A JavaScript RDF store and application library for linked data client applications

WORLD WIDE WEB 2012 LYON - FRANCE

VNiVERSiDAD D SALAMANCA

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Motivation

Effective use of RDF as the data layer for stand-alone JS applications?

Assumptions

- Stand-alone JS applications
- RDF data
- RESTful APIs
- Read/Write support
- Integration of different data sources
- Different platforms: desktop browsers, mobile devices
- Online/Offline support

Proposed Solution

- RDFStore-JS
  - data storage
  - data query

https://github.com/antoniogarrote/rdfstore-js

```
npm install rdfstore
```

- SemanticKO

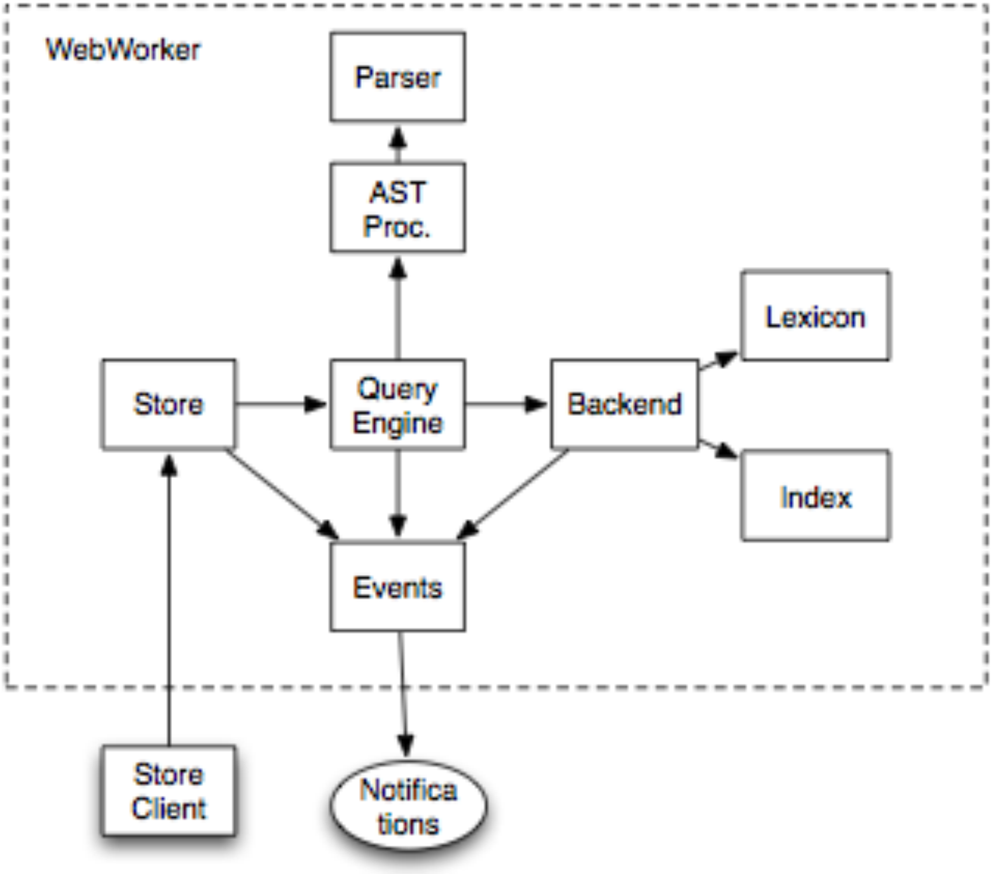
https://github.com/antoniogarrote/semantic-ko

  - Presentation logic
  - User interaction

RDFStore-js

- JS RDF storage library
- JS SPARQL query library (1.1+Update)
- Browser and Node.js support
- Evented API
- Support for different RDF serializations
- Persistence, WebWorkers

RDFStore-js: Architecture



RDFStore-js: Architecture

- Lexicon storage + B-Tree indices
- SPARQL parser + query planner

- Different backends: synchronous, asynchronous, memory, MongoDB
- Browser persistence using LocalStorage API
- WebWorkers support
- SPARQL HTTP interface
- RDF JS Interfaces API for "CONSTRUCT" queries

RDFStore-js: Evented API

- JS engines are single threaded: extensive use of events
- Evented API: register SPARQL queries on the store
- Callbacks invoked when queries result set changes
- Use of the store as a triple space / blackboard system

RDFStore-js: Performance

- Implementation of LUBM benchmark included in the source code
- Queries modified due to lack of inference support
- 1 university =~ 15MB data < 1 second

SemanticKO

- Application development library
- Use of declarative bindings between DOM tree and RDF data graph
- Built on top of RDFStore evented API
- Extension of Knockout.JS library

SemanticKO: Declarative Bindings

Data graph:

```
t:Lisp    rdfs:label    "Lisp".

t:John_McCarthy
          foaf:name       "John McCarthy" ;
          t:inventorOf    t:Lisp.
```

