W3C

1. RDF/RDFS Language Reference

RDF Node

- **rdfs:Resource** — *the generic class of identified concept*

rdf:type	[rdfs:Resource → rdfs:Class]	*membership*
rdfs:label	[rdfs:Resource → rdfs:Literal]	*annotation*
rdfs:comment	[rdfs:Resource → rdfs:Literal]	*annotation*
rdfs:seeAlso	[rdfs:Resource → rdfs:Resource]	*annotation*
rdfs:isDefinedBy	[rdfs:Resource → rdfs:Resource]	*annotation*
rdf:value	[rdfs:Resource → rdfs:Resource]	*complex values*

- **rdfs:Literal** — *the generic class of literal values*
- **rdf:XMLLiteral** — *the class of typed literals (c.f. XMLSchema)*

Class

- **rdfs:Class** — *the class of rdf classes*

rdfs:subClassOf	[rdfs:Class → rdfs:Class]	*subset relation*

Property

- **rdf:Property** — *the class of properties(i.e. binary relations)*

rdfs:subPropertyOf	[rdf:Property→ rdf:Property]
rdfs:domain	[rdf:Property→ rdfs:Class]
rdfs:range	[rdf:Property→ rdfs:Class]

Containers

- **rdfs:Container** — *the generic superclass of rdf resource containers*

rdfs:member	[rdfs:Resource → rdfs:Resrouce]	*membership*
rdf:_1, rdf_2, ...	Sub-properties of rdf:member	

- **rdf:Alt** — *container of alternatives*
- **rdf:Bag** — *unordered container*
- **rdf:Seq** — *ordered container*
- **rdfs:ContainerMembershipProperty** — *all sub-properties of rdfs:member*

List

- **rdf:List** — *the class of RDF Lists*

rdf:first	[rdf:List → rdfs:Resource]	car
rdf:rest	[rdf:List → rdfs:List]	cdr

- **rdf:nil** — an instance of RDF:List representing the empty list

Datatype

- **rdfs:Datatype** — *the class of datatypes*

RDF Reification

- **rdf:Statement** — *the class of RDF statements*

rdf:subject	[rdf:Statement → rdfs:Resource]
rdf:predicate	[rdf:Statement → rdfs:Resource]
rdf:object	[rdf:Statement → rdfs:Resource]

OWL 2 Reference Card v.05

2. OWL Language Reference

Constructs in shadow are available in OWL 2

Classes and Class Expressions

owl:Class — *all OWL classes, a sub-class of rdfs:Class*

owl:intersectionOf	[owl:Class → two or more owl:Class]
owl:unionOf	[owl:Class → two or more owl:Class]
owl:complementOf	[owl:Class → owl:Class]
owl:oneOf	[owl:Class → one or more individuals]

Properties

owl:DatatypeProperty	*range is instance of rdfs:Datatype*
owl:ObjectProperty	*range is instance of owl:Class*

Object Property Restrictions

owl:Restriction

owl:onProperty	[owl:Restriction → owl:ObjectProperty]
owl:allValuesFrom	[owl:Restriction → owl:Class]
owl:someValuesFrom	[owl:Restriction → owl:Class]
owl:hasValue	[owl:Restriction → individual]
owl:SelfRestriction	[owl:Restriction → owl:ObjectProperty]

Object Property Cardinality Restrictions

owl:Restriction

owl:onProperty	[owl:Restriction → owl:ObjectProperty]
owl:onClass	[owl:Restriction →owl:Class]
owl:cardinality **owl:maxCardinality** **owl:minCardinality**	[owl:Restriction → xsd:nonNegativeInteger]
owl:minQualifiedCardinality **owl:minQualifiedCardinality** **owl:qualifiedCardinality**	[owl:Restriction → xsd:nonNegativeInteger] [owl:onClass → owl:Class]

Data Property Restrictions

owl:Restriction

owl:onProperty	[owl:Restriction → owl:DatatypeProperty]
owl:allValuesFrom	[owl:Restriction → owl:DataRange]
owl:someValuesFrom	[owl:Restriction → owl:DataRange]
owl:hasValue	[owl:Restriction → literal]
owl:onProperties	[owl:Restriction → one or more owl:DatatypeProperty]

