# Ontohub.org - a web platform for distributed and heterogeneous ontologies

Till Mossakowski[1,2]
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[1]SFB/TR 8 "Spatial cognition", University of Bremen, Germany
[2]DFKI GmbH, Bremen, Germany

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# Ontohub: Repository for Distributed Ontologies

Available at: `http://ontohub.org`
Sources: `http://github.com/ontohub/ontohub`

- Ontohub is an **ontology repository engine** with a **web frontend**
- specialized on managing **distributed ontologies**
  - ISO Working Draft 17347 (Ontology Integration and Interoperability – Distributed Ontology Language) `http://ontoiop.org`
  - Distributed means: **logically heterogeneous**, **modular**, **interlinked**, **annotated**, and **distributed over the Web**.

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# Single and Distributed Ontologies

Ontohub supports **single** ontologies in the following languages:

- **OWL** (RDF/XML works best)
- **Common Logic** (CLIF works best)
- **Propositional Logic**
- **First-order Logic** (CASL, TPTP)
- **Higher-order Logic** (THF)
- **Modal logic**

and **distributed** ontologies in

- **DOL** (Distributed Ontology Language)
- **HetCASL** (Heterogeneous Common Algebraic Specification Language)

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# Ontohub's Notion of Ontology

Ontohub's **notion** of an ontology is **generic**:

- a set of **symbols**
- each symbol has a **kind**:
  - in OWL: Class, ObjectProperty, DataProperty
  - in Common Logic: name, sequence marker
  - in first-order logic: predicate symbol, function symbol
- and a set of **sentences** (axioms, definitions, theorems)
- in some ontology **language**

Semantics: theory of **institutes** (see OntoIOp/DOL)
All objects identified by IRIs, can have **metadata** and **comments** (only supported for ontologies so far).

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# Use of Ontohub for Ontology Evaluation

(currently only via local Hets installation, will soon be added to the web platform)

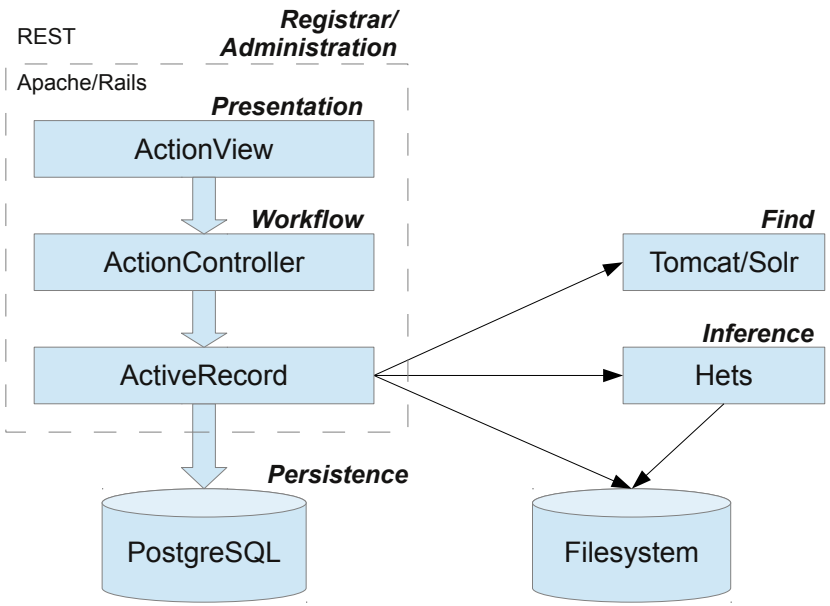
- checking consistency
- relating to other ontologies (views)
- checking intended consequences (theorems)
- integration of OOPS! (planned for hackathon)

# State of Development

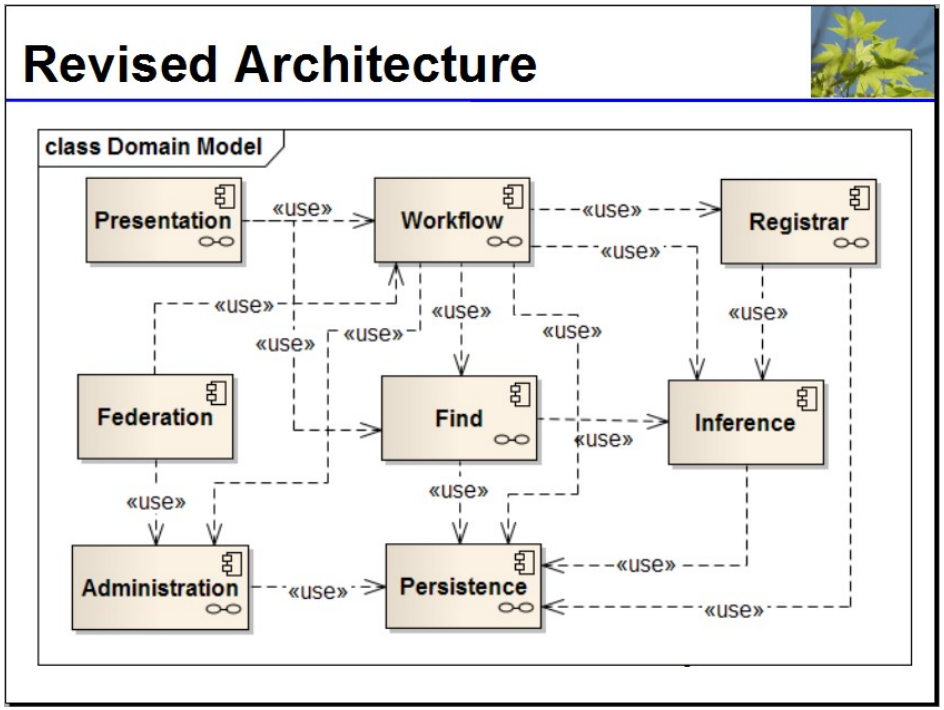
- 6 programmers, 2 ruby on rails consultants, 3 ontologists
- sources under AGPL, see `http://github.com/ontohub/ontohub`
- recently implemented **Registry** for Ontology **Languages** and **Translations**
- implemented a small but essential **subset of the OOR requirements** (`http://ontolog.cim3.net/cgi-bin/wiki.pl?OpenOntologyRepository_Requirement`)

# Current Architecture

## Ontohub:




## OOR:




http://ontolog.cim3.net/cgi-bin/wiki.pl?

