

2016-05-24@Fujitsu World Tour 2016 in Spain Fujitsu Laboratories of Europe

## Outline



- What is the LOD
- RDF and SPARQL
- LOD4ALL overview
- How to use LOD4ALL

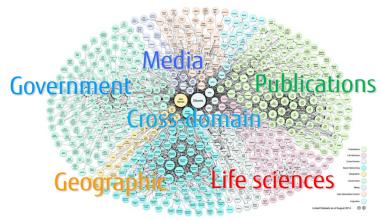


## LOD overview

# Linked Open Data (LOD)

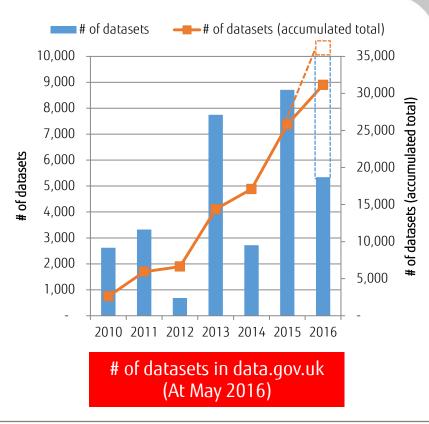


- What is LOD?
  - Network of data, published in a standard format (RDF)
  - Unlike traditional Web pages written in natural language, data is machine-readable through a standard API (SPARQL, LDP)



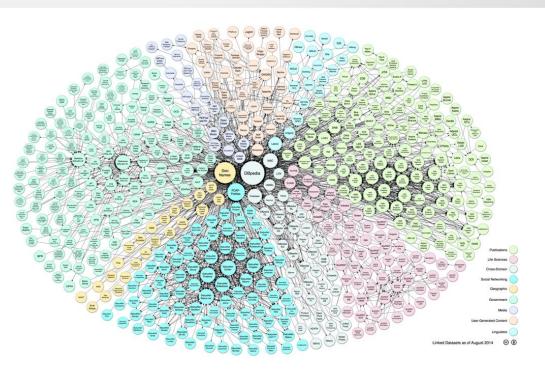
Source: lod-cloud.net (2014)

Status of LOD: 895 datasets, >76 Billion triples



### LOD Cloud





- DBPedia: one of the largest LOD Cloud datasets (~1.2B triples).
- Diseasome: a network of disorders and disease genes (~91K triples).
- \*.data.gov.uk: ~11K datasets data sets published in the public domain (~1.4M triples.)

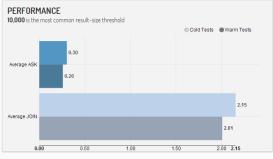
# LOD SPARQL Endpoints

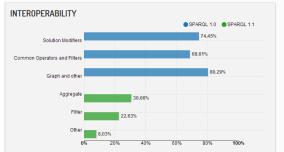


- Many LOD datasets are accessible via a SPARQL endpoint
- But,
  - availability
  - performance
  - interoperability
  - discoverability

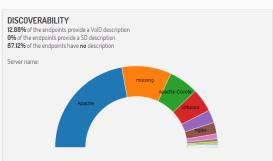
... are important issues to consider regarding LOD utilisation







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Source : SPARQL-ES (<a href="http://sparqles.okfn.org/">http://sparqles.okfn.org/</a>)

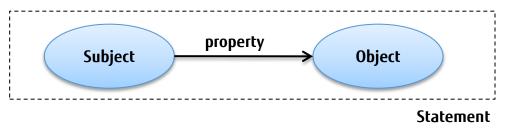
## RDF



- RDF is a basic Knowledge Representation language based on semantic networks
  - Useful to represent metadata and describe any type of information in a machineaccesible way (aka data model)
  - Resources are described in terms of properties and property values using RDF statement

Statements are represented as triples, consisting of a subject, predicate, and object

