This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current W3C publications and the latest version of this technical report can be found in the W3C Publications List at http://www.w3.org/TR/2012/PER-owl2-xml-serialization-20121018/.

Summary of Changes

Th is section lists the changes documents and their change summary. This section also includes the changes since the last call, the changes since candidate recommendation, and the changes since proposed recommendation.

Table of Contents

- 1 Introduction
- 2 Overview
- 3 The Serialization Syntax
- 4 The XML Schema

1 Overview

This section defines the XML serialization of OWL 2, an alternative exchange syntax for OWL 2. OWL 2 is defined by three W3C Recommendations: OWL 2 Web Ontology Language Reference, OWL 2 Web Ontology Language Ontology interchange Format and Syntax (OWL 2 XML Syntax), and OWL 2 Web Ontology Language XML Serialization. The latter document captures the complete and final version of the serialization of OWL 2. The XML serialization is defined as an option to OWL 2, and it is not possible to use an OWL 2 ontology without providing its XML serialization.

The serialization includes the following features:

- A namespace for OWL 2
- A mechanism for defining classes, properties, and individuals
- A mechanism for defining logical expressions
- A mechanism for defining axioms
- A mechanism for defining annotations
- A mechanism for defining namespaces
- A mechanism for defining profiles
- A mechanism for defining imports
- A mechanism for defining global conditions

The XML serialization is designed to support the following features:

- OWL 2 has been designed to be compatible with XML, which is the most widely used format for exchanging data on the web.
- OWL 2 has been designed to be compatible with OWL 1.
- OWL 2 has been designed to be compatible with other Web languages, such as RDF and SPARQL.
- OWL 2 has been designed to be compatible with other Web languages, such as RDF and SPARQL.

The XML serialization is based on the following principles:

- The XML serialization is designed to be as close as possible to the XML syntax, but it is not possible to use an OWL 2 ontology without providing its XML serialization.
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2 The Serialization Syntax

This section defines the XML serialization of OWL 2. OWL 2 is defined by three W3C Recommendations: OWL 2 Web Ontology Language Reference, OWL 2 Web Ontology Language Ontology interchange Format and Syntax (OWL 2 XML Syntax), and OWL 2 Web Ontology Language XML Serialization. The latter document captures the complete and final version of the serialization of OWL 2. The XML serialization is defined as an option to OWL 2, and it is not possible to use an OWL 2 ontology without providing its XML serialization.

The XML serialization is defined as a set of XML elements and attributes that can be used to represent OWL 2 ontologies. The XML serialization is designed to be as close as possible to the XML syntax, but it is not possible to use an OWL 2 ontology without providing its XML serialization.

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3 The XML Schema

This section defines the XML schema for the XML serialization of OWL 2. The XML schema is defined as a set of XML elements and attributes that can be used to represent OWL 2 ontologies. The XML schema is designed to be as close as possible to the XML syntax, but it is not possible to use an OWL 2 ontology without providing its XML serialization.