OpenOntologyRepository_Architecture/Candidate03#

nid2MUD

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# Demo I (Start Page)

Try the public website:
`http://ontohub.org`

- as a user: simply **register**
- as an admin: ask at ontohub@informatik.u bremen.de


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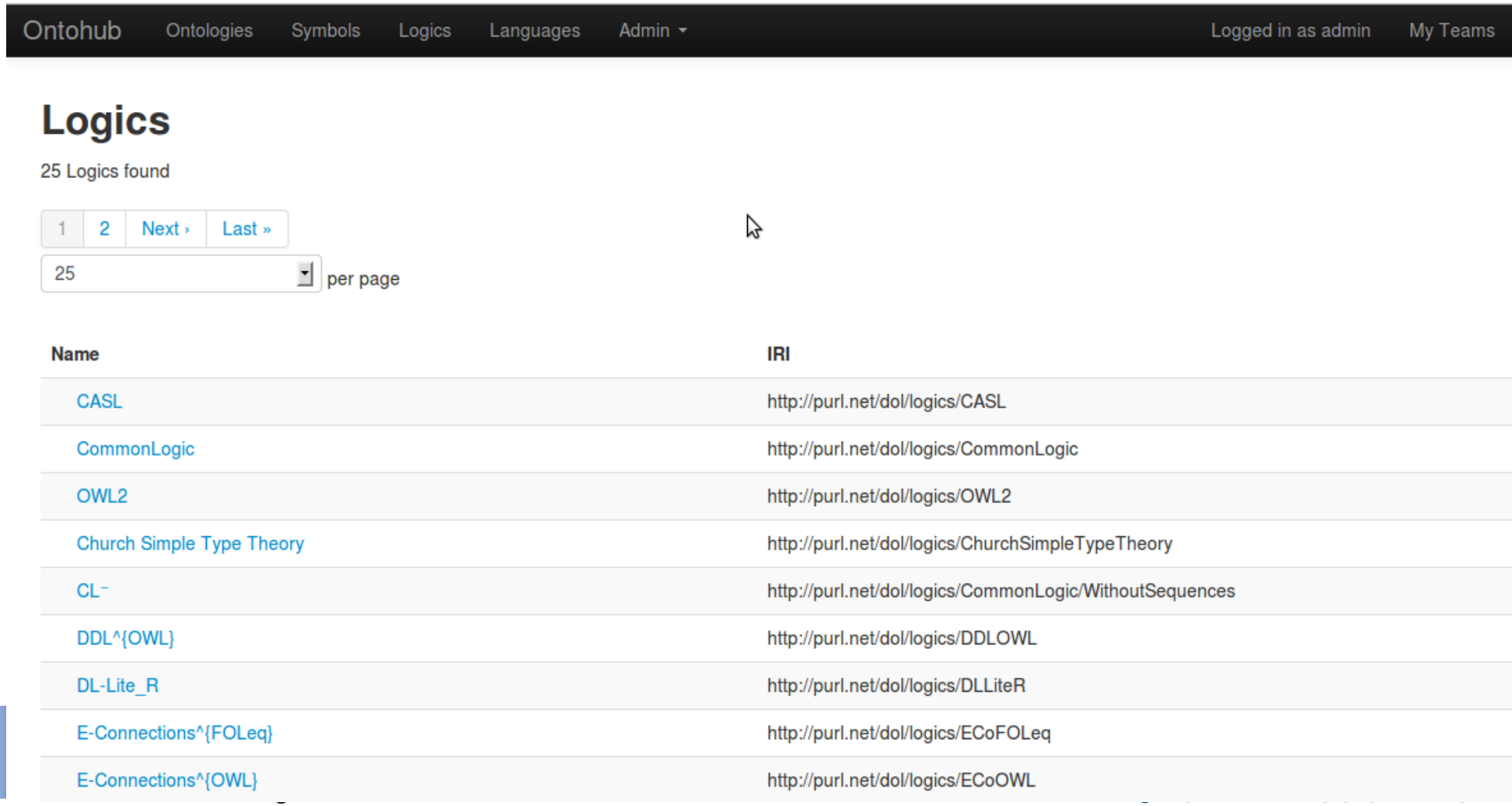
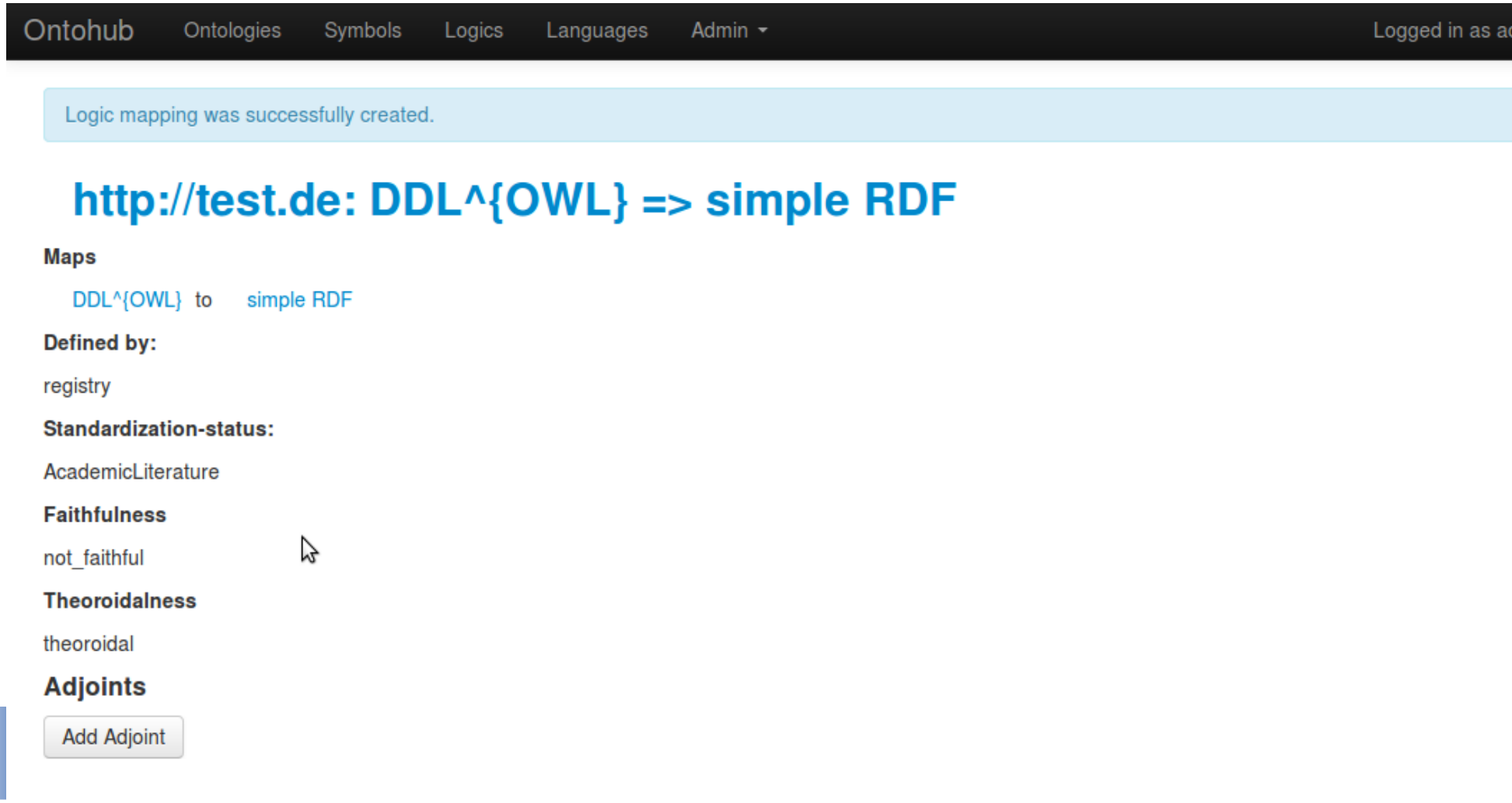
# Demo II (Logics)

