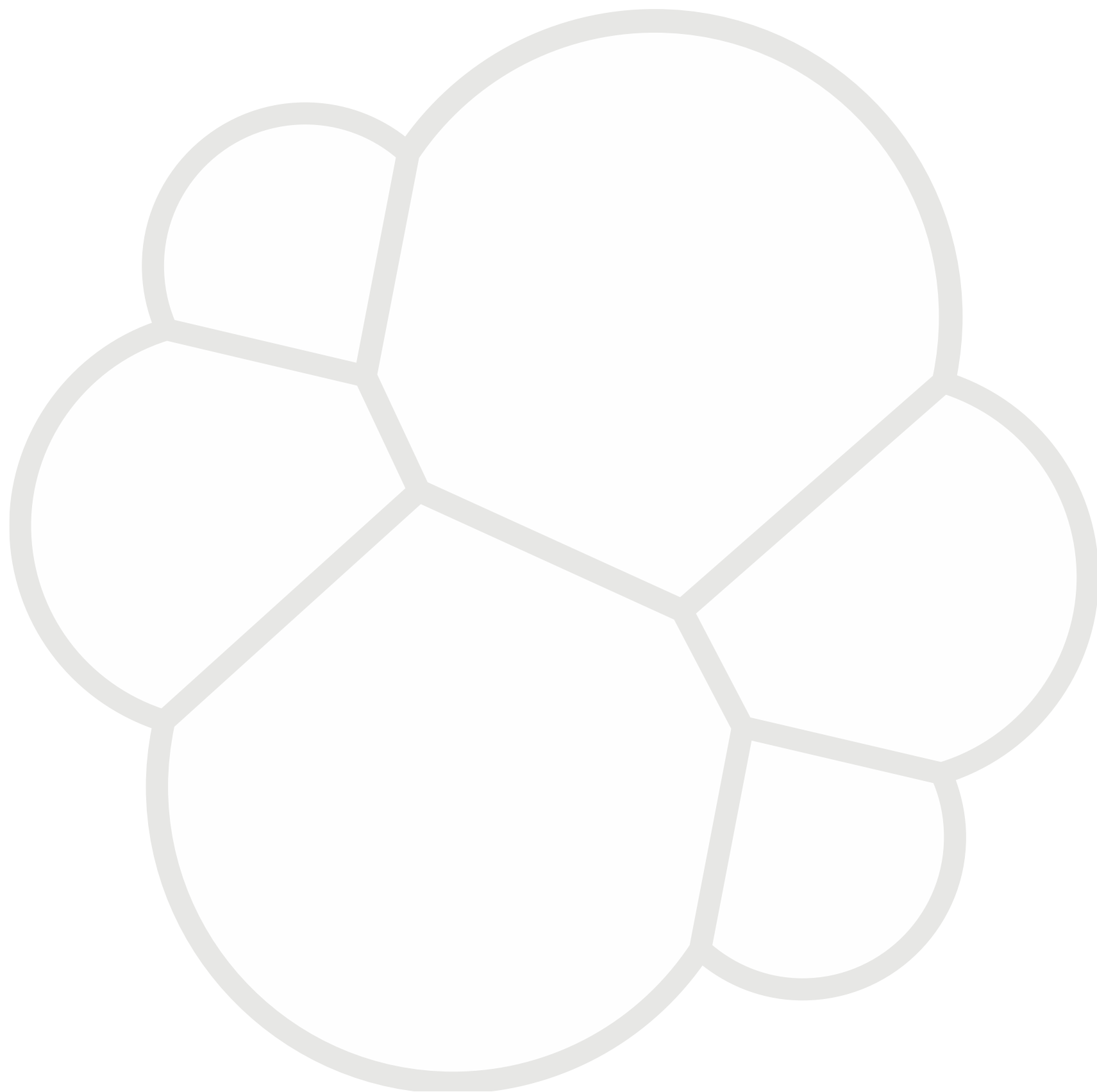


elasticsearch-lua

Building Lua Applications on Top of Elasticsearch



Pablo Musa
@pablitomusa



Elasticsearch is...

an open source, document-oriented, RESTful
full text search engine
with soft real-time analytics capabilities

Elasticsearch is...