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<!DOCTYPE xsd:schema [<!-- Data property expressions -->
<xsd:element name="ObjectInverseOf" type="owl:ObjectInverseOf"/>
<xsd:complexType name="ObjectPropertyExpression" abstract="true">
<xsd:element name="Declaration" type="owl:Declaration"/>
</xsd:complexType>
<!ELEMENT Literal (#PCDATA)>
<xsd:complexType name="Literal">
<xsd:element name="AnonymousIndividual" type="owl:AnonymousIndividual"/>
</xsd:complexType>
<xsd:complexType name="NamedIndividual">
<xsd:element name="NamedIndividual" type="owl:NamedIndividual"/>
</xsd:complexType>
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<xsd:element name="ObjectProperty" type="owl:ObjectProperty"/>
</xsd:complexType>
<xsd:complexType name="ObjectProperty">
<xsd:element name="Datatype" type="owl:Datatype"/>
</xsd:complexType>
<xsd:element name="Class" type="owl:Class"/>
<xsd:complexType name="Class">
<xsd:group ref="owl:Axiom" minOccurs="0" maxOccurs="unbounded"/>
<xsd:group ref="owl:ontologyAnnotations"/>!
<xsd:element ref="owl:Prefix" minOccurs="0" maxOccurs="unbounded"/>
</xsd:complexType>
<xsd:element name="Ontology" type="owl:Ontology">
<xsd:attribute name="abbreviatedIRI" type="owl:abbreviatedIRI" use="optional"/>
<xsd:attribute name="IRI" type="xsd:anyURI" use="required"/>
<xsd:attribute name="versionIRI" type="xsd:anyURI" use="optional"/>
<xsd:attribute name="ontologyIRI" type="xsd:anyURI" use="optional"/>
<xsd:attribute name="targetNamespace" type="xsd:anyURI" use="optional"/>
<xsd:attribute name="elementFormDefault" type="xsd:string" use="optional"/>
<xsd:attribute name="attributeFormDefault" type="xsd:string" use="optional"/>
<xsd:attribute name="xml:base" type="xsd:string" use="optional"/>
! [PN_LOCAL], [PNAME_NS], [PNAME_LN] and [68] (PrefixedName)
    The entities implement productions [95] (PN_CHARS_BASE), [96] (PN_CHARS_U), [98] (PN_CHARS), [99] (PN_PREFIX),
    [100] (PN_CHARS_BASE;)((&PN_CHARS_U;|\-|[0-9]|&#x00B7;|\[\&PN_CHARS; |\[&#x0300;-&#x036F;|\[&#x203F;-&#x2040;|\[\&PN_CHARS; |\[&#xF900;-&#xFDCF;|\[&#xFDF0;-&#xFFFD;|\[&#x10000;-&#xEFFFF;]]]]])]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]]}
```
<xsd:group name="ObjectPropertyAxiom">
  
  
  <xsd:complexType name="ObjectPropertyAxiom" abstract="true">
    <xsd:element name="DisjointUnion" type="owl:DisjointUnion"/>
  </xsd:complexType>

  <xsd:complexType name="DisjointUnion">
    <xsd:element name="DisjointClasses" type="owl:DisjointClasses"/>
  </xsd:complexType>

  <xsd:complexType name="DisjointClasses">
    <xsd:element name="EquivalentClasses" type="owl:EquivalentClasses"/>
  </xsd:complexType>

  <xsd:complexType name="EquivalentClasses">
    <xsd:element name="SubClassOf" type="owl:SubClassOf"/>
  </xsd:complexType>

  <xsd:complexType name="SubClassOf">
    <xsd:complexContent>
    </xsd:complexContent>
  </xsd:complexType>

  <xsd:complexType name="ClassAxiom" abstract="true"> <!-- Class expression axioms -->
    <xsd:group name="Axiom">
      <xsd:complexContent>
      </xsd:complexContent>
    </xsd:group>
  </xsd:complexType>

  <xsd:complexType name="Axiom" abstract="true"> <!-- Axioms -->
    <xsd:element name="DataExactCardinality" type="owl:DataExactCardinality"/>
  </xsd:complexType>

  <xsd:complexType name="DataMaxCardinality">
    <xsd:element name="DataMinCardinality" type="owl:DataMinCardinality"/>
  </xsd:complexType>

  <xsd:complexType name="DataMinCardinality">
    <xsd:element name="DataHasValue" type="owl:DataHasValue"/>
