

Linked Data

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Linked Data Principles

What Is Linked Data?

A method of publishing structured data
so that it can be interlinked
and become more useful.

Builds upon standard Web technologies
such as HTTP and URIs
to share information
in a way that can be read automatically by computers.

[from Wikipedia](#)

Ingredients

- HTTP & URIs
- RDF
- Vocabularies (RDF Schema, OWL)
- You

Linked Data Principles

http://youtu.be/OM6XIIcm_qo

- 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, using the standards (RDF*, SPARQL)
- Include links to other URIs so that they can discover more things



Tim Berners-Lee
<http://www.w3.org/DesignIssues/LinkedData.html>

Principle 1:

Use URIs as names for things

Principle 2:

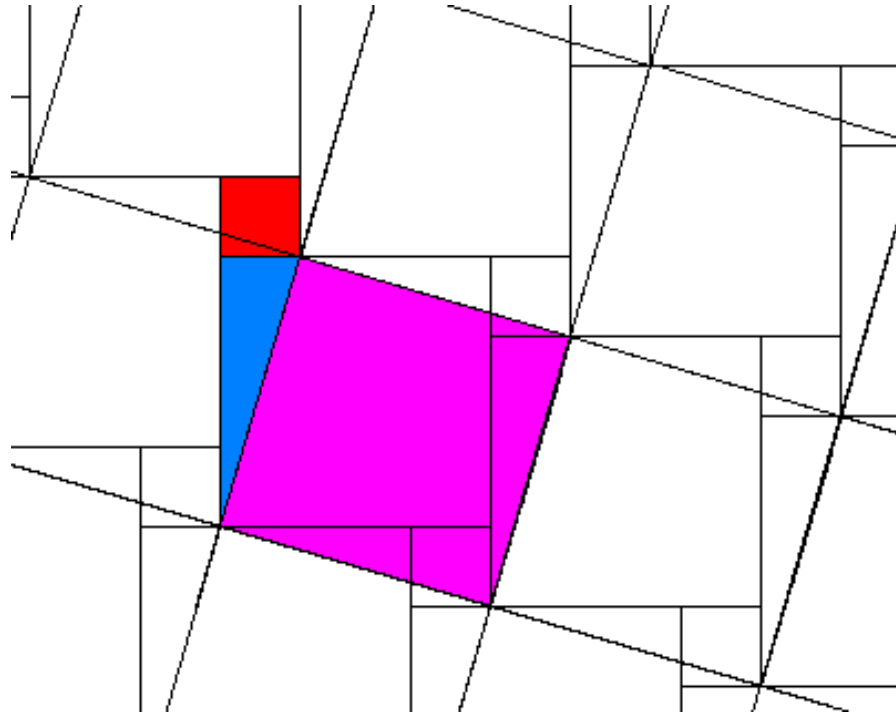
Use HTTP URIs so that people
can look up those names

Can USC Have a URI?



http://dbpedia.org/page/University_of_Southern_California

Can the Pythagoras Theorem Have a URI?



http://www.freebase.com/view/en/pythagorean_theorem

My Dog: Can He Have a URI?



<http://szekelys.com/diego>

Principle 3:

When someone looks up a URI,
provide useful information, using
the standards (RDF*, SPARQL)

http://dbpedia.org/page/University_of_Southern_California

About: University of Southern California

An Entity of Type: [Private university](#), from Named Graph: [http://dbpedia.org](#), within Data Space: [dbpedia.org](#)

The University of Southern California (USC) is a private, not-for-profit, nonsectarian, research university located in Los Angeles, California, USA. USC was founded in 1880, making it California's oldest private research university. USC's four year, full-time undergraduate program enrolled 17,380 undergraduate students in Fall 2010. USC is also home to 19,516 graduate and professional students in a number of different programs, including business, law, social work, and medicine.