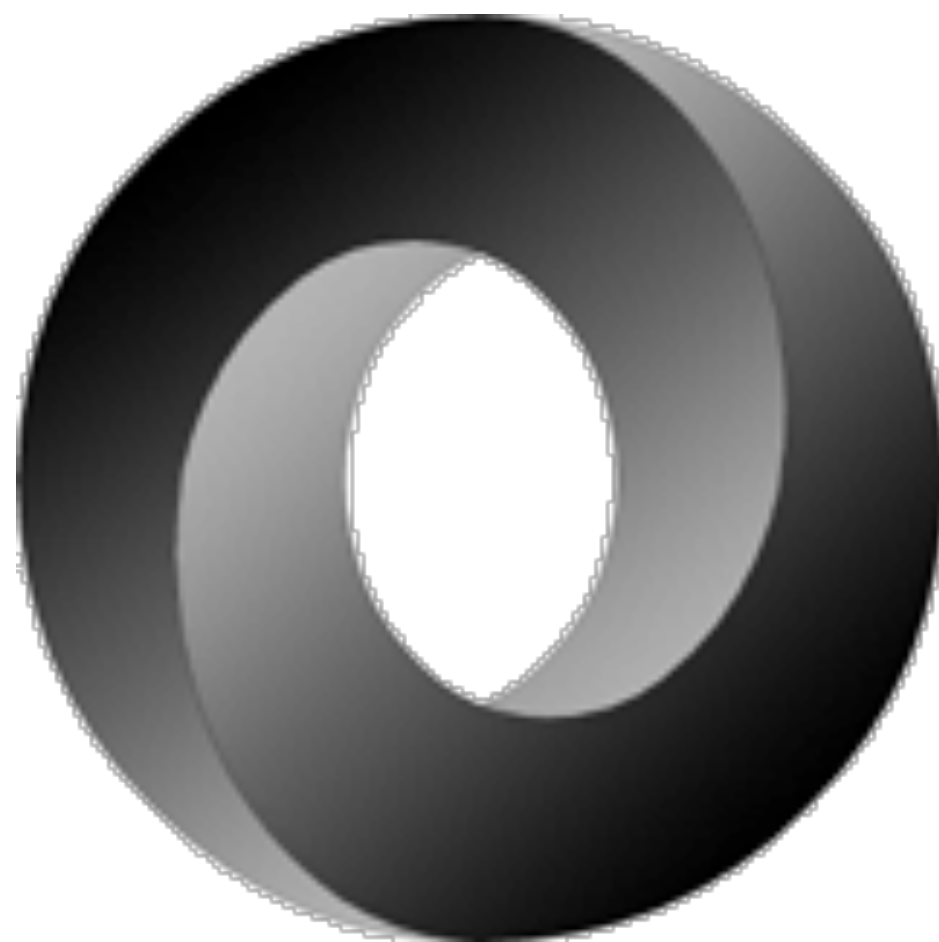
an **open source**, document-oriented, RESTful, full text search engine with
soft real-time analytics capabilities

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Elasticsearch is...

an open source, **document-oriented**, RESTful, full text search engine with
soft real-time analytics capabilities



Source: <http://json.org/>

```
{  
  "name" : "Webinar"  
  "geo" : {  
    "city" : "Amsterdam",  
    "lat" : 4.85, "lon" : 52.34  
  }  
}
```

Elasticsearch is...

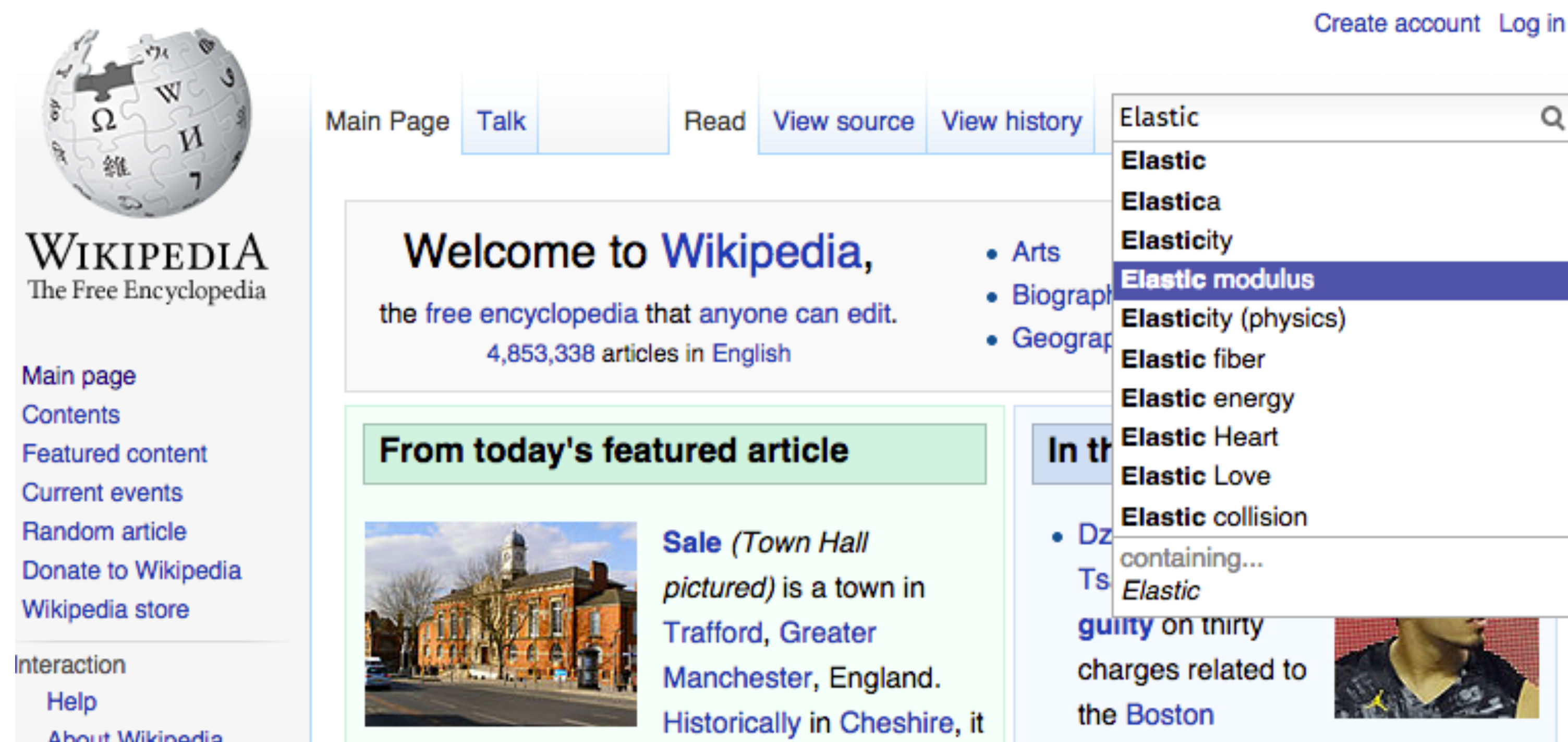
an open source, document-oriented, **RESTful**, full text search engine with
soft real-time analytics capabilities



