The role of ontologies and reasoners

An ontology is a formal naming and definition of the types, properties, and interrelationship of the entities that exist in some domain. It defines and represents consensual knowledge as a set of concepts within a domain, using a shared vocabulary to denote the types, properties, and relationships of those concepts. Artificial intelligence, the Semantic Web, systems engineering, software engineering, biomedical informatics, library science, enterprise bookmarking, and information architecture all uses ontologies to represent concepts that belong to their domain in very specific ways. Domain ontologies (domain-specific ontologies) plays a significant role in the definition and use of an enterprise architecture framework.

Ontologies are commonly encoded using ontology languages. OWL (Web Ontology Language), produced by the W3C Web Ontology Working Group, is one of the formal languages to construct ontologies. It is an international standard for encoding and sharing ontologies and is designed to support the Semantic Web. An OWL ontology may include classes, relations, attributes, formal axioms, and instances. OWL can be used to build most kinds of ontologies. The Concept Modeler maps to a subset of the OWL. The following are some examples of what you can do with OWL ontologies using the Concept Modeler:

- Import existing OWL ontologies for concept reuse, and/or as a starting point for the creation of a concept model.
- Export a concept model as an OWL ontology, which can be augmented by the addition of axioms not supported by the Concept Modeler. For example, axioms can be added to constrain model interpretations, or for advanced reasoning (e.g., transitivity) not supported by the Concept Modeler and UML.

A semantic reasoner infers logical consequences from a set of asserted axioms in an ontology, and typically provides automated support for reasoning tasks such as classification and querying. The inferences made by a semantic reasoner over an ontology generated by the Concept Modeler can be used to find logical inconsistencies in the primary concept model. Hence, a semantic reasoner can provide information to validate and improve a concept model.

The logical consistency of a concept model is particularly important if the desired result is a system that classifies information. As stated above, the inferences made by a semantic reasoner can help to ensure that the concept model is logically consistent in its classification.

The Concept Modeler maps to a subset of OWL that is most useful to the business purposes of defining a concept model. Consequently, any attempt to “round trip,” (i.e., re-import a possibly modified ontology model that has been exported by the concept model) is very likely to be “lossy”, particularly if the ontology generated from a concept model is augmented by additional axioms not supported by the Concept Modeler. Therefore, as a prime tenet of MDA, the concept model is considered to be the “primary” artifact, and the ontology is the “secondary” artifact. Business concept development and changes must be made in the concept model.

Related pages

- MDA
- Concept modeling purpose
- Open-world assumption vs. closed-world assumption
- Information modeling purpose