    <xsd:element name="DataAllValuesFrom" type="owl:DataAllValuesFrom"/>
  </xsd:complexType>

  <xsd:complexType name="DataAllValuesFrom">
    <xsd:element name="DataSomeValuesFrom" type="owl:DataSomeValuesFrom"/>
  </xsd:complexType>

  <xsd:complexType name="DataSomeValuesFrom">
    <xsd:element name="ObjectExactCardinality" type="owl:ObjectExactCardinality"/>
  </xsd:complexType>

  <xsd:complexType name="ObjectMaxCardinality">
    <xsd:element name="ObjectMinCardinality" type="owl:ObjectMinCardinality"/>
  </xsd:complexType>

  <xsd:choice>
    <xsd:attributeGroup ref="xml:specialAttrs"/>
    <xsd:sequence>
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```xml
<xsd:complexType name="DisjointDataProperties">
  <!-- This is the superproperty expression of the property chain 
  or the property chain on the right side of the subproperty expression -->
  <xsd:group ref="owl:ObjectPropertyExpression" minOccurs="2" maxOccurs="unbounded"/>
</xsd:complexType>

<xsd:complexType name="EquivalentDataProperties">
  <xsd:element name="SubDataPropertyOf" type="owl:SubDataPropertyOf"/>
</xsd:complexType>

<xsd:complexType name="SubDataPropertyOf">
  <xsd:group ref="owl:ObjectPropertyExpression"/>
</xsd:complexType>

<xsd:complexType name="DataPropertyAxiom"> <!-- Data property axioms -->
  <xsd:element name="TransitiveObjectProperty" type="owl:TransitiveObjectProperty"/>
</xsd:complexType>

<xsd:complexType name="AsymmetricObjectProperty">
  <xsd:element name="IrreflexiveObjectProperty" type="owl:IrreflexiveObjectProperty"/>
</xsd:complexType>

<xsd:complexType name="SymmetricObjectProperty">
  <xsd:element name="ReflexiveObjectProperty" type="owl:ReflexiveObjectProperty"/>
</xsd:complexType>

<xsd:complexType name="ReflexiveObjectProperty">
  <xsd:element name="InverseFunctionalObjectProperty" type="owl:InverseFunctionalObjectProperty"/>
</xsd:complexType>

<xsd:complexType name="InverseFunctionalObjectProperty">
  <xsd:element name="FunctionalObjectProperty" type="owl:FunctionalObjectProperty"/>
</xsd:complexType>

<xsd:complexType name="FunctionalObjectProperty">
  <xsd:element name="InverseObjectProperties" type="owl:InverseObjectProperties"/>
</xsd:complexType>

<xsd:complexType name="InverseObjectProperties">
  <xsd:element name="ObjectPropertyRange" type="owl:ObjectPropertyRange"/>
</xsd:complexType>

<xsd:element name="ObjectPropertyDomain" type="owl:ObjectPropertyDomain"/>

<xsd:element name="DisjointObjectProperties" type="owl:DisjointObjectProperties"/>

<xsd:complexType name="DisjointObjectProperties"/>

<xsd:complexType name="EquivalentObjectProperties">
  <xsd:complexType name="ObjectPropertyChain">
    <xsd:element name="SubObjectPropertyOf" type="owl:SubObjectPropertyOf"/>
  </xsd:complexType>
</xsd:complexType>

<xsd:complexType name="SubObjectPropertyOf">
  <xsd:group ref="owl:ObjectPropertyExpression"/>
</xsd:complexType>

<xsd:complexType name="ObjectPropertyExpression"/>

<xsd:complexType name="owl:DataPropertyAxiom">
  <xsd:extension base="owl:DataPropertyAxiom">
    <xsd:extension base="owl:DataPropertyAxiom">
      <xsd:extension base="owl:DataPropertyAxiom">
        <xsd:extension base="owl:Axiom">
          <xsd:sequence>
            <xsd:group ref="owl:ObjectPropertyExpression"/>
          </xsd:sequence>
        </xsd:extension>
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</xsd:complexType>

<xsd:complexType name="owl:ObjectPropertyAxiom">
  <xsd:extension base="owl:ObjectPropertyAxiom">
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</xsd:complexType>
```