Source: <https://httpwg.github.io/asset/http.svg>

Elasticsearch is...

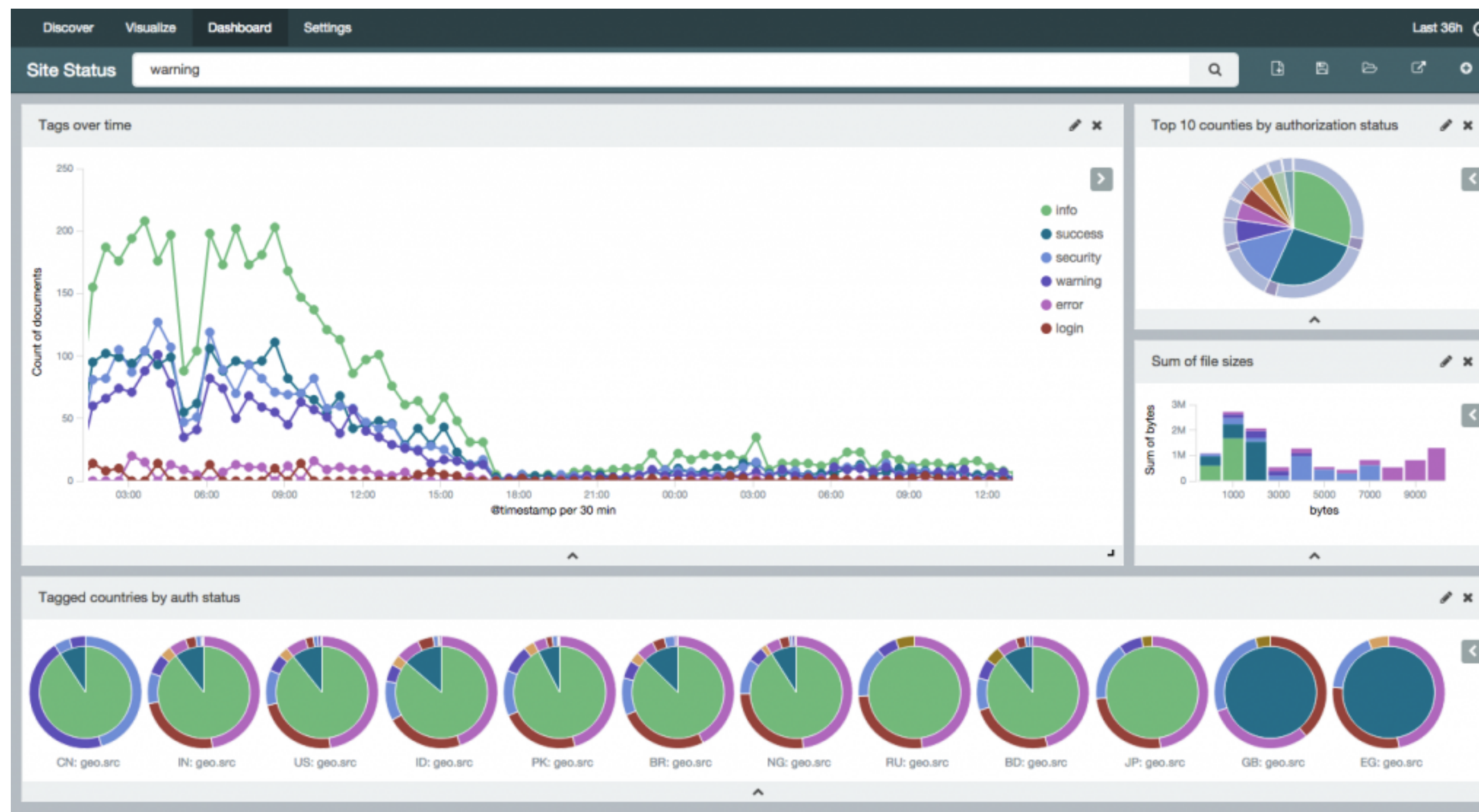
an open source, document-oriented, RESTful, **full text search engine** with
soft real-time analytics capabilities