http://ontohub.org/logics



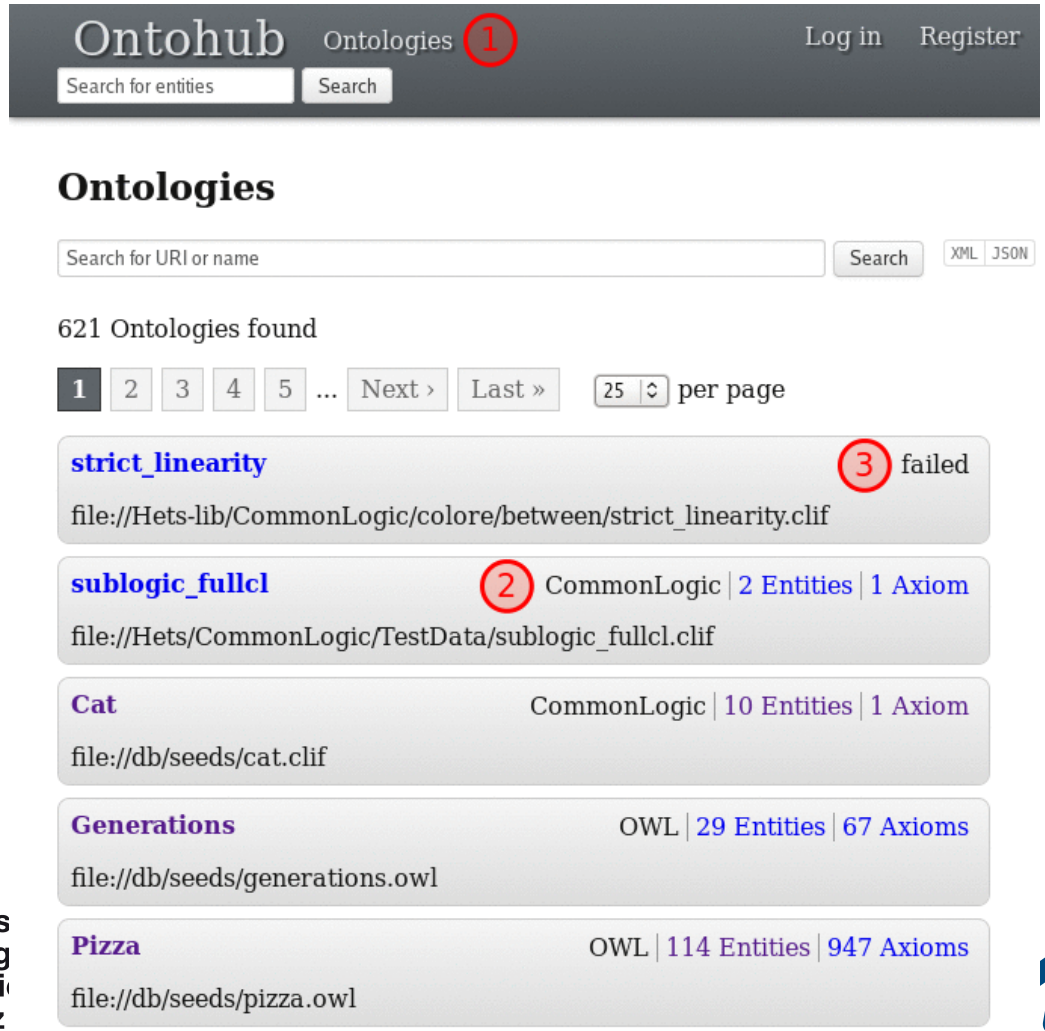
# Demo III (Logic Mapping)

http://ontohub.org/ontologies



# Demo IV (Ontology Overview)

http://ontohub.org/ontologies

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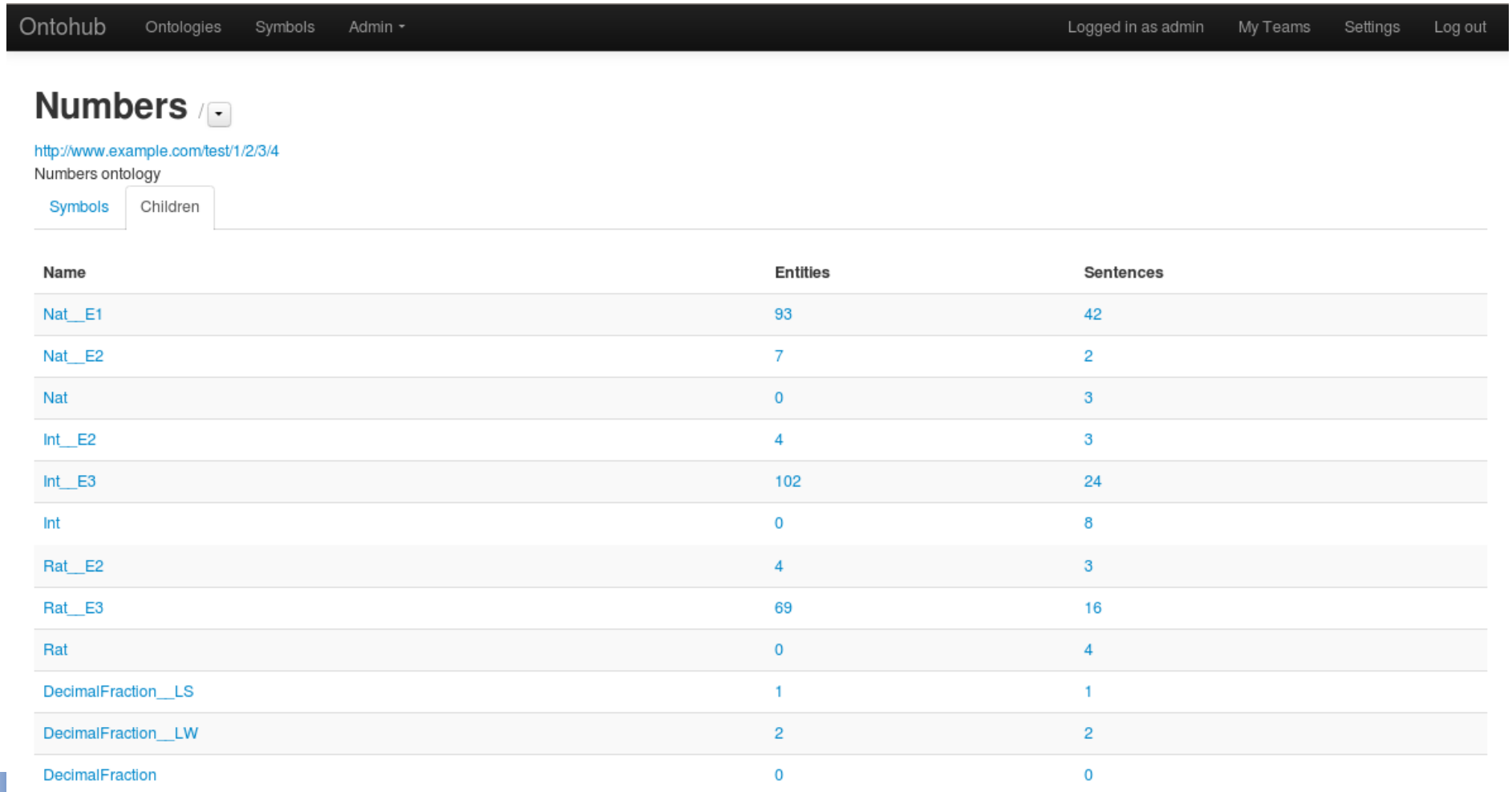
# Demo Va (Distributed Ontology)