<xsd:element name="ClassAssertion" type="owl:ClassAssertion"/>

...
4 OWL 2 XML serialization ontology

The XML serialization of a OWL 2 ontology document is a sequence of Unicode characters accessible from some IRI by means of the standard protocols that can be parsed into an XML document that conforms to the XML schema defined in this document and adheres to the constraints described in Section 4 of this document.

5 Appendix: The Derivation from the Functional Syntax (Informative)

The XML schema has been obtained by a straightforward translation of the structural specification of the OWL 2 Specification [OWL 2 Specification] in the following way:

- Each IRI that is intended to be serialized is mapped to a global element, whose elements and attributes correspond to the components of the IRI class. Each IRIs element has an IRI Schema type with the same name.
- Each IRI class that is not intended to be serialized directly, is represented as a global element inside a serialization ontology document, whose value elements correspond to the children of the IRI class. For all except a small line, there is a corresponding global IRI Schema type with the same name. The properties in the serialization ontology document represent the semantics of the properties in the OWL 2 XML serialization.

Since IRI Schema-type system does not support multiple IRI-IRIs, some abstract IRI classes cannot be directly mapped into an IRI Schema-type hierarchy with the intended result. In the case where there is multiple parent classes, only the most useful parents are mapped into the IRI-type hierarchy. The included groups are:

- Entity
- EntityProperties
- Annotation
- AnnotationProperties
- AnnotationAssertion
- AnnotationAxiom

Some groups are mere documentation in the schema, and therefore are not included as types.

- fourier
- fourierFunctions
- annotationFunctions

The XML schema that captures the structure of OWL 2 entities, axioms, and axioms. Not all of IRI documents which are legal according to this schema correspond to an valid OWL 2 serialization.

To get to the IRI-IRIs, ommitting an OWL 2 XML serialization ontology document description are must:

- Secure all the IRIs and mapped the abbreviated IRIs in the above described way.
- Get the imports closure of the ontology.
- To determine whether the IRLI-strategy is correctly, are must:
- Check the typing restrictions
- Check the XML serialization

Each axiom in the IRI-IRIs system of IRIs contains complete information about the type of the all entities in it. Therefore the OWL 2 XML Syntax processing is simpler than the canonical parsing process from Section 3.6 of OWL 2 Specification [OWL 2 Specification].

6 Appendix: Internet Media Type, File Extension, and Macintosh File Type

Context

See fourier

See also Section 6.9 on serialization.

Type name

Subtype name

Required parameters

Optional parameters

Optional parameters

Output format and encoding

Mime type

Encoding

XML serialization of a OWL 2 ontology document is a sequence of Unicode characters accessible from some IRI by means of the standard protocols that can be parsed into an XML document that conforms to the XML schema defined in this document and adheres to the constraints described in Section 4 of this document.

An OWL 2 XML serialization ontology document is a sequence of Unicode characters accesible from some IRI by means of the standard protocols that can be parsed into an XML document that conforms to the XML schema defined in this document and adheres to the constraints described in Section 4 of this document.

The Internet Media Type / MIME Type for the OWL XML Serialization is

See also

6 Appendix: Internet Media Type, File Extension, and Macintosh File Type

To determine whether the OWL Ontology is structurally correct, one must:

The XML schema thus captures the structure of OWL 2 entities, expressions, and axioms. Not all XML documents which are legal according to this schema correspond to structural correct OWL ontologies.

Since IRI Schema-type system does not support multiple IRI-IRIs, same abstract IRI classes cannot be directly mapped into an IRI Schema-type hierarchy with the intended result. In the case where there is multiple parent classes, only the most useful parents are mapped into the IRI-type hierarchy. The included groups are:

- Entity
- EntityProperties
- Annotation
- AnnotationProperties
- AnnotationAssertion
- AnnotationAxiom

Some groups are mere documentation in the schema, and therefore are not included as types.

- fourier
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The XML schema that captures the structure of OWL 2 entities, axioms, and axioms. Not all of IRI documents which are legal according to this schema correspond to an valid OWL 2 serialization.

To get to the IRI-IRIs, ommitting an OWL 2 XML serialization ontology document description are must:

- Secure all the IRIs and mapped the abbreviated IRIs in the above described way.
- Get the imports closure of the ontology.
- To determine whether the IRLI-strategy is correctly, are must:
- Check the typing restrictions
- Check the XML serialization

Each axiom in the IRI-IRIs system of IRIs contains complete information about the type of the all entities in it. Therefore the OWL 2 XML Syntax processing is simpler than the canonical parsing process from Section 3.6 of OWL 2 Specification [OWL 2 Specification].

The information that follows will be submitted to the IESG for review, approval, and registration with IANA.
7 Appendix: Change Log (Informative)

7.1 Changes Since Last Call

This section summarizes the changes to this document since the

Recommendation of 5 April 2009


Changes Since Candidate Recommendation

This section summarizes the changes to this document since the

Candidate Recommendation of 30 April, 2009


8 Acknowledgments

The starting point for the development of OWL 2 was the

OWL1.1 member submission, itself a result of user and developer feedback, and in particular of information gathered during the

OWL1.1 Experiences and Directions (OWLED) Workshop series. The working group also considered information from the

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