Elasticsearch is...

an open source, document-oriented, RESTful, full text search engine with

soft real-time analytics capabilities



Getting up and running... is easy

```
$ wget https://download.elastic.co/elasticsearch/elasticsearch/elasticsearch-2.1.1.tar.gz  
  
$ tar -zxvf elasticsearch-2.1.1.tar.gz  
$ cd elasticsearch-2.1.1  
  
$ ./bin/elasticsearch
```

<http://localhost:9200>

`elasticsearch-lua`

Lua vs JSON

```
{
  title      = "A Requirements Elicitation Approach Based in Templates and Patterns",
  author     = "A. Durán Toro",
  add_authors = { "B. Bernárdez Jiménez", "A. Ruiz Cortés", "M. Toro Bonilla" },
  key_words  = { "requirements engineering", "requirements elicitation" },
  language   = "en",
  conference = "WER99",
}
```

```
{
  "title"      : "A Requirements Elicitation Approach Based in Templates and Patterns",
  "author"     : "A. Durán Toro",
  "add_authors" : [ "B. Bernárdez Jiménez", "A. Ruiz Cortés", "M. Toro Bonilla" ],
  "key_words"  : [ "requirements engineering", "requirements elicitation" ],
  "language"   : "en",
  "conference" : "WER99",
}
```

CRUD

```
local paper = {  
  title = "A Requirements Elicitation Approach Based in Templates and Patterns",  
  ...  
}  
  
local elasticsearch = require"elasticsearch"  
local client = elasticsearch.client() -- use default configs  
local r, e = client:index(  
  index = "wer", type = "papers", id = 1, body = paper  
)
```

```
local r, e = client:get( { index = "wer", type = "papers", id = 1 } )
```

```
local r, e = client:update(  
  index = "wer", type = "papers", id = 1, body = { doc = { title = "Updated Title" } }  
)
```

```
local r, e = client:delete( { index = "wer", type = "papers", id = 1 } )
```

Search

```
local r, e = client:search( { index = "wer", type = "papers", q = "requirements" } )
```

```
local r, e = client:search( { index = "wer", type = "papers", q = "title:requirements"})
```

```
local r, e = client:search{  
  index = "wer",  
  type = "papers",  
  body = {  
    query = {  
      filtered = {  
        query = {  
          multi_match = {  
            query = "requirements", fields = { "key_words^10", "title^5", "abstract" }  
          } },  
          filter = { range = { year = { gte = "now-3y" } } }  
        } } }  
      }  
    }
```

Search

```
local r = client.search( { index = "papers" type = "wer" q = "requirements" } )
{
  took = 1.0, timed_out = false,
  _shards = { total = 5.0, successful = 5.0, failed = 0.0 },
  hits = {
    total = 1.0, max_score = 0.17673586,
    hits = [ {
      _index = "wer", "_type": "papers", "_id": "1",
      _score = 0.17673586,
      _source = {
        title = "A Requirements Elicitation Approach Based in Templates and Patterns",
        key_words = { "requirements engineering", "requirements elicitation" },
        year = "2013", ...
      }
    }
  ]
}
```

Why Elasticsearch?



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WER15 - Workshop em Engenharia de Requisitos 2015: Lima, Perú

Hugo Vega, Ernesto Cuadros, João Araújo, Nelly Condori-Fernandez (Ed.): Anais do WER15 - Workshop em Engenharia de Requisitos, Lima, Perú, April 22, 23, and 24, 2015.

