

# Semantic Web Tiny-System

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# Aim

- The W3C Italian Office had the will to publish on its Web site reviews (20/30 words of description) about Semantic Web resources related to Java (at least initially)
- Why don't play with Semantic Web technologies and try to learn its tools in order to realize a tiny (very small)-system able to handle these reviews and publish them on a Web site?

- Information about Resources described with ontologies

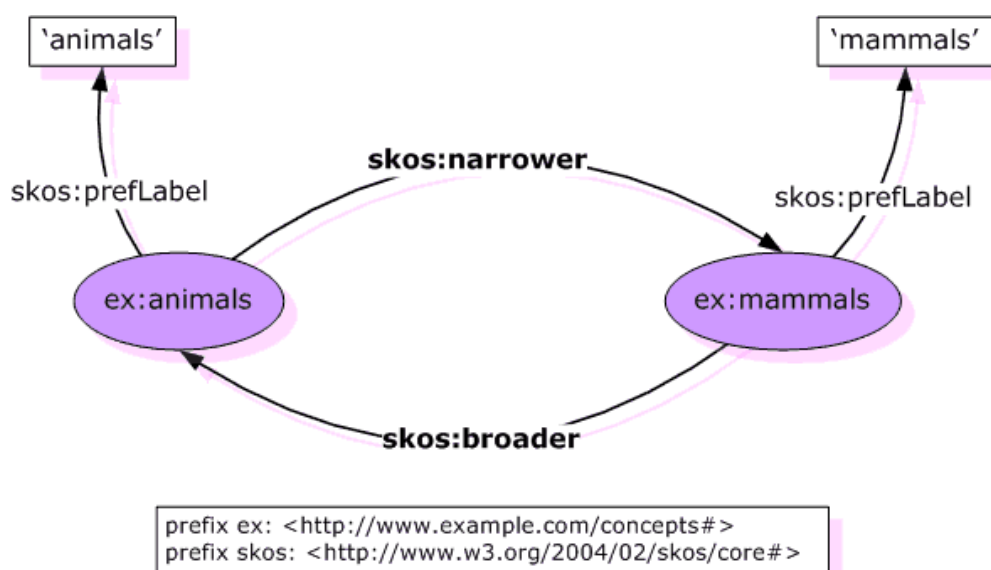
```
examples of properties of a resource:  
Name  
Description  
URI  
date of the review  
...
```

- **OWL** - Ontology Web Language

- It extends the predicate logic of RDF. For example it introduces the concept of equivalence among resources and the inverse relationship.

- *equivalence among resources means to state that 2 or more URI represents the same element*
- *inverse means the possibility to say "if (subject, predicate, object) then (object, inverse\_predicate, subject) is true too".*

- Resources can be organized into categories
- SKOS stands for Simple Knowledge Organisation System. The name SKOS was chosen to emphasise the goal of providing a simple yet powerful framework for expressing knowledge organisation systems in a machine-understandable way.
- **SKOS Core** provides a model for expressing the basic structure and content of concept schemes.
- A 'concept scheme' is defined here as: a set of concepts, optionally including statements about semantic relationships between those concepts. Thesauri, classification schemes, subject heading lists, taxonomies, 'folksonomies', and other types of controlled vocabulary are all examples of concept schemes. Concept schemes are also embedded in glossaries and terminologies.
- It also allows to express Broader/Narrower Relationships: to assert that one concept is broader in meaning (i.e. more general) than another, where the scope (meaning) of one falls completely within the scope of the other, use the `skos:broader` property. To assert the inverse, that one concept is narrower in meaning (i.e. more specific) than another, use the `skos:narrower` property.





*(skos:ConceptScheme)CategoryScheme skos:hasTopConcept skos:Concept(Documents, Events, Programs)*

Schema_Categorie	Category_Scheme
-- Documenti	-- Documents
-- Eventi	-- Events
-- Programmi	-- Programs
-- Annotazione	-- Annotation
-- Editore	-- Editor
-- Interrogazione	-- Query
-- Ragionatore	-- Reasoner
-- Regole	-- Rules
...	...