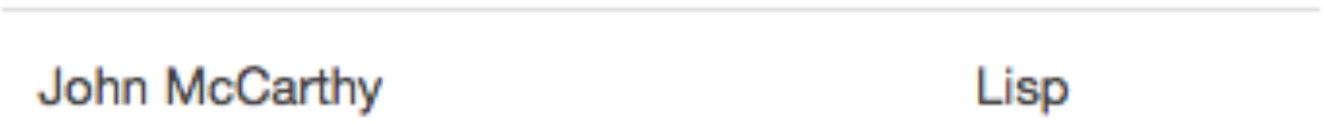
SemanticKO: Declarative Bindings

View template:

```
<table id="example2">
  <tr about="[t:John_McCarthy]">
    <td data-bind="text: [foaf:name]"></td>
    <td rel="[t:inventorOf]"
        data-bind="text: [rdfs:label]"></td>
  </tr>
</table>
```

SemanticKO: Declarative Bindings

Client evaluation output:



```
John McCarthy                              Lisp
```

SemanticKO: ViewModel

Data graph:

```
t:John_McCarthy foaf:name     "John McCarthy" ;
                a              foaf:Person ;
                t:inventorOf   t:Lisp .
t:Alan_Kay      foaf:name      "Alan Kay" ;
                a              foaf:Person ;
                t:inventorOf   t:Smalltalk .
t:Lisp          rdfs:label     "Lisp" .
t:Smalltalk     rdfs:label     "Smalltalk" .
```

SemanticKO: ViewModel

ViewModel:

```
 var viewModel =
     {people: ko.observableArray([
       "t:John_McCarthy",
       "t:Alan_Kay"
      ]),
      selectedPerson: ko.observable()};
```

SemanticKO: ViewModel

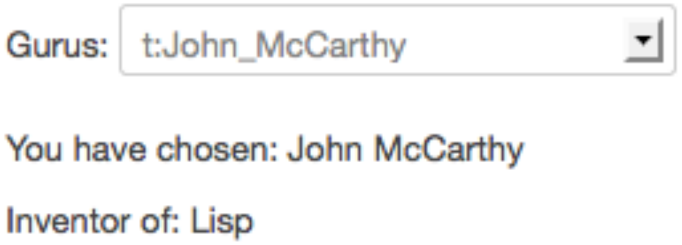
View template:

```
Gurus: <select data-bind="options: people,
                          value:  selectedPerson"></select>

You have chosen:
<span about="selectedPerson"
         data-bind="text: [foaf:name]"></span>
<p rel="[t:inventorOf]">
  Inventor of:<span data-bind="text: [rdfs:label]"></span>
 </p>
```

SemanticKO: ViewModel

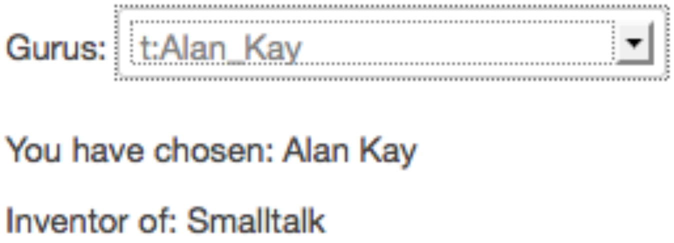
Client evaluation output:



Gurus: t:John_McCarthy

You have chosen: John McCarthy

Inventor of: Lisp



Gurus: t:Alan_Kay

You have chosen: Alan Kay

Inventor of: Smalltalk

SemanticKO: SPARQL templates

```
<div id="example5">
  <ul data-bind="template: 'example5-template'"></ul>
</div>

<!-- The template -->
<script id="example5-template" type="text/html">
  {{each sko.where("{?subject a foaf:Person}")()}}
      <li about="${$value}"
          data-bind="text: [foaf:name]">
      </li>
  {{/each}}
</script>
```

SemanticKO: RDF Adapter Classes

```
sko.Class.define("ObjectSomeValuesFrom([foaf:name])",{
    decoratedName: function() {
          return "mr. " + this.getProp("[foaf:name]");
    }
});
```