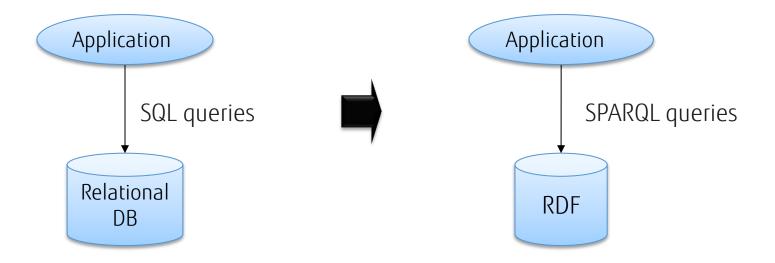
[S,P,O]



### **SPARQL**



Language developed to allow accessing datasets expressed in RDF.





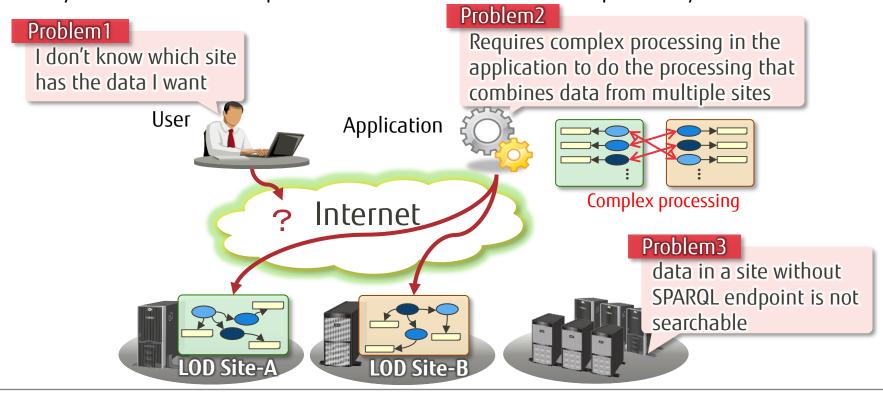
## LOD4ALL overview

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## Current Status and Issues of LOD



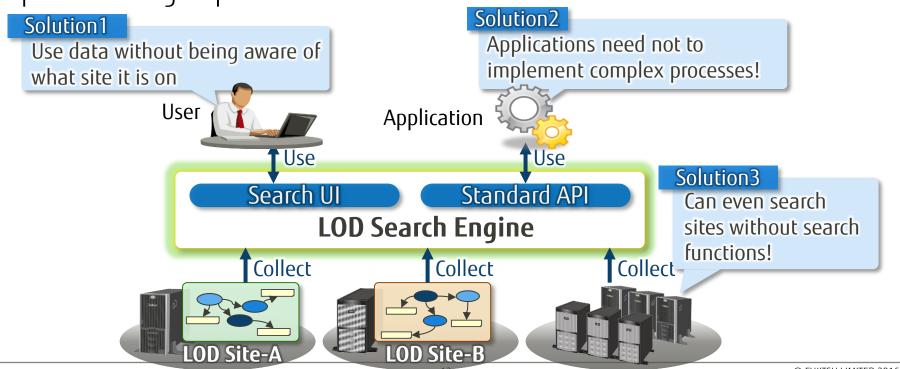
Many web sites have published their own data separately



