

Presentation at the
WWW 2008 Workshop:
Linked Data on the Web (LDOW2008)

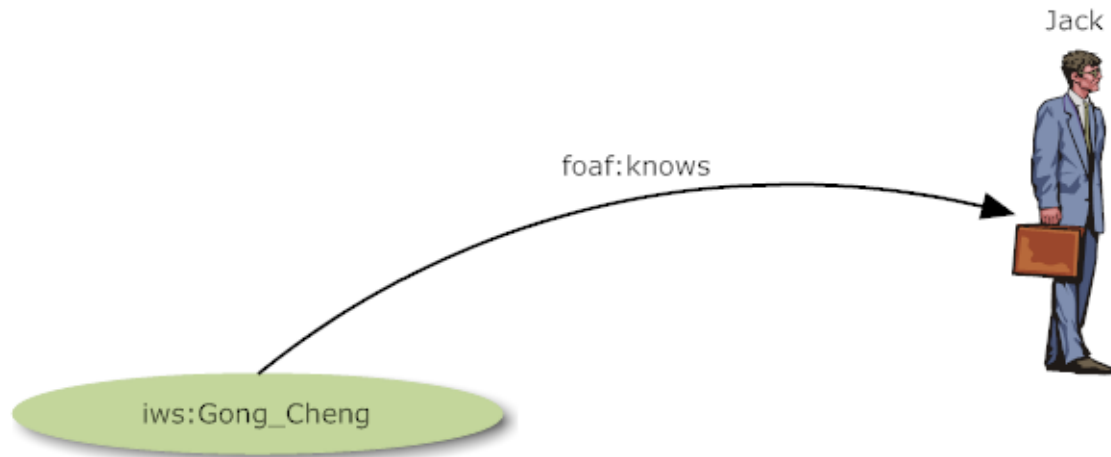
Searching Semantic Web Objects Based on Class Hierarchies

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*Institute of Web Science, School of Computer Science and Engineering
Southeast University, Nanjing, China*

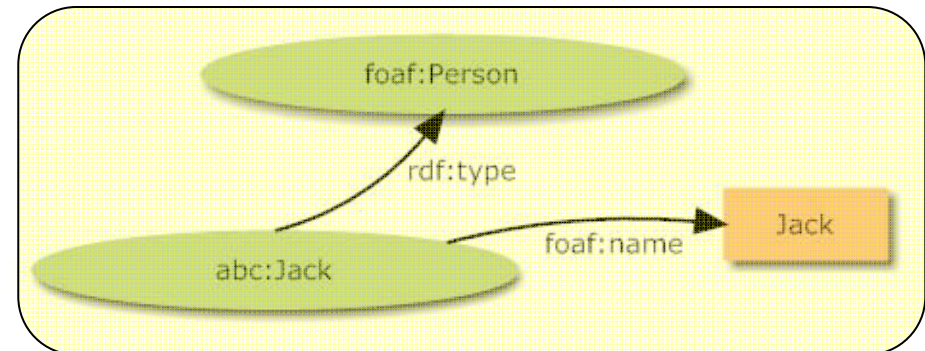
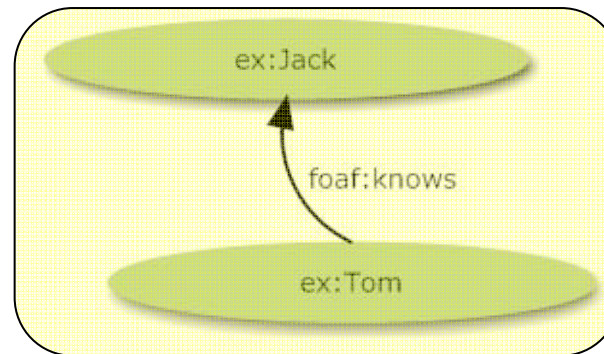
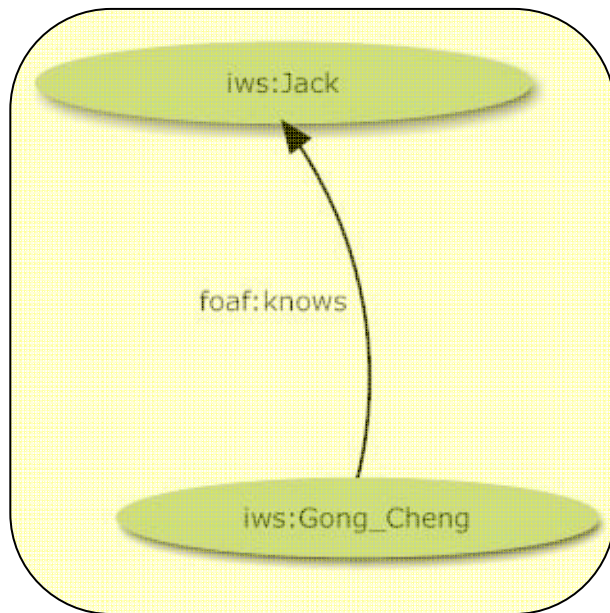


