Linked Open Data A Step Towards a Semantic Web

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Hong Kong September 2010 "Developments in science and information processing have changed the meaning of the verb, 'to know.' It used to mean 'having information stored in one's memory.' It now means the process of having access to information and knowing how to use it."

---Herbert Simon

Status of the Semantic Web

- For years we have heard about it! Is it real?
- Where are the applications for it? Is there a "killer app?"
- Who is using it?
- What role (if any) will it play in the Future Web?

The Semantic Web is alive and well in Linked Open Data (LOD)!

Perceptions of Web Content

- The Web is generally thought of being composed of pages, documents
- We have been able to insert some data
 - Images
 - Multimedia
- Web 2.0 mashups provided a new way of thinking about a "Web of Data" but it was awkward to obtain
 - APIs
 - "Screen-scraping"

The Web of Documents

- Analogy
 - A global **filesystem**
- Designed for
 - Human consumption
- Primary objects
 - **Documents** (or sub-parts of)
- Links between
 - **Documents** (or sub-parts of)
- Degree of structure in objects
 - Fairly **low**
- Semantics of content and links
 - Implicit

The Web of Documents: Issues

- Simplicity
 - Loosely structured data, untyped links, disconnected data
- Integration
 - Show me all the publications from HKU PhD students in Computer Science
- Querying
 - Which papers have I written with colleagues outside the US?

The Web of Linked Documents





"Data Silos" on the Web



A World Wide Network of Data Silos



The Web of Linked Data

- Analogy
 - A global **database**
- Designed for
 - Machines first, humans later
- Primary objects
 - Things (or descriptions of things)
- Links between
 - Things
- Degree of structure in (descriptions of) things
 - High
- Semantics of content and links
 - Explicit



Linked Data is

- A way of publishing data on the Web that
 - Encourages reuse
 - Reduces redundancy
 - Maximizes its (real and potential) inter-connectedness
 - Enables network effects to add value to data

Linked Data Technology Stack

- URIs Universal Resource Indicators
- HTTP HyperText Transport Protocol
- RDF Resource Description Framework
- (RDFS/OWL) RDF Schema/Web Ontology Language

URIs – Not Just for Web Pages

- "A Uniform Resource Identifier (URI) provides a simple and extensible means for identifying a resource" – RFC 3986
- Many different schemes http://, ftp://, tel:, urn:, mailto:
- Some URIs for "real world" things
 - http://www.bebowhite.com/
 - http://dbpedia.org/page/University_of_Hong_Kong
 - http://sws.geonames.org/1819729/

HTTP

- Data access mechanism
- Using *http://* URIs to identify things allows people to reference these things

RDF

- A data format for describing things and their interrelationships
 - Standardized (XML)
 - Easily parsed by machines

FOAF: Friend of a Friend

- An RDF vocabulary for describing people:
 - Identities
 - Interests
 - Affiliations
 - Social networks
 - Etc.

```
<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:foaf="http://xmlns.com/foaf/0.1/"
    xmlns:admin="http://webns.net/mvcb/">
    </foaf:Person rdf:ID="me">
    </foaf:Person rdf:ID="me">
    </foaf:name>Bebo White</foaf:name>
    </foaf:title>Professor</foaf:title>
    </foaf:fiamily_name>Bebo</foaf:givenname>
    </foaf:family_name>White</foaf:family_name>
    </foaf:mbox_shalsum>52fd53a6f2cf0943e08992c0e600720a6fcfcc78</foaf:mbox_shalsum>
    </foaf:homepage rdf:resource="http://www.ecom-icom.hku.hk/home/welcome.asp"
    /></foaf:Person>
    </rdf:RDF>
```

Try it yourselfhttp://www.ldodds.com/foaf/foaf-a-matic

The RDF Data Model • Relationships between objects are described using *triples* Subject \rightarrow Predicate \rightarrow Object Bebo 🗲 workplaceHomePage HKU HKU → based_near Hong Kong → <uri> or "literal" <uri> <uri> \rightarrow



Data Merging with RDF

- Mix schemas/vocabularies within one document
- Less painful data merging
- Mashups that work the way they're supposed to!





Linked Data Principles

- Use URIs as names of things
 - Anything, not just documents
 - You are not your homepage
 - Information resources and non-information resources
- Use HTTP URIs
 - Globally unique names, distributed ownership
 - Allows people to look up those names
- Provide useful information in RDF
 - When someone looks up a URI
- Include RDF links to other URIs
 - To enable discovery of related information

Why Publish Linked Data?

- Ease of discovery
- Ease of consumption
 - Standards-based data sharing
- Reduced redundancy
- Added value
 - Build ecosystems around your data/content

The Linking Open Data Project

UNKINGOPENDATA W3C SWEO Community Project

The Linking Open Data Project

- Community project with W3C support
- Take existing open data sets
- Make them available on the Web in RDF
- Interlink them with other data sets
- Began in early 2007

The Free Encyclopedia

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Article Discussion

University of Hong Kong

From Wikipedia, the free encyclopedia (Redirected from University of hong kong)

The University of Hong Kong (or HKU, traditional Chinese: 香港大學) is the oldest tertiary institution in Hong Kong. Its motto is "Sapientia et Virtus" in Latin, meaning "wisdom and virtue", and "明徳格物" in Chinese. The official language of instruction is English.