SemanticKO: Additional examples

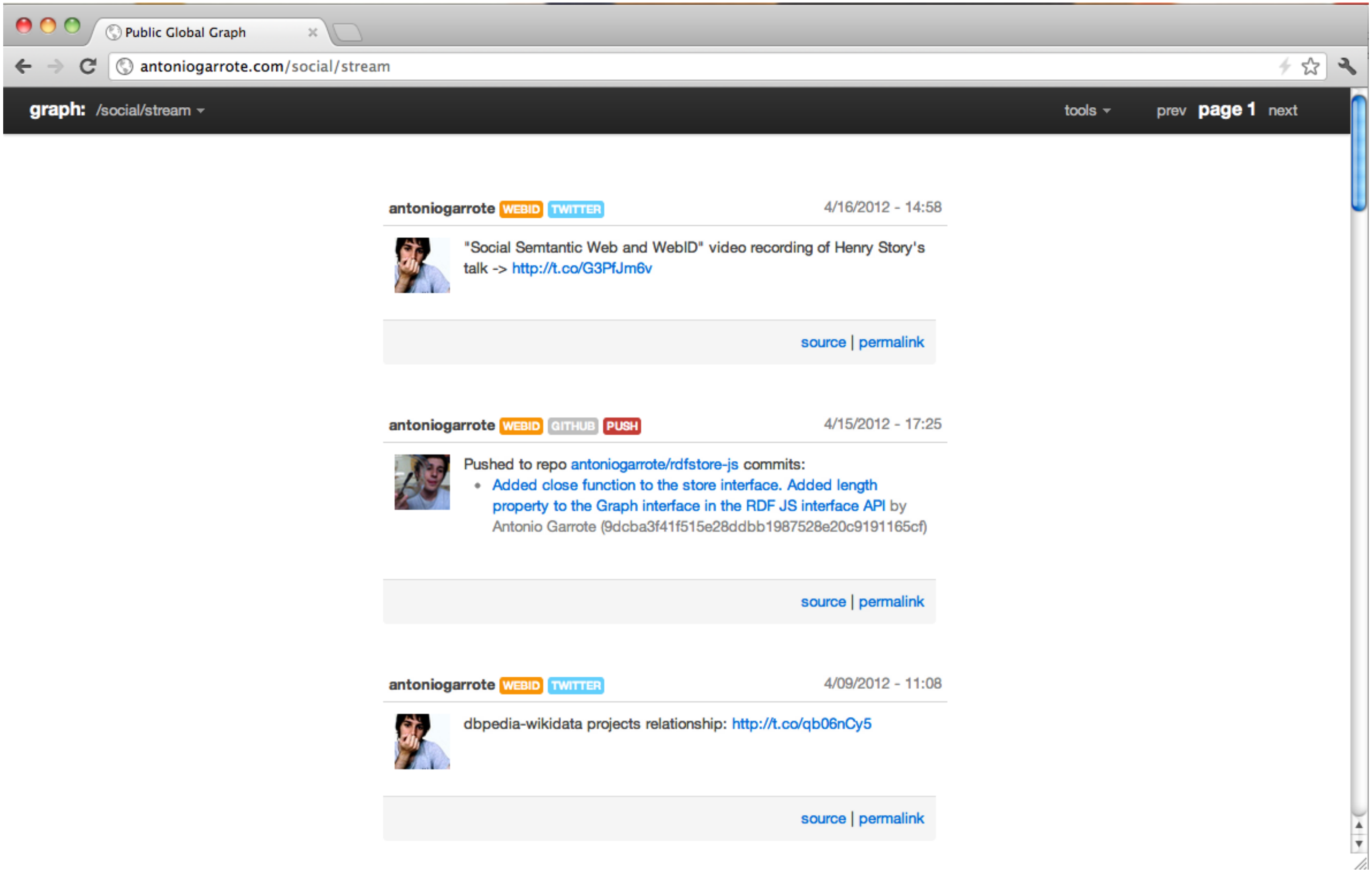
http://antoniogarrote.github.com/semantic-ko/

Sample Applications

social.rdf

- Aggregations of social web data using a single WebID
- Aggregated data exposed as a RESTful API
- RDFStore used in node.js backend, WebID implementation and frontend
- Administrative front-end built using SemanticKO

social.rdf



antoniogarrote WEBID TWITTER 4/16/2012 - 14:58

"Social Semtantic Web and WebID" video recording of Henry Story's talk -> http://t.co/G3PfJm6v

source | permalink

antoniogarrote WEBID GITHUB PUSH 4/15/2012 - 17:25

Pushed to repo antoniogarrote/rdfstore-js commits:

- Added close function to the store interface. Added length property to the Graph interface in the RDF JS interface API by Antonio Garrote (9dcba3f41f515e28ddbb1987528e20c9191165cf)

