Toward a Graphical Notation for OWL 2

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Object Management Group standard for model driven ontology development

Family of metamodels & profiles enabling model interchange & ontology development in UML 2

Includes

- 5 platform independent metamodels, 4 normative
- UML Profiles for RDF/S, OWL, & Topic Maps
- Informative Mappings
- Flexible conformance options, with CL, TM optional

Available at http://www.omg.org/spec/ODM/1.0/
Motivation

- To provide a standard graphical notation to enhance communication of OWL to others
- To enable ontology-based information models to be integral parts of an information-centric system architecture that:
  - Incorporates coherent and integrated sets of vocabularies, ontologies, and “gold standard” data models, developed & maintained independently from other aspects of a system
  - Increases platform independence as well as interoperability across services, processes, and other applications
  - Achieves limited breakage and rework as applications and services evolve, reducing maintenance costs
  - Improves software, process, and service quality (through shared information services, vocabularies, and other artifacts that are logically consistent - internally and with one another)
  - Improves opportunity for new capabilities & increasing automation in search, complex event and other transaction processing, transformation services, adaptive & predictive capabilities, etc.
The UML Profiles for RDF & OWL

- Intended to be highly intuitive for UML users
- Reuse UML constructs when they have the same semantics as OWL
- Define customized stereotypes of existing UML constructs to make them consistent with RDF and OWL semantics
- Use standard UML 2 notation
- When suitable UML constructs do not already exist, define additional combinations of stereotyped UML constructs to provide usable forms of notation for RDF and OWL semantics
- Utilize a model library to refer to defined sets of foundation elements (such as standard data types and property values)
Key Features of the RDF Profile

- `rdfs:Resource` is modeled as `UML::InstanceSpecification`
- `rdf:Property` is modeled by a combination of `UML::Property`, `UML::Association`, and `UML::AssociationClass`
- Graphs, named graphs, and documents are all modeled as `UML::Package`
Notation for OWL classes, using stereotyped UML::Class, and object properties, using stereotyped UML::AssociationClass is familiar to UML modelers.

Faithful notation for restrictions requires distinguishing necessary from necessary & sufficient membership, which is less intuitive to UMLers.

Latest thinking in the ODM Revision Task Force (RTF) for property notation includes the use of surrogates – to allow us to depict AssociationClasses in a “standalone” mode, without dragging unnecessary detail onto every diagram.
Surrogate Property Notation

Surrogates

\(\infty\) must have a base property defined via a traditional association or association class

\(\infty\) provide a flexible alternative for reuse in property hierarchies, complex restrictions, and property chain diagrams
OWL 2 Disjoint Union

- UML inherently supports generalization sets that are complete or incomplete, overlapping or disjoint
- Shortcuts, such as collapsing a named class with the anonymous unionClass, when equivalence is intended, are under consideration
Next Steps

- RTF is eliminating usability issues with the OWL 1 profile, expanding test cases, ensuring OWL 2 compatibility
- Support for OWL 2 is in work
- Publication of the ODM 1.1 revision in mid-2010
- Planned mappings to
  - Information Management Metamodel (forthcoming) - to IMM metamodels for XML Schema and Entity-Relationship diagramming
  - SoaML specification for Service Oriented Architectures – including an ODM-based ontology for OMG business process representations (BPMN) & next-generation service description
  - Production Rule Representation (PRR) specification, – a subset of the Rule Interchange Format
  - OMG and ISO standards for systems engineering and product data modeling, including SysML and ISO STEP
Emerging Development Projects

- Eclipse ATL Project includes an ODM component for translation between UML and OWL - see [http://www.eclipse.org/m2m/atl/usecases/ODMImplementation/](http://www.eclipse.org/m2m/atl/usecases/ODMImplementation/)


- Sourceforge Common Logic Project - Java and ODM-based libraries for support of ISO Common Logic, including RDF/RDFS/OWL interoperability, at [https://sourceforge.net/projects/common-logic](https://sourceforge.net/projects/common-logic)

- New ODM Eclipse Project Planned
  - Sandpiper will be a primary contributor, donating metamodels and profiles, EMF XMI, Java APIs generated from metamodel
  - Additional participants / supporters are welcome