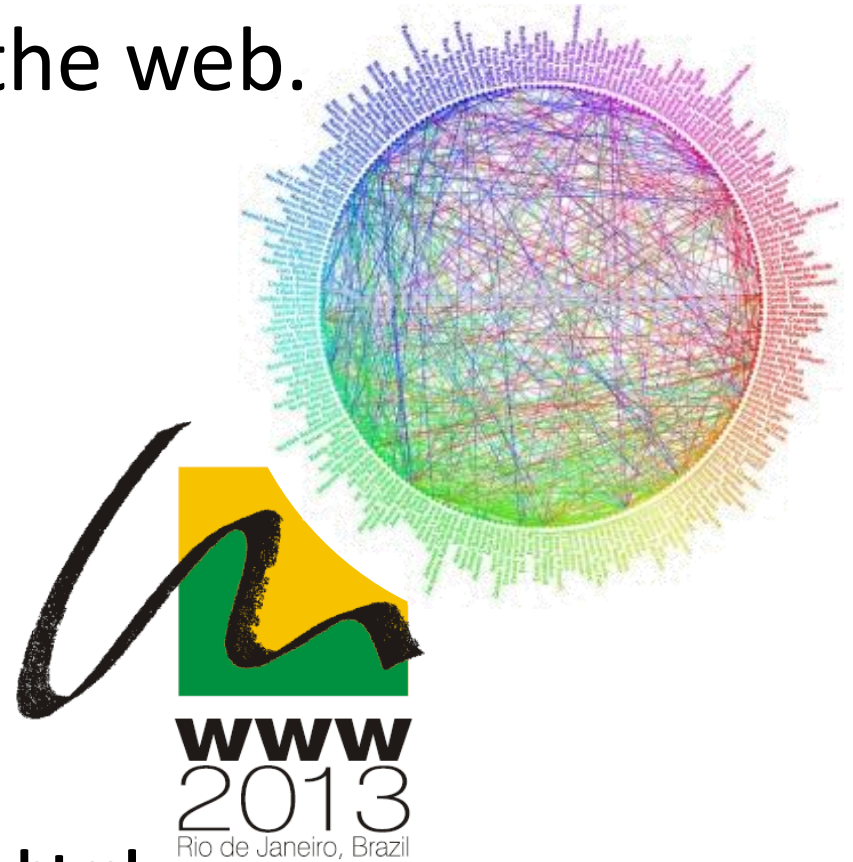
★★★★☆ (30 customer reviews)

web 1, 2, 3

one web...



tomorrow, he, who controls the metadata,
controls the web.



SLIDES @ w3.org/2013/05/w3c-track.html

Fabien Gandon, <http://fabien.info>, @fabien_gandon

Ivan Herman, <http://www.w3.org/People/Ivan/>