Property	Value
dbpedia-owl:abstract	<div><ul style="list-style-type: none">The University of Southern California (USC) is a private, not-for-profit, nonsectarian, research university located in Los Angeles, California, USA. USC was founded in 1880, making it California's oldest private research university. USC's four year, full-time undergraduate program enrolled 17,380 undergraduate students in Fall 2010. USC is also home to 19,516 graduate and professional students in a number of different programs, including business, law, social work, and medicine. The university has a "very high" level of research activity and received \$463.7 million in sponsored research from 2008 to 2009. USC was named "College of the Year 2009" by the editors of Time and The Princeton Review for the university's extensive community-service programs. USC students hail from 112 countries, and all 50 states in the United States. USC sponsors a variety of intercollegiate sports and competes in the NCAA Pacific-12 Conference. Members of the sports teams, the Trojans, have won 93 NCAA team championships, ranking them third in the nation, and 361 NCAA individual championships, ranking them second in the nation. Trojan athletes have won 236 medals at the Olympic games. The cost of attendance at USC is comparable to other leading private research universities, at around \$57,876 per year as of the 2011–2012 academic year, including tuition, room and board, and other expenses. Twenty-four percent of the entering freshman class received a merit-based scholarship from USC. Over 60 percent received need-based financial assistance. Many received both.Die University of Southern California – auch bekannt unter dem Kürzel USC – ist die älteste Privatuniversität in Kalifornien. Sie hat ihren Sitz in Los Angeles. Die USC ist Mitglied der Association of American Universities, einem seit 1900 bestehenden Verbund führender forschungsintensiver nordamerikanischer Universitäten.La Universidad del Sur de California (en inglés University of Southern California, normalmente abreviado como USC, SC o Southern California, es una universidad privada situada en el centro de Los Angeles, California. Fue fundada en 1880, lo que la convierte en la primera universidad privada de investigación en California. USC es una de las universidades más selectivas del país. En 2006 solamente 27000 alumnos consiguieron matricularse, de entre 34000 que lo intentaron. Estando establecida en el centro de una ciudad cosmopolita, USC es una de las instituciones educativas más diversas, con estudiantes de los 50 estados de EE. UU., así como de más de 115 países. Aparte de sus méritos académicos, USC es reconocida como una de las mejores universidades en el ámbito deportivo, contando en sus vitrinas con el segundo mayor número de títulos de campeonatos universitarios, con 106, así como 86 trofeos de la NCAA. El equipo deportivo más reconocido de los Trojans es el de fútbol americano, que recientemente ganó los campeonatos nacionales de 2003 y 2004.Etelä-Kalifornian yliopisto on vuonna 1880 perustettu yksityinen yliopisto, joka sijaitsee Los Angelesissa. Yhdysvaltojen parhaimpien korkeakoulujen listalla UCS on sijalla 26. Koulussa on noin 16 600 opiskelijaa.L'University of Southern California (comunemente chiamata USC), situata nel University Park vicino a Los Angeles, California, USA, è stata fondata nel 1880, rendendola la più antica università privata degli Stati Uniti d'America. U.S. News & World Report colloca USC come la 27esima università nella classifica 2008 dell'America's Best Colleges", riconosciuta anche come una delle più selettive università con solo 8.364 studenti degli oltre 34.000 applicanti ammessi nel 2006. Secondo il profilo della matricole del 2007, il 18% delle ammissioni erano associate a legacy preferences, cioè al titolo di preferenza concessa ai parenti di ex studenti dell'università. USC è stata anche nominata nel 2000 "College dell'anno" da TIME magazine e dal Princeton Review per i notevoli servizi offerti alla comunità universitaria. Collocata nel cuore in una città globale come Los Angeles, USC registra il più alto numero negli Stati Uniti di nazionalità tra i suoi studenti, provenienti da tutti i 50 stati americani e oltre 115 paesi. USC è anche casa di vincitori del Premio Nobel come il chimico Prof. George Olah, direttore del Loker Hydrocarbon Research Institute. Dall'anno 2005 è sede della USC Shoah Foundation Institute, fondazione creata da Steven Spielberg, per la raccolta delle testimonianze audio-video dei sopravvissuti della Shoah. USC è il più grande datore di lavoro privato di Los Angeles ed il terzo più grande nello stato della California, ed è responsabile per 4 miliardi di dollari di profitto nel Los Angeles County: gli studenti di USC spendono \$406 milioni all'anno nell'economia locale ed i visitatori del campus aggiungono altri \$12.3南カリフォルニア大学 (University of Southern California, 略称: USC) は1880年に設立された私立大学。アメリカ合衆国カリフォルニア州ロサンゼルスにある。De University of Southern California, ook wel bekend als USC, werd opgericht in 1880 en is daarmee Californië's oudste particuliere onderzoeksuniversiteit. USC ligt in het stedelijke centrum van Los Angeles. Een grote rivaliteit bestaat er tussen USC en stadsgeenoot UCLA. Bestand:Internet-web-browser. svg 34° 1' 13" N, 118° 17' 8" WUniversity of Southern California (forkortet USC) er et privat universitet i Los Angeles i delstaten California, USA. Det ble opprettet i 1880 og er delstatens eldste private forskningsuniversitet. Både TIME Magazine og Princeton Review kåret det til «College of the Year 2000». Nobelprisvinneren György A. Olah forsker her. Anerkjente forskningsfelt er blant annet fysikk, kjemi og mikroelektronikk. Lærestedet samarbeider imedisin med Jiao Tong Universitetet i Shanghai. Tidligere studenter omfatter Neil Armstrong, Warren Christopher, George Lucas, Norman Schwarzkopf, John Wayne og Forest Whitaker. Skolene og fakultetene omfatter: The College of Letters, Arts, and Sciences School of International Relations The Graduate School USC Center for Visual Anthropology USC Jane Goodall Research Center The Professional Schools USC School of Architecture Marshall School of Business USC Leventhal School of Accounting USC School of Cinematic Arts Division of Animation and Digital Arts USC Interactive Media Division/Interactive Media Division Institute for Multimedia Literacy Summer Film Program USC Annenberg School for Communication Annenberg Center for Communication USC School of Dentistry USC Rossier School of Education USC Viterbi School of Engineering USC Roski School of Fine Arts USC Leonard Davis School of Gerontology USC Gould School of Law Keck School of Medicine of USC USC Thornton School of Music USC School of Pharmacy USC School of Policy, Planning, and Development USC School of Social Work USC School of Theatre Ved universitetet var det 33.389 studenter og 2.570 vitenskapelig ansatte i 2006, og samme året var skolepengene USD 33.892. Studene gis opp til doktorgradsnivå. Bibliotekene ved USC har nærmere 4 millioner boktitler.University of Southern California (University of Południowej Kalifornii, USC) - uczelnia wyższa o statusie świeckiego uniwersytetu prywatnego, z siedzibą w Los Angeles w stanie Kalifornia. Powstała w 1880 roku. Obecnie USC kształci ok. 34,8 tysiąca studentów, w tym ok. 16,8 tysiący słuchaczy studiów licencjackich oraz 18 tysięcy magistrantów i doktorantów. Uczelnia zatrudnia ok. 10,8 tysiąca osób, w tym ok. 4700 pracowników naukowych. Uniwersytet należy do Pacific-10 Conference. Jego drużyny sportowe występują jako USC Trojans. Uczelnia dysponuje halą sportową na ponad 10 tysięcy widzów (Galen Center). Jej zespół futbolu amerykańskiego rozgrywa swoje mecze na Los Angeles Memorial Coliseum (stadion olimpijski z lat 1932 i 1984). Jak dotąd, 362 jej studentów i absolwentów wzięło udział w igrzyskach olimpijskich, zdobywając 112 złotych, 66 srebrnych i 58 brązowych medali.A Universidade do Sul da Califórnia é uma universidade privada localizada em Los Angeles, no estado norte-americano da Califórnia. Foi fundada em 1880. Passaram por esta universidade algumas pessoas notáveis como George Lucas, Paul Frommer, John Wayne, Frank Gehry, Neil Armstrong, Matt Reeves e O. J. Simpson. Atualmente tem como aluno o baixista Flea, da banda Red Hot Chili Peppers.南加州大学 (Template:Lang- 南加州大学), 简称南加大, 位於加州洛杉磯市中心, 由監理會於1880年創立, 是加州最古老的私立研究型大學。根據南加大為2005年準新生預備的入學申請文件所引的資料, 南加大已成為全國最具競爭力的大學之一, 全美大學排名第27名。其中电影学院全美排名第一, 工程学院全美排名第八。在2006年, 34,000申請者中只錄取2700名學生。南加大於2000年獲時代雜誌(Time Magazine)選為年度風雲大學(College of the Year), 以及獲得Princeton Review對大學的廣泛社會服務課程。根據卡內基教育基金會2005年公布的大學分類, 南加大被歸類為特高研究型大學(very high research activity)。在美國4,383所高等學府中, 只有96所獲得此項分類。南加大亦是新近諾貝爾化學獎得主, 洛克菲勒研究所所長George Olah教授的工作處。南加大也是少數同時擁有兩座由國家科學基金會(NSF)提供資金成立的工程研究中心(ERC)- 專門研究網路及多媒體的綜合多媒體系統中心(IMSC) 以及 微電子生物系統中心(BMES)。此外, 南加大被美國流土安全部選為第一所流土安全卓越中心。南加大是洛杉磯地區重要企業業主, 每年在洛杉磯都會提供40億美元的經濟輸出,而南加大的學生每年在地土花費則高達4億6百萬美元和造訪校園的遊客則提供了另外的1千2百30萬美元的花費。南加大最近的慶祝活動中, 為學校慶典29個美元, 是美國高等教育歷史上所獲得的第二高總籌款額。這使南加大及其合作伙伴可在短期內完成興建27幢新大樓, 為學生提供超過75萬平方米的活動、科學研究、教學及醫療空間。南加大的體育成績亦很彪炳, 它是美國所有大學中曾奪得第二多冠軍獎的大學, 總共獲得104個冠軍。University of Southern California, USC, är ett privat universitet i Los Angeles i Kalifornien i USA. USC grundades 1880, vilket gör det till det äldsta privata universitetet i södra Kalifornien. Campusområdet är beläget nära downtown Los Angeles. Nobelpristagaren i kemi år 1994, professor George Olah, verkar vid USC. Förste mannen på månen, Neil Armstrong, har tagit en civilingenjörsexamen (Masters of Science) på lärosätet. Universitetet Южної Каліфорнії (англ. University of Southern California, skorp. USC, Southern California eller Southern Cal) — частный исследовательский университет, расположен по соседству с Парком Лос-Анджелеса, Калифорния, США. УЮК был основан в 1880 году и является самым старым частным университетом Калифорнии. В 2007 году в университете обучалось 16 384 студента и 17 024 аспирантов, 4 676 бакалавров и 5 380 специалистов. Четырёхлетняя программа, считается одной из самых напряжённых и насыщенных, и одной из лучших, по мнению «Фонда Карнеги». 2007 году среди поступивших в университет, 18 % поступили потому что их родители учились там же. В университете учатся студенты из всех штатов США и более чем из 115 стран мира. УЮК имеет в штате более 8 000 сотрудников. Также в университете хорошо развита научная исследовательская деятельность, в 2007 году на развитие было потрачено \$484,6 миллиона.Fichier:052607-016-BovardHall-USC.jpg Bovard Administration Building Fichier:052607-014-DohenyLibrary-USC.jpg The Edward L. Doheny Jr. Memorial Library (Doheny Library) Fichier:052607-019-MuddHall-USC.jpg Mudd Hall of Philosophy Fichier:052607-018-School of Engineering.jpg USC Viterbi School of Engineering L'université de Californie du Sud (en anglais, University of Southern California, USC) est une université américaine privée située à Los Angeles. L'université a été fondée en 1880. Elle est considérée comme l'une des plus sélectives des États-Unis. Son budget est de 2,74 milliards de dollars . Dans le domaine sportif, les USC Trojans défendent les couleurs de l'université de Californie du Sud.</div>

[dbpedia-owl:affiliation](#)