<http://iws.seu.edu.cn/services/falcons/>

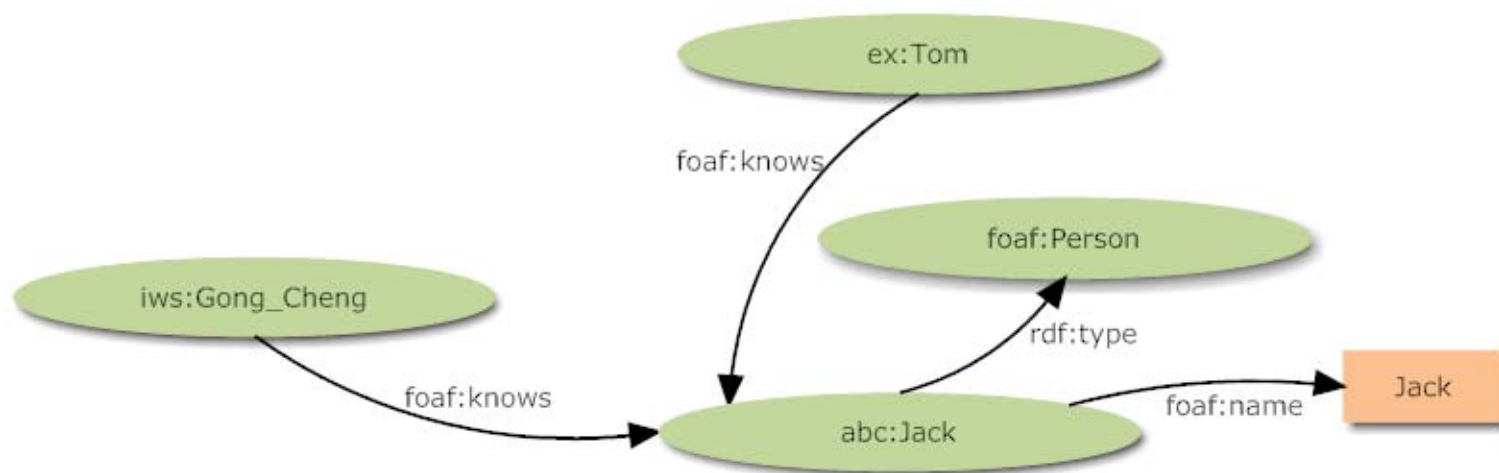
Information Islands vs. Web of Data



Information Islands vs. Web of Data

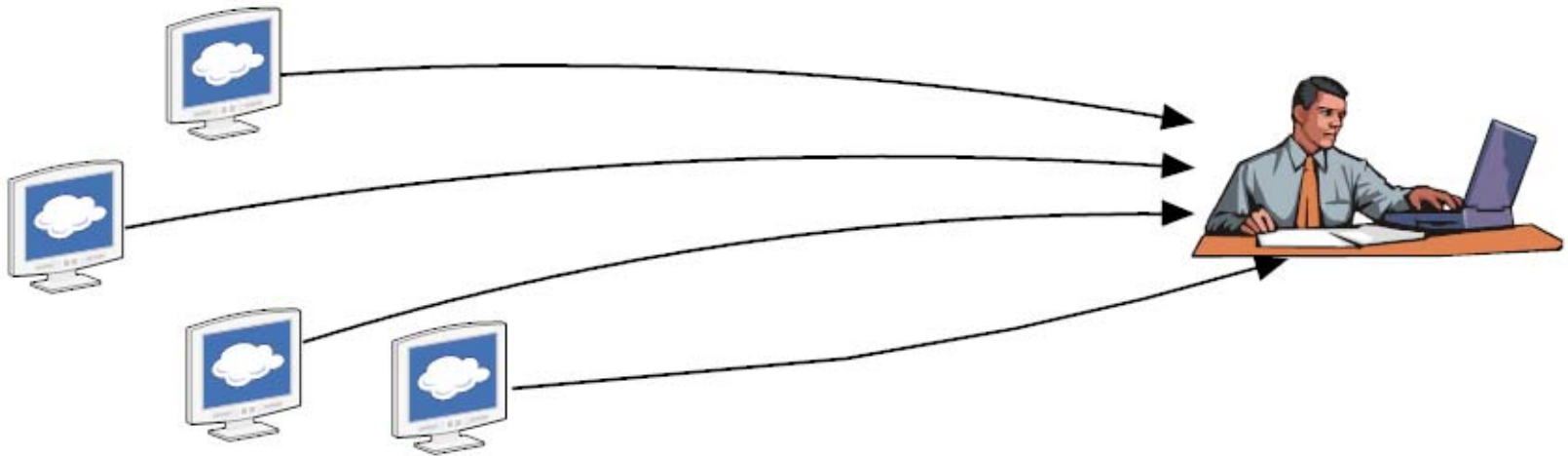


Information Islands vs. **Web of Data**



Motivation

- How to find URIs?
- Linked Open Data brings ...



Motivation

- How to find URIs?
- Linked Open Data brings ...
- Single-point retrieval system



Demo

- <http://iws.seu.edu.cn/services/falcons/>

Date	Document			Entity			#vocabulary
	#document	#triple	#RDF_sentence	#object	#class	#property	
2008-03-26 17:02:24	9,634,401	356,244,433	285,616,738	49,787,384	2,195,506	195,707	4,622

Demo

Object Search [Concept Search](#)

Supports Boolean operators, quotes, and wildcard characters.

All

Active Project	Artifact	Attribute	Conference	Document
Event	Force	Group	Item	Items
Landmark	Measure	Person	Region	Relation

Objects 1 - 10 of 331 for your search **Beijing 2008** (0.046 seconds)[Beijing](#)

Types: Capital, City

Labels: 北京" || Pekin || Пекин" || 北京市" || Pequim || Pechino || **Beijing** || Pékin" || Peking || Pekín"<http://dbpedia.org/resource/Beijing> - [Described in 198 documents](#)[Beijing Guoan](#)

Types: Club

Labels: **Beijing** Hyundai || 北京国安" || 北京国安足球俱乐部" || **Beijing** Guoanhttp://dbpedia.org/resource/Beijing_Guoan - [Described in 36 documents](#)[Beijing SWAT](#) Labels: **Beijing** SWAThttp://dbpedia.org/resource/Beijing_SWAT - [Described in 4 documents](#)