*category:Programs skos:narrower category:SemanticWeb*  
*category:SemanticWeb skos:broader category:Programs*

- Open source!
- Java ! (portable, secure, ...)
- eXtensible !
- Able to handle current Semantic Web standards

# Jena

- **Jena** is a Java framework for writing Semantic Web applications
- Probably the most widely used Java environment for RDF and OWL today
- Features:
  - *RDF API*
  - *OWL API*
  - *Parser*
  - *Persistence*
  - *Reasoning Subsystem*



# ARQ

- **ARQ** is a query engine for Jena that supports the SPARQL RDF Query language.
- **SPARQL** is the query language developed by the W3C RDF Data Access Working Group.

- The PostgreSQL database was already running on the site of the Office

- **Apache-Tomcat** Apache Tomcat is the servlet container that is used in the official Reference Implementation for the Java Servlet and JavaServer Pages technologies

The first release of SWTS was released in July 2006 (keep reserved)

An extended version of SWTS is under development: tests have been performed using Pellet and Bossam.

- **Pellet** is an open-source Java based OWL DL reasoner. It can be used in conjunction with either Jena or OWL API libraries.
- **Bossam** is a Java based OWL DL reasoner. It can be used in conjunction with Jena.

## Resource rc:belongsTo Category Category rc:contains Resource (inverse)

Metadata (Ist\_Risorse)

**ONTOLOGY BROWSER**

For Project: Ist\_Risorse

Ontologies

- Ontology (http://www.w3c.it/SWTSOnt/Ist\_Risorse)
- Ontology (http://www.w3c.it/SWTSOnt/Ist\_Categorie)
- Ontology (http://www.w3c.it/SWTSOnt/Risorse\_Categorie)

For Project: Ist\_Risorse

Asserted Hierarchy

- owl:Thing
  - rc:Categoria
  - rc:ConceptScheme
  - rc:Risorsa

Object properties

- skos:broader ↔ skos:narrower
- rc:appartiene ↔ rc:contiene
- skos:hasTopConcept
- skos:narrower ↔ skos:broader
- rc:contiene ↔ rc:appartiene

Datatype Properties

- dc:description
- skos:altLabel
- skos:prefLabel
- dc:title
- rc:descrizione
- dcterms:issued
- rc:dataRecensione
- rc:nome
- rc:uri

**CLASS BROWSER**

For Project: Ist\_Risorse

Class Hierarchy

- owl:Thing
  - rc:Categoria (19)
  - rc:ConceptScheme (1)
  - rc:Risorsa (1)

**INSTANCE BROWSER**

For Class: rc:Categoria

Asserted

- i\_c:Annotazione
- i\_c:API
- i\_c:Conferenze
- i\_c:Corso\_Seminari
- i\_c:Documenti
- i\_c:Editore
- i\_c:Eventi
- i\_c:Giornate\_di\_Lavoro
- i\_c:Interrogazione
- i\_c:Navigatore
- i\_c:Programmi
- i\_c:Ragionatore
- i\_c:Regole
- i\_c:RSS
- i\_c:Sistemi
- i\_c:Traduzioni
- i\_c:Validazione
- i\_c:Visualizzazione
- i\_c:WebSemantico

skos:altLabel

Value	Lang

skos:prefLabel

Value	Lang
SemanticWeb	en
WebSemantico	it

rc:contiene

skos:narrower
i_c:Editore
i_c:RSS
i_c:Annotazione
i_c:Regole
i_c:Visualizzazi
i_c:Navigatore
i_c:Validazione
i_c:API
i_c:Sistemi
i_c:Interrogazion
i_c:Ragionatore

skos:broader

i_c:Programmi
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- List of published resources (more recent by top concepts)
- Search by category
- Advanced search
- Administration (reserved access)

Ufficio Italiano W3C - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.w3c.it:38080/SWTS/

**W3C** WORLD WIDE WEB  
consortium  
 Ufficio Italiano **Semantic Web**

Questa sezione contiene rimandi a risorse di pubblica utilità quali strumenti e documenti  
 Sono graditi contributi di esperienze.  
 Il sistema semantico è in corso di realizzazione.