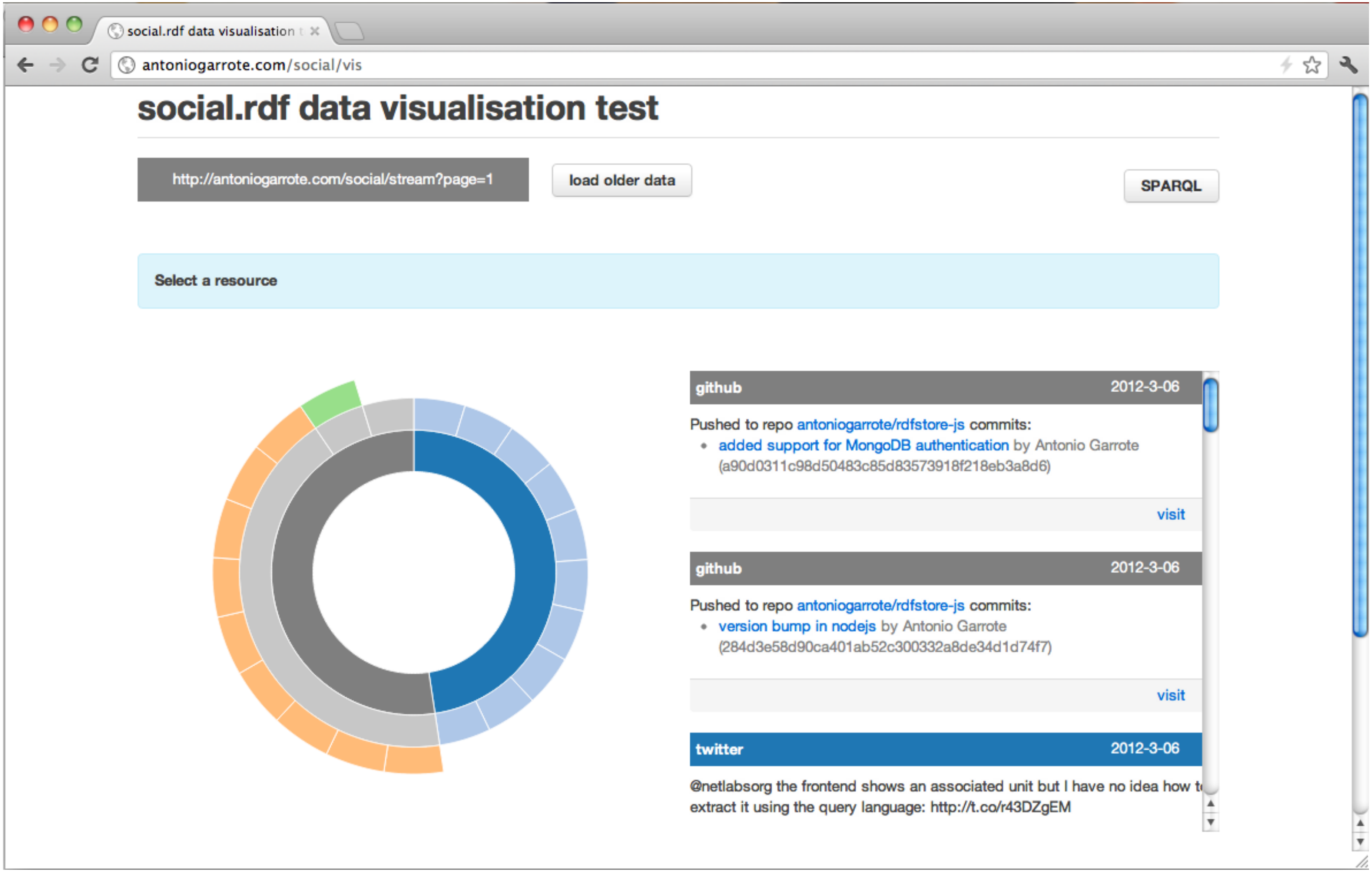
source | permalink

antoniogarrote WEBID TWITTER 4/09/2012 - 11:08

dbpedia-wikidata projects relationship: http://t.co/qb06nCy5

source | permalink

social.rdf



social.rdf data visualisation t
antoniogarrote.com/social/vis

social.rdf data visualisation test

http://antoniogarrote.com/social/stream?page=1
load older data
SPARQL

Select a resource

github 2012-3-06

Pushed to repo antoniogarrote/rdfstore-js commits:

- added support for MongoDB authentication by Antonio Garrote (a90d0311c98d50483c85d83573918f218eb3a8d6)

visit

github 2012-3-06

Pushed to repo antoniogarrote/rdfstore-js commits:

- version bump in nodejs by Antonio Garrote (284d3e58d90ca401ab52c300332a8de34d1d74f7)

visit

twitter 2012-3-06

@netlabsorg the frontend shows an associated unit but I have no idea how t extract it using the query language: http://t.co/r43DZgEM

social.rdf

- Application URL:

  http://antoniogarrote.com/social/stream

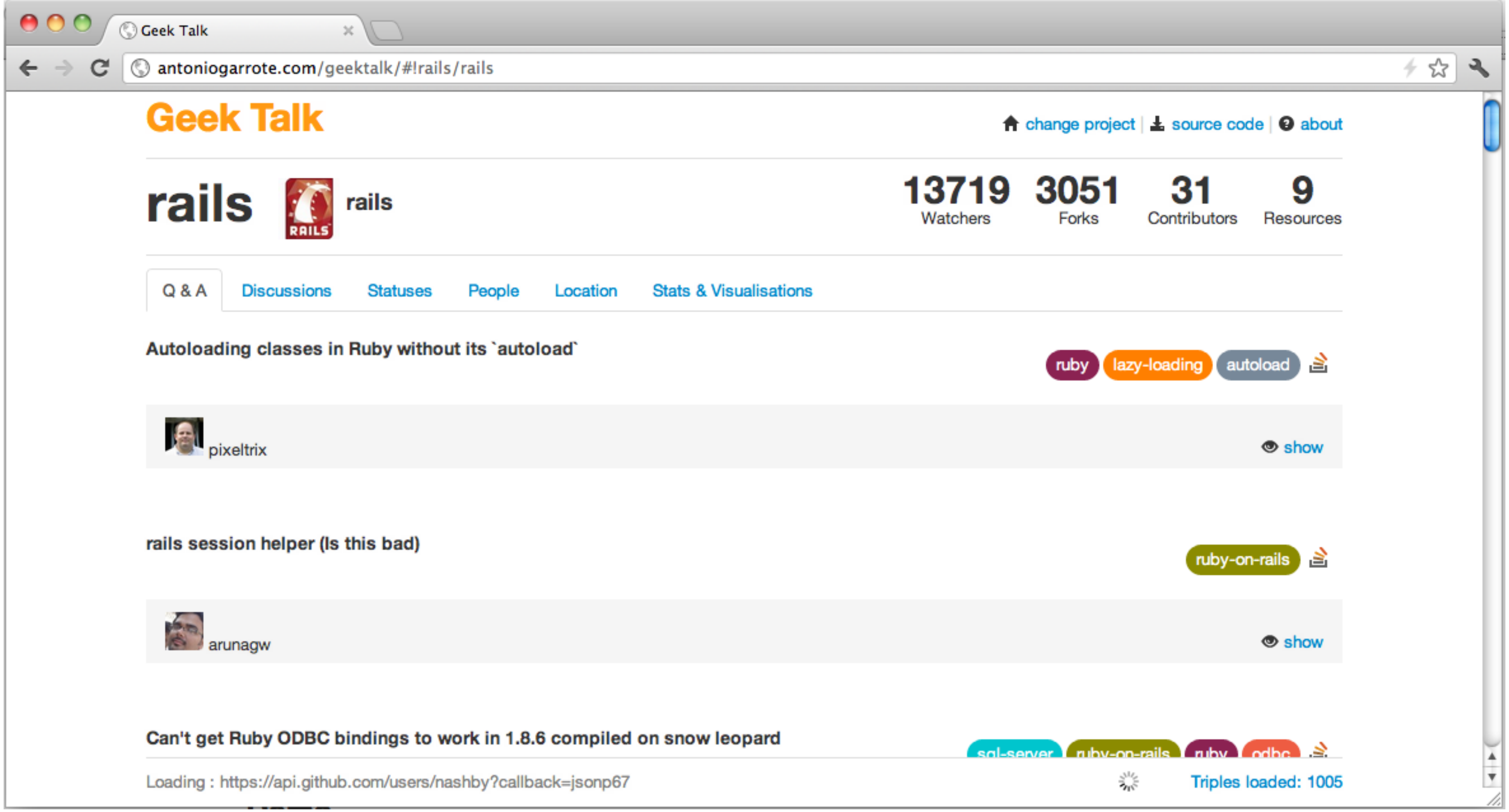
- Source code URL:

  https://github.com/antoniogarrote/social.rdf

Geek Talk

- Aggregation and visualization of data from different APIs for the members of a software project
- APIs:
  - Github
  - StackOverflow
  - Twitter
  - HackerNews
  - Google Maps

Geek Talk



Geek Talk

antoniogarrote.com/geektalk/#!rails/rails

Geek Talk

change project | source code | about

rails rails

13719 Watchers | 3051 Forks | 31 Contributors | 9 Resources

Q & A | Discussions | Statuses | People | Location | Stats & Visualisations

Autoloading classes in Ruby without its `autoload`

ruby lazy-loading autoload

pixeltrix — show

rails session helper (Is this bad)