Demo



Object Search [Concept Search](#)

Supports Boolean operators, quotes, and wildcard characters.

All >> Event

Act

Conference

Contest

Objects 1 - 10 of 58 for your search **Beijing 2008** (0.053 seconds)

[2008 Summer Olympics bids](#) 

Types: Command

Labels: 2008 Summer Olympics bids || Candidatures pour les Jeux Olympiques de 2008

http://dbpedia.org/resource/2008_Summer_Olympics_bids - [Described in 5 documents](#)

[WWW2008](#) 

Types: Subject, Conference,

Labels: WWW2008

<http://ontoworld.org/wiki/Special:URIRResolver/WWW2008> - [Described in 5 documents](#)

[2008 Summer Paralympics](#) 

Types: Game

Labels: XIII Giochi Paralimpici estivi || Paralympische Zomerspelen 2008 || 2008年夏季残疾人奥林匹克运动会 || 北京パラリンピック

Sommer-Paralympics 2008 || 2008 Summer Paralympics

http://dbpedia.org/resource/2008_Summer_Paralympics - [Described in 4 documents](#)

Demo



Object Search [Concept Search](#)

Supports Boolean operators, quotes, and wildcard characters.

[All](#) >> [Event](#) >> [Conference](#)

Objects **1 - 1** of **1** for your search **Beijing 2008** (0.072 seconds)

[WWW2008](#) 

Types: Subject, Conference,

Labels: WWW2008

<http://ontoworld.org/wiki/Special:URIResolver/WWW2008> - [Described in 5 documents](#)

Navigating Class Hierarchies for Query Restriction



Object Search [Concept Search](#)

Beijing 2008

Search Objects

Supports Boolean operators, quotes, and wildcard characters.

