Reviewing the Design of DAML+OIL: An Ontology Language for the Semantic Web

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Compromises and Problems

DAML+OIL pushes the boundary of practical inference.
- Inference is difficult, because of expressive power requested by user communities.
- E.g., sets of individuals + inverting properties.
- DAML+OIL allows untyped literals, e.g., "10", which is either a string or an integer.
- Needed because RDF permits untyped literals.
- DAML+OIL separates objects, like John, from data type values, like integers.
- To help with practical and decidable inference.
- But can't talk about some kinds of (poorly-typed) relationships
  - e.g., an author that is either a person or a string (the name of the author).

DAML+OIL has two different semantics, model-theoretic and axiomatic.
- To satisfy two communities.
- The two semantics are different in some cases.

DAML+OIL syntax is RDF n-triples.
- Mandated by the view of RDF as the language for the Semantic Web.
- Triples are not good syntax carriers for complex constructs.
- What to do with malformed knowledge bases?

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Moving to OWL

OWL is the W3C web ontology language, and a successor for DAML+OIL.
- OWL should thus integrate well with other W3C recommendations.
- OWL should not change too much from DAML+OIL.

DAML+OIL has a larger design group and user community.
- More pressure for practical inference.
- More pressure for alternative different syntaxes, e.g., UML.
- OWL should address DAML+OIL problems.

- Implementations to show practicality of inference.
- A better datatyping solution, compatible with XML Schema and RDF datatyping.
- A way of describing the object / value split.
- A single, definitive semantics.
- A way of thinking about syntax that avoids the problems of triples.
- A way of building on the new RDF semantics.

OWL should address DAML+OIL problems.
- Pressure for even more expressive power.
- A way of thinking about syntax that avoids the problems of triples.

In Description Logic syntax:
- Triples are not good syntax carriers for complex constructs.
- What to do with malformed knowledge bases?

In the Description Logic:
- The structure of a knowledge base is not maintained in the triples.
- e.g., definitions vs. information about a class—both turn into just triples.

Removing some DAML+OIL constructs, e.g., restrictions, from RDF resources, violating semantic extension vision.

Possible Solutions:
1. Remove some DAML+OIL constructs, e.g., restrictions, from RDF resources, violating semantic extension vision.
2. Make DAML+OIL syntax an extension of RDF syntax, violating same-syntax vision.
3. Limit DAML+OIL inferences, losing, e.g., commutativity of conjunction.