

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

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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 OntoOp/DOL)

All objects identified by IRIs, can have **metadata** and **comments** (only supported for ontologies so far).

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)



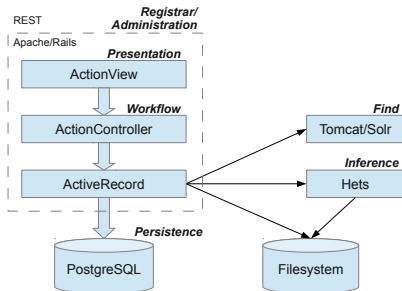
State of Development

- 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)



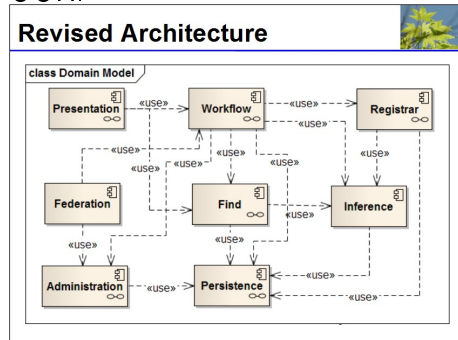
Current Architecture

Ontohub:



OOR:

Revised Architecture



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

OpenOntologyRepository_Architecture/Candidate03#

nid2MUD

Demo I (Start Page)

Try the public website:
<http://ontohub.org>
 New version with more
 features: <http://ontohub-new.informatik.uni-bremen.de>























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Ontohub Ontologies Symbols Logics Languages Admin ▾



Welcome!



Latest ontologies

-  [grz](#) by  [admin](#) 20 hours ago
-  [quasiorder](#) by  [admin](#) 20 hours ago
-  [quasigroup](#) by  [admin](#) 20 hours ago
-  [semigroup](#) by  [admin](#) 20 hours ago
-  [wcg](#) by  [admin](#) 20 hours ago
-  [successor](#) by  [admin](#) 20 hours ago
-  [mon_planar_mereology](#) by  [admin](#) 20 hours ago
-  [wog](#) by  [admin](#) 20 hours ago
-  [undirected_graph](#) by  [admin](#) 20 hours ago
-  [simple_graph](#) by  [admin](#) 20 hours ago

Latest comments

-  [admin](#) commented  [Generations](#) 21 hours ago

Ut quasi veritatis maxime aut voluptatem corrupti dolorem. Voluptatum velit pariatur delectus sap... [read more](#)
-  [admin](#) commented  [Cat](#) 21 hours ago

Esse illum aliquid. Ratione doloribus inventore dolor et. Voluptate natus veritatis et quidem a. ... [read more](#)
-  [admin](#) commented  [Test1](#) 21 hours ago

Fugiat blanditiis ab. Perferendis dolor nesciunt veritatis blanditiis id quis magni. Mollis vel... [read more](#)

Demo II (Logics)

<http://ontohub-new.informatik.uni-bremen.de/logics>

Ontohub Ontologies Symbols Logics Languages Admin Logged in as Till Mossakowski My Teams Settings Log out

Logics

25 Logics found Create Logic

1 2 Next > Last >

25 per page

Name	IRI	
CASL	http://purl.net/dol/logics/CASL	5 Ontologies
CommonLogic	http://purl.net/dol/logics/CommonLogic	186 Ontologies
OWL2	http://purl.net/dol/logics/OWL2	2 Ontologies
Church Simple Type Theory	http://purl.net/dol/logics/ChurchSimpleTypeTheory	0 Ontologies
CL-	http://purl.net/dol/logics/CommonLogicWithoutSequences	0 Ontologies
DDL*(OWL)	http://purl.net/dol/logics/DDLOWL	0 Ontologies
DL-Lite_R	http://purl.net/dol/logics/DLLiteR	0 Ontologies
E-Connections*(FOLeq)	http://purl.net/dol/logics/ECOFOLeq	0 Ontologies
E-Connections*(OWL)	http://purl.net/dol/logics/ECOWL	0 Ontologies
EL++	http://purl.net/dol/logics/ELplusplus	0 Ontologies
F-logic	http://purl.net/dol/logics/F-logic	0 Ontologies
first-order logic	http://purl.net/dol/logics/FOL	0 Ontologies
first-order logic with equality	http://purl.net/dol/logics/FOLeq	0 Ontologies



Demo IIa (Logic OWL)

<http://ontohub-new.informatik.uni-bremen.de/logics/4>

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OWL2

Defined by: Edit Logic Delete Logic

Standardization-status:

Description

Mappings



Add Mapping


Supported Languages

OWL 2 DL (exact) edit delete

?