All >> Event

Act

Conference

Contest

Recommending subclasses

Objects 1 - 10 of 58 for your search **Beijing 2008** (0.053 seconds)

[2008 Summer Olympics bids](#)

Types: Command

Labels: 2008 Summer Olympics bids || Candidatures pour les Jeux Olympiques de 2008

http://dbpedia.org/resource/2008_Summer_Olympics_bids - [Described in 5 documents](#)

Filtering results

[WWW2008](#)

Types: Subject, Conference,

Labels: WWW2008

<http://ontoworld.org/wiki/Special:URIRResolver/WWW2008> - [Described in 5 documents](#)

[2008 Summer Paralympics](#)

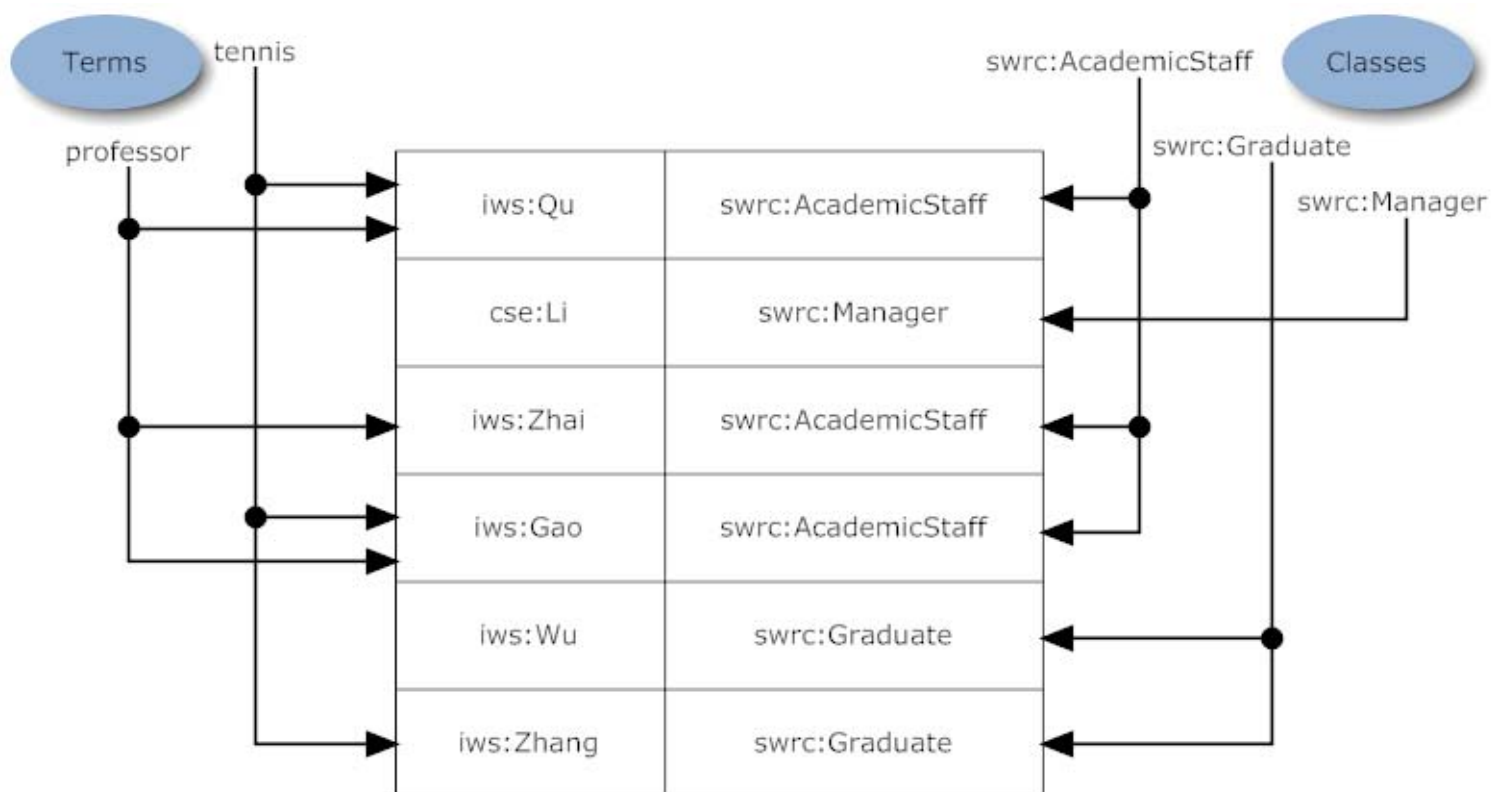
Types: Game

Labels: XIII Giochi Paralimpici estivi || Paralympische Zomerspelen 2008 || 2008年夏季残疾人奥林匹克运动会" || 北京パラリンピック" Sommer-Paralympics 2008 || 2008 Summer Paralympics

http://dbpedia.org/resource/2008_Summer_Paralympics - [Described in 4 documents](#)

