Queries in DOL

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OntoIOp teleconference, 2014-06-04

DOL is a logical (meta) language

- focus on ontologies, models, specifications,
- and their logical relations: logical consequence, interpretations, ...

Queries are different:

- answer is not "yes" or "no", but an answer substitution
- query language may differ from language of OMS that is queried

Sample query languages

- conjunctive queries in OWL
- Prolog/Logic Programming
- SPARQL

Overview of DOL

1. modular and heterogeneous OMSs
   - basic OMSs
   - references to named OMSs
   - extensions, unions, translations
   - reductions
   - approximations, module extractions
   - minimization, maximization
   - combination, OMS bridges
2. OMS declarations and relations (based on 1)
   - OMS definitions (giving a name to an OMS)
   - interpretations (of theories), equivalences
   - module relations
   - alignments
   - query definitions

Syntax of queries in DOL - a suggestion

New OMS declarations and relations:

```
query qname = select vars where sentence in OMS
                [along language-translation]
substitution sname : OMS1 to OMS2 = derived-symbol-map
result rname = sname_1, ..., sname_n for qname
```

New sentences (however, as structured OMS!):

```
apply(sname,sentence)
```

Semantics of queries in DOL

Based on: R. Diaconescu: Herbrand theorems in arbitrary institutions. Information Processing Letters 90 (2004) 29–37.

query qname = **select** vars **where** sentence **in** OMS

$\exists \chi$.sentence, where χ: $Sig[OMS] \to Sig[OMS] \cup vars$ is a signature morphism

substitution sname : OMS1 **to** OMS2 = derived-symbol-map

Same semantics as interpretation or view. Semantics of derived signature morphisms are abstract substitutions, see paper.

result rname = sname_1, ..., sname_n **for** qname

Is well-defined iff $OMS \models \forall \chi.apply(sname\_i, sentence)$

Semantics of queries in DOL, cont'd

result rname = sname_1, ..., sname_n **for** qname
%complete%

Is well-defined iff ($OMS \models \forall \chi.apply(\theta, sentence)$ iff θ is among sname_1, ..., sname_n)

apply(sname,sentence)

$Sen(\psi)$(sentence), where ψ is the abstract substitution corresponding to derived-symbol-map.