

# Towards a RIF(RAF) Ontology

Axel Polleres

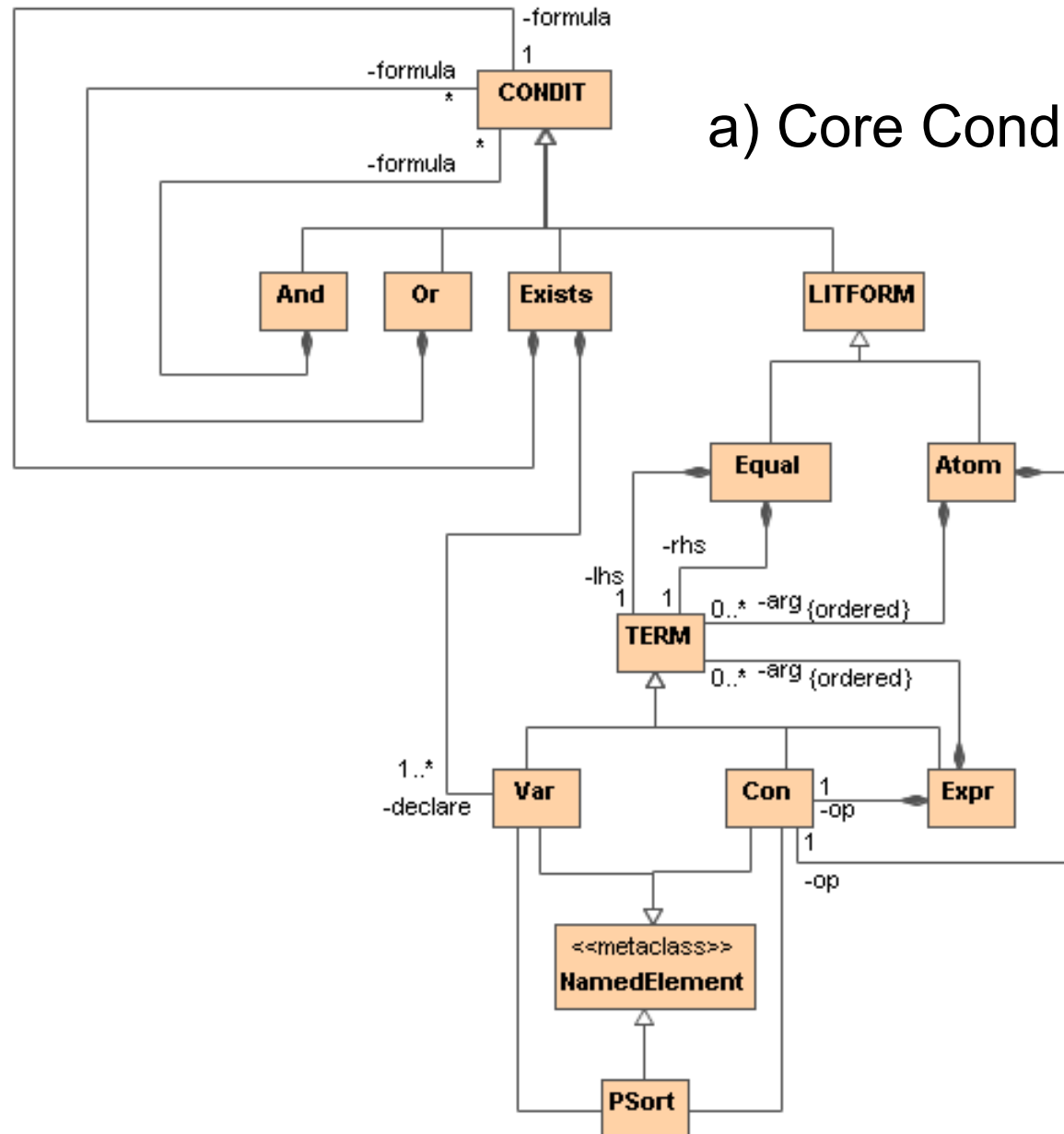
# Why an Ontology for RIFRAF

- Many discriminators in the RAF questionnaire
- Not clear how to proceed on that
- Idea/approach from last F2F:
  - “Ontologize” the questionnaire
  - and thereby formalize the discriminators
- Goal: Get a classification scheme for rule systems and supported RIF dialects, ie.:
  - Given a ruleset  $R$ , determine whether it falls into RIF dialect  $D$ , or whether it can be processed by rulesystem  $S$ .