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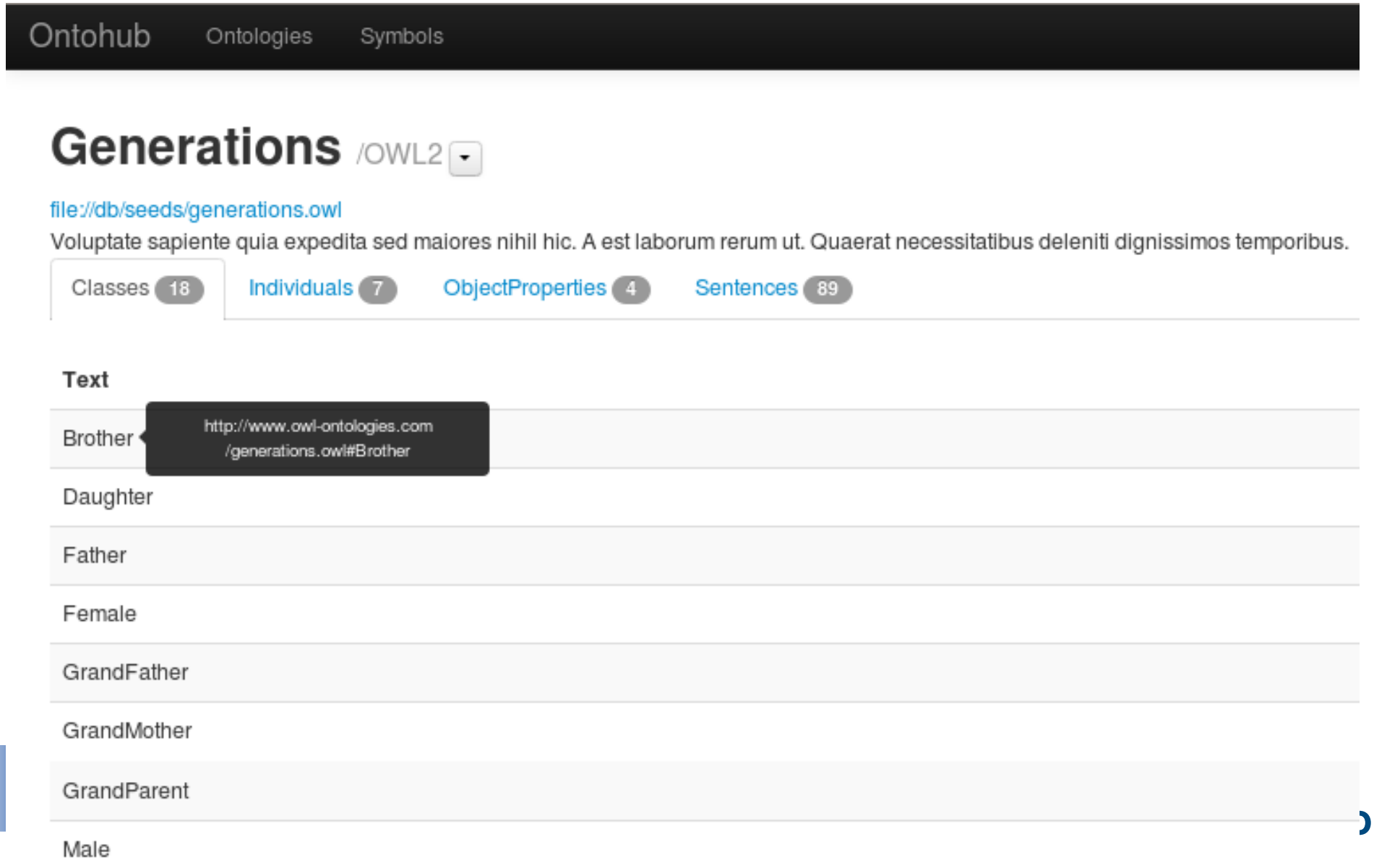
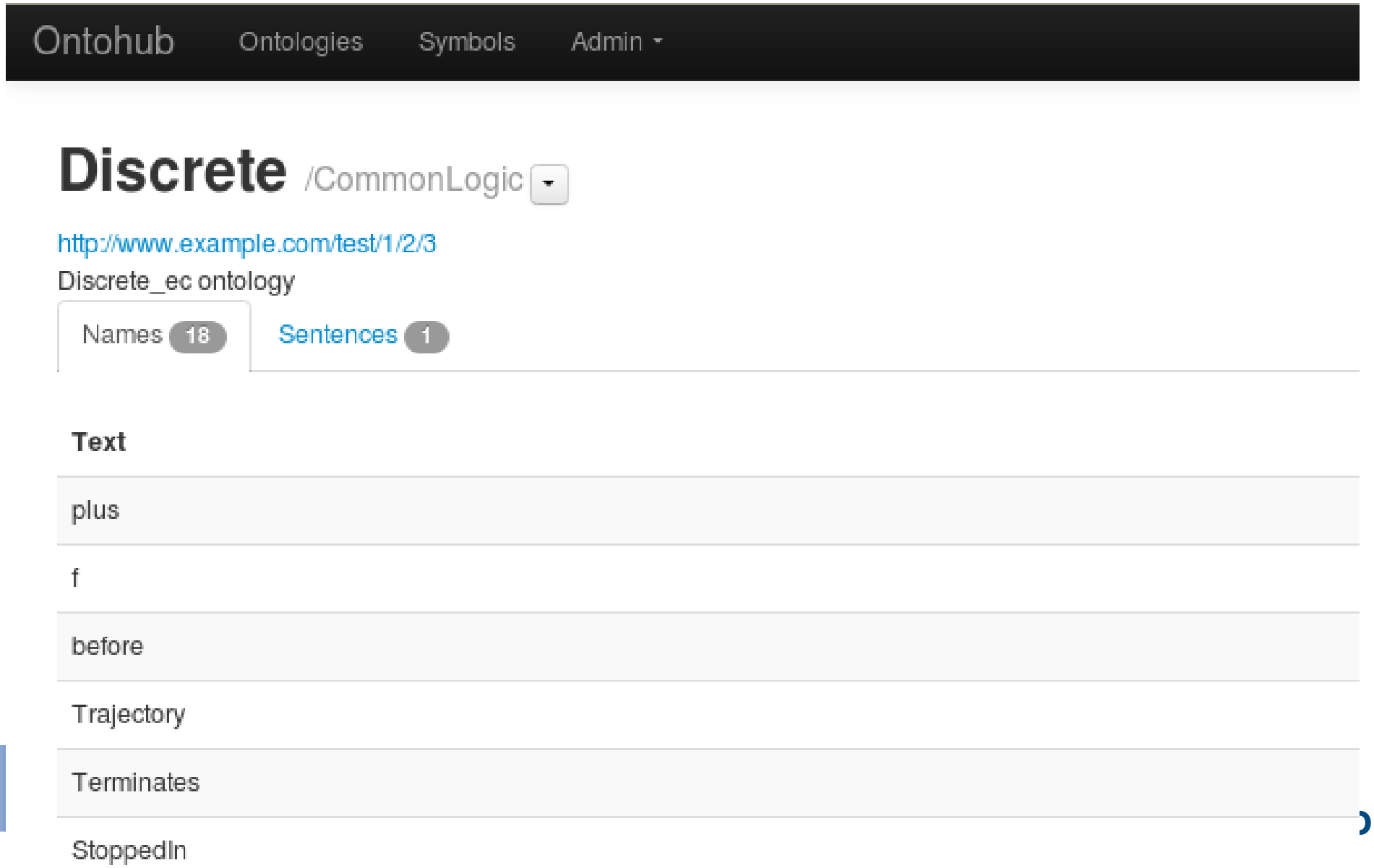
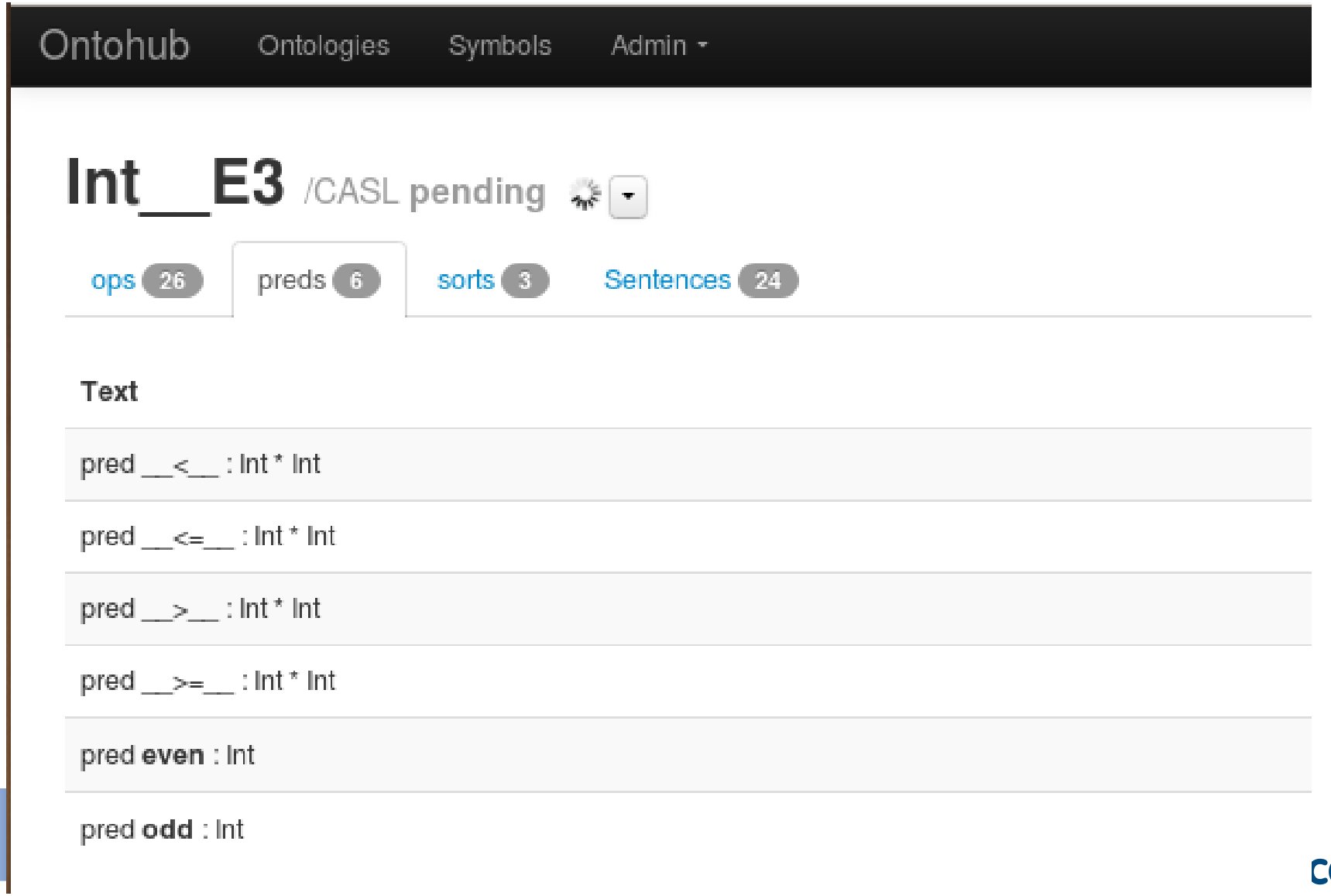
# Demo Vb (Overview of Symbols - OWL)