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```
@proceedings{WERpapers: WER15,  
  editor = {Hugo Vega, Ernesto Cuadros, João Araújo, Nelly Condori-Fernandez},  
  title = {Anais do WER15 - Workshop em Engenharia de Requisitos, Lima, Perú, April 22, 23, and 24, 2015},  
  publisher = { },  
  ISBN = {978-9972-825-80-4},  
  year = {2015}  
}
```

Requirements Engineering Workshop (S1)

1 - A Collaborative Approach to Capture the Domain Language . *Leandro Antonelli, Gustavo Rossi, Alejandro Oliveros*. Anais do WER15 - Workshop em Engenharia de Requisitos, Lima, Perú, April 22, 23, and 24, 2015, pp . [\[pdf\]](#) [\[scholar\]](#) **Downloads: 28**

Abstract: Software development is a succession of descriptions in different languages where a previous description is necessary for the next one. Thus, it is important to begin software development with requirements that are as correct and as complete as possible. Although some literature holds the belief that correctness and completeness are two attributes that requirements specifications must satisfy, we know that these attributes are very difficult to meet. However, we have to find ways to diminish the level of incompleteness and deal with the possible conflicts that do arise in the requirements context. Defining the domain language before specifying the requirements is a way of coping with this problem. Nevertheless, it is hard to produce a domain language specification when there are many stakeholders involved. We rely on collaboration in order to foster the cooperation of the stakeholders, thus they are able to explore the differences constructively and search for solutions that go beyond their own limited views. In this paper, we propose a strategy to capture the domain language in a collaborative way using Language Extended Lexicon and we show a preliminary validation of the proposed strategy

2 - Extração de requisitos apoiada por técnicas de Inteligência Artificial embutidas em ferramentas de apoio. *Cristiane Aparecida Lana, Lucas Gonçalves Cunha, José Luis Braga, Antônio de Pádua Albuquerque Oliveira*. Anais do WER15 - Workshop em Engenharia de Requisitos, Lima, Perú, April 22, 23, and 24, 2015, pp . [\[pdf\]](#) [\[scholar\]](#) **Downloads: 32**

Abstract: A linguagem peculiar e a pluralidade de visões distintas exigem conhecimento e experiência do engenheiro de requisitos para o sucesso da atividade de extração de requisitos em domínios específicos. Neste trabalho, são apresentadas as ferramentas i*Get e TEKBS, que utilizam técnicas de inteligência artificial para auxiliarem o engenheiro de requisitos na extração de metas concretas e flexíveis, no contexto de iStar. A i*Get utiliza as “ações concretas” definidas no LAL enquanto a TEKBS as “ações flexíveis” combinadas com os sinônimos dos termos que representam essas ações, obtidos a partir do Wordnet. Os resultados são transformados em base de fatos da ferramenta CLIPS, e então processados usando uma base de regras de análise disparadas pela máquina de inferência do CLIPS. Resultados preliminares mostram que um número maior de requisitos são extraídos pelo engenheiro, melhorando o conhecimento sobre o domínio.

3 - Improving Quality Model Construction Through Knowledge Reuse. *Juan Pablo Carvallo, Xavier Franch, Carme Quer*. Anais do WER15 - Workshop em Engenharia de

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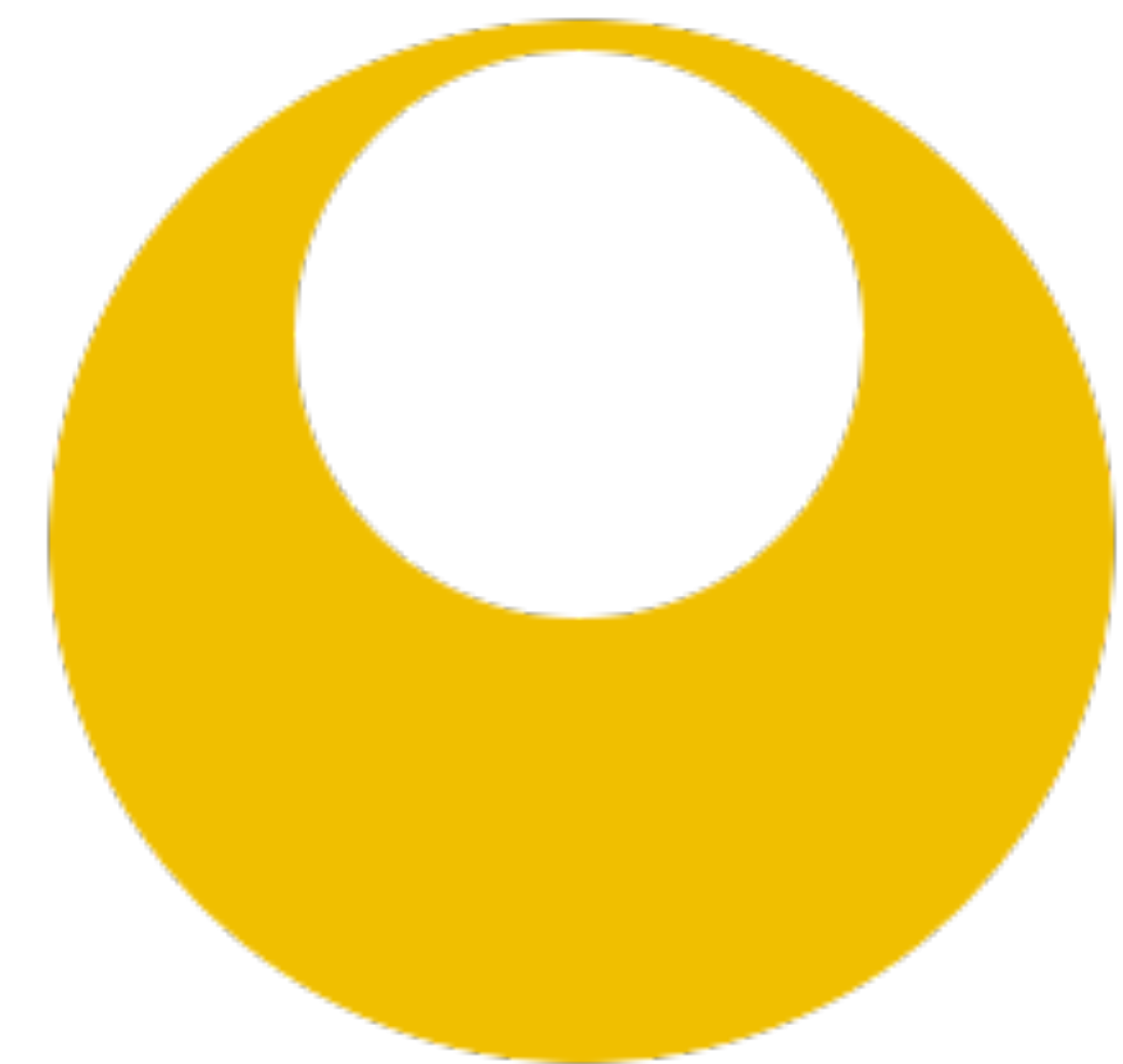
