

Anonymous OWL

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@BIOL

Outline

- Classes
 - Class Descriptions
 - Class Axioms
- Individuals

Class Descriptions

- OWL distinguishes six types of class descriptions:
 1. a class identifier (a URI reference)
 2. an exhaustive enumeration of individuals that together form the instances of a class
 3. a property restriction
 4. the intersection of two or more class descriptions
 5. the union of two or more class descriptions
 6. the complement of a class description
- The **first type is special in the** sense that it describes a class through a *class name*. The other five types of class descriptions describe an anonymous class by *placing constraints on the class extension*.

OWL Web Ontology Language Reference

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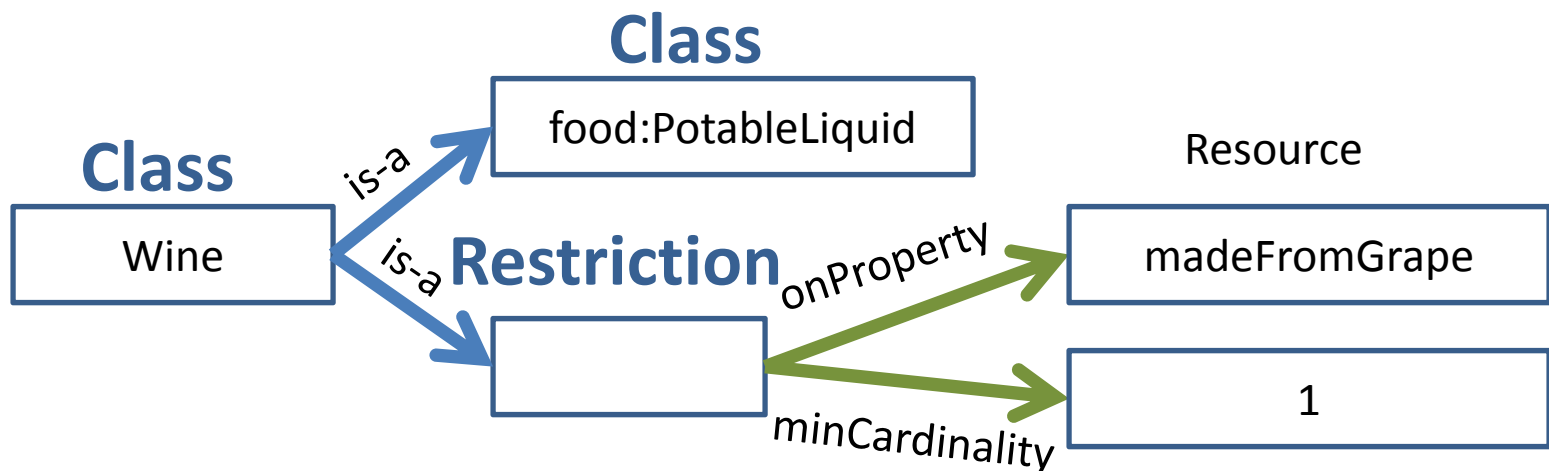
Named Classes

- A type 1 class description is syntactically represented as an named instance of owl:Class, a subclass of rdfs:Class:

```
<owl:Class rdf:ID="Human"/>
```

The others

- The other five forms of class descriptions consist of anonymous or unnamed classes
 - a set of RDF triples in which a **blank node** represents the class being described
 - That **blank node** has an `rdf:type` property whose value is `owl:Class`.



To class

- To expand the definition of Wine to include the notion that a wine is made from at least one WineGrape.
- As with property definitions, class definitions have multiple subparts that are implicitly conjoined.

```
<owl:Class rdf:ID="Wine">  
  <rdfs:subClassOf rdf:resource="&food;PotableLiquid"/>  
  <rdfs:subClassOf>  
    <owl:Restriction>  
      <owl:onProperty rdf:resource="#madeFromGrape"/>  
      <owl:minCardinality rdf:datatype="&xsd;nonNegativeInteger">1</owl:minCardinality>  
    </owl:Restriction>  
</rdfs:subClassOf> ... </owl:Class>
```

- The highlighted subclass restriction above defines an unnamed class that represents the set of things with at least one madeFromGrape property.
- We call these *anonymous classes*. Including this restriction in the Wine class definition body states that things that are wines are also members of this anonymous class. That is, every individual wine must participate in at least one madeFromGrape relation.

The class [owl:Restriction](#) is defined as a subclass of [owl:Class](#).

Property restrictions

- It describes an anonymous class, namely a class of all individuals that satisfy the restriction.

- [Cardinality constraint](#)

```
<owl:Restriction>
```

```
  <owl:onProperty rdf:resource="(some property)" />
```

```
  (precisely one value or cardinality constraint, see below)
```

```
</owl:Restriction>
```

- [Value constraint](#)

```
<owl:Restriction>
```

```
  <owl:onProperty rdf:resource="#hasParent" />
```

```
  <owl:allValuesFrom rdf:resource="#Human" />
```

```
</owl:Restriction>
```


Enumeration

- [owl:oneOf](#) property

```
<owl:Class>
```

```
  <owl:oneOf rdf:parseType="Collection">
```

```
    <owl:Thing rdf:about="#Eurasia"/>
```

```
    <owl:Thing rdf:about="#Africa"/>
```

```
    <owl:Thing rdf:about="#NorthAmerica"/>
```

```
    <owl:Thing rdf:about="#SouthAmerica"/>
```

```
    <owl:Thing rdf:about="#Australia"/>
```

```
    <owl:Thing rdf:about="#Antarctica"/>
```

```
  </owl:oneOf>
```

```
</owl:Class>
```

Intersection, union and complement

- **AND, OR and NOT** operators on classes

```
<owl:Class>
  <owl:intersectionOf rdf:parseType="Collection">
    <owl:Class>
      <owl:oneOf rdf:parseType="Collection">
        <owl:Thing rdf:about="#Tosca" />
        <owl:Thing rdf:about="#Salome" />
      </owl:oneOf>
    </owl:Class>
    <owl:Class>
      <owl:oneOf rdf:parseType="Collection">
        <owl:Thing rdf:about="#Turandot" />
        <owl:Thing rdf:about="#Tosca" />
      </owl:oneOf>
    </owl:Class>
  </owl:intersectionOf>
</owl:Class>
```

Class axioms

- Class descriptions form the building blocks for defining classes through class axioms.
- Class description of **type 1**
 - states the existence of a class

• Combining class descriptions into class axioms

- [rdfs:subClassOf](#)
- [owl:equivalentClass](#)
- [owl:disjointWith](#)

For example: Subclass axioms provide us with partial definitions: they represent necessary but not sufficient conditions for establishing class membership of an individual

Individuals (using /owl:about/)

- A member of a class

```
<Region rdf:ID="CentralCoastRegion" />
```

≡

```
<owl:Thing rdf:ID="CentralCoastRegion" />  
<owl:Thing rdf:about="#CentralCoastRegion">  
  <rdf:type rdf:resource="#Region"/>  
</owl:Thing>
```

anonymous Individuals

- Individual axioms need not necessarily be about named individuals: they can also refer to anonymous individuals.

<Measurement>

<observedSubject rdf:resource="#JaneDoe"/>

<observedPhenomenon rdf:resource="#Weight"/>

<observedValue>

<Quantity>

<quantityValue rdf:datatype="&xsd;float">59.5</quantityValue>

<quantityUnit rdf:resource="#Kilogram"/>

</Quantity>

</observedValue>

<timeStamp rdf:datatype="&xsd;dateTime">2003-01-24T09:00:08+01:00</timeStamp>

</Measurement>

- some **Measurement** and some **Quantity**