# Demo Vc (Overview of Symbols - Common Logic)



# Demo Vd (Overview of Symbols - FOL/CASL)

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# Demo Ve (Overview of Sentences - Common Logic)


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# Demo Vf (Overview of Sentences - FOL/CASL)

Ontohub Ontologies Symbols Admin

## Int__E3 /CASL pending

ops 26 preds 6 sorts 3 Sentences 24

| Name | Text |
|---|---|
| leq_def_Int | forall m, n : Int . m <= n <=> n - m in Nat %(leq_def_Int)% |
| geq_def_Int | forall m, n : Int . m >= n <=> n <= m %(geq_def_Int)% |
| less_def_Int | forall m, n : Int . m < n <=> m <= n /\ not m = n %(less_def_Int)% |
| greater_def_Int | forall m, n : Int . m > n <=> n < m %(greater_def_Int)% |
| even_def_Int | forall m : Int . even(m) <=> even(abs(m)) %(even_def_Int)% |
| odd_def_Int | forall m : Int . odd(m) <=> not even(m) %(odd_def_Int)% |
| odd_alt_Int | forall m : Int . odd(m) <=> odd(abs(m)) %(odd_alt_Int)% |
| neg_def_Int | forall a, b : Nat . - (a - b) = b - a %(neg_def_Int)% |
| sign_def_Int | forall m : Int . sign(m) = 0 when m = 0 else 1 when m > 0 else - 1 %(sign_def_Int)% |
| abs_def_Int | forall m : Int . abs(m) = - m when m < 0 else m %(abs_def_Int)% |
| add_def_Int | forall a, b, c, d : Nat . (a - b) + (c - d) = (a + c) - (b + d) %(add_def_Int)% |
| mult_def_Int | forall a, b, c, d : Nat . (a - b) * (c - d) = (a * c + b * d) - (b * c + a * d) %(mult_def_Int)% |

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# Demo VI (Search Symbols)

Ontohub Ontologies Admin Person Search (1) Logged in as admin My Teams Settings Log out

**Entity Search** (3) refine search

Person kind:ObjectProperty Search ?

**15 Entities** found in **4 Ontologies** (2)

1. **OpenAALOntology**

**11 Entities** found. Showing 1 - 10

| Text | Kind | Name | URI | Range |
|---|---|---|---|---|
| Class <http://www.openaal.org/SAM/Ontology/person#Person> | Class | <http://www.openaal.org/SAM/Ontology/person#Person> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#AP> | Class | <http://www.openaal.org/SAM/Ontology/person#AP> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#Activity> | Class | <http://www.openaal.org/SAM/Ontology/person#Activity> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#Carer> | Class | <http://www.openaal.org/SAM/Ontology/person#Carer> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#English> | Class | <http://www.openaal.org/SAM/Ontology/person#English> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#Fall> | Class | <http://www.openaal.org/SAM/Ontology/person#Fall> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#German> | Class | <http://www.openaal.org/SAM/Ontology/person#German> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#Language> | Class | <http://www.openaal.org/SAM/Ontology/person#Language> | | |
| Class <http://www.openaal.org/SAM/Ontology/person#Acute-State> | Class | <http://www.openaal.org/SAM/Ontology/person#Acute-State> | | |
| ObjectProperty <http://www.openaal.org/SAM/Ontology#has-person-state> | ObjectProperty | <http://www.openaal.org/SAM/Ontology#has-person-state> | | |

2. **FOAF**

**2 Entities** found.

| Text | Kind | Name | URI | Range |
|---|---|---|---|---|
| Class <http://xmlns.com/foaf/0.1/Person> | Class | <http://xmlns.com/foaf/0.1/Person> | | |
| Class <http://www.w3.org/2000/10/swap/pim/contact#Person> | Class | <http://www.w3.org/2000/10/swap/pim/contact#Person> | | |