Combined Inverted Index

- Query: <terms, classes>

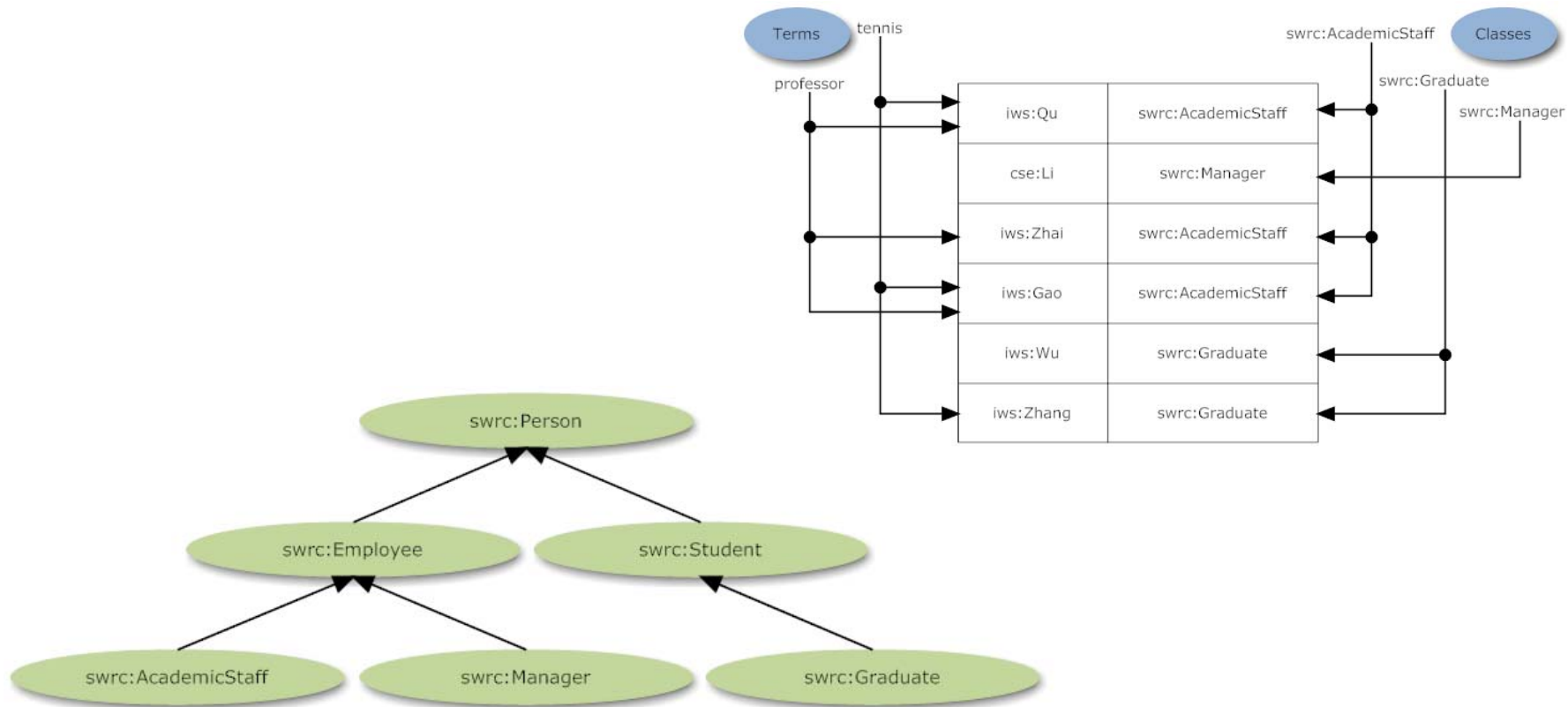


Provenance of Typing Information

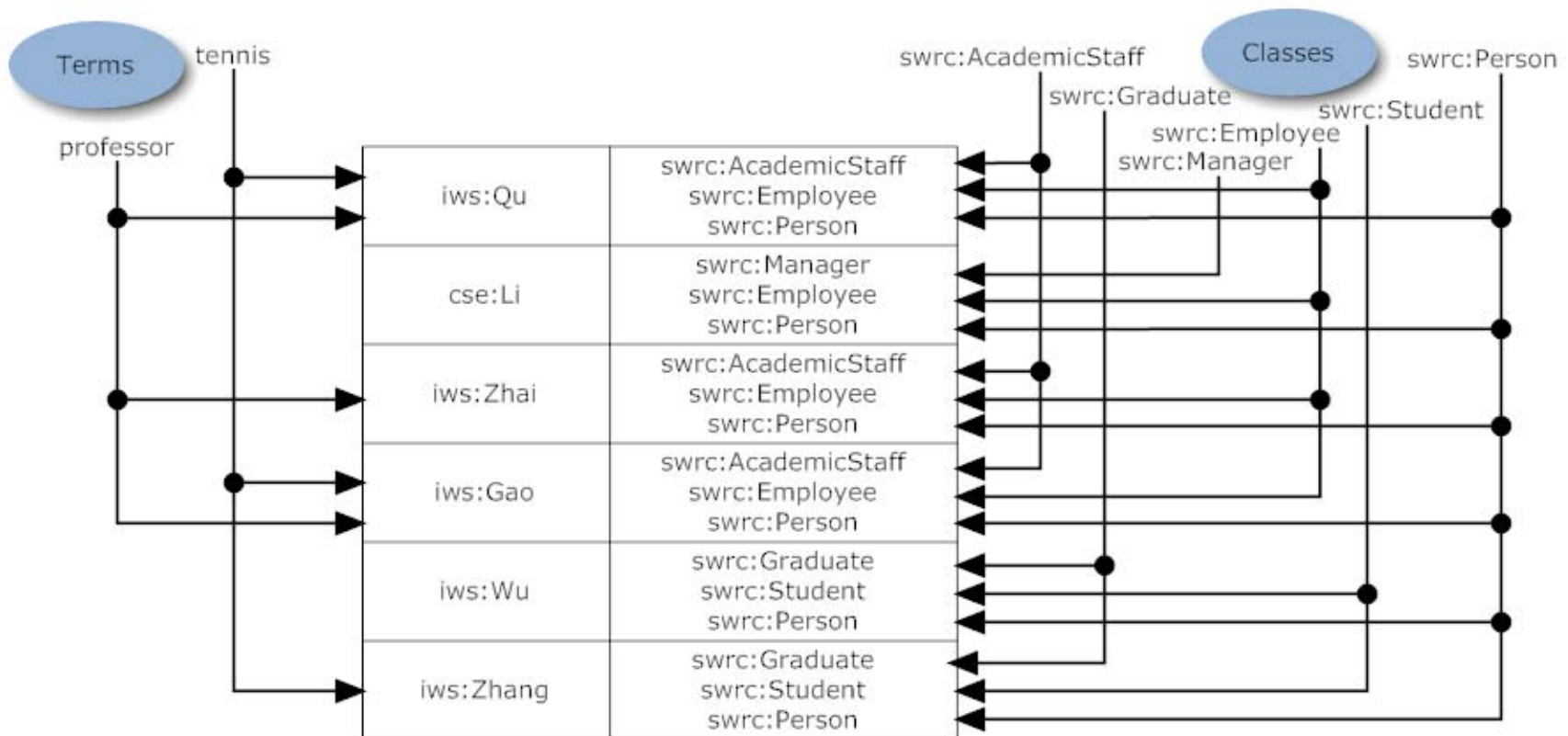
- Heuristics