ruby-on-rails

arunagw — show

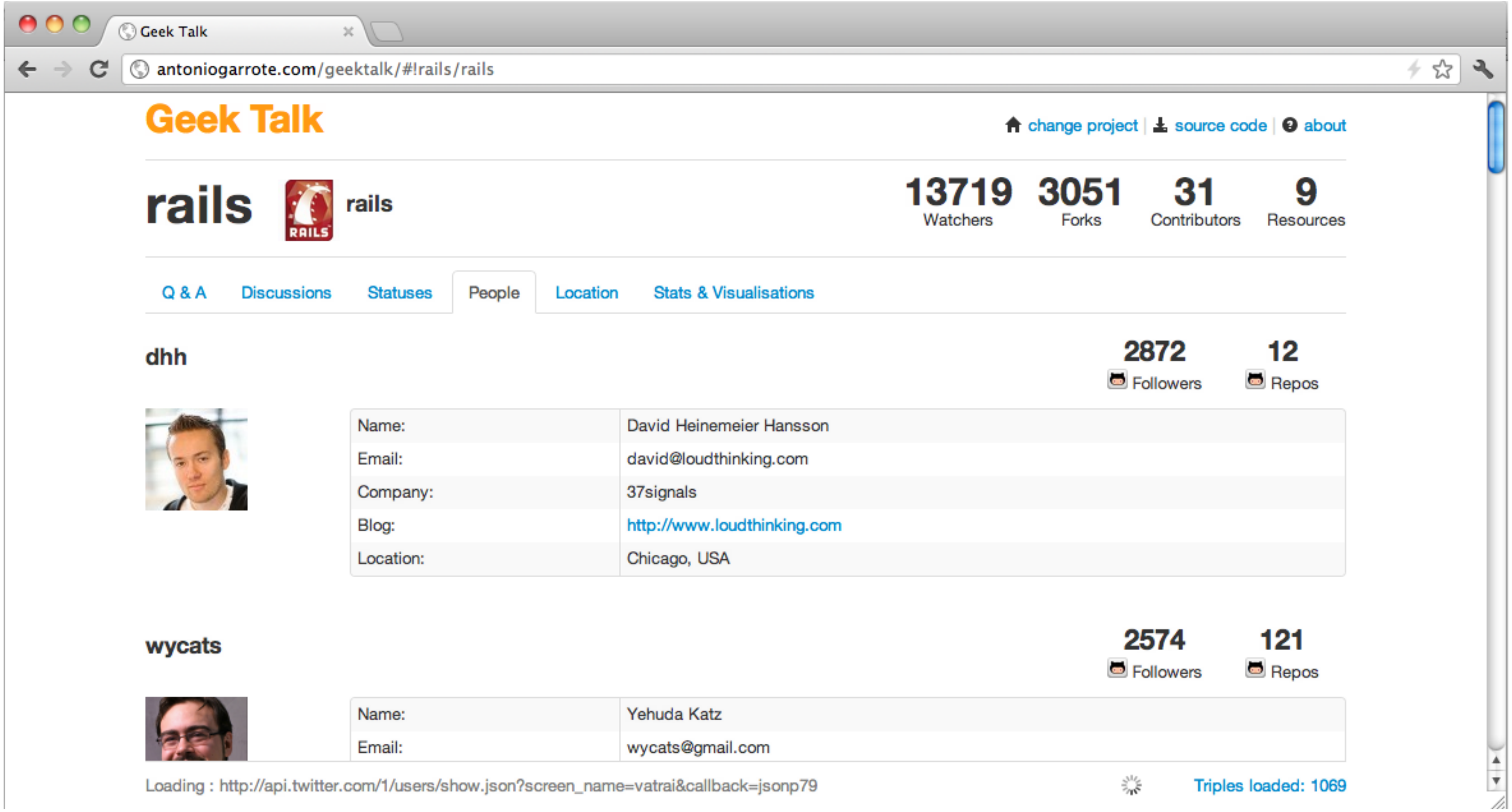
Can't get Ruby ODBC bindings to work in 1.8.6 compiled on snow leopard

sql-server ruby-on-rails ruby odbc

Loading : https://api.github.com/users/nashby?callback=jsonp67

Triples loaded: 1005

Geek Talk


Geek Talk
antoniogarrote.com/geektalk/#!rails/rails
change project | source code | about
RAILS
Q & A
Discussions
Statuses
People
Location
Stats & Visualisations

Geek Talk

rails

rails

13719	3051	31	9
Watchers	Forks	Contributors	Resources

dhh

2872	12
Followers	Repos

Name:	David Heinemeier Hansson
Email:	david@loudthinking.com
Company:	37signals
Blog:	http://www.loudthinking.com
Location:	Chicago, USA