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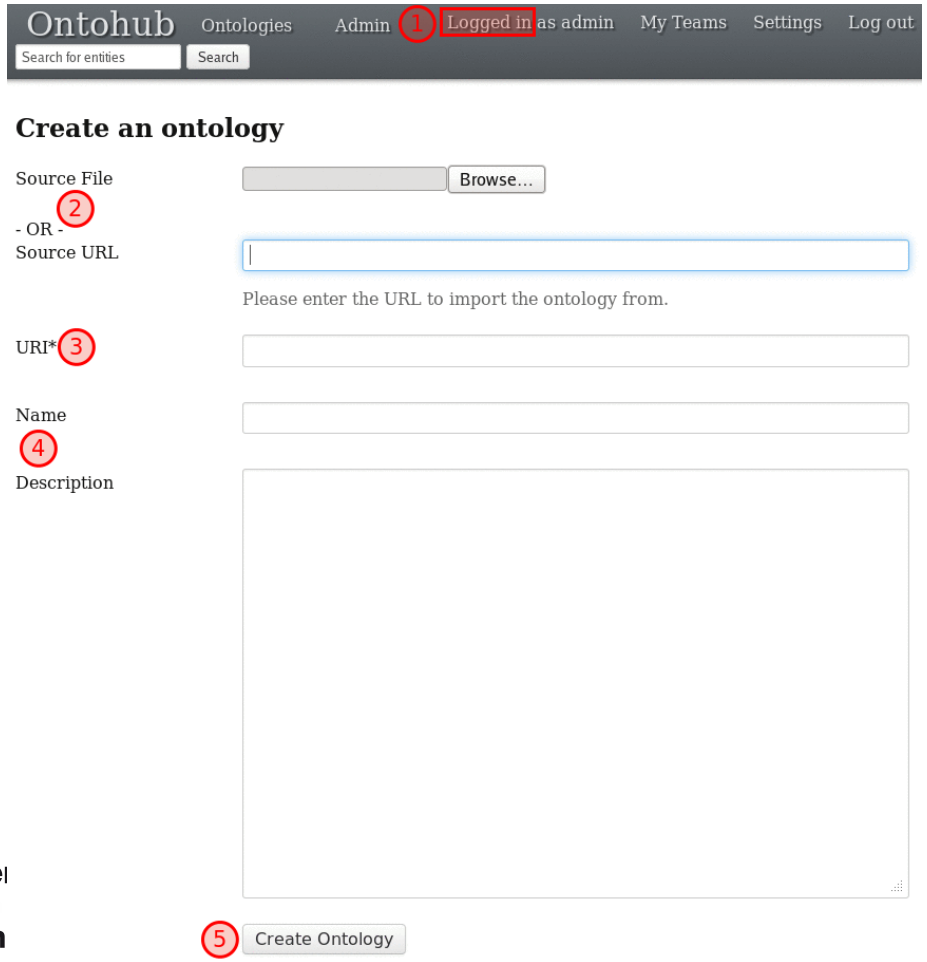
# Demo VII (Create an Ontology)

http://ontohub.org/ontologies/new
(must be logged in)

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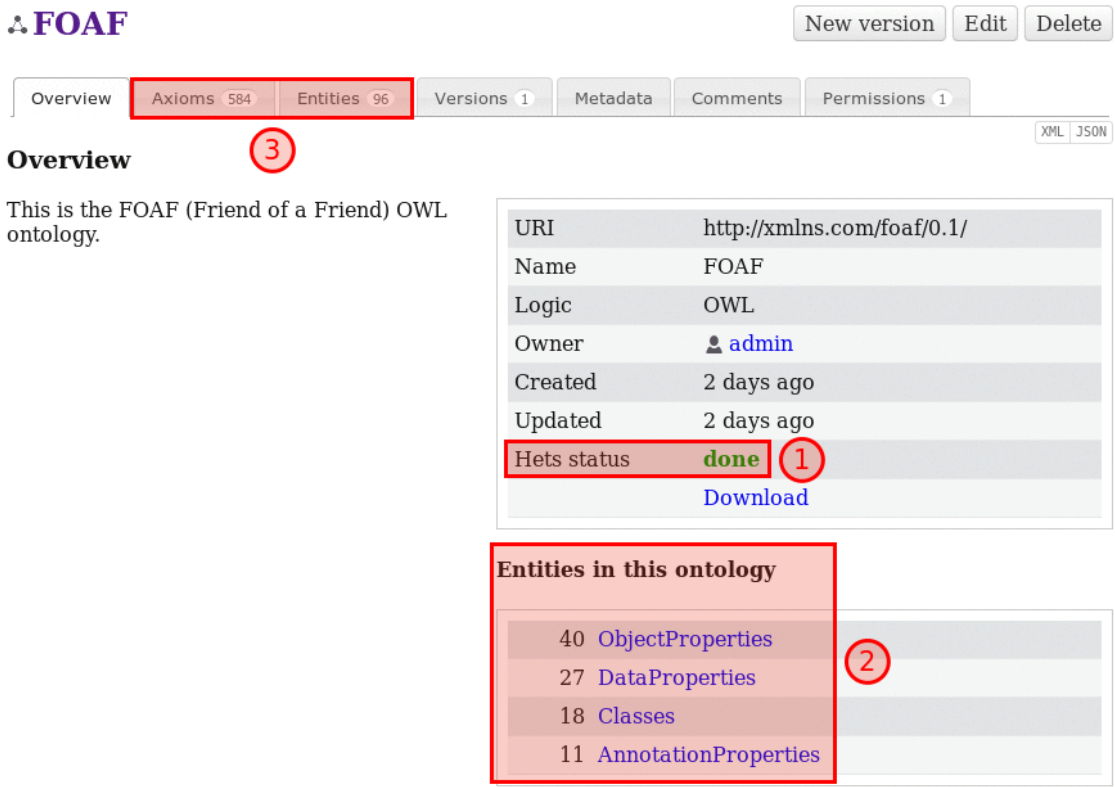
# Demo VIII (Successful Import)

Hets ("inference" component) tells Ontohub about the **logic** of an imported ontology, and about its **symbols** and **axioms**:

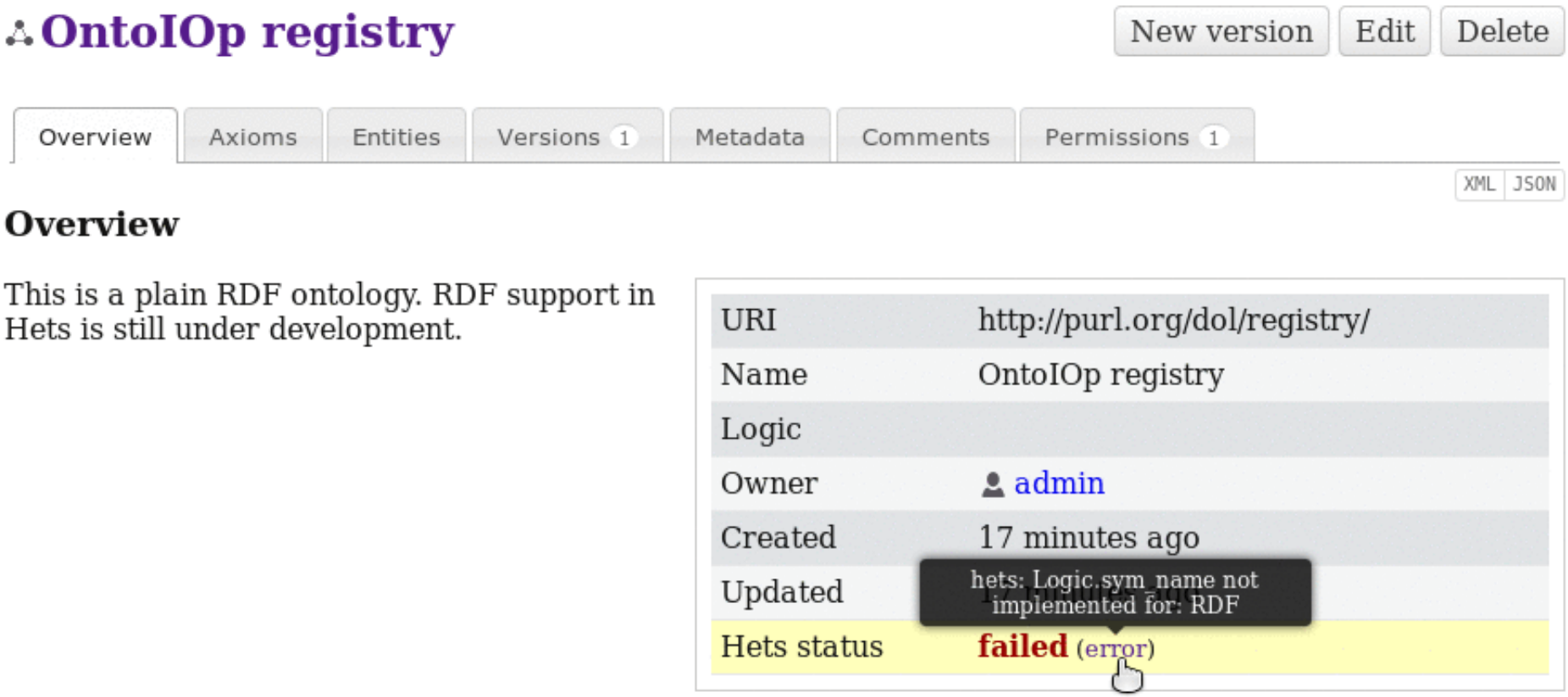



Works for any logic supported by Hets

Hets: Heterogeneous Tool Set, http://www.dfki.de/cps/hets

# Demo IX (Unsuccessful Import)

When Hets fails to process an ontology (here: because [auto-detecting the] logic is not yet supported), Ontohub tells the user:



# Demo X (Symbols Reported by Hets)

Hets reports **symbols** and **axioms** with their **name**, **source text**, **URI** (later), and **range**.

**sublogic_fullcl**

New version | Edit | Delete

Overview | Axioms 1 | Entities 2 | Versions 1 | Metadata | Comments | Permissions

XML JSON

**Entities**

| Text | Kind | Name | URI | Range |
|---|---|---|---|---|
| ...Q | SequenceMarker | ...Q | | 1.30 |
| x | Name | x | | 1.26 |

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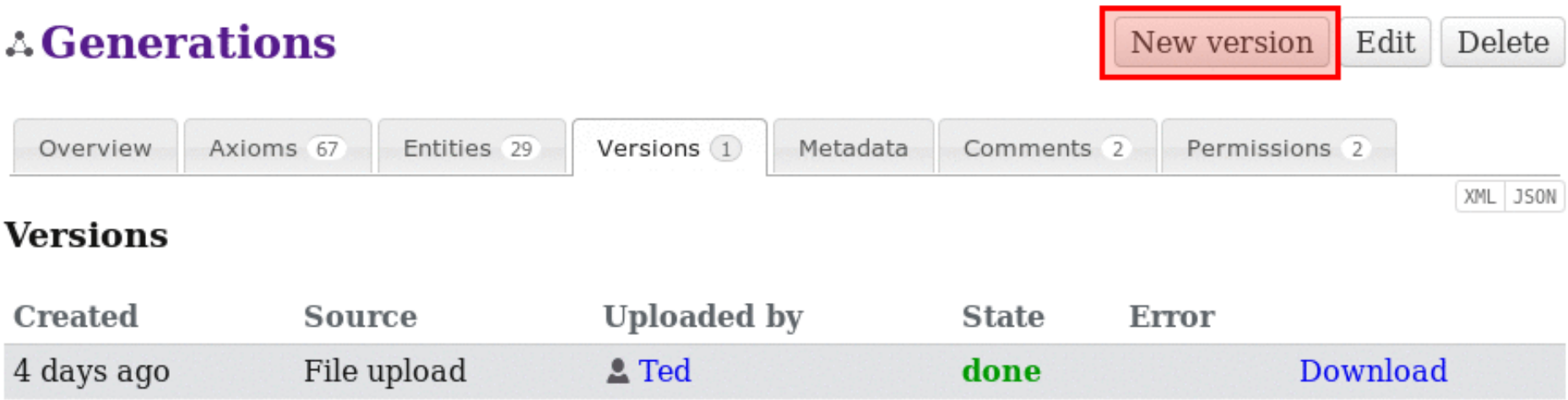
# Demo XI (Versions of an Ontology)

Old versions are stored (not more than this, for now), one can upload a new one.

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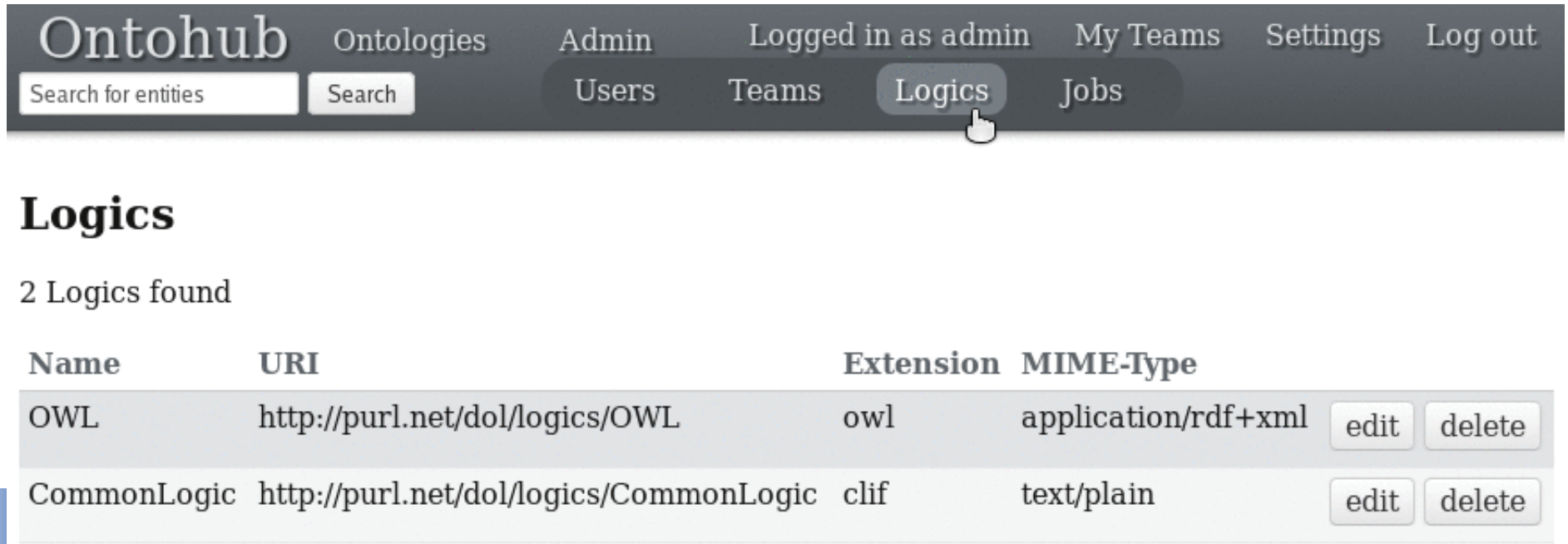
# Demo XII (Administration)