Data Property Cardinality Restrictions

owl:Restriction

owl:onProperty **owl:cardinality**	[owl:Restriction → owl:DatatypeProperty]
owl:maxCardinality **owl:minCardinality**	[owl:Restriction → xsd:nonNegativeInteger]
owl:minQualifiedCardinality **owl:minQualifiedCardinality**	[owl:Restriction → xsd:nonNegativeInteger] [owl:onDataRange → owl:DataRange]
owl:qualifiedCardinality	

http://www.w3.org/2007/OWL

Data Ranges

owl:DataRange	sets of data values, range of data-valued property
owl:datatypeComplementOf	[rdfs:Datatype → owl:DataRange]
owl:oneOf	[rdfs:Datatype → one or more literals]
owl:onDatatype	[owl:Restriction → rdfs:Datatype]
owl:withRestrictions	[datatype restriction → list of one or more literals, list of facets & restriction values

Datatypes

Facets: **owl:length, owl:minLength, owl:maxLength, owl:pattern, owl:minInclusive, owl:minExclusive, owl:maxInclusive, owl:maxExclusive, owl:totalDigits, owl:fractionDigits**

Class Expression Axioms

rdfs:subClassOf	[owl:Class → owl:Class or rdfs:Class]
owl:equivalentClass	[owl:Class → two or more owl:Class]
owl:disjointWith	[owl:Class → two or more owl:Class]
owl:disjointUnionOf	[owl:Class → two or more owl:Class]

Object Property Axioms

rdfs:subPropertyOf	[owl:ObjectProperty → owl:ObjectProperty]
rdfs:subPropertyOf	[owl:ObjectProperty → owl:propertyChain of two or more object properties]
owl:inverseOf	[owl:ObjectProperty → owl:ObjectProperty]
owl:equivalentProperty	[owl:ObjectProperty → one or more owl:ObjectProperty]
owl:property DisjointWith	[owl:ObjectProperty → owl:ObjectProperty]
rdfs:domain	[owl:ObjectProperty → owl:Class]
rdfs:range	[owl:ObjectProperty → owl:Class]
owl:propertyChain	[owl:ObjectProperty → two or more object properties]

owl:FunctionalProperty	*(s,p,o1) , (s, p,o2) =>sameAs(o1, o2)*
owl:InverseFunctionalProperty	*(s1,p,o) , (s2, p,o) => sameAs(s1, s2)*
owl:ReflexiveProperty	*(a,p,a) for all a*
owl:IrreflexiveProperty	*(a,p,b) => a≠b*
owl:SymmetricProperty	*(s,p,o) => (o,p,s)*
owl:AsymmetricProperty	*(a,p,b) => not (b,p,a)*
owl:TransitiveProperty	*(a,p,b), (b,p,c) => (a,p,c)*

Data Property Axioms

rdfs:subPropertyOf	[owl:DatatypeProperty → owl:DatatypeProperty]
owl:equivalentProperty	[owl:DatatypeProperty → one or more owl:DatatypeProperty]
owl:property DisjointWith	[owl:DatatypeProperty → owl:DatatypeProperty]
rdfs:domain	[owl:DatatypeProperty → owl:Class]
rdfs:range	[owl:DatatypeProperty → owl:DataRange]

- **owl:FunctionalProperty** — *(s,p,o1) , (s, p,o2) =>sameAs(o1, o2)*

Object and Data Property Axioms

- **owl:hasKey** — [owl:Class→ list of property expressions]

reference: http://www.w3.org/2007/OWL/wiki/Syntax#Keys

Special classes

- **owl:Thing** *all OWL individuals*
  - **owl:differentFrom** [owl:Thing → owl:Thing]
  - **owl:sameAs** [owl:Thing → owl:Thing]
- **owl:Nothing** *the complement of owl:Thing*
- **owl:AllDifferent** *OWL built-in*
  - **owl:distinctMembers** [owl:AllDifferent → list of individuals]
- **owl:AllDisjointClasses**
- **owl:members** [owl:AllDisjointClasses→ list of classes]
- **owl:AllDisjointProperties**
- **owl:members** [owl:AllDisjointProperties → list of property expressions]

Assertions

- **owl:NegativePropertyAssertion** [data property->value]
  - **owl:sourceIndividual**
  - **owl:assertionProperty**
  - **owl:targetValue**

Special properties

- **owl:TopDataProperty**
- **owl:BottomDataProperty** the complement of owl:TopDataProperty
- **owl:TopObjectProperty**
- **owl:BottomObjectProperty** the complement of owl:TopObjectProperty