# Base Ontology

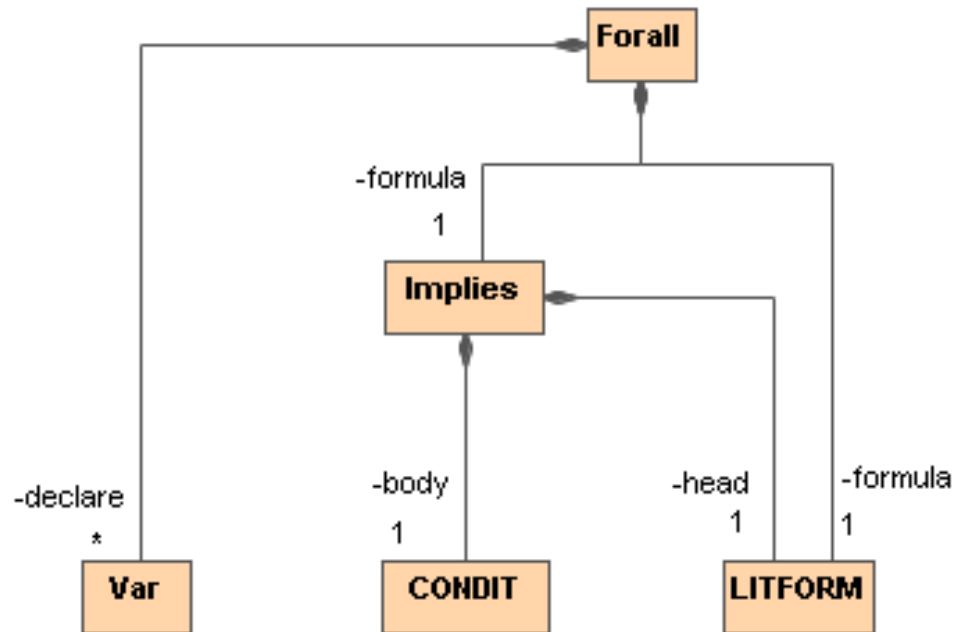
- Basic Ingredients very similar to the concepts and properties discussed for the RIF Core Metamodel, Discriminators talk about:
  - **Condition**, Action, Event
  - **Rule**
  - Ruleset
  - RuleSystem
  - etc.
- So, let's start with that...

# Base Ontology vs RIF Core Metamodel



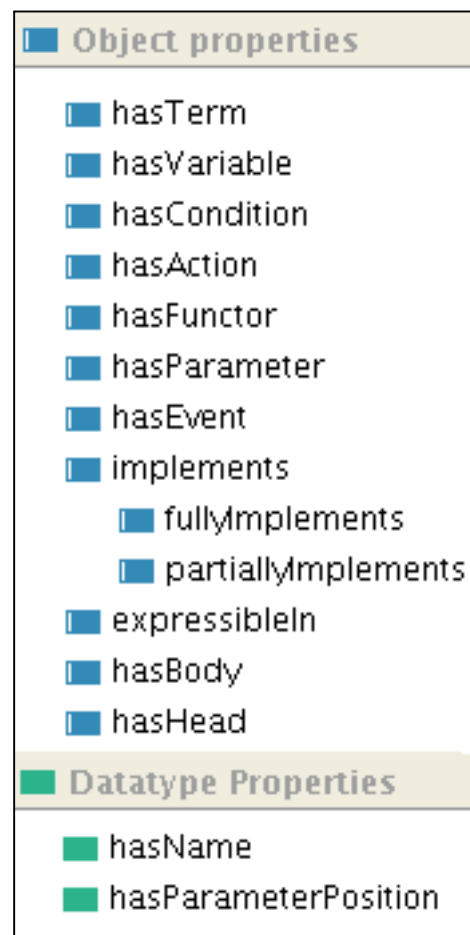
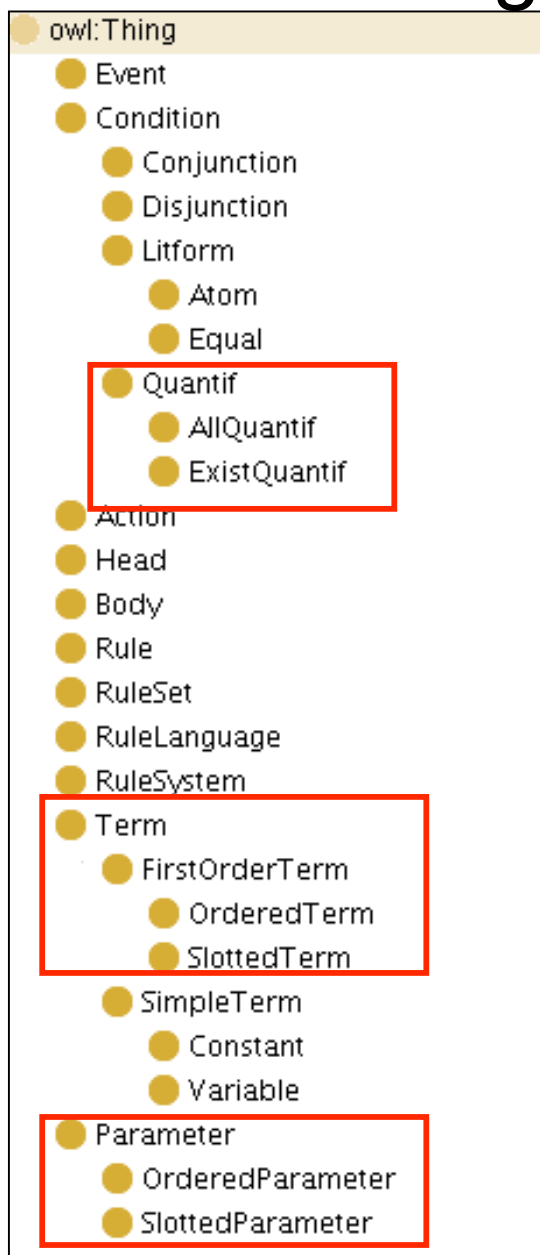
a) Core Condition metamodel