The University is referred by Quacquarelli Symonds as a "world-class comprehensive research university" [2]. In 2009, it was ranked 24th in Quacquarelli Symonds' THES - QS World University Rankings^[3] and 1st in their Asian University Rankings.^[4]

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Coordinates: 🔘 22°17′03″N 114°08′16″E

The Univer	sity of Hong Kong 香港大學			
Coat of Arms of HKU				
MOTIO	Sapientia Et vinus (Latin) 明德格物 (Classical			
	Chinese) ^[1]			
Motto in English	Wisdom and Virtue			
Established	1911 (age 98–99)			
Туре	Public			
Chancellor	Sir Donald Tsang			
Vice-Chancellor	Tsui Lap-chee			
Students	23,400 (total)			
	/			

Read Edit View history

DBpedia

About: University of Hong Kong

An Entity of Type : <u>Public university</u>, from Named Graph : <u>http://dbpedia.org</u>, within Data Space : <u>dbpedia.org</u>

The University of Hong Kong is the oldest tertiary institution in Hong Kong. Its motto is "Sapientia et Virtus" in Latin, meaning "wisdom and virtue", and "明德格物" in Chinese. The official language of instruction is English. The University is referred by Quacquarelli Symonds as a "world-class comprehensive research university" and was ranked 24th in the 2009 THES - QS World University Rankings, making it 2nd in Asia. In 2009, it was ranked the 1st in Asian universities by Quacquarelli Symonds.

Property	Value
dbpedia-owl:abstract	The University of Hong Kong is the oldest tertiary institution in Hong Kong. Its motto is "Sapientia et Virtus" in Latin, meaning "wisdom and virtue", and "明徳格物" in Chinese. The official language of instruction is English. The University is referred by Quacquarelli Symonds as a "world-class comprehensive research university" and was ranked 24th in the 2009 THES - QS World University Rankings, making it 2nd in Asia. In 2009, it was ranked the 1st in Asian universities by Quacquarelli Symonds. Die Universität Hongkong (engl. The University of Hong Kong, chinesisch 香港大學) ist eine englischsprachige und die älteste Hochschule in der chinesischen Stadt Hongkong. Sie liegt im Westen der eigentlichen Insel Hongkong. La Universidad de Hong Kong es la más antigua institución de educación superior en Hong Kong. Su lema es "Sapientia et virtus" en latín, que significa "la sabiduría y la virtud", "明徳格物" en chino. El idioma oficial de enseñanza es el Inglés. La Universidad es segun Quacquarelli Symonds una "universidad de investigación comprensivoa de clase mundial" y ocupó el puesto 24 en el 2009 THES - QS World University Rankings, por lo que es la 2º en Asia (después de la Universidad de Tokio). En 2009, fue clasificada como la 1 ª en las universidades asiáticas por Quacquarelli Symonds. HKU también se incluyó en el ranking del 2006 de Newsweek de las 100 mejores universidades mundiales. L'Université de Hong Kong est une université de langue anglaise et la plus vieille institution d'études supérieures dans la Région Administrative Spéciale de Hong Kong. Sa devise est, en latin, Sapientia et Virtus et, en chinois, 明徳格物, ce qui peut se traduire par sapience et vertu. L'université est traditionnellement considérée comme l'une des meilleures de l'Asie. En 2008, le Times Higher Education Supplement lui accorde un le rang de 26 au monde.

Geonames

Geonames

Geonames

▼http://sws.geonames.org/1819728/about.rdf 🗟 🍪 📢 🚕 🚆 🎹

http://sws.geonames.org/1819728/	country Code feature Class feature Code in Country location Map name nearby Features parent Feature wikipedia Article	HK S S.UNIV HK http://www.geonames.org/1819728/the-university-of-hong-kong.html The University of Hong Kong http://sws.geonames.org/1819728/nearby.rdf http://sws.geonames.org/1819730/ http://de.wikipedia.org/wiki/Universitāt_Hongkong http://de.wikipedia.org/wiki/Universitāt_Hongkong http://en.wikipedia.org/wiki/Université_de_Hong_Kong http://fr.wikipedia.org/wiki/Ta港大學
http://sws.geonames.org/1819728/about.rdf	type sameAs lat long attribution Name attribution URL license Date Created Date Modified type	Feature http://dbpedia.org/resource/University_of_Hong_Kong 22.2815217614718 114.139065742493 GeoNames http://sws.geonames.org/1819728/ http://creativecommons.org/licenses/by/3.0/ 2006-01-15 2008-04-09 Feature

Find All

😻 HM Government

What are you looking for?

Search

🔩 Data | <u>view all publishers</u>

The Linked Open Data Cloud

180 datasets, 20 billion RDF triples

Why is Linked Open Data Important?

- Because in many cases <u>it's our data</u>!
- Efficiency, reducing redundancy
- Promotes a digital society
- Opens the door to data innovation and discovery
- Holds the promise of creating from data
 - Knowledge
 - Wisdom
 - Benefit for all

Thank You for Your Attention!

Questions? Comments? bebo@slac.stanford.edu