Individuals

- **owl:NamedIndividual**

Annotation

- **owl:Axiom**
- **owl:Declaration** *on entities (classes, datatypes, properties, individuals)*
- **owl:AnnotationProperty** *range is rdfs:Literal*
- **owl:DeprecatedClass** *domain is owl:Class*
- **owl:DeprecatedProperty** *domain is owl:ObjectProperty and owl:DatatypeProperty*

Note: OWL 2 supports rich annotation on axioms, entities and ontologies
reference: http://www.w3.org/2007/OWL/wiki/Syntax#Annotations

Ontology

- **owl:Ontology** *ontology description*
- **owl:imports** *domain/range are owl:Ontology*
- **owl:OntologyProperty** *domain/range are owl:Ontology*
  - **owl:backwardCompatibleWith** [owl:Ontology → owl:Ontology]
  - **owl:incompatibleWith** [owl:Ontology → owl:Ontology]
  - **owl:priorVersion** [owl:Ontology → owl:Ontology]
  - **owl:versionInfo** [→] *no domain or range constraint*

3. Profiles

[O]: object property; [D]: data type property; [OC]: object property chain

OWL-EL? (EL++)

- **Classes**: owl:intersectionOf; rdfs:subClassOf; owl:equivalentClass; owl:disjointWith; owl:oneOf – single item only [O,D];owl:Thing; owl:Nothing
- **Restrictions**: owl:someValuesFrom [O,D] ; owl:hasValue [O,D] ; owl:SlefRestriction
- **Properties**: rdfs:subPropertyOf [O,D,OC]; owl:equivalentProperty [O,D]; owl:TransitiveProperty [O] ; owl:ReflexiveProperty [O]; owl:FunctionalProperty [D]; owl:hasKey; rdfs:domain and rdfs:range [O,D]; owl:TopObjectProperty, owl:BottomObjectProperty, owl:TopDataProperty, owl:BottomDataProperty
- **Assertions**: owl:sameAs, owl:differentFrom, owl:Class, owl:ObjectProperty, owl:DataProperty, owl:NegativePropertyAssertion [O,D]
- **Datatypes**: rdfs:Literal, xsd:decimal, xsd:integer, xsd:nonNegativeInteger, xsd:dateTime, xsd:date, xsd:string, xsd:normalizedString, xsd:anyURI, xsd:token, xsd:Name, xsd:NCName, xsd:hexBinary, xsd:base64Binary, owl:internationalizedString

reference: http://www.w3.org/2007/OWL/wiki/Profiles#EL.2B.2B

OWL-QL? (DL-Lite) -- TBA

- **Classes**
- **Restrictions**
- **Properties**
- **Assertions**
- **Datatypes**

reference: http://www.w3.org/2007/OWL/wiki/Profiles#DL-Lite

OWL-RL? -- TBA

- **Classes**
- **Restrictions**
- **Properties**
- **Assertions**
- **Datatypes**

reference: http://www.w3.org/2007/OWL/wiki/Profiles#OWL-R

4. Name spaces and Date types

prefix	URI and popular classes/properties
rdf	http://www.w3.org/1999/02/22-rdf-syntax-ns#
rdfs	http://www.w3.org/2000/01/rdf-schema#
owl	http://www.w3.org/2002/07/owl#
xsd	http://www.w3.org/2001/XMLSchema#
ox	http://www.w3.org/2006/12/owl2-xml#

Supported datatypes

Real	Integer	Strings	Datetime	Others
xsd:decimal	xsd:int	xsd:string	xsd:date	xsd:anyURI
xsd:double	xsd:integer	xsd:normalizedString	xsd:dateTime	xsd:base64Binary
xsd:float	xsd:long	xsd:token	xsd:time	xsd:boolean
owl:real	xsd:short	xsd:language	xsd:gYearMonth	xsd:byte
owl:realPlus	xsd:negativeInteger	xsd:NMTOKEN	xsd:gYear	xsd:hexBinary
	xsd:positiveInteger	xsd:Name	xsd:gMonthDay	xsd:unsignedByte
	xsd:nonPositiveInteger	xsd:NCName	xsd:gDay	owl:dateTime?
	xsd:nonNegativeInteger	xsd:ID	xsd:gMonth	xsd:facet
	xsd:unsignedLong	xsd:IDREF		
	xsd:unsignedInt	xsd:ENTITY		
	xsd:unsignedShort	rdf:text?		

TBA