- 1 - WER99 - **A Requirements Elicitation Approach Based in Templates and Patterns.**
A. Durán Toro B. Bernárdez Jiménez, A. Ruiz Cortés, and M. Toro Bonilla. [\[pdf\]](#) [\[scholar\]](#) Cit: 81
- 2 - WER07 - **Requirements for Tools for Ambiguity Identification and Measurement in Natural Language Requirements Specifications.**
Nadzeya Kiyavitskaya Nicola Zeni, Luisa Mich, Daniel M. Berry. [\[pdf\]](#) [\[scholar\]](#) Cit: 50
- 3 - WER00 - **From Early Requirements Modeled by the i* Technique to Later Requirements Modeled in Precise UML.**
Fernanda Alencar Jaelson Castro, Gilberto Cysneiros , John Mylopoulos. [\[pdf\]](#) [\[scholar\]](#) Cit: 40
- 4 - WER00 - **Formal and Informal Aspects of Requirements Tracing.**
Francisco A. C. Pinheiro . [\[pdf\]](#) [\[scholar\]](#) Cit: 39
- 5 - WER02 - **Capturing Web Application Requirements through Goal-Oriented Analysis.**
D. Bolchini P. Paolini. [\[pdf\]](#) [\[scholar\]](#) Cit: 27
- 6 - WER02 - **Supporting Cooperative Requirements Engineering with an Automated Tool.**
D.F. Togneri R. de A. Falbo, C. S. de Menezes. [\[pdf\]](#) [\[scholar\]](#) Cit: 27
- 7 - WER07 - **Business Process Monitoring and Alignment: An Approach Based on the User Requirements Notation and Business Intelligence Tools.**
Alireza Pourshahid Daniel Amyot , Pengfei Chen Michael Weiss , Alan J. Forster. [\[pdf\]](#) [\[scholar\]](#) Cit: 26
- 8 - WER02 - **Uma Proposta para Melhorar o Rastreamento de Requisitos.**
M. Toranzo J.F.B. Castro, E. Mello. [\[pdf\]](#) [\[scholar\]](#) Cit: 25
- 9 - WER01 - **Requirements Elicitation Using a Combination of Prototypes and Scenarios.**
Markus Mannio Uolevi Nikula. [\[pdf\]](#) [\[scholar\]](#) Cit: 24
- 10 - WER03 - **Closing the Gap between Organizational Modeling and Information System Modeling.**
Alicia Martínez Oscar Pastor, Hugo Estrada. [\[pdf\]](#) [\[scholar\]](#) Cit: 23
- 11 - WER01 - **A Non-Functional Approach for COTS Components Trading.**
Luis Iribarne Antonio Vallecillo, Carina Alves, Jaelson Castro. [\[pdf\]](#) [\[scholar\]](#) Cit: 23

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- Apache + CGI Lua + **MySQL** + **Google Search**
- Apache + Sailor + **Elasticsearch**



VS.



Sailor!



VS.

- Elasticsearch is not a Database!
- Do we really need a Database?





VS.

- MySQL is not a Search Engine!
- Do we really need a Search Engine?



Google™ Custom Search

Search

← → ↻ cse.google.com/cse?cx=009472974280876244117:xpn-pdgov3q&q=requireme... ☆

Google pesquisa personalizada

requirements

Pesquisar

Aproximadamente 262 resultados (0,45 segundos)

[Research Findings on Empirical Evaluation of Requirements ...](#)

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Research Findings on Empirical Evaluation of **Requirements**. Specifications Approaches.

Nelly Condori-Fernandez. 1. , Maya Daneva. 2. , Klaas Sikkel. 2.

wer.inf.puc-rio.br/WERpapers/artigos/artigos.../fernandez.pdf

[Metamodeling for Requirements Reuse](#)

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description make **requirements** reuse difficult. In this paper we present a meta- model to integrate some different types of semiformal diagrams into a require-.

[wer.inf.puc-rio.br/wer02/zip/Metamodeling_reuse\(6\).pdf](http://wer.inf.puc-rio.br/wer02/zip/Metamodeling_reuse(6).pdf)

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- Everything in Lua

Moving to Elasticsearch!

MySQL => Elasticsearch