Database Semantico	Link locali
<p><b>► Tecnologie utilizzate</b></p> <p>Il sistema, sviluppato con tecnologie java (Jena, Pellet, ARQ) si appoggia ad un database (postgresql), gestisce ontologie (OWL) e un vocabolario (SKOS)</p> <hr/> <p><b>► Risorse disponibili</b></p> <ol style="list-style-type: none"> <li><input checked="" type="radio"/> elenco risorse pubblicate (più recenti per categorie principali)</li> <li><input type="radio"/> ricerca per categoria</li> <li><input type="radio"/> ricerca avanzata</li> <li><input type="radio"/> Amministrazione (accesso riservato)</li> </ol> <p>Invia richiesta</p>	<ul style="list-style-type: none"> <li>• <a href="#">I membri italiani</a></li> <li>• <a href="#">Come entrare a far</a></li> <li>• <a href="#">Le W3C Recomme</a></li> <li>• <a href="#">Italiano</a></li> <li>• <a href="#">La mailing list di W</a></li> <li>• <a href="#">I comunicati stamp</a></li> <li>• <a href="#">EuroWeb 2001</a></li> <li>• <a href="#">Eventi e partecipazi</a></li> <li>• <a href="#">Italiano W3C</a></li> <li>• <a href="#">Documenti</a></li> <li>• <a href="#">L'angolo tecnico</a></li> </ul> <p>Google™</p> <p>Cerca: <input type="text" value="cerca nel sito"/></p> <ul style="list-style-type: none"> <li><input checked="" type="radio"/> Cerca in w3c.it</li> <li><input type="radio"/> Cerca in w3.org</li> <li><input type="radio"/> Cerca nel Web</li> </ul>

Massimo Martinelli  
 Date: 3-March-2007 11:01 PM

W3C XHTML 1.0 ✓ W3C CSS ✓

Done

# How it works: Administration

- Export Model
- New Resource
- Remove Resource
- New Category
- Remove Category



The screenshot shows a web interface titled "Database Semantico" with a sub-section "Gestione Amministrativa". It contains a numbered list of five actions, each with a radio button. The first action, "Esporta modello (file OWL)", is selected. Below the list are two buttons: "Invia richiesta" and "Menu principale".

Database Semantico

**Gestione Amministrativa**

1.  Esporta modello (file OWL)
2.  Nuova Risorsa
3.  Rimozione Risorsa
4.  Nuova categoria
5.  Rimozione Categoria

# Query by Category

Database Semantico

## Ricerca per Categoria

scelta categoria:  include sottocategorie

- Eventi
- +Conferenze
- +Giornate\_di\_Lavoro
- Documenti
- +Corsi\_Seminari
- +Traduzioni
- Programmi
- +WebSemantico
- ++Ragionatore
- ++Interrogazione
- ++Sistemi**
- ++API
- ++Validazione
- ++Navigatore
- ++Visualizzazione
- ++Regole
- ++Annotazione
- ++RSS
- ++Editore



## Risultato Ricerca per Categoria

**Nome:** Kaon

**Descrizione:** KAON2 e'una infrastruttura per gestire ontologie OWL-DL, SWRL, e F-Logic .

**Description:** KAON2 is an infrastructure for managing OWL-DL, SWRL, and F-Logic ontologies

**Uri:** <http://kaon2.semanticweb.org/>

**Data Recensione:** 2007-02-28

**Categoria:** [http://www.w3c.it/SWTSOnt/1st\\_Categorie#Sistemi](http://www.w3c.it/SWTSOnt/1st_Categorie#Sistemi)

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**Nome:** Corese

**Descrizione:** Corese (Conceptual Resource Search Engine) e'un motore RDF scritto in Java e basato su Grafi Concettuali. Permette l'elaborazione di espressioni RDF Schema e RDF.

