F-OWL: An OWL Reasoner in Flora-2

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http://fowl.sourceforge.net/
Feature

- Supports RDF and OWL-Full
- Supports RDF/N-Triple query
- Supports Dynamic Import
- Provides a Java API
- Tested with the RDF and OWL test cases
F-OWL Design

Owlxsrb: Command Line Interface

F-OWL Java API

Yajxb

Jena-ARP

F-OWL Inference Engine

Flora2: An Object-Oriented Knowledge Base Language

XSB

Stephen Decker’s Yet another Java-XSB Bridge

http://xsb.sourceforge.net/

http://flora.sourceforge.net/

http://fowl.sourceforge.net/
F-OWL Inference Engine

- A set of rules that reason over the data model of RDF-S & OWL
  - Implemented in Flora-2
- A set of rules that map XML DataTypes into XSB terms
- A set of rules that perform ontology consistency checks
- A set of rules that “glue” together the upper Java API calls to the lower layer Flora-2/XSB rules
F-OWL Java API

- Core class: `fowlEngine`
  - Public method
    - `init()`: starts XSB engine
    - `startFlora()`: loads Flora-2 modules
    - `startFOWL()`: loads F-OWL modules
    - `rule()`: executes a specified rule
    - `load()`: imports OWL(RDF/XML) from a specified URI
    - `query()`: execute N-Triple query
owlxsb: F-OWL’s CLI

Users can

- import OWL docs into the KB
- modify stored triples
- execute queries over the stored N-Triples
- execute RDF/OWL test cases
- manage Namespace mapping table
- ... also access f-owl documentation
“I hate CLI” --> I want GUI

- Read & parse RDF/OWL Manifest files
- Fetch RDF/OWL test files at runtime
- Extensive log report
F-OWL on Sourceforge

http://fowl.sourceforge.net/

F-OWL is an open source project hosted on sourceforge
F-OWL tests “Test Cases”

- Use of OWL Namespace: *Check OWL Syntax*
- **Entailment Tests:** *Load Premises file, Prove Conclusion file is TRUE*
- **Non-Entailment Tests:** *Load Premises file, Prove Conclusion file is FALSE*
- **OWL for OWL Tests:** *Prove conclusion is TRUE*
- **Consistency Tests:** *Load the file, Run consistency checker, Prove the file can be satisfied.*
- **Inconsistency Tests:** *Prove the file cannot be satisfied via consistency checker.*
- **Import Entailment/Level Tests:** *load imported ontology, check for import loop!*
Test Results

Published at the W3C web site

http://www.w3.org/2003/08/owl-systems/test-results-out.html

F-OWL fails on:

- Some large test files (e.g., food and wine)
- OWL DL Files with Complex XSD datatype:
  for example: “invR-N-times-M-to-1”
Uses...

- F-OWL is / will be used in four Ph.D. dissertations at UMBC
  - Pervasive computing (Harry Chen)
  - Policy language (Lalana Kagal)
  - OWL+Bayesian reasoning (Zhongli Ding)
  - Multiagent systems (Youyong Zou)

- Motivation: all need an OWL reasoner as part of a hybrid reasoning system

- Prolog provides a good host environment
Travel Agent Game in Agentcities

Motivation
- Market dynamics
- Auction theory (TAC)
- Semantic web
- Agent collaboration (FIPA & Agentcities)

Features
- Open Market Framework
- Auction Services
- OWL message content
- OWL Ontologies
- Global Agent Community

Technologies
- FIPA (JADE, April Agent Platform)
- Semantic Web (RDF, OWL)
- Web (SOAP, WSDL, DAML-S)
- Internet (Java Web Start)

Ontologies
- http://taga.umbc.edu/ontologies/
- travel.owl - travel concepts
- fipaowl.owl - FIPA content lang.
- auction.owl - auction services
- tagaql.owl - query language

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Rei Policy Language

- A declarative policy language for describing policies over actions
- Based on deontic concepts (permission, prohibitions, obligations and dispensations) and speech acts (delegate, request, etc.)
- Represented in RDF and OWL
- Current policy reasoner in XSB with a custom policy IDE in Eclipse
UMBC Cobra

OWL usage

- Ontologies
- Content language
- F-OWL reasoner
- REI policy language
- DAML-Time components

http://cobra.umbc.edu/
Bayes OWL

• Probabilistic extension of OWL to support uncertain ontology representation and reasoning

• Approaches
  – Extend OWL for probabilistic annotation
  – Translate OWL ontology to Bayesian network (OWL-BN)
  – Probabilistic mappings between individual OWL-BN
  – Treat ontology reasoning (within and across ontologies) as Bayesian inference

• Plan for next year
  – Preliminary investigation on probabilistic concept mapping between OWL-BNs
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Future Work

- Better Support XSD data types
- Include additional rules to reasoning over OWL-Full
- Provide Web-base GUI to F-OWL
- Support additional query languages
  - RDQL/RQL
- Storing triples in MySQL
- Optimizations