```
-- code to load luasql

local client = require"elasticsearch".client()
local conferences = query("SELECT * from conferences")

for conf in conferences do
    local bulk = {}

    table.insert(bulk, { index = { _type = 'conferences', _id = conf.id } })
    table.insert(bulk, conf)

    papers = query("SELECT * from papers WHERE name_conference = '" .. conf.name_conference .. "'")
    for paper in papers do
        table.insert(bulk, { index = { _type = 'papers', parent = conf.id, _id = paper.id } })
        table.insert(bulk, paper)
    end

    local res, err = client:bulk( { index = 'wer', body = bulk })
    if not res then
        error("bulk request failed:" .. err)
    end
end
```


Data Modeling

- Denormalize your data
- Nested objects
- Parent/Child

Mappings ("Schema")

```
{
  "settings": {
    "number_of_shards": 1,
    "number_of_replicas": 0
  },
  "mappings": {
    "conferences": {
      "properties": {
        ...
      }
    },
    "papers": {
      "_parent": {
        "type": "conferences"
      },
      "properties": {
        ...
      }
    }
  }
}
```

```
"properties"
  "id": {
    "type": "integer"
  },
  "year": {
    "type": "integer"
  }
}
```

```
"properties": {
  "id": {
    "type": "integer"
  },
  "paper_session": {
    "type": "string",
    "fields": {
      "raw": {
        "type": "string",
        "index": "not_analyzed"
      }
    }
  }
}
```

Minimal code changes

```
-- CONNECT
local env = require"luasql.mysql".mysql()
local con = env:connect(cfg.db_name, cfg.db_login, cfg.db_passwd, cfg.db_host, cfg.db_port)
-----

local client = require("elasticsearch").client()

-- GET ALL CONFERENCES
local stmt = "select * from conferences order by id;"
local res, err = con:execute(stmt)
-----

local query = { sort = {"id"}, size = all }
local res, err = client:search({index = index, type = 'conferences', body = query})

-- GET ONE CONFERENCE
local stmt = "select * from conferences where name_conference ='" .. conference .. "';"
local res, err = con:execute(stmt)
-----

local params = {index = index, type = 'conferences', id = conference}
local res, err = client:get(params)
```


Modify search box



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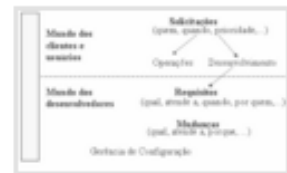
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Aproximadamente 247 resultados (0,29 segundos)



[Indicadores para a Gerência de Requisitos](#)

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Indicadores para a Gerência de **Requisitos**. Claudia Hazan¹², Julio Cesar Sampaio do Prado Leite². 1 SERVIÇO FEDERAL DE PROCESSAMENTO DE ...
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Organizando Processos de **Requisitos**. Soeli T. Fiorini. Julio Cesar Sampaio do Prado Leite. Carlos José Pereira de Lucena soeli,julio,lucena@inf.puc-rio.br.
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[Processo de Engenharia de Requisitos Aplicado a Requisitos](#)

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aplicado a **requisitos** não-funcionais de desempenho, que são um fator ... consequência de mudanças de estratégia a fim de inserir um **requisito** não-funcional.

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Néstor Adolfo Mamani Macedo Julio Cesar Sampaio do Prado Leite. [\[pdf\]](#) [\[scholar\]](#) **Qualidade: 0.51**
- 2 - WER00 - **Identificación de Patrones de Reutilización de Requisitos de Sistemas de Información.**
A. Durán Toro A. Ruiz Cortés, R. Corchuelo Gil, M. Toro Bonilla. [\[pdf\]](#) [\[scholar\]](#) **Qualidade: 0.39**
- 3 - WER01 - **Uma Estratégia para Implantação de uma gerência de Requisitos Visando a Melhoria dos Processos de Sof.**
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- 4 - WER05 - **Avaliação de uma Metodologia de Medição da Qualidade em um Documento de Requisitos Orientado a Aspectos.**
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- 5 - WER11 - **Uma Proposta de Elicitação e Análise de Requisitos no Contexto de Médias e Pequenas Empresas de Desenvolvimento de Software.**
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- 6 - WER12 - **Prefacio Español - 15° Workshop sobre Ingeniería de Requisitos.**
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- 7 - WER02 - **Transformación de Especificación de Requisitos en Esquemas Conceptuales usando Diagramas de Interacc.**
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- 8 - WER13 - **Uma Abordagem para Engenharia de Requisitos no Domínio de Software Embarcado.**
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- 9 - WER05 - **É possível substituir processos de Engenharia de Requisitos por Contagem de Pontos de Função?.**
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- 10 - WER01 - **Comprobación Automática de Requisitos de Calidad en Sistemas Multiorganizacionales.**
Antonio Ruiz Amador Durán, Rafael Corchuelo, Beatriz Bernárdez, Miguel Toro. [\[pdf\]](#) [\[scholar\]](#) **Qualidade: 0.36**