Ontologies using this logic

-  [Pizza](#)
-  [Generations](#)



Demo III (Logic Mapping)

Ontohub [Ontologies](#) [Symbols](#) [Logics](#) [Languages](#) [Admin](#) ▾

Logged in as a

Logic mapping was successfully created.

http://test.de: DDL^{OWL} => simple RDF

Maps

[DDL^{OWL}](#) to [simple RDF](#)

Defined by:

registry

Standardization-status:

AcademicLiterature

Faithfulness

not_faithful

Theoroidalness

theoroidal

Adjoints

Add Adjoint

Demo IV (Ontology Overview)

ontohub-new.informatik.uni-bremen.de/ontologies

Ontohub [Ontologies](#) 1 [Log in](#) [Register](#)

Ontologies

[XML](#) [JSON](#)

621 Ontologies found

1 [2](#) [3](#) [4](#) [5](#) ... [Next >](#) [Last »](#) per page

[strict_linearity](#) 3 failed

file://Hets-lib/CommonLogic/colore/between/strict_linearity.clif

[sublogic_fullcl](#) 2 [CommonLogic](#) | [2 Entities](#) | [1 Axiom](#)

file://Hets/CommonLogic/TestData/sublogic_fullcl.clif

[Cat](#) [CommonLogic](#) | [10 Entities](#) | [1 Axiom](#)

file://db/seeds/cat.clif

[Generations](#) [OWL](#) | [29 Entities](#) | [67 Axioms](#)

file://db/seeds/generations.owl

[Pizza](#) [OWL](#) | [114 Entities](#) | [947 Axioms](#)

file://db/seeds/pizza.owl

Demo Va (Distributed Ontology)

Ontohub Ontologies Symbols Admin -

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Numbers

<http://www.example.com/test/1/2/3/4>

Numbers ontology

Symbols Children

Name	Entities	Sentences
Nat_E1	93	42
Nat_E2	7	2
Nat	0	3
Int_E2	4	3
Int_E3	102	24
Int	0	8
Rat_E2	4	3
Rat_E3	69	16
Rat	0	4
DecimalFraction_LS	1	1
DecimalFraction_LW	2	2
DecimalFraction	0	0

Demo Vb (Overview of Symbols - OWL)

Ontohub

Ontologies

Symbols

Generations /OWL2

<file:///db/seeds/generations.owl>

Voluptate sapiente quia expedita sed maiores nihil hic. A est laborum rerum ut. Quaerat necessitatibus delentit dignissimos temporibus.

Classes **18**Individuals **7**ObjectProperties **4**Sentences **89**

Text

Brother

<http://www.owl-ontologies.com/generations.owl#Brother>

Daughter

Father

Female

GrandFather

GrandMother

GrandParent

Male



Demo Vc (Overview of Symbols - Common Logic)

[Ontohub](#)[Ontologies](#)[Symbols](#)[Admin ▾](#)

Discrete /CommonLogic ▾

<http://www.example.com/test/1/2/3>

Discrete_ec ontology

Names **18**Sentences **1**

Text

plus

f

before

Trajectory

Terminates

StoppedIn



Demo Vd (Overview of Symbols - FOL/CASL)

Ontohub Ontologies Symbols Admin ▾

Int__E3 /CASL pending

[ops](#) 26 [preds](#) 6 [sorts](#) 3 [Sentences](#) 24

Text

- pred `<` : Int * Int
- pred `<=` : Int * Int
- pred `>` : Int * Int
- pred `>=` : Int * Int
- pred **even** : Int
- pred **odd** : Int

Demo Ve (Overview of Sentences - Common Logic)