wycats

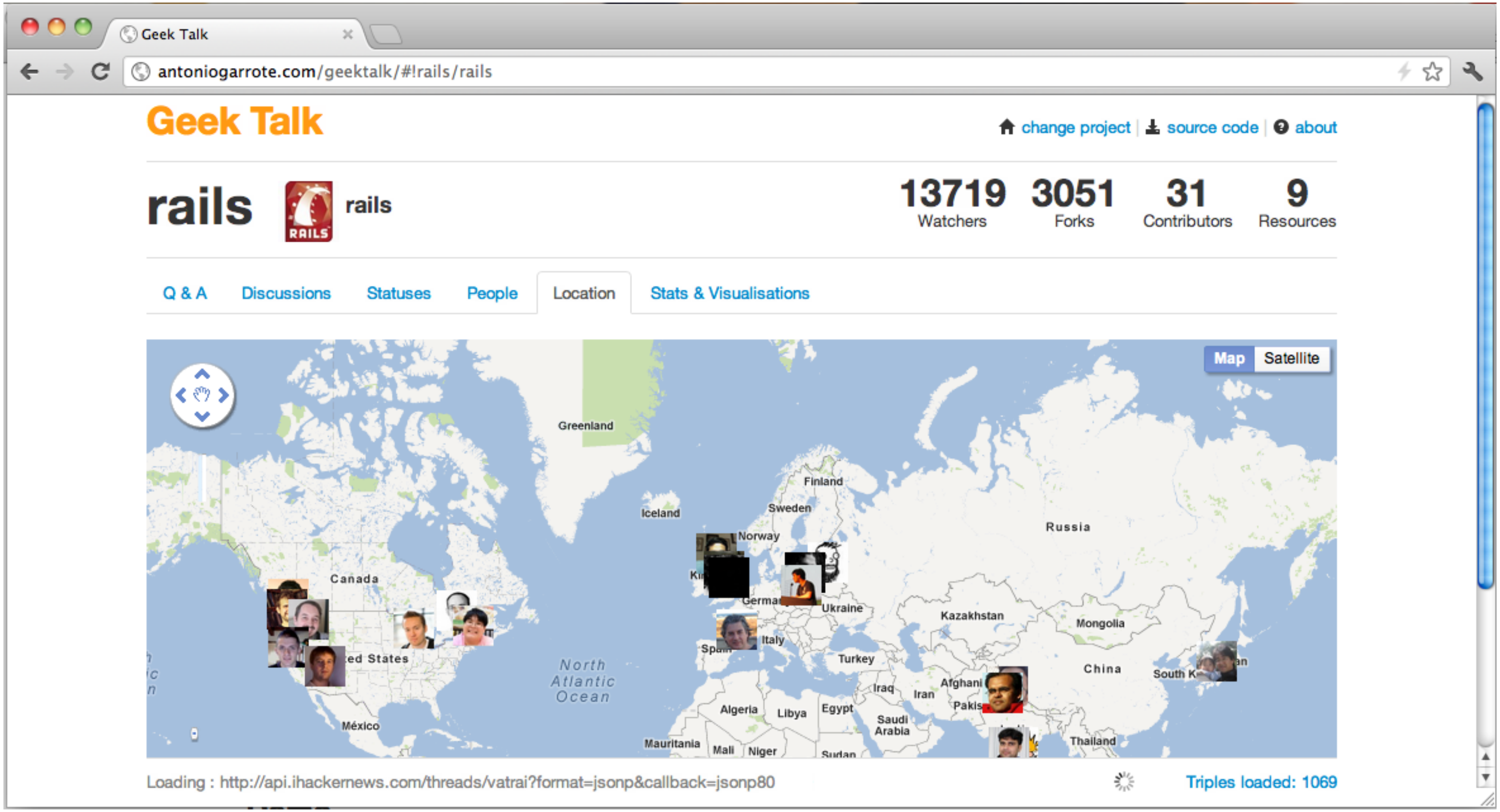
2574	121
Followers	Repos

Name:	Yehuda Katz
Email:	wycats@gmail.com

Loading : http://api.twitter.com/1/users/show.json?screen_name=vatrai&callback=jsonp79

