W3C: OWL 2 Web Ontology Language - Structural Specification and Functional-Style Syntax (second Edition)

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Table 1: Data sheet for OWL 2 Web Ontology Language - Structural Specification and Functional-Style Syntax (second Edition)

Title	OWL 2 Web Ontology Language - Structural Specification and Functional-Style Syntax (second Edition)
Acronym	OWL 2
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Note: The following is an excerpt from the W3C site. It is provided here as a convenience and is not authoritative. Refer to the original document as the authoritative reference.

Abstract

The OWL 2 Web Ontology Language, informally OWL 2, is an ontology language for the Semantic Web with formally defined meaning. OWL 2 ontologies provide classes, properties, individuals, and data values and are stored as Semantic Web documents. OWL 2 ontologies can be used along with information written in RDF, and OWL 2 ontologies themselves are primarily exchanged as RDF documents. The OWL 2 Document Overview describes the overall state of OWL 2, and should be read before other OWL 2 documents.

The meaningful constructs provided by OWL 2 are defined in terms of their structure. As well, a functional-style syntax is defined for these constructs, with examples and informal descriptions. One can reason with OWL 2 ontologies under either the RDF-Based Semantics [OWL 2 RDF-Based Semantics] or the Direct Semantics [OWL 2 Direct Semantics]. If certain restrictions on OWL 2 ontologies are satisfied and the ontology is in OWL 2 DL, reasoning under the Direct Semantics can be implemented using techniques well known in the literature.

Introduction

This document defines the OWL 2 language. The core part of this specification — called the structural specification — is independent of the concrete exchange syntaxes for OWL 2 ontologies. The structural specification describes the conceptual structure of OWL 2 ontologies and thus

provides a normative abstract representation for all (normative and nonnormative) syntaxes of OWL 2. This allows for a clear separation of the essential features of the language from issues related to any particular syntax. Furthermore, such a structural specification of OWL 2 provides the foundation for the implementation of OWL 2 tools such as APIs and reasoners. Each OWL 2 ontology represented as an instance of this conceptual structure can be converted into an RDF graph OWL 2 RDF Mapping; conversely, most OWL 2 ontologies represented as RDF graphs can be converted into the conceptual structure defined in this document as OWL 2 RDF Mapping.

This document also defines the functional-style syntax, which closely follows the structural specification and allows OWL 2 ontologies to be written in a compact form. This syntax is used in the definitions of the semantics of OWL 2 ontologies, the mappings from and into the RDF/XML exchange syntax, and the different profiles of OWL 2. Concrete syntaxes, such as the functional-style syntax, often provide features not found in the structural specification, such as a mechanism for abbreviating IRIs.

Finally, this document defines OWL 2 DL — the subset of OWL 2 with favorable computational properties. Each RDF graph obtained by applying the RDF mapping to an OWL 2 DL ontology can be converted back into the conceptual structure defined in this document by means of the reverse RDF mapping as OWL 2 RDF Mapping.

An OWL 2 ontology is a formal description of a domain of interest. OWL 2 ontologies consist of the following three different syntactic categories:

- *Entities, such as classes, properties, and individuals, are identified by IRIs. They form the primitive terms of an ontology and constitute the basic elements of an ontology. For example, a class a:Person can be used to represent the set of all people. Similarly, the object property a:parentOf can be used to represent the parent-child relationship. Finally, the individual a:Peter can be used to represent a particular person called "Peter".*
- *Expressions represent complex notions in the domain being described. For example, a class expression describes a set of individuals in terms of the restrictions on the individuals' characteristics.*
- *Axioms are statements that are asserted to be true in the domain being described. For example, using a subclass axiom, one can state that the class a:Student is a subclass of the class a:Person.*

These three syntactic categories are used to express the logical part of OWL 2 ontologies — that is, they are interpreted under a precisely defined semantics that allows useful inferences to be drawn. For example, if an individual a:Peter is an instance of the class a:Student, and a:Student is a subclass of a:Person, then from the OWL 2 semantics one can derive that a:Peter is also an instance of a:Person.

In addition, entities, axioms, and ontologies can be annotated in OWL 2. For example, a class can be given a human-readable label that provides a more descriptive name for the class. Annotations have no effect on the logical aspects of an ontology — that is, for the purposes of the OWL 2 semantics, annotations are treated as not being present. Instead, the use of annotations is left to the applications that use OWL 2. For example, a graphical user interface might choose to visualize

a class using one of its labels.

Finally, OWL 2 provides basic support for ontology modularization. In particular, an OWL 2 ontology O can import another OWL 2 ontology O' and thus gain access to all entities, expressions, and axioms in O'.

This document defines the structural specification of OWL 2, the functional syntax for OWL 2, the behavior of datatype maps, and OWL 2 DL. Only the parts of the document related to these three purposes are normative. The examples in this document are informative and any part of the document that is specifically identified as informative is not normative. Further, the informal descriptions of the semantics of OWL 2 constructs in this document are informative; the Direct Semantics and the RDF-Based Semantics are precisely specified in separate documents.

The italicized keywords must, must not, should, should not, and may are used to specify normative features of OWL 2 documents and tools, and are interpreted as specified in RFC 2119.

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