Ontohub Ontologies Symbols Admin Logged in as admin My Teams Settings Log out

Discrete /CommonLogic ▾

<http://www.example.com/test/1.2/3>

Discrete_ec ontology

Names 18 Sentences 1

Name Text

```
discrete_ec . (cl-text discrete_ec (forall (t1 f t2) (iff (Stopped t1 f t2) (exists (e t) (and (Happens e t) (before t1 t) (before t t2) (Terminates e f t)))))) (forall (t1 f t2) (iff (Started t1 f t2) (exists (e t) (and (Happens e t) (before t1 t) (before t t2) (Initiates e f t)))))) (forall (e t1 t2 t1 t2) (iff (and (Happens e t1) (before 0 t2) (Trajectory f1 t1 t2 t2) (not (StoppedIn t1 t1 (plus t1 t2)))) (HoldsAt t2 (plus t1 t2)))) (forall (e t1 t2 t1 t2) (iff (and (Happens e t1) (Terminates e t1 t1) (before 0 t2) (AntiTrajectory f1 t1 t2 t2) (not (StartedIn t1 t1 (plus t1 t2)))) (HoldsAt t2 (plus t1 t2)))) (forall (f t) (iff (and (HoldsAt f t) (not (ReleasedAt f (plus t 1))) (not (exists (e) (and (Happens e t) (Terminates e f t)))) (HoldsAt f t (plus t 1)))) (forall (f t) (iff (and (not (HoldsAt f t) (not (ReleasedAt f (plus t 1)))) (not (exists (e) (and (Happens e t) (Initiates e f t)))) (not (HoldsAt f (plus t 1)))))) (forall (f t) (iff (and (Released f t) (not (exists (e) (and (Happens e t) (or (Initiates e f t) (Terminates e f t)))) (ReleasedAt f (plus t 1)))) (forall (f t) (iff (and (not (ReleasedAt f t) (not (exists (e) (and (Happens e t) (Releases e f t)))) (not (ReleasedAt f (plus t 1)))) (forall (e t) (iff (and (Happens e t) (Initiates e t) (HoldsAt f (plus t 1)))) (forall (e t) (iff (and (Happens e t) (Terminates e f t) (not (HoldsAt f (plus t 1)))) (forall (e t) (iff (and (Happens e t) (Releases e f t) (ReleasedAt f (plus t 1)))) (forall (e t) (iff (and (Happens e t) (or (Initiates e f t) (Terminates e f t) (not (ReleasedAt f (plus t 1)))))) (discrete_ec)%
```



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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)%

Demo VI (Search Symbols)

Entity Search 3 refine search

Person kind:ObjectProperty

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>		



Demo VII (Create an Ontology)

http:
//ontohub-new.informatik.uni-bremen.de/ontologies/new
(must be logged in)

Ontohub Ontologies Admin **1** Logged in as admin My Teams Settings Log out

Search for entities Search

Create an ontology

Source File **2**

- OR -

Source URL **4**

Please enter the URL to import the ontology from.

URI **3**

Name **4**

Description

Demo VIII (Successful Import)

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

△ FOAF

New version Edit Delete

Overview **Axioms 584** **Entities 96** Versions 1 Metadata Comments Permissions 1 XSL 155W

Overview ③

This is the FOAF (Friend of a Friend) OWL ontology.

URI	http://xmlns.com/foaf/0.1/
Name	FOAF
Logic	OWL
Owner	admin
Created	2 days ago
Updated	2 days ago
Hets status	done ①
	Download

Entities in this ontology ②

40	ObjectProperties
27	DataProperties
18	Classes
11	AnnotationProperties

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:

OntoIop registry

New version

Edit

Delete

Overview

Axioms

Entities

Versions 1

Metadata


Comments

Permissions 1

XML JSON

Overview

This is a plain RDF ontology. RDF support in Hets is still under development.

URI	http://purl.org/dol/registry/
Name	OntoIop registry
Logic	
Owner	 admin
Created	17 minutes ago
Updated	hets: Logic.sym_name not implemented for: RDF
Hets status	failed (error)

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.

Generations

[New version](#)[Edit](#)[Delete](#)[Overview](#)[Axioms 67](#)[Entities 29](#)[Versions 1](#)[Metadata](#)[Comments 2](#)[Permissions 2](#)[XML](#) [JSON](#)

Versions

Created	Source	Uploaded by	State	Error
4 days ago	File upload	 Ted	done	Download



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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

Logics

2 Logics found

Name	URI	Extension	MIME-Type		
OWL	http://purl.net/dol/logics/OWL	owl	application/rdf+xml	edit	delete
CommonLogic	http://purl.net/dol/logics/CommonLogic	clif	text/plain	edit	delete

Future I: Git Backend and Web Editor

Files **Commits**

test file from COLORE 42acf35

by user@example.com a few seconds ago

master Home / bipartite_graph.clif

bipartite_graph.clif Commit changes Cancel Download History Delete

* Message

```

1 (cl-text bipartite_graph
2
3
4 (cl-imports undirected_graph)
5
6 (cl-imports graph_def)
7
8 (forall (x y ...)
9   (if (cycle x ... y)
10     (even_cycle x ... y)))
11 )
12 )
13
```

Easy submission of patches (new git branch)
 ⇒ Community feedback improves ontologies



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

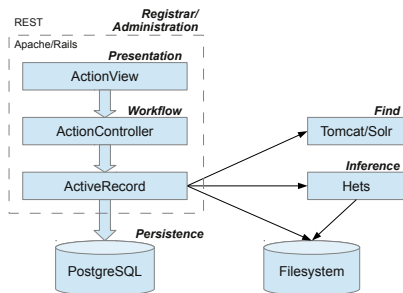
New features:

- **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>



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>

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>