- Dereference document
- Namespace document
- Documents on the same host
- Other documents

Class-inclusion Reasoning

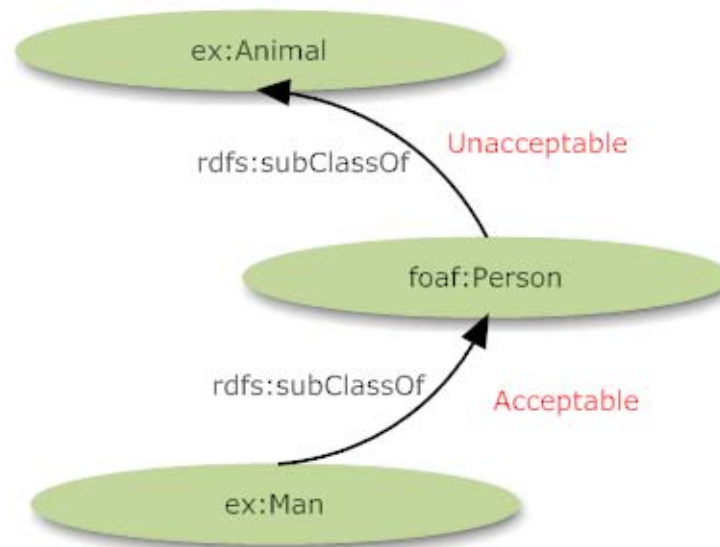


Class-inclusion Reasoning (cont.)