Triples loaded: 1069

Geek Talk

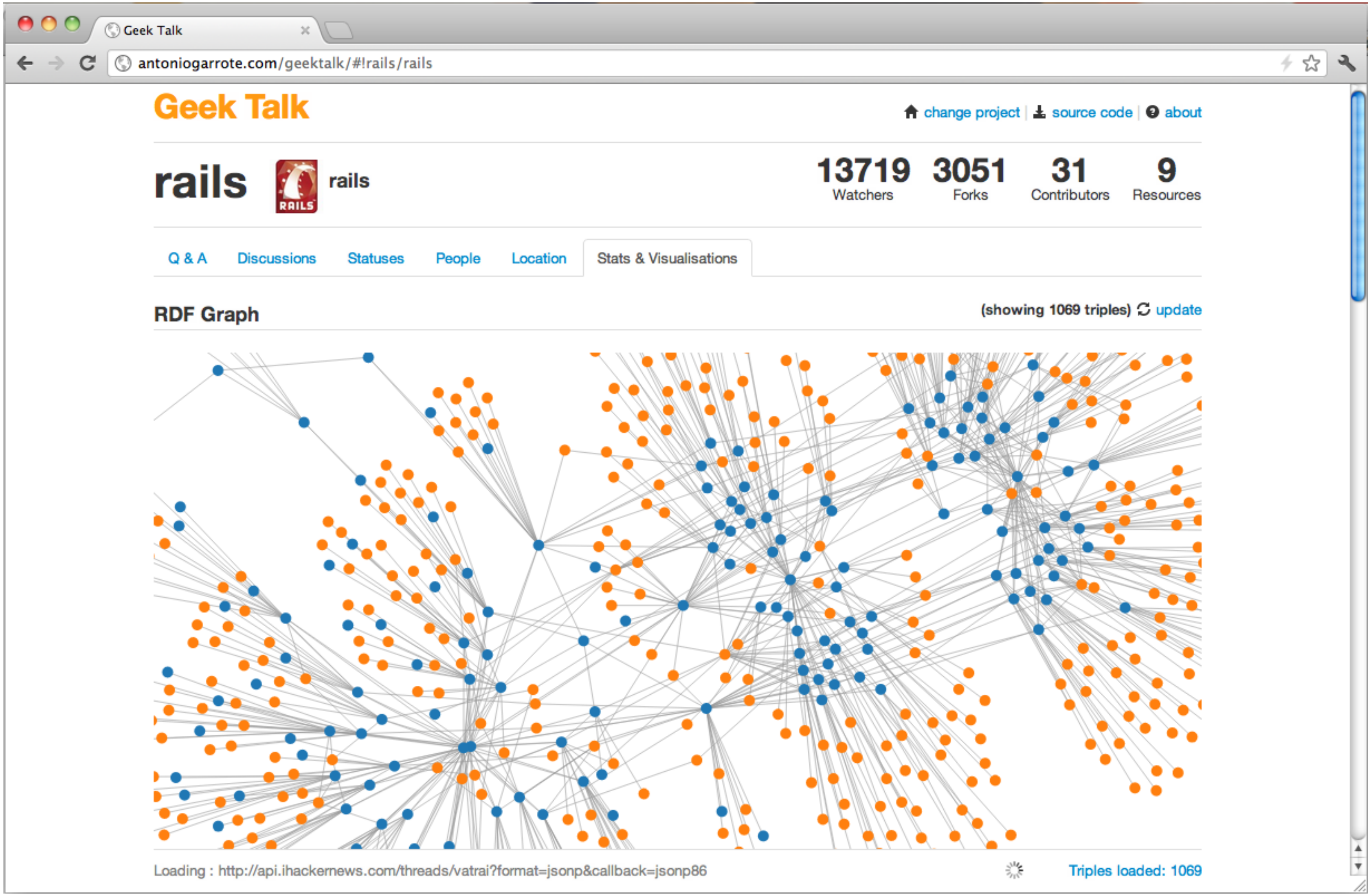


13719 Watchers | 3051 Forks | 31 Contributors | 9 Resources

Loading : http://api.ihackernews.com/threads/vatrai?format=jsonp&callback=jsonp80

Triples loaded: 1069

Geek Talk



Geek Talk

rails rails

13719 Watchers | 3051 Forks | 31 Contributors | 9 Resources

RDF Graph

(showing 1069 triples)

Loading : http://api.ihackernews.com/threads/vatrai?format=jsonp&callback=jsonp86

Triples loaded: 1069

Geek Talk

- Application URL:

  http://antoniogarrote.com/geektalk

- Source code URL:

  https://github.com/antoniogarrote/geektalk

Related Libraries

JSON-LD Macros

- Declarative transformations of JSON APIs into JSON-LD
- Integration with RDFStore-JS

https://github.com/antoniogarrote/json-ld-macros

JSON-LD Macros

```
"https://api.github.com/repos/*/*/collaborator":
 {
    '$.data': {
       '@ns': {'ns:default': 'gh',
                      'ns:replace': {'avatar_url':'foaf:depiction', 'name': 'foaf:name'}},
       '@context': {'gh': 'https://api.github.com/vocabulary#',
                         'foaf': 'http://xmlns.com/foaf/0.1/',
                         'foaf:depiction': {'@type': '@id'},
                         'gh:url' : {'@type': '@id'}},
       '@type': ['https://api.github.com/vocabulary#User',
                     'http://xmlns.com/foaf/0.1/Person'],
       '@id': [{'f:valueof': 'login'},
                   {'f:prefix': 'http://geektalk.com/vocabulary/geek#'}],
       '@only': ['url', 'avatar_url', 'name', 'login', 'url"]
    }
 }
```

LinkedVis

- Data visualization from RDF graphs
- Based on the "Grammar of Graphics"
- Extended primitives for interactive manipulation
- Data embedded into visualization

https://github.com/antoniogarrote/linkedvis

Micrograph.js

- Data layer for JSON, Microdata and RDF
- Built on top of a reduced version of RDFStore-JS
- Implicit transformation from JSON, Microdata into RDF
- MongoDB query-like JSON query language
- Automatic transformation into SPARQL

https://github.com/antoniogarrote/micrograph.js

Future Work

- Improved parser and reduced sized
- Additional features: query paths, filter functions, etc
- Integrity constraints and inference
- Server side integration
- IndexedDB persistence
- Additional backends: Redis
- Improved performance