- [dbpedia:Pacific-12_Conference](#)
- [dbpedia:Association_of_American_Universities](#)
- [dbpedia:Mountain_Pacific_Sports_Federation](#)
- [dbpedia:American_Collegiate_Hockey_Association](#)

[dbpedia-owl:athletics](#)

[dbpedia-owl:campus](#)

[dbpedia-owl:city](#)

[dbpedia-owl:country](#)

[dbpedia-owl:endowment](#)

[dbpedia-owl:facultySize](#)

[dbpedia-owl:mascot](#)

[dbpedia-owl:motto](#)

- [dbpedia:Urban_area](#)
- [dbpedia:Los_Angeles](#)
- [dbpedia:United_States](#)
- [2.948E9](#)
- [4735](#) (xsd:integer)
- [Traveler](#)
- [Let whoever earns the palm bear it](#)
- [Palman qui meruit ferat](#)

[dbpedia-owl:numberOfPostgraduateStudents](#)

[19516](#) (xsd:integer)

[dbpedia-owl:numberOfStudents](#)

[36896](#) (xsd:integer)

[dbpedia-owl:numberOfUndergraduateStudents](#)

[17380](#) (xsd:integer)

[dbpedia-owl:officialSchoolColour](#)

[USC Cardinal & USC Gold](#)

[dbpedia-owl:president](#)

[dbpedia:C...L...Max_Nikias](#)

[dbpedia-owl:staff](#)

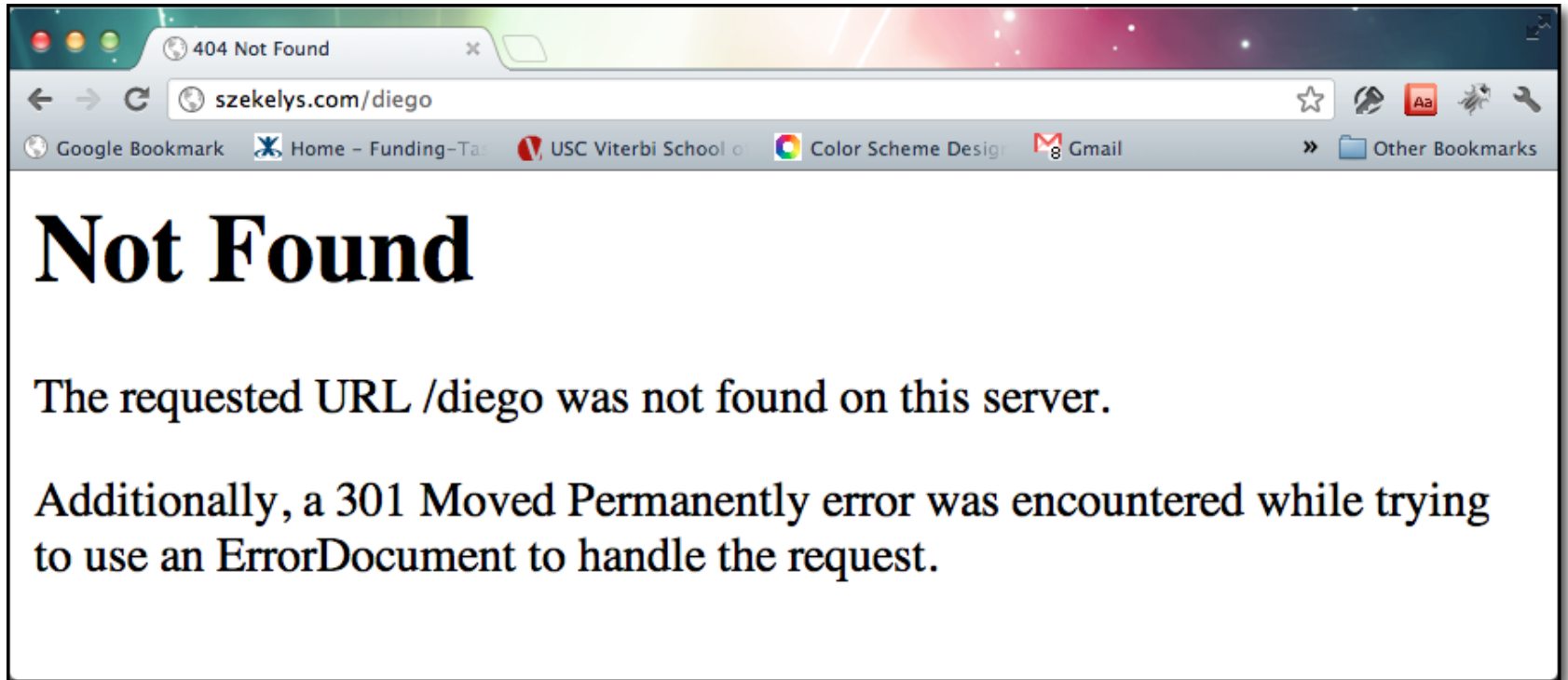
[10774](#) (xsd:integer)

[dbpedia-owl:state](#)

[dbpedia:California](#)

A screenshot of a web browser window displaying an RDF file. The browser's address bar shows the file path: `en.pythagorean_theorem`. The status bar at the bottom indicates the file is encoded in UTF-8, contains 24,749 characters, and is 2,283 lines long. The main content area shows the RDF file's structure, starting with a XML declaration and an RDF namespace. It includes various properties like `cc:attributionName`, `fb:parentConcept`, and `owl:sameAs` linking to related concepts and theorems. The file ends with a license statement and type declarations.

http://szekelys.com/diego



~~Principle 3:~~

~~When someone looks up a URI,
provide useful information, using
the standards (RDF*, SPARQL)~~

Principle 4:

Include links to other URIs so that they can discover more things

http://szekelys.com/diego

```
@prefix rdf:                <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dbpprop:<http://dbpedia.org/property/> .
@prefix dbpedia:          <http://dbpedia.org/resource/> .
@prefix dbpedia-owl:      <http://dbpedia.org/ontology/> .
@prefix fb:               <http://rdf.freebase.com/ns/> .
```

http://szekelys.com/diego

<code>rdf:type</code>	<code>"Dog" ;</code>
<code>http://szekelys.com/name</code>	<code>"Diego" ;</code>
<code>dbpedia-owl:species</code>	<code>"Labrador Retriever" ;</code>
<code>dbprop:country</code>	<code>"Canada" ;</code>
<code>dbprop:color</code>	<code>"Yellow" ;</code>
<code>fb:base.petbreeds.dog_size.gender</code>	<code>"Male" .</code>

Linked Data?

http://szekelys.com/diego

```
@prefix rdf:                <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dbpprop:<http://dbpedia.org/property/> .
@prefix dbpedia:          <http://dbpedia.org/resource/> .
@prefix dbpedia-owl:      <http://dbpedia.org/ontology/> .
@prefix fb:               <http://rdf.freebase.com/ns/> .
```

http://szekelys.com/diego

rdf:type

http://szekelys.com/name

dbpedia-owl:species

dbprop:country

dbprop:color

fb:base.petbreeds.dog_size.gender

~~"Dog" ;
"Diego" ;
"Labrador Retriever" ;
"Canada" ;
"Yellow" ;
"Male" .~~

Not Linked Data

http://szekelys.com/diego

@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dbpprop:<http://dbpedia.org/property/> .
@prefix dbpedia: <http://dbpedia.org/resource/> .
@prefix dbpedia-owl: <http://dbpedia.org/ontology/> .
@prefix fb: <http://rdf.freebase.com/ns/> .

http://szekelys.com/diego

rdf:type

http://szekelys.com/name

dbpedia-owl:species

dbprop:country

dbprop:color

fb:base.petbreeds.dog_size.gender

dbpedia:Dog ;

"Diego" ;

dbpedia:Labrador Retriever ;

dbpedia:Canada ;

dbpedia:Yellow ;

fb:en.male"/> .