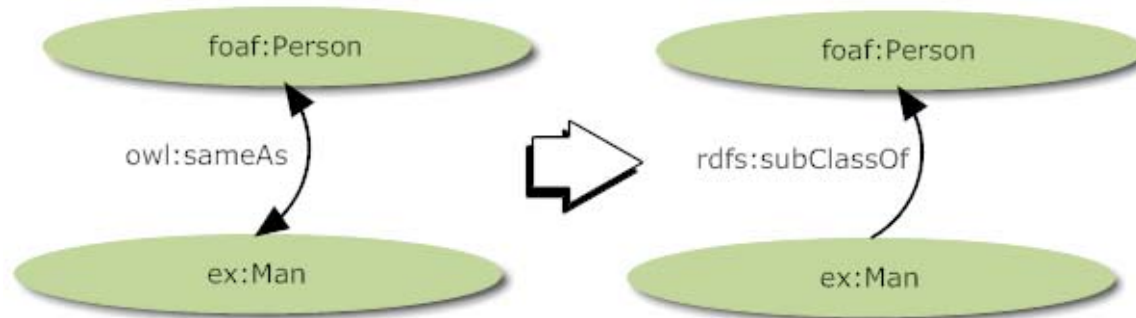
Class-inclusion Reasoning (cont.)

- Which axioms would be accepted by the reasoning engine?
 - The authorized description of a vocabulary is allowed to reuse the classes from other vocabularies but **CANNOT** further constrain their meaning.



Class-inclusion Reasoning (cont.)

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 - The authorized description of a vocabulary is allowed to reuse the classes from other vocabularies but **CANNOT** further constrain their meaning.



Recommending Subclasses

- If a subclass covers more results, it will be more likely to be recommended.



Falcons Object Search [Concept Search](#)
Beijing 2008 Search Objects
Supports Boolean operators, quotes, and wildcard characters.

All >> Event

Act Conference **Contest**

Objects 1 - 10 of 58 for your search **Beijing 2008** (0.053 seconds)

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Types: Game
Labels: XIII Giochi Paralimpici estivi || Paralympische Zomerspelen 2008 || 2008年夏季残疾人奥林匹克运动会" || 北京パラリンピック"
Sommer-Paralympics 2008 || 2008 Summer Paralympics
http://dbpedia.org/resource/2008_Summer_Paralympics - [Described in 4 documents](#)

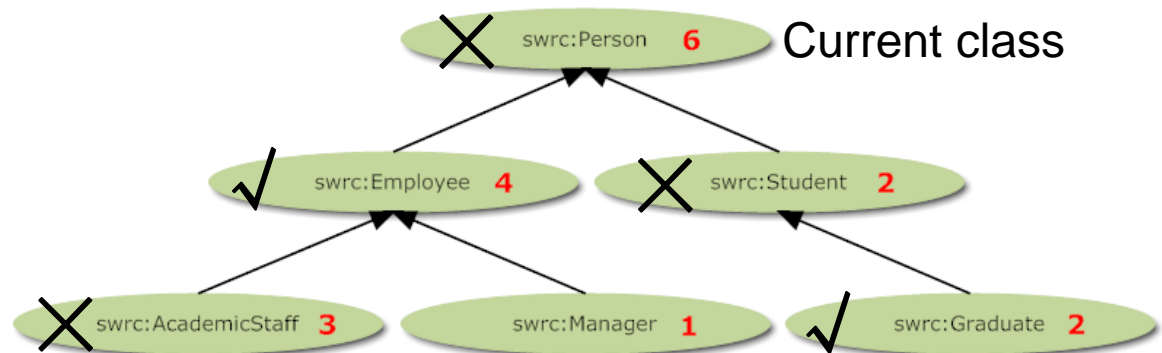
Recommending Subclasses

- If a subclass covers more results, it will be more likely to be recommended.
- Algorithm
 - Iterate over the first 1,000 results to collect classes.
 - Rank classes.
 - Select top K classes, s.t.:
 - Each selected class must be a strict subclass of a current class.
 - The class inclusion relation does NOT hold between any pair of the selected classes.

