Development of LDL

Guohui Xiao

May 5, 2010

1 Expressive Power

- ObjectPropertyDomain

  the domain of R is D

  $\exists R.\top \sqsubseteq D \Rightarrow$ `D(x) :- R(x,y).`

- ObjectPropertyRange

  the range of R is D

  $\top \sqsubseteq \forall R.D \Rightarrow$ `D(y) :- R(x,y).`

2 Extending OWL-API with More Role Constructors

OWL API 3.0 is targeted on OWL 2 which is based on description logic SROIQ.

In SROIQ, we do not have much role constructors.

We extend OWL-API with the following role constructors:

- Role conjunction: LDLObjectPropertyIntersectionOf
- Role intersection: LDLObjectPropertyUnionOf
- Role transitive closure: LDLObjectPropertyTransitiveClosureOf
- Role inversion: LDLObjectPropertyInversionOf
- Role nominals: LDLObjectPropertyOneOf
- Role chain: LDLObjectPropertyChainOf

Note that, in OWL2, we already have role inversion and chain. However, the syntaxes are very restricted. In LDL, we will release this, so we need to add new constructors.

Affected java classes in owl-api 3.0:

- org.coode.owlapi.rdfxml.parser

- class OWLRDFConsumer
    - objectPropertyExpressionTranslatorSelector (A)
    - translatedObjectPropertyExpression (A)
    - translateToObjectPropertyExpressionSet(IRI) (A)
    - setupPredicateHandlers() (M)
        - addPredicateHandler(new TPObjectPropertyTransitiveClosureOfHandler(this));
        - addPredicateHandler(new TPObjectPropertyUnionOfHandler(this));
        - addPredicateHandler(new TPObjectPropertyIntersectionOfHandler(this));

For every new constructor, we

- add LDLObjectPropertyChainOf
- add LDLObjectPropertyChainOfImpl
- add LDLObjectPropertyChainOfTranslator
- add TPObjectPropertyChainOfHandler (seems no use)
- update ObjectPropertyExpressionTranslatorSelector
- update OWLRDFVocabulary
- update OWLDataFactoy
- update OWLDataFactoryImpl
- update OWLRDFConsumer
- update *Visitor

For inveseOf, which is already an OWL2 constructor, we

- add OWLObjectPropertyInverseOfTranslator
- update ObjectPropertyExpressionTranslatorSelector

3 DLV java wrapper

The DLV Wrapper Project (http://www.mat.unical.it/wrapper/index.html) is too old. It does not support latest DLV which support WFS.

So I decompiled the source code of DLV Java Wrapper 3.0 and read it.

Finally I wrote one.

4 XSB java wrapper

4.1 JNI Mode

To compile the

Add the following line

```
#include <context.h>
```

to the c files.

In XSBHello.java

```
String[] xsbargs= {"/home/staff/xiao/local/xsb/xsb3.2",
"--noprompt", "--quietload"};
```

To run XSBHello, we must add the following to the VM variables:

```
    -Djava.library.path=/home/staff/xiao/local/xsb/xsb3.2/lib:
/home/staff/xiao/local/xsb
```

problem:

- How to compile a class expression as a legal predicate?
- Always crash!!

I have given it up :-(

4.2 Sub-process Mode of Interprolog

- Unexpected Exception
- Report unfounded result as true

4.3 My Sub-process Java Wrapper for XSB

I implemented a sub-process java wrapper for XSB.

Using multi-threads to monitor the output (stderr, stdout) of the XSB sub process.

5 Evaluation

- **Reasoner** KAON2

  Literature Motik's PhD Thesis

  Ontology VICODI, LUBM, Wine, Galen

  Task Querying Large ABoxes, TBox Classification

- **Reasoner** CEL

  Literature CELA Polynomial-time Reasoner for Life Science Ontologies

Ontology Go, Galen, Snomed

Task Classification

- **Reasoner** HermiT

  Literature HermiT: A Highly-Efficient OWL Reasoner

  Ontology Fly, GO, GALEN, ...

  Task Classification

- **Reasoner** Requiem

  Literature Efficient Query Answering for OWL 2

  Ontology VICODI, LUBM

  Task Query Rewriting

- **Reasoner** Pellet

  Literature Pellet: A Practical OWL-DL Reasoner

  Ontology AKT, Tambis, SUMO, Food, OWL-S, Financial, SWEEt, Wine, Galen

  Ontology Consistency Checking, Classification

- **Reasoner** DLVHex + dlplugin

  Literature Exploiting Conjunctive Queries in Description Logic Programs

  Ontology Same with KAON2

  Task Conjunctive Query for DL-program