# LOD Search Engine by Fujitsu Labs



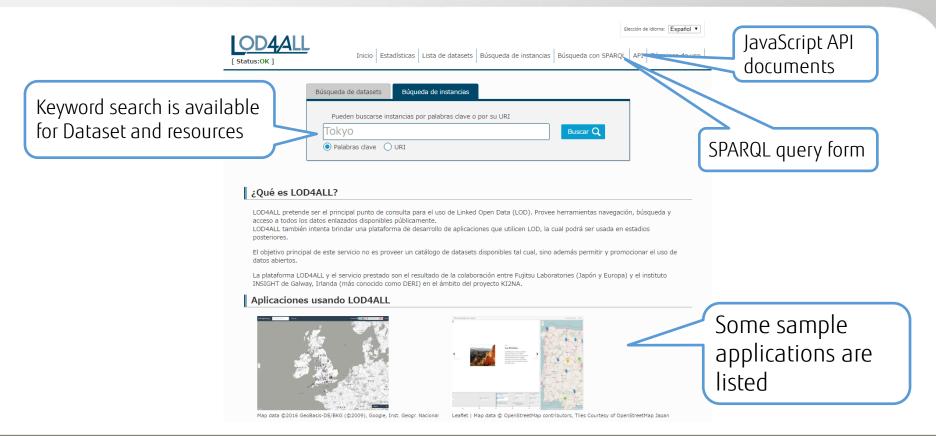
 Store LOD from around the world (several tens of billion data items), and provide a high-speed search