Example

• $K = 2$

iws:Qu	swrc:AcademicStaff swrc:Employee swrc:Person
cse:Li	swrc:Manager swrc:Employee swrc:Person
iws:Zhai	swrc:AcademicStaff swrc:Employee swrc:Person
iws:Gao	swrc:AcademicStaff swrc:Employee swrc:Person
iws:Wu	swrc:Graduate swrc:Student swrc:Person
iws:Zhang	swrc:Graduate swrc:Student swrc:Person



Summarizing SW Objects



General	DOC	WOT	CONTACT	DC	DOAP	FOAF
[Tim Berners-Lee] described in FOAF: http://xmlns.com/foaf/0.1/http://www.w3.org/People/Berners-Lee/card#i						
-- phone -->		☞ tel:+1-(617)-253-5702 [G1] 🔍				
sha1sum of a personal mailbox URI name		965c47c5a70db7407210cef6e4e6f5374a525c5c[G1]				
-- personal mailbox -->		☞ mailto:timbl@w3.org [G1] 🔍				
-- based near -->		+...[G2] +...[G1]				
Given name		Timothy[G1]				
nickname		TimBL[G1] timbl[G1]				
family name		Berners-Lee[G1]				
<-- member --		☞ DIG [G1] 🔍 (http://dig.csail.mit.edu/data#DIG)				
name		Tim Berners Lee[G15] Tim Berners-Lee[G16] Timothy Berners-Lee[G1]				
-- openid -->		☞ Tim Berners-Lee [G1] 🔍 (http://www.w3.org/People/Berners-Lee/)				

Authorized Sources

Sentences in Green

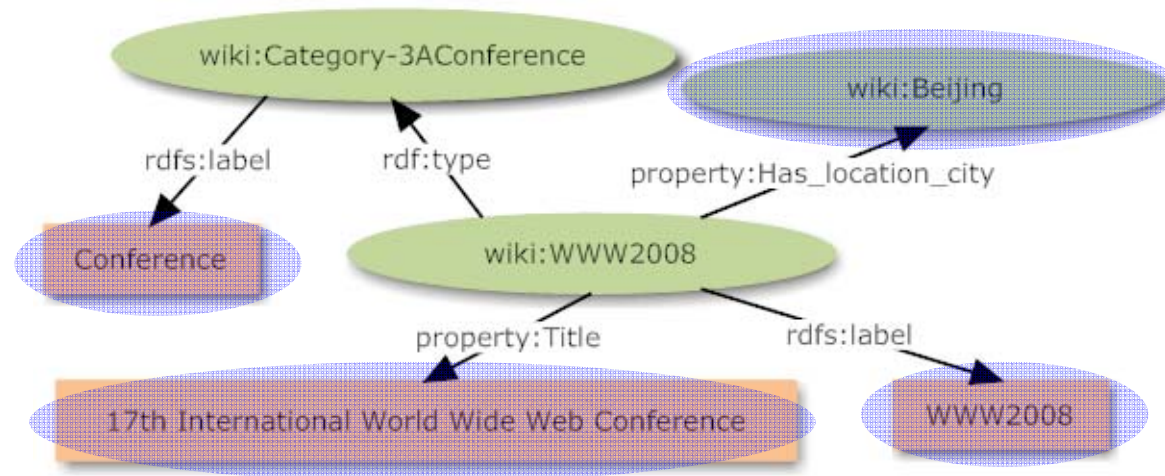
G0(<http://www.w...ople/EM/contact>)
 G1(<http://www.w...erners-Lee/card>)
 G2(<http://www.w...rs-Lee/card.rdf>)
 G3(<http://www.w...wap/grammar/bnf>)
 G4(<http://www.w...m/contact#phone>)
 G5(<http://www.w...m/doc#versionOf>)
 G6(<http://www.w...wap/pim/doc.rdf>)
 G7(<http://www.w...g/2007/ont/unit>)

Other Sources

G8(<http://heddl...om/edd/foaf.rdf>)
 G9(<http://larve...002/10/foaf.rdf>)
 G10(<http://peopl...oshani/foaf.rdf>)
 G11(<http://peopl...004/06/foaf.rdf>)
 G12(<http://berru...net/foaf.rdf#me>)
 G13(<http://berrueta.net/foaf.rdf>)
 G14(<http://forty.../03/ripple/demo>)
 G15(<http://bbfll...ty.org/foaf.xml>)
 G16(<http://danbri.org/foaf.rdf>)
 G17(<http://eikeon.com/data>)
 G18(<http://eyaloren.org/foaf.rdf>)
 G19(<http://richa...iak.de/foaf.rdf>)
 G20(<http://dig.c...ajar/ajaw/data>)
 G21(<http://kuruman.org/foaf.rdf>)
 G22(<http://bbfll.../henry/card.rdf>)
 G23(<http://www.s...ByID.aspx?id=32>)

Mapping Terms to SW Objects

- Expanding textual description of SW objects



Thank You

- Welcome to Nanjing!