Principle 4:

Include links to other URIs so that
they can discover more things

http://szekelys.com/diego

@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dbpprop:<http://dbpedia.org/property/> .
@prefix dbpedia: <http://dbpedia.org/resource/> .
@prefix dbpedia-owl: <http://dbpedia.org/ontology/> .
@prefix fb: <http://rdf.freebase.com/ns/> .

http://szekelys.com/diego

~~rdf:type~~

~~http://szekelys.com/name~~

dbpedia-owl:species

dbprop:country

dbprop:color

fb:base.petbreeds.dog_size.gender fb:en.male"/> .

dbpedia:Dog ;

"Diego" ;

dbpedia:Labrador Retriever ;

dbpedia:Canada ;

dbpedia:Yellow ;

Principle 3:

When someone looks up a URI, provide **useful information**, using the standards (RDF*, SPARQL)

http://szekelys.com/diego

```
@prefix rdf:                <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix dbpprop:<http://dbpedia.org/property/> .
@prefix dbpedia:          <http://dbpedia.org/resource/> .
@prefix dbpedia-owl:      <http://dbpedia.org/ontology/> .
@prefix fb:               <http://rdf.freebase.com/ns/> .
@prefix foaf:             <http://xmlns.com/foaf/0.1/> .
```

http://szekelys.com/diego

rdf:type

foaf:name

dbpedia-owl:species

dbprop:country

dbprop:color

fb:base.petbreeds.dog_size.gender fb:en.male"/> .

dbpedia:Dog ;

"Diego" ;

dbpedia:Labrador Retriever ;

dbpedia:Canada ;

dbpedia:Yellow ;

foaf is a widely used vocabulary

friend of a friend

Now we know what linked data is

What can go wrong?

Different URIs For the Same Thing

<http://data.nytimes.com/N13611972026987463463>

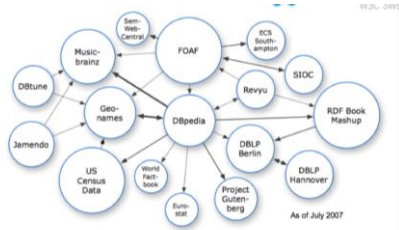
http://dbpedia.org/resource/Muhammad_Ali

[http://mpii.de/yago/resource/Muhammad Ali](http://mpii.de/yago/resource/Muhammad_Ali)

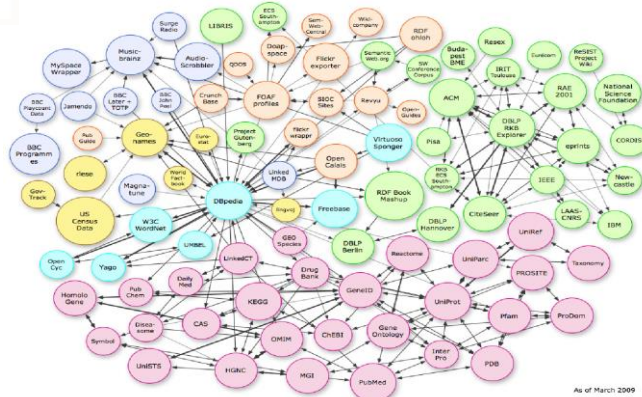
Linked Data Challenges

- Different URIs for the same thing
 - ... makes it harder to link the data
- Timeliness
 - ... not up to date
- Provenance
 - ... not only a linked data problem
- Tools
 - ... slow performance compared to traditional data
 - ... search engines not yet mature
 - ... many RDF formats, not supported by all tools

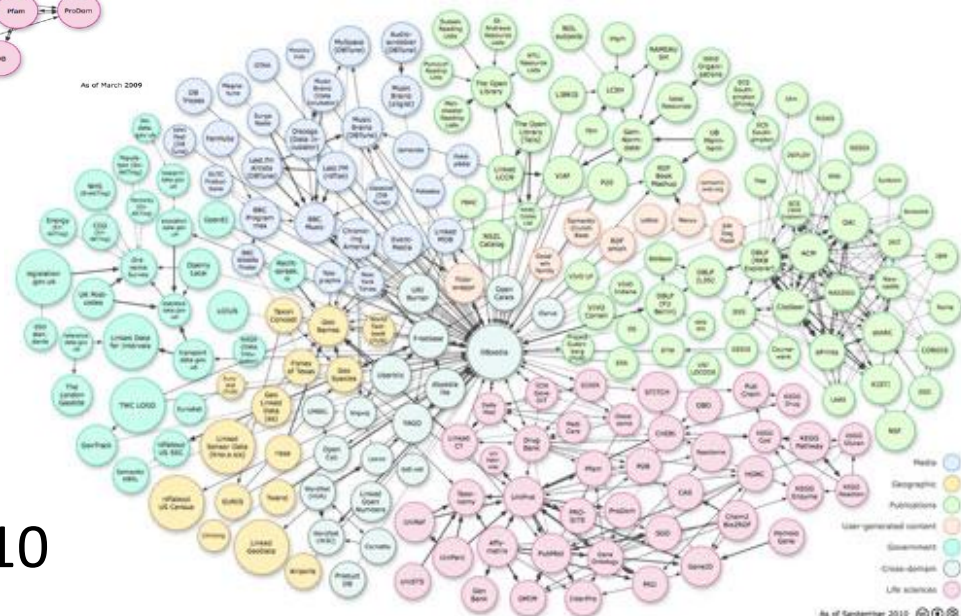
Getting Bigger Every Day



July 2007



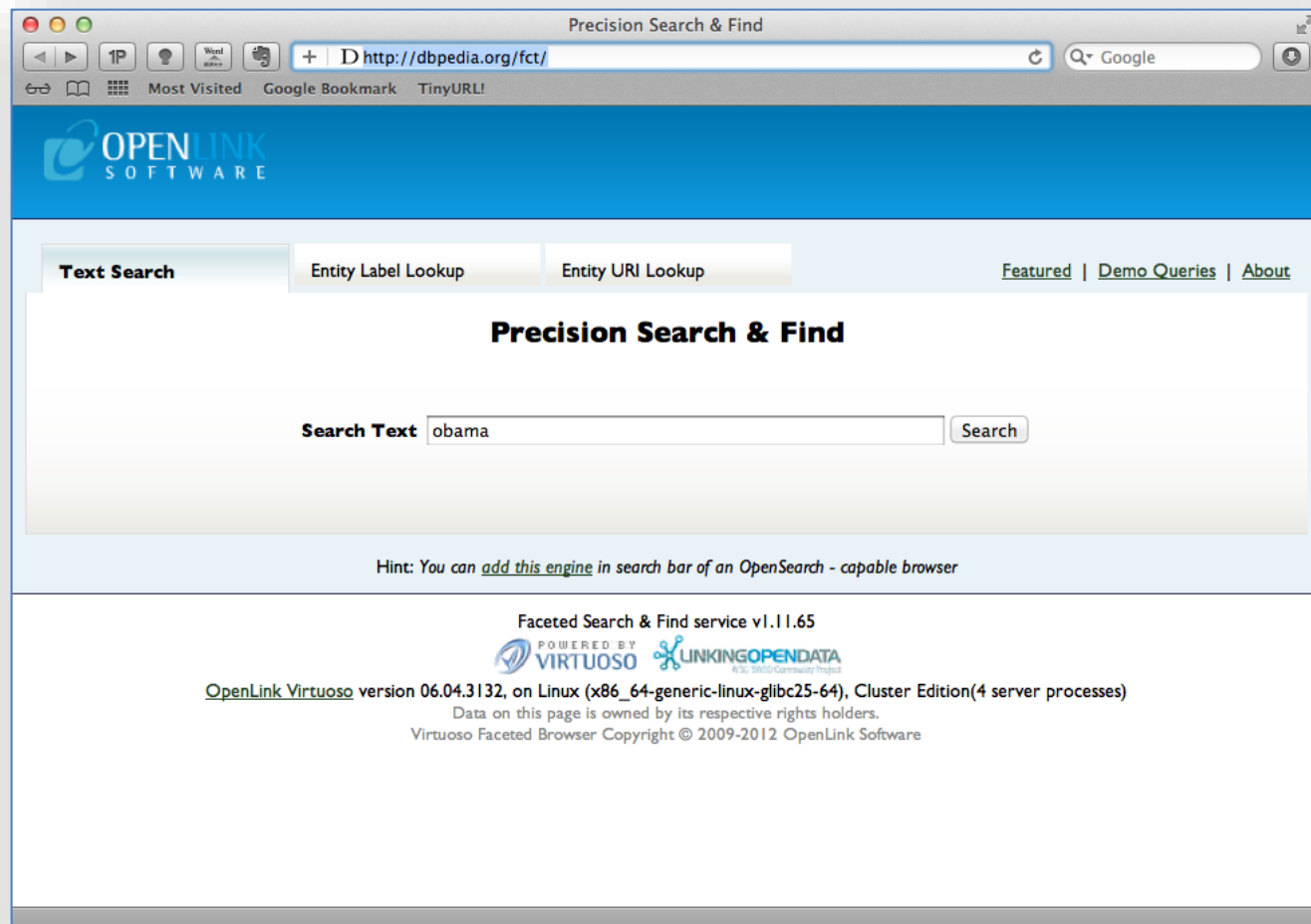
March 2009



September 2010

Working with Linked Data

OPENLINK Browser



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

OPENLINK: Results

The screenshot displays the OpenLink Virtuoso web interface. The browser window title is "About: Los Angeles". The address bar shows the URL: <http://dbpedia.org/describe/?url=http%3A%2F%2Fdbpedia.org%2Fres>. The page features a blue header with the "OPENLINK SOFTWARE" logo and navigation tabs: "Facets", "Description", "Metadata", and "Settings".

The main content area is titled "About: Los Angeles" with links for "Sponge" and "Permalink". It states: "An Entity of Type : [GeoclassPopulatedPlace](#), within Data Space : [dbpedia.org](#)". Below this, a dropdown menu shows "Type: yago:GeoclassPopulatedPlace" and a "Constrain facet" button. A QR code is visible on the right.

A text box contains the following description: "Los Angeles, with a population at the 2010 United States Census of 3,792,621, is the most populous city in California and the second most populous in the United States, after New York City, on a land area of 468.67 square miles (1,213.8 km), and is located in the southern region of the state."

The "Attributes" section lists various properties and their values:

- is sameAs of**: http://www4.wiwiiss.fu-berlin.de/flickrwrapp/photos/Los_Angeles, [yago-res:Los_Angeles](#)
- is Bild of**: [Lovell House](#), [John C. Fremont Branch Library, Los Angeles](#), [Carroll Avenue](#)
- is premiere place of**: [Chapter Two \(play\)](#), [California Suite](#), [Children of a Lesser God \(play\)](#), [Underneath the Lintel](#), [Be Like Water](#), [»more»](#)
- is home town of**: [The Bangles](#), [NOFX](#), [Spock's Beard](#), [L7 \(band\)](#), [Los Angeles Philharmonic](#), [»more»](#)

At the bottom, a red oval highlights the "Alternative Linked Data Views" section, which includes links for [SPARQL](#), [ODE](#), [Raw Data in: CXML](#), [CSV](#), [RDF \(N-Triples\)](#), [N3/Turtle](#), [JSON XML](#), [OData \(Atom JSON\)](#), [Microdata \(JSON HTML\)](#), and [JSON-LD](#).

The footer contains the following text: "OpenLink Virtuoso version 06.04.3132, on Linux (x86_64-generic-linux-glibc25-64), Cluster Edition(4 server processes). Data on this page belongs to its respective rights holders. Virtuoso Faceted Browser Copyright © 2009-2012 OpenLink Software".

OPENLINK: iSPARQL

The screenshot shows the iSPARQL Query Execution interface. The browser address bar displays the URL: http://dbpedia.org/isparql/view/?query=define%20sql%3Adescribe-mode%20%22CBD%22%20DESCRIBE%20%3Chttp%3A%2F%2Fdbpedia.org%2Fresource%2FLos_Angelos%3E&resultview=browser. The interface includes tabs for Precision Search & Find, About: Los Angeles, iSPARQL Query Execution, and OpenLink Data Explorer. The main content area shows a SPARQL query result for 'Los Angeles'. The result is displayed in a table with columns: #, Subject, Predicate, and Object. The table contains 20 rows of results, including URIs and descriptive text. The first row is highlighted in yellow.

#	Subject	Predicate	Object
1	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://schema.org/Place
2	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://umbel.org/umbel/rc/City
3	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://umbel.org/umbel/rc/Populated
4	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.w3.org/2002/07/owl#Thing
5	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://schema.org/City
6	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://www.opengis.net/gml/Feature
7	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://umbel.org/umbel/rc/Village
8	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/class/yago/County
9	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/class/yago/Geocla
10	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://umbel.org/umbel/rc/Location
11	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/ontology/Populate
12	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/class/yago/Cities
13	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/class/yago/Popula
14	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/ontology/Settleme
15	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/class/yago/HostC
16	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/ontology/Place
17	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/1999/02/22-rdf-syntax-ns#type	http://dbpedia.org/ontology/City
18	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/2002/07/owl#sameAs	http://rdf.freebase.com/ns/m/030qb
19	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/2000/01/rdf-schema#comment	Los Angeles, è un'importante città dell'America. Insieme a New York è la città più importante economicamente, culturalmente, cinematograficamente (cinque mesi prima che la California diventasse uno stato).
20	http://dbpedia.org/resource/Los_Angelos	http://www.w3.org/2000/01/rdf-schema#comment	Los Angeles (ofte forkortet LA, fullt navn Los Angeles) er en by i California på vestkysten av USA. Los Angeles er den største byen i California med et innbyggertall på 4 097 340, mens Los Angeles County har et innbyggertall på 10 000 000. Los Angeles er også den største byområdet i USA.

http://dbpedia.org/isparql/view/?query=define%20sql%3Adescribe-mode%20%22CBD%22%20DESCRIBE%20%3Chttp%3A%2F%2Fdbpedia.org%2Fresource%2FLos_Angelos%3E&resultview=browser

OPENLINK: ODE

OpenLink Data Explorer

linkeddata.uriburner.com/ode/?uri=http%3A%2F%2Fdbpedia.org%2Fresource%2FJos_Angela

OpenLink SOFTWARE Data Explorer

http://dbpedia.org/resource/John_Singer_Sargent

What Where When Who Images Grid view Tag Cloud SVG Graph Navigator Custom

This view shows all RDF data grouped by subject resource.

Cache Total 261 triples All: Check Uncheck Invert Sel Purge Refresh Permalink

John Singer Sargent - 261 triples - Remove Refresh Permalink

Order By Resource Category

[rdf:type](#), [wdrs:describedby](#), [opl:hasNamespacePrefix](#), [dbpprop:influenced](#), [dbpedia-owl:influenced](#), [dbpedia-owl:influencedBy](#), [owl:sameAs](#), [rdfs:label](#), [foaf:name](#), [dbpprop:name](#), [foaf:topic](#), [foaf:depiction](#), [foaf:givenName](#), [rdfs:comment](#), [dcterms:subject](#), [foaf:surname](#), [foaf:isPrimaryTopicOf](#), [dbpedia-owl:birthPlace](#), [dbpprop:dateOfBirth](#), [dbpedia-owl:training](#), [dbpedia-owl:wikiPageExternalLink](#), [dbpprop:influencedBy](#), [dbpprop:hasPhotoCollection](#), [dbpprop:birthPlace](#), [dbpprop:dateOfDeath](#), [dbpprop:deathPlace](#), [dbpprop:field](#), [dbpedia-owl:abstract](#), [dbpedia-owl:deathPlace](#), [dbpedia-owl:birthDate](#), [dbpedia-owl:deathDate](#), [dbpedia-owl:thumbnail](#), [dbpedia-owl:individualisedPnd](#), [dbpprop:placeOfBirth](#), [void:spatialEndpoint](#), [dbpprop:caption](#), [dbpprop:nationality](#), [dbpprop:birthDate](#), [dbpprop:deathDate](#), [dbpprop:training](#), [dbpprop:works](#), [dbpprop:signature](#), [dbpprop:imagesize](#), [dbpprop:background](#), [dbpprop:placeOfDeath](#), [dbpprop:wordnet_type](#), [dbpprop:wikiPageUsesTemplate](#), [wasDerivedFrom](#), [foaf:primaryTopic](#), [dbpedia-owl:wikiPageDisambiguates](#), [dbpprop:artist](#), [dbpedia-owl:wikiPageRedirects](#), [plac:container_of](#), [dc:title](#), [opl:isDescribedUsing](#), [inDataset](#), [formats:media_type](#), [prv:usedData](#), [prv:retrievedBy](#), [prv:accessedService](#), [prv:performedAt](#), [prv:performedBy](#)

27 records (258 triples, 115 properties) match selected filters.
To enable grouping, order records by some value.
Page: 1 2

1.1

rdf:type opl:DataSource
wdrs:describedby proxy:entity/http/dbpedia.org/resource/John_Singer_Sargent
opl:hasNamespacePrefix dc

terms

rdf:type opl:DataSource
wdrs:describedby proxy:entity/http/dbpedia.org/resource/John_Singer_Sargent
opl:hasNamespacePrefix dcterms

22-rdf-syntax-ns

rdf:type opl:DataSource
wdrs:describedby proxy:entity/http/dbpedia.org/resource/John_Singer_Sargent
opl:hasNamespacePrefix rdf

<http://linkeddata.uriburner.com/ode/>

DBPedia SPARQL Endpoint

The screenshot shows the Virtuoso SPARQL Query Editor web interface. The browser's address bar displays `http://dbpedia.org/sparql`. The page title is "Virtuoso SPARQL Query Editor". Below the title, there are links for "About", "Namespace Prefixes", "Inference rules", and "iSPARQL". The "Default Data Set Name (Graph IRI)" field contains `http://dbpedia.org`. The "Query Text" area contains the following SPARQL query:

```
select distinct ?s ?o where {  
  ?s rdf:type <http://dbpedia.org/ontology/Place>.  
  ?s dbpprop:website ?o .  
  ?s <http://dbpedia.org/ontology/isPartOf> <http://dbpedia.org/resource/California>  
} LIMIT 500
```

Below the query text, there is a note: "(Security restrictions of this server do not allow you to retrieve remote RDF data, see [details](#)).". The "Results Format" is set to "HTML" (with a dropdown arrow), and a note says "(The CXML output is disabled, see [details](#))". The "Execution timeout" is set to "0" milliseconds, with a note "(values less than 1000 are ignored)". The "Options" section has a checked checkbox for "Strict checking of void variables". At the bottom, another note says "(The result can only be sent back to browser, not saved on the server, see [details](#))".

`http://dbpedia.org/sparql`

DBPedia Example



What I typed: http://dbpedia.org/resource/Los_Angeles

What I got: http://dbpedia.org/page/Los_Angeles

dbpedia:50th_Grammy_Awards

- dbpedia:1992_MTV_Video_Music_Awards
- dbpedia:1987_MTV_Video_Music_Awards
- dbpedia:1988_MTV_Video_Music_Awards

is foaf:based_near of

- dbpedia:Valerie_Perez

is foaf:primaryTopic of

- http://en.wikipedia.org/wiki/Los_Angeles

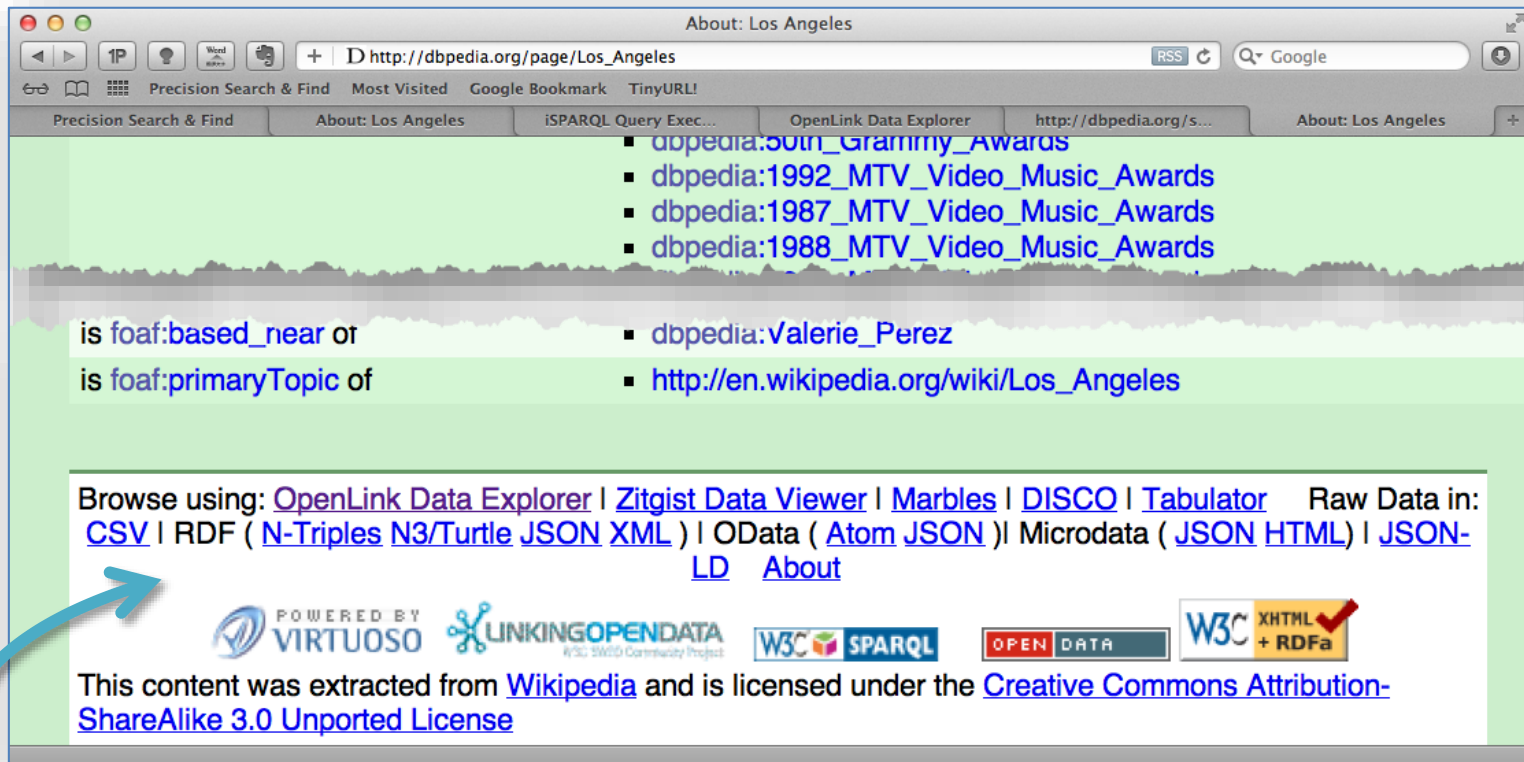
Browse using: [OpenLink Data Explorer](#) | [Zitgist Data Viewer](#) | [Marbles](#) | [DISCO](#) | [Tabulator](#) Raw Data in: [CSV](#) | [RDF \(N-Triples N3/Turtle JSON XML\)](#) | [OData \(Atom JSON\)](#) | [Microdata \(JSON HTML\)](#) | [JSON-LD](#) [About](#)

POWERED BY VIRTUOSO LINKING OPENDATA W3C SPARQL OPEN DATA W3C XHTML + RDFa

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DBpedia Example

http://dbpedia.org/resource/Los_Angeles



The screenshot shows a web browser window titled "About: Los Angeles" with the URL http://dbpedia.org/page/Los_Angeles. The page content includes a list of related entities such as [dbpedia:50th_Grammy_Awards](#), [dbpedia:1992_MTV_Video_Music_Awards](#), [dbpedia:1987_MTV_Video_Music_Awards](#), [dbpedia:1988_MTV_Video_Music_Awards](#), [dbpedia:Valerie_Perez](#), and http://en.wikipedia.org/wiki/Los_Angeles. It also shows properties like [foaf:based_near](#) and [foaf:primaryTopic](#). At the bottom, there is a section titled "Browse using:" with links to various tools: [OpenLink Data Explorer](#), [Zitgist Data Viewer](#), [Marbles](#), [DISCO](#), [Tabulator](#), and [Raw Data in: CSV | RDF \(N-Triples N3/Turtle JSON XML \) | OData \(Atom JSON \) | Microdata \(JSON HTML \) | JSON-LD About](#). Below this, there are logos for "POWERED BY VIRTUOSO", "LINKING OPENDATA", "W3C SPARQL", "OPEN DATA", and "W3C XHTML + RDFa". A blue arrow points from the text "Many formats to view/get the data" to the "Raw Data in:" section.

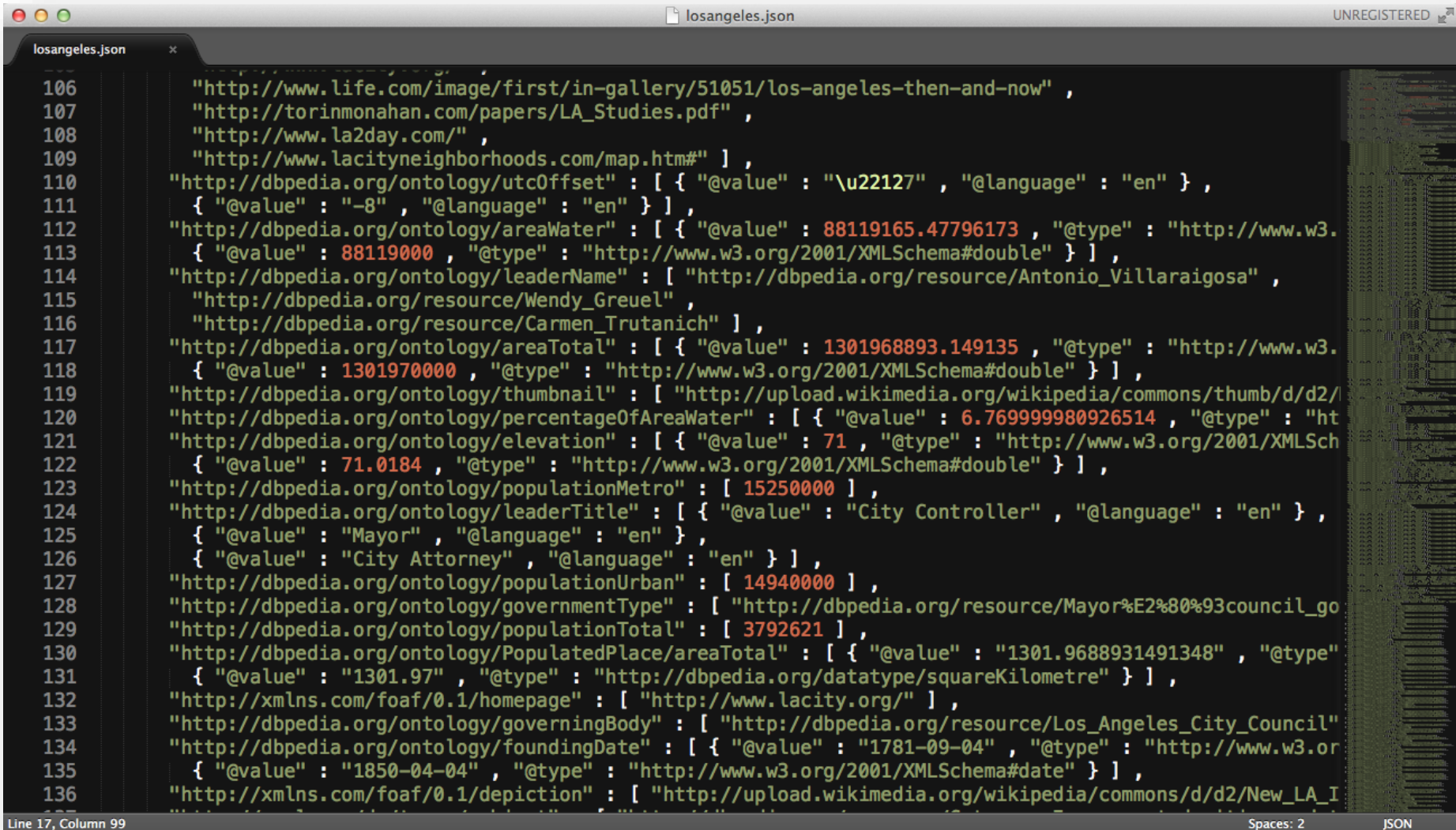
Browse using: [OpenLink Data Explorer](#) | [Zitgist Data Viewer](#) | [Marbles](#) | [DISCO](#) | [Tabulator](#) Raw Data in: [CSV](#) | [RDF \(N-Triples N3/Turtle JSON XML \)](#) | [OData \(Atom JSON \)](#) | [Microdata \(JSON HTML \)](#) | [JSON-LD](#) [About](#)

POWERED BY VIRTUOSO LINKING OPENDATA W3C SPARQL OPEN DATA W3C XHTML + RDFa

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Many formats to view/get the data

JSON-LD



The screenshot shows a code editor window titled "losangeles.json" with a tab icon and a close button. The editor displays a JSON-LD document for Los Angeles, with line numbers 106 through 136 visible on the left. The JSON is formatted with syntax highlighting, showing URLs, values, and types. The document includes information about various aspects of Los Angeles, such as its location, area, population, and government. The status bar at the bottom indicates "Line 17, Column 99", "Spaces: 2", and "JSON".

```
106 "http://www.life.com/image/first/in-gallery/51051/los-angeles-then-and-now" ,
107 "http://torinmonahan.com/papers/LA_Studies.pdf" ,
108 "http://www.la2day.com/" ,
109 "http://www.lacityneighborhoods.com/map.htm#" ] ,
110 "http://dbpedia.org/ontology/utcOffset" : [ { "@value" : "\u22127" , "@language" : "en" } ,
111 { "@value" : "-8" , "@language" : "en" } ] ,
112 "http://dbpedia.org/ontology/areaWater" : [ { "@value" : 88119165.47796173 , "@type" : "http://www.w3.
113 { "@value" : 88119000 , "@type" : "http://www.w3.org/2001/XMLSchema#double" } ] ,
114 "http://dbpedia.org/ontology/leaderName" : [ "http://dbpedia.org/resource/Antonio_Villaraigosa" ,
115 "http://dbpedia.org/resource/Wendy_Greuel" ,
116 "http://dbpedia.org/resource/Carmen_Trutanich" ] ,
117 "http://dbpedia.org/ontology/areaTotal" : [ { "@value" : 1301968893.149135 , "@type" : "http://www.w3.
118 { "@value" : 1301970000 , "@type" : "http://www.w3.org/2001/XMLSchema#double" } ] ,
119 "http://dbpedia.org/ontology/thumbnail" : [ "http://upload.wikimedia.org/wikipedia/commons/thumb/d/d2/
120 "http://dbpedia.org/ontology/percentageOfAreaWater" : [ { "@value" : 6.769999980926514 , "@type" : "ht
121 "http://dbpedia.org/ontology/elevation" : [ { "@value" : 71 , "@type" : "http://www.w3.org/2001/XMLSch
122 { "@value" : 71.0184 , "@type" : "http://www.w3.org/2001/XMLSchema#double" } ] ,
123 "http://dbpedia.org/ontology/populationMetro" : [ 15250000 ] ,
124 "http://dbpedia.org/ontology/leaderTitle" : [ { "@value" : "City Controller" , "@language" : "en" } ,
125 { "@value" : "Mayor" , "@language" : "en" } ,
126 { "@value" : "City Attorney" , "@language" : "en" } ] ,
127 "http://dbpedia.org/ontology/populationUrban" : [ 14940000 ] ,
128 "http://dbpedia.org/ontology/governmentType" : [ "http://dbpedia.org/resource/Mayor%E2%80%9393council_go
129 "http://dbpedia.org/ontology/populationTotal" : [ 3792621 ] ,
130 "http://dbpedia.org/ontology/PopulatedPlace/areaTotal" : [ { "@value" : "1301.9688931491348" , "@type"
131 { "@value" : "1301.97" , "@type" : "http://dbpedia.org/datatype/squareKilometre" } ] ,
132 "http://xmlns.com/foaf/0.1/homepage" : [ "http://www.lacity.org/" ] ,
133 "http://dbpedia.org/ontology/governingBody" : [ "http://dbpedia.org/resource/Los_Angeles_City_Council"
134 "http://dbpedia.org/ontology/foundingDate" : [ { "@value" : "1781-09-04" , "@type" : "http://www.w3.or
135 { "@value" : "1850-04-04" , "@type" : "http://www.w3.org/2001/XMLSchema#date" } ] ,
136 "http://xmlns.com/foaf/0.1/depiction" : [ "http://upload.wikimedia.org/wikipedia/commons/d/d2/New_LA_I
```


DBpedia Online



The screenshot shows a web browser window with the address bar displaying `http://wiki.dbpedia.org/OnlineAccess#h28-4`. The page features the DBpedia logo and a navigation menu on the left. The main content area is titled "Accessing the DBpedia Data Set over the Web" and includes a "Contents" section with a list of links. The first section, "1. Querying DBpedia", is expanded, showing a subsection "1.1. Public SPARQL Endpoint".

wiki.dbpedia.org : Online Access

<http://wiki.dbpedia.org/OnlineAccess#h28-4>

DBpedia
DBpedia Blog | Get Involved | Get Help

Accessing the DBpedia Data Set over the Web

The DBpedia data set can be accessed online via a SPARQL query endpoint and as Linked Data.

Contents

- 1. Querying DBpedia
 - 1.1. Public SPARQL Endpoint
 - 1.2. Public Faceted Web Service Interface
 - 1.3. Example queries displayed with the Berlin SNORQL query explorer
 - 1.4. Examples rendering DBpedia Data with Fluidops Information Workbench
 - 1.5. Examples rendering DBpedia Data with Google Map
 - 1.6. Example displaying DBpedia Data with Exhibit
 - 1.7. Example displaying DBpedia Data with gFacet
- 2. Linked Data
 - 2.1. Background
 - 2.2. The DBpedia Linked Data Interface
 - 2.3. Sample Resources
 - 2.4. Sample Views of 2 Sample DBpedia Resources
- 3. Web Traffic on DBpedia
- 4. Semantic Web Crawling Sitemap

1. Querying DBpedia

The DBpedia data set enables quite astonishing query answering possibilities against Wikipedia data.

1.1. Public SPARQL Endpoint

There is a public SPARQL endpoint over the DBpedia data set at <http://DBpedia.org/sparql>. The endpoint is provided using [Openlink Virtuoso](#) as the back-end database engine.

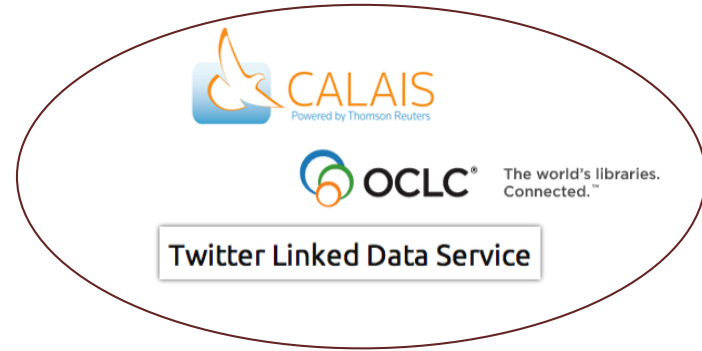


```
Pedro-Szekelys-MacBook-Pro:Downloads szekely$ curl http://dbpedia.org/data/University_of_Sri_Jayewardenepura
<?xml version="1.0" encoding="utf-8" ?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><rdf:type rdf:resource="http://schema.org/EducationalOrganization"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><rdf:type rdf:resource="http://umbel.org/umbel/rc/EducationalOrganization"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><dbpedia-owl:abstract xmlns:dbpedia-owl="http://dbpedia.org/ontology/" xml:lang="en">The University of Sri Jayewardenepura (ශ්‍රී ජයවර්ධනපුර විශ්වවිද්‍යාලය in Sinhala) is one of the Universities in Sri Lanka. It is located in Gangodawila, Nugegoda, near Sri Jayewardenepura Kotte, the capital city of Sri Lanka. It was formed in 1958 out of the Vidyodaya Pirivena, a Buddhist educational centre.</dbpedia-owl:abstract></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><rdf:type rdf:resource="http://dbpedia.org/ontology/EducationalInstitution"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><foaf:depiction xmlns:foaf="http://xmlns.com/foaf/0.1/" rdf:resource="http://upload.wikimedia.org/wikipedia/commons/8/8c/Sjp4.jpg"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><foaf:page xmlns:foaf="http://xmlns.com/foaf/0.1/" rdf:resource="http://en.wikipedia.org/wiki/University_of_Sri_Jayewardenepura"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><dbpedia-owl:wikiPageExternalLink xmlns:dbpedia-owl="http://dbpedia.org/ontology/" rdf:resource="http://www.pim.lk"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/Premasara_Epasinghe"><dbpedia-owl:education xmlns:dbpedia-owl="http://dbpedia.org/ontology/" rdf:resource="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><dcterms:subject xmlns:dcterms="http://purl.org/dc/terms/" rdf:resource="http://dbpedia.org/resource/Category:Universities_in_Sri_Lanka"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><dbpprop:chancellor xmlns:dbpprop="http://dbpedia.org/property/" xml:lang="en">Prof. Ven. Bellanvila Vimalarathana Thero</dbpprop:chancellor></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><foaf:homepage xmlns:foaf="http://xmlns.com/foaf/0.1/" rdf:resource="http://www.sjp.ac.lk"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/A._T._Ariyaratne"><dbpprop:almaMater xmlns:dbpprop="http://dbpedia.org/property/" rdf:resource="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><dbpprop:wordnet_type xmlns:dbpprop="http://dbpedia.org/property/" rdf:resource="http://www.w3.org/2006/03/wn/wn20/instances/synset-university-noun-2"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><foaf:name xmlns:foaf="http://xmlns.com/foaf/0.1/" xml:lang="en">University of Sri Jayewardenepura</foaf:name></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><owl:sameAs xmlns:owl="http://www.w3.org/2002/07/owl#" rdf:resource="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"/></rdf:Description>
<rdf:Description rdf:about="http://dbpedia.org/resource/University_of_Sri_Jayewardenepura"><rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Thing"/></rdf:Description>
```

Getting RDF



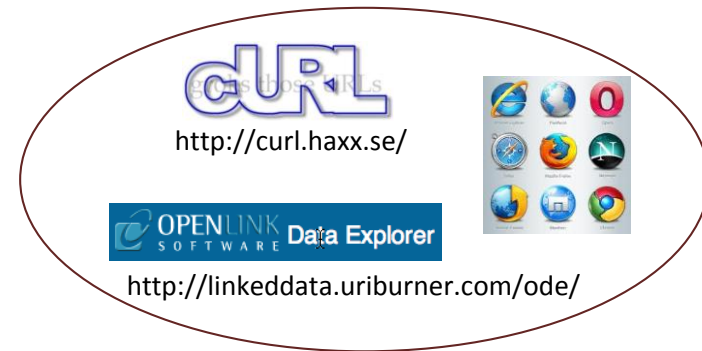
RDF Dump



REST Service



SPARQL Endpoint



URI Dereferencing