Administrator can manage:

- users, teams (also some self-management)
- logics (later: users can contribute $\rightsquigarrow$ registry)
- (Hets) jobs

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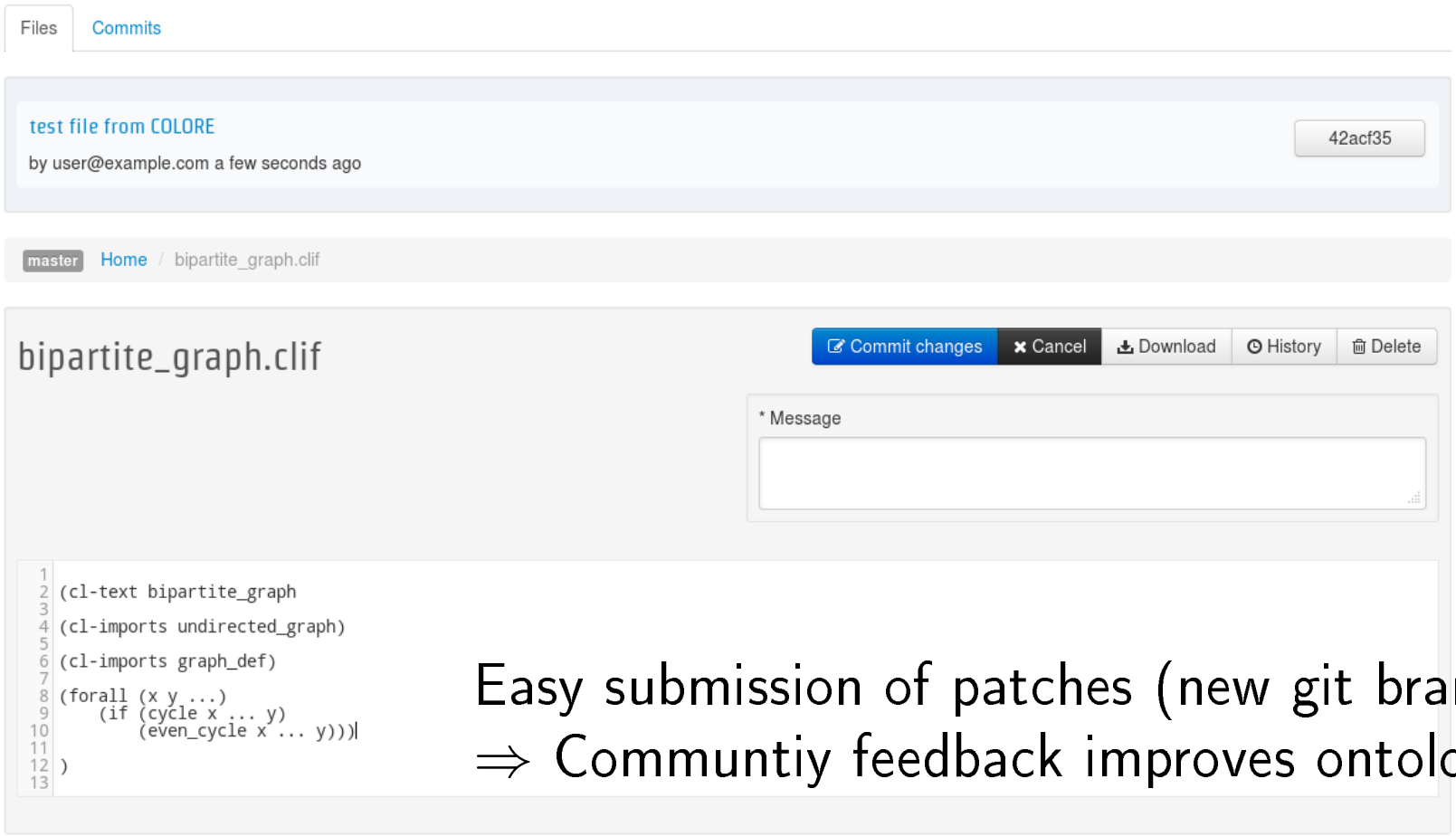
# Future I: Git Backend and Web Editor




Easy submission of patches (new git branch)

$\Rightarrow$ Communtiy feedback improves ontologies

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# Future II: General Repository Functionality

Improvements of existing features:

- **Search**: partial matches; refine symbol search by ontology; show axioms that contain the symbol searched for

New features:

- **Metadata and comments** for symbols and axioms
- **Metadata** editing
- **Edit** relevant section of an ontology (e.g. "this axiom")
- **Social features**: invite users, e-mail notifications

Your ideas? `https://github.com/ontohub/ontohub/issues`

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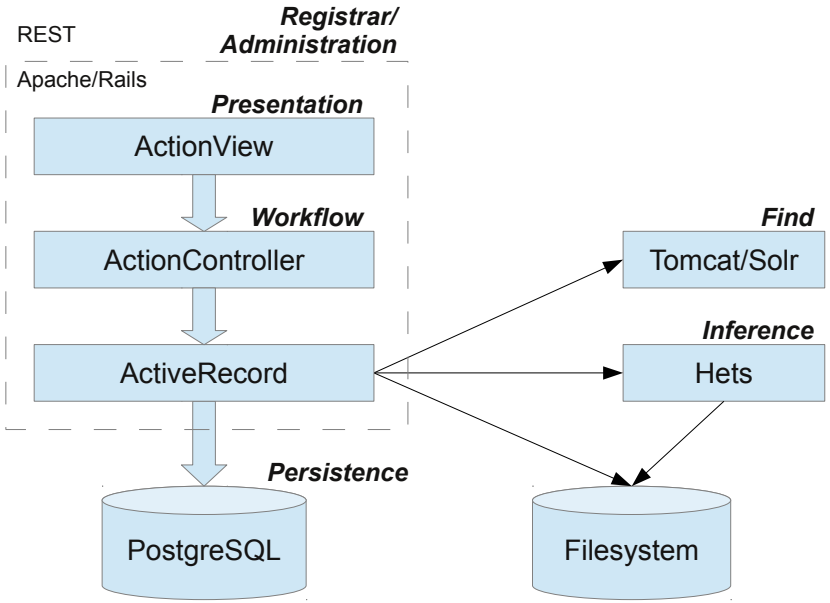
# Future III: Decouple Components




- ontology logic and structure detection currently done by locally installed Hets
- decouple, in OOR architecture spirit:
  let any RESTful web service offer structure and inference services

Your ideas? `https://github.com/ontohub/ontohub/issues`

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# Future IV: More Distributedness

Next aspects of **distributed ontologies** to be realized:

- **Links** between ontologies
  - formal interpretations and informal alignments
  - optionally including symbol→symbol maps
- **Linked Data Compliance**
  - download ontologies from Ontohub by URI
  - annotate external ontologies without importing them into Ontohub

Your ideas? `https://github.com/ontohub/ontohub/issues`

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