DAML+OIL Overview

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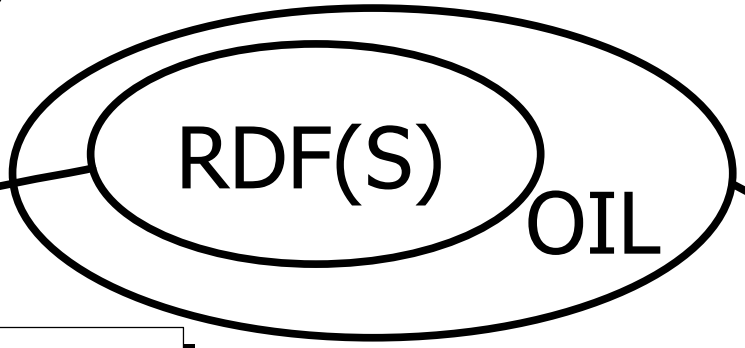
DAML+OIL as RDF(S) extension



- class
- subclass-of
- property
- subprop.
- domain
- range

- class-expressions
  - AND, OR, NOT
- slot-constraints
  - has-value, value-type
  - cardinality
- slot-properties
  - trans, symm

DAML+OIL: Classes

```
<daml:Class rdf:ID="Male">
     <rdfs:subClassOf rdf:resource="#Animal"/>
</daml:Class>

<daml:Class rdf:ID="Female">
     <rdfs:subClassOf rdf:resource="#Animal"/>
     <daml:disjointWith rdf:resource="#Male"/>
</daml:Class>

<daml:Class rdf:ID="Man">
   Ù!<rdfs:subClassOf rdf:resource="#Person"/>
     <rdfs:subClassOf rdf:resource="#Male"/>
</daml:Class>
```

Class-Building Operations

- Relation to other Classes
  - `rdfs:subClassOf`
  - `daml:disjointWith`
  - `daml:disjointUnionOf`
  - `daml:sameClassAs`
  - `daml:equivalentTo`
- Contained Elements:
  - `daml:oneOf`
- Boolean combinations:
  - `daml:intersectionOf`
  - `daml:unionOf`
  - `daml:complementOf`

DAML+OIL: Properties

```
<daml:ObjectProperty rdf:ID="hasParent">
     <rdfs:domain rdf:resource="#Animal"/>
     <rdfs:range rdf:resource="#Animal"/>
</daml:ObjectProperty>

<daml:ObjectProperty rdf:ID="hasChild">
     <daml:inverseOf
rdf:resource="#hasParent"/>
</daml:ObjectProperty>

<daml:UniqueProperty rdf:ID="hasMother">
     <rdfs:subPropertyOf
rdf:resource="#hasParent"/>
     <rdfs:range rdf:resource="#Female"/>
</daml:UniqueProperty>
```

Property-Building Operations

- **Basic Types:**
  - `daml:ObjectProperty`
  - `daml:DataTypeProperty`
- **Special Types**
  - `daml:TransitiveProperty`
  - `daml:UniqueProperty`
  - `daml:UnambigousProperty`
- **Further Restrictions:**
  - `rdfs:subPropertyOf`
  - `rdfs:domain`
  - `rdfs:range`
  - `daml:samePropertyAs`
  - `daml:inverseOf`

DAML+OIL: Prop. Restrictions

```
<daml:Class rdf:ID="Person">
    <rdfs:subClassOf rdf:resource="#Animal"/>
    <rdfs:subClassOf>
     <daml:Restriction>
          <daml:onProperty
               rdf:resource="#hasFather"/>
          <daml:toClass rdf:resource="#Man"/>
     </daml:Restriction>
     <daml:Restriction daml:cardinality="1">
          <daml:onProperty
               rdf:resource="#hasFather"/>
     </daml:Restriction>
    </rdfs:subClassOf>
</daml:Class>
```

DAML+OIL: Prop. Restrictions

```
<daml:Class rdf:ID="Person">
    <rdfs:subClassOf rdf:resource="#Animal"/>
    <rdfs:subClassOf>
       <daml:Restriction daml:cardinalityQ