```
function es.search(q, size)
  local p = { index = index, type = 'papers', q = q, size = size or 10 }
  local res, err = client:search(p)
  -- error handling and return
end
```

Is it that simple?

Elasticsearch is not Alone

Elastic



Elasticsearch

Store, Search & Analyze

Logstash

Collect, Enrich & Transport

Beats

Collect, Parse & Ship

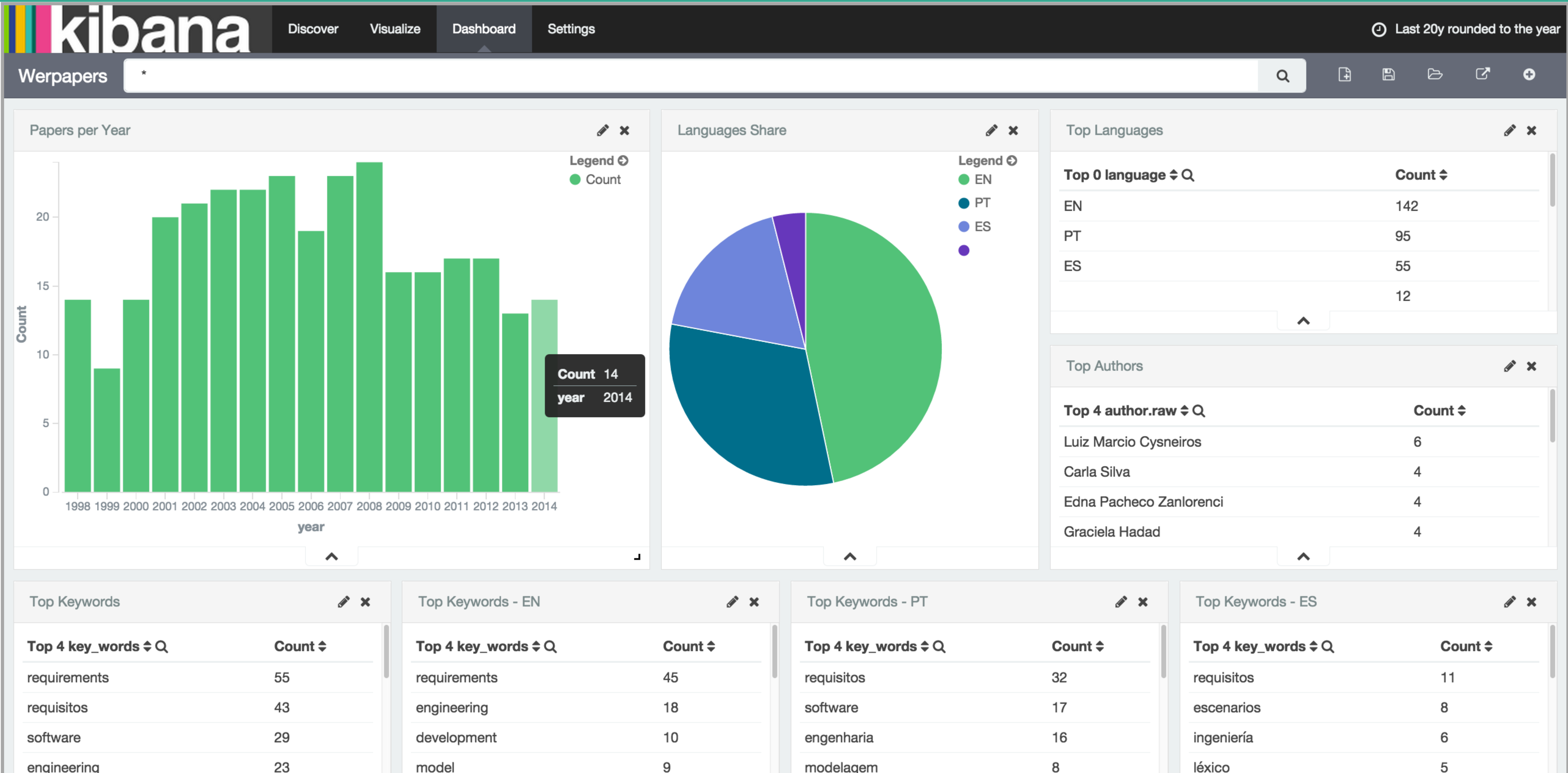
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Elasticsearch as a Service

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Next Steps

+Use cases

+Real applications

+Tests

Automate Integration with Elasticsearch

Make it an official client

Thanks for listening! Questions?

Pablo Musa
pablo@elastic.co

References

<https://github.com/DhavalKapil/elasticsearch-lua>

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<http://sailorproject.org/>

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