**Description:** Corese stands for Conceptual Resource Search Engine. It is an RDF engine written in Java and based on Conceptual Graphs (CG). It enables the processing of RDF Schema and RDF statements.

**Uri:** <http://www-sop.inria.fr/acacia/soft/corese/>

**Data Recensione:** 2007-02-28

**Categoria:** [http://www.w3c.it/SWTSOnt/1st\\_Categorie#Sistemi](http://www.w3c.it/SWTSOnt/1st_Categorie#Sistemi)

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**Nome:** Jena

**Descrizione:** Jena e'un sistema di supporto Java per costruire applicazioni per il Web Semantico. Fornisce un ambiente di programmazione per RDF, RDFS e OWL, include un motore di inferenza basato su regole.

**Description:** Jena is a Java framework for building Semantic Web applications. It provides a programmatic environment for RDF, RDFS and OWL, including a rule-based inference engine.

**Uri:** <http://jena.sourceforge.net/>

**Data Recensione:** 2006-08-02

**Categoria:** [http://www.w3c.it/SWTSOnt/1st\\_Categorie#Sistemi](http://www.w3c.it/SWTSOnt/1st_Categorie#Sistemi)

[Menu precedente](#)

# Advanced Search

resources containing a specific sequence of characters

belonging to a specific category (subcategory)

**Database Semantico**

► **Come funziona la ricerca avanzata**

Come per la ricerca per categoria anche la ricerca avanzata utilizza una query SPARQL.  
Questo sistema utilizza una estensione SPARQL per la ricerca di testi contenuti all'interno delle ontologie OWL.

**Ricerca Avanzata**

Seleziona le risorse che contengono almeno una delle seguenti sequenze di caratteri:

e trova le risorse appartenenti alla categoria  e includendo le sottocategorie  S

impostando il seguente limite di risultati:

## Risultato Ricerca Avanzata

**Nome:** ARQ

**Descrizione:** ARQ e'un motore di interrogazione per Jena che supporta il linguaggio di interrogazione SPARQL RDF.

**Description:** ARQ is a query engine for Jena that supports the SPARQL RDF Query language.

**Uri:** <http://jena.sourceforge.net/ARQ/>

**Data Recensione:** 2007-02-28

**Categoria:** [http://www.w3c.it/SWTSOnt/Ist\\_Categorie#Interrogazione](http://www.w3c.it/SWTSOnt/Ist_Categorie#Interrogazione)

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# The SPARQL Query for the Advanced Search

```
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
PREFIX rc: <http://www.w3c.it/SWTSOnt/Risorse_Categorie#>
PREFIX i_r: <http://www.w3c.it/SWTSOnt/Ist_Risorse#>
PREFIX i_c: <http://www.w3c.it/SWTSOnt/Ist_Categorie#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>

SELECT DISTINCT ?resource ?category ?date
WHERE { ?resource rc:name ?name;
          rc:belongsTo ?category;
          rc:reviewDate ?date;
          rc:description ?description.
        FILTER REGEX(?description, "pattern")
      }
```

- improve the internationalization
  - add other properties (e.g.: using vocabularies like as DOAP)
  - add (play with) SWRL rules
  - add an external reasoner (*a beta release is allowable*)
- 
- use SWTS as a base for collecting informations about accessibility issues
- 
- Any suggestion?

Contact us for suggestions and information

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*If it is not on the Web it does not exist ...*

... you will find on the Office site (<http://www.w3c.it/>)

the *slides*

(<http://weblabsrvbkp.isti.cnr.it:38080/SWTS/Slidy/SemanticWebTinySystem/SW>)

Try **Semantic Web Tiny Sistem** at

<http://weblabsrvbkp.isti.cnr.it:38080/SWTS/>