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# The landing page

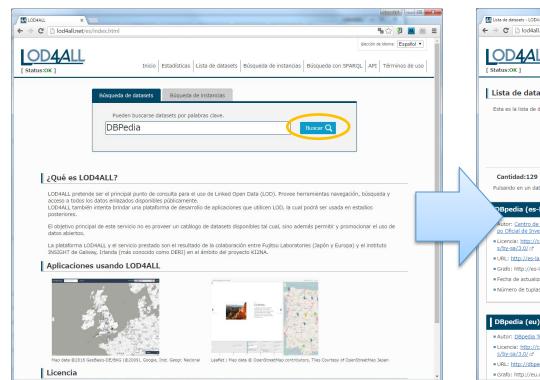


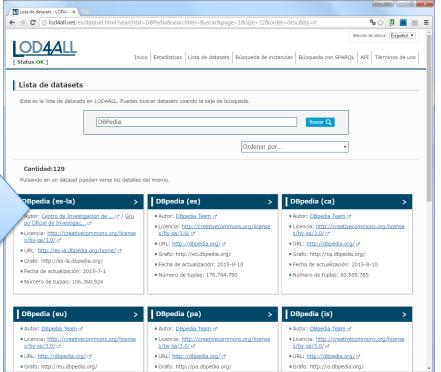


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#### Dataset search

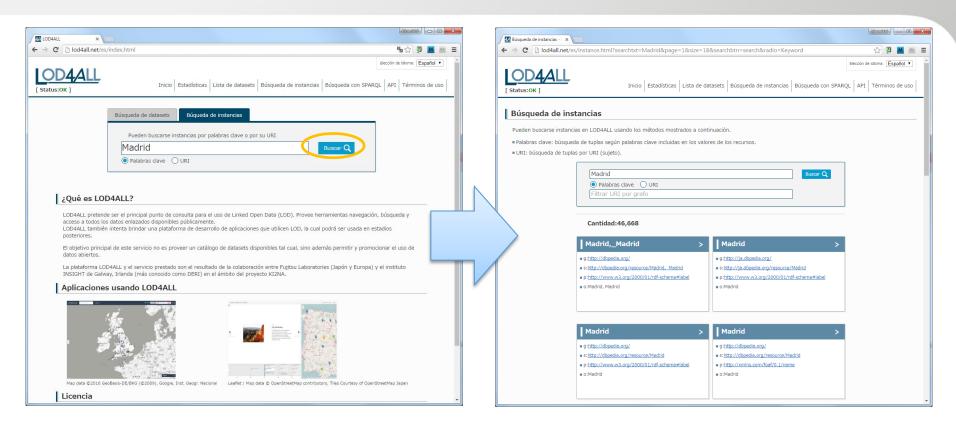






# Keyword search for resources

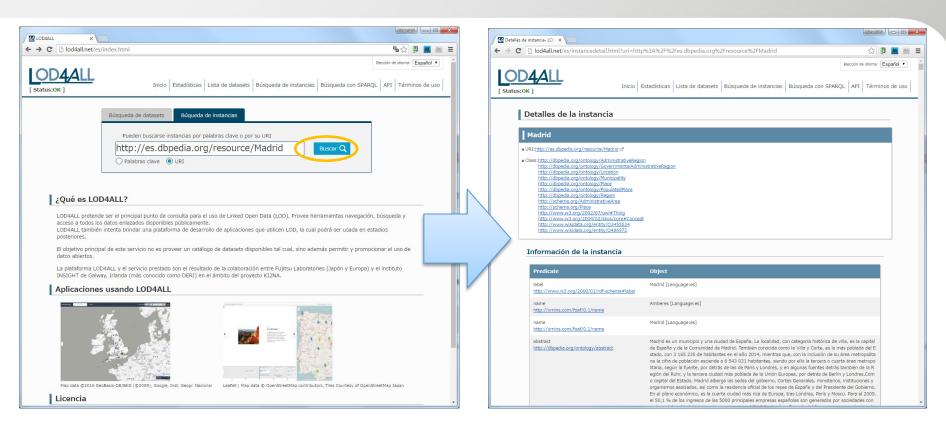




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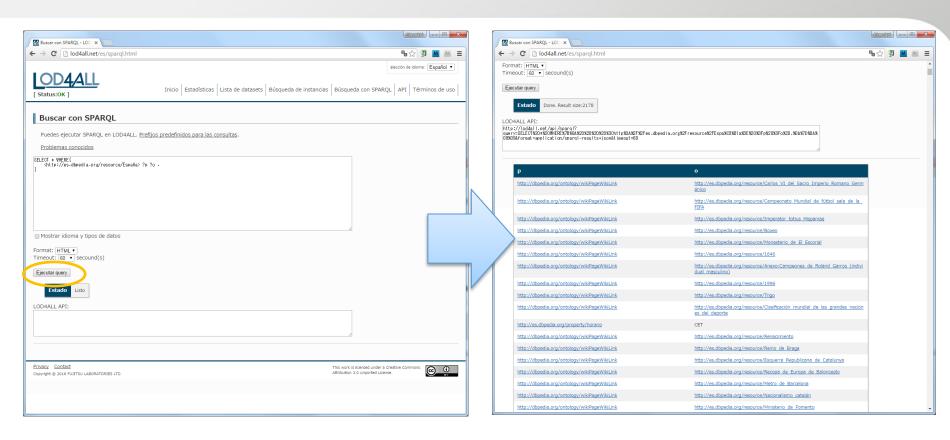
## Keyword search for resources cont.





# SPARQL query form





## Statistics



	# of datasets	# of triples	# of classes	# of property
Overall	2,191	8,649,810,865	919,698	1,613,870
Spanish Dataset				
Spanish DBpedia		176,744,790	331	38,862
Latin American DBpedia		106,360,924	228	21,136
Spanish Government Open Data		58,328,671	263	13,449
Open Data Madrid		311,824	592	1,353
Open Data Santander		367,080	8	844
The 43 missing Ayotzinapa, Mexico		1,365	5	38

# Sample code to use SPARQL endpoint



- JavaScript
- Python
- Java

## Javascript: LFASparql



# Import

<script type="text/javascript"
src="http://lod4all.net/api/lfasp
arql-2.0.0.js"></script>

# Example

```
var Ifasparql = new LFASparql();
var sparql_query = "SELECT DISTINCT * WHERE { < http://dbpedia.org/resource/Tokyo> ?p ?o . }";
lfasparql.executeSparql({
  appID: "xawsaykmcb",
  sparql: sparql_query,
  success: getResult,
  error: getError
});
function getResult(data) {
  for(var i = 0; i < data.length; i++) {</pre>
  // Process for "o" and "p" bindings
function getError(xhr, status, error) {
  error json = JSON.parse(xhr.responseText);
  console.log("Error occured: " + status + "\nError: " + error + "\nError detail: " + error_json.message);
```

# Python: py-lod4all



# Installation

As usual.