# Base Ontology vs RIF Core Metamodel



b) Core Rule metamodel

# Base Ontology - Classes and Properties:



Find latest version at:

<http://lists.w3.org/Archives/Public/public-rif-wg/2007Feb/att-0082/rifraf20070221.owl>

# Base Ontology - Differences to RIF Core Metamodel:

- Caters for slotted and ordered Terms.
- Functors of Terms can be Terms again (e.g. HiLog, not catered for in basic model so far)
- No distinction between term and expression on ontological level
- Pure OWL ontology likely not enough for formalization?
  - we will need integrity constraints/CWA to restrict certain dialects/rulesets, e.g. to express: all rules in a PROPOSITIONAL ruleset **contain only** propositional atoms.
  - Non-DL expressible axioms necessary?
- (How deep) do we want to go into this exercise?
- What's the benefit?

# Formalizing/Testing Discriminators on rulesets - Examples

## 1 Syn: Syntactic Discriminators

### 1.1 Restricted vs. Unrestricted Use of Logic Variables

#### 1.1.1 Single-occurrence variables (no implicit variable equality) vs. Multiple-occurrence variables (implicit variable equality)

- **Multiple variable occurrences per predicate allowed:**
- **Only single occurrence of variables per predicate:**

```
recHasCondition(X,C1) :- hasCondition(X,C).  
recHasCondition(X,C1) :- hasCondition(X,C0), hasCondition(C,C1).
```

```
MULTIPLEVAROCCURR :- ruleset(RS), hasRule(RS,R), hasBody(R,B),  
recHasCondition(B,C), Atom(C), hasTerm(C,T),  
recHasParameter(T,P1), recHasParameter(T,P2), P1 != P2,  
hasTerm(P1,V), hasTerm(P2,V), Variable(V).
```

- Equality test predicate available

```
EQUALTESTOCCUR :- ruleset(RS), hasRule(RS,R), hasBody(R,B),  
recHasCondition(B,C), Equal(C).
```

Forgive me to have used prolog syntax here, replace it by whatever rule language you like. What I want to show here is that using e.g. a logic program and the vocabulary defined in the RIFRAF Base Ontology, I can test the discriminators on a given ruleset.

- 1.1.2 Range-restricted Rules (No Head-Only Variables) vs. non-Range-restricted Rules.
  - Head-only variables allowed
  - Head variables must occur in any form in the body/condition

```

recHasCondition(X,C1) :- hasCondition(X,C).
recHasCondition(X,C1) :- hasCondition(X,C0), hasCondition(C,C1).

HAEDONLYVAROCCURR    :-    ruleset(RS), hasRule(RS,R), headVar(V,R), naf bodyVar(V,R).

bodyVar(V,R) :- hasBody(R,B), recHasCondition(B,C), Atom(C), hasTerm(C,T),
                recHasParameter(T,P), hasTerm(P,V), Variable(V).

headVar(V,R) :- hasBody(R,H), recHasCondition(H,C), Atom(C), hasTerm(C,T),
                recHasParameter(T,P), hasTerm(P,V), Variable(V).

```

would need slight modification, if Action part was also considered.

- Head variables must occur positively in the body/condition (safety):  
*need to extend base ontology for Litforms, kinds of negation, etc.  
 ... Phase 2, I'd say, I'd rather wait for the respective suggestions in  
 the RIF metamodel, or resp. we develop it further jointly!*

etc. ...

## Summary:

- Exercise for formalizing the discriminators is not complete, I just started in a one shot attempt, but:

### **Bottom-line:**

- Many of the discriminators can be formalized by similar logic programs/rules over the proposed base ontology.
- Important: I'd appreciate some people to join, if this is of interest at all to the WG (Is it? Does it make sense?)
- Stable RIF Core Ontology and agreement on the Base ontology is a prerequisite. **I do not see much difference between the base ontology and the RIF Metamodel, actually it should be the same.**