\$ python setup.py install

# Example

```
import lod4all
connection = lod4all.Connection(
  proxy_host=None,
  proxy_port=None,
  proxy_user=None,
  proxy_pass=None
query = 'SELECT DISTINCT * WHERE { < http://dbpedia.org/resource/Tokyo> ?p ?o . }'
response = connection.execute spargl(query)
if response.success:
  for binding in response.data['results']['bindings']:
    # Do whatever with binding['o'] or binding['p']
else:
  # Error connecting to lod4all
  print(response.error code)
```

# Java: java-lod4all



# Installation

Put lod4all.jar on your CLASSPATH

# Example

```
import org.json.JSONArray;
import net.lod4all.api.LOD4All;
public static void main () {
  String guery = "SELECT DISTINCT * WHERE {" +
                "<http://dbpedia.org/resource/Tokyo> ?p ?o ." + "}";
  LOD4All lod4All =
LOD4All.initialize ("xawsaykmcb").proxyHostAndPort ("proxy.fle.fujitsu.com", 9876);
  //This will execute the query and will show on the console the result of it.
  lod4All.guery(guery).showQuery();
  //This will execute the query and return the JSONArray Object
  JSONArray result = lod4All.runQuery2Json(false);
```

### Restrictions in LOD4ALL



- http://lod4all.net/restrict.html
- We can not upload new dataset during Hackathon



# How to use LOD4ALL

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# General procedure to use LOD4ALL



- 1. Specify domain
- 2. Check datasets via Dataset search
- 3. Check some data via Keyword search
- 4. Create a SPARQL query
- 5. Execute the query via SPARQL endpoint

# Example: Simple smart city application



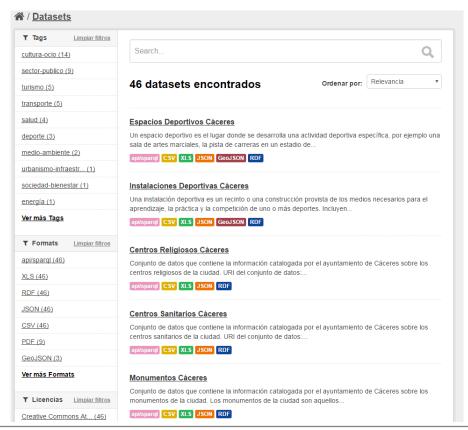
http://opendata.caceres.es/



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## http://opendata.caceres.es/dataset

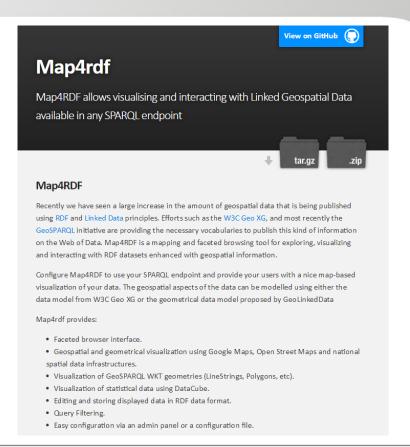




# Map4rdf visualization tool

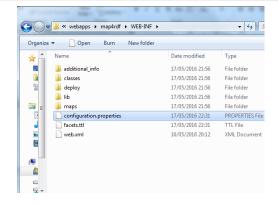


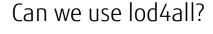
http://oeg-dev.dia.fi.upm.es/map4rdf/



# Map4rdf configuration



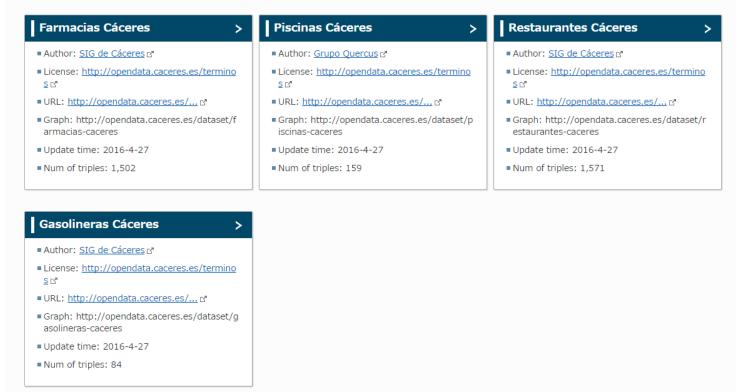






# Some Cáceres data is already in LOD4ALL

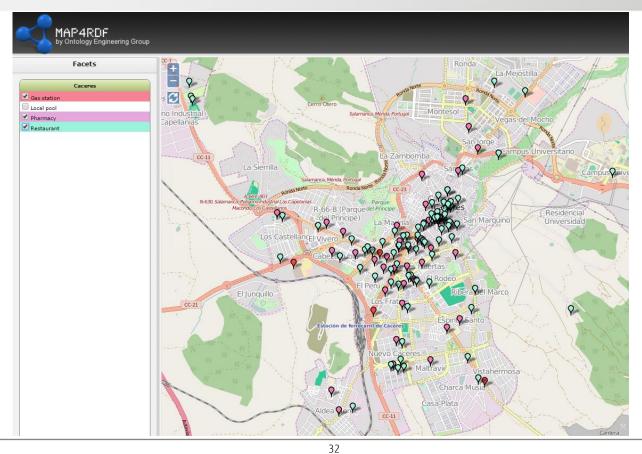




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http://lod4all.net/dataset.html?searchtxt=C%C3%A1ceres&searchbtn=Search&page=1&size=12&order=desc&by=0





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# Integrating Map4rdf with LOD4ALL?



Map4rdf github repository <a href="https://github.com/oeg-upm/map4rdf">https://github.com/oeg-upm/map4rdf</a>

■ Java: java-lod4all



### Other Smart cities initiatives



#### http://ciudad2020.linkeddata.es/

#### CIUDAD 2020

CIUDAD 2020 es un provecto Innpronta que pretende lograr un avance en las áreas de eficiencia energética. Esta iniciativa ha sido desarrollada por Internet del futuro, Internet de las cosas, comportamiento humano, sostenibilidad medioambiental y movilidad y Ontology Engineering Group (OEG) transporte, con el objetivo de diseñar la ciudad del futuro, sostenible, inteligente y eficiente.

Por ello, CIUDAD2020 concibe, diseña e implementa un nuevo paradigma de ciudad sostenible y eficiente sustentada sobre tres ejes fundamentales: Energía, Transporte y Control medioambiental, OEG e iSOCO participan en el proyecto liderando la publicación de los datos relativos a estos tres ejes. Las fuentes publicadas están disponibles en RDF (Resource Description Framework) de acuerdo con los principios de Linked Data.

#### Iniciativas desarrolladas

A continuación puede consultar las iniciativas desarrolladas hasta el momento.

Toda la



Datos de

transporte.linkeddata.es

información Toda la disponible ciudad.linkeddata.es

información

Datos de Medio Ambiente

> Datos de Energía

Datos disponibles aquí

Toda la información disponible energia.linkeddata.es

#### Sobre nosotros



e iSOCO



Este trabajo está siendo financiado por el Centro para el Desarrollo Tecnológico Industrial como parte del programa español de investigación INNPRONTA.





## SmartLand - Ecuador



http://smartland.utpl.edu.ec/ Models **SmartLand** Metadata 0 **Reto:** Integrar Datos en un Services Contexto Heterogéneo y Distribuido Lavers, data, Data Source - Domain A symbology Local/Regional Datastore Silo A Silo D Scenario: heterogeneous environment Other Datasources Problem: (a) lack of integration and interoperability Challenge: Exploitation and facilities (b) Overlap of information (c) Ambiguity in integration of Heterogeneous Data Data Source - Domain C Silo C Data Source - Domain B External Local/Regional datastore datastore Services methodologies Metadata Technologies and Metadata and Layers, data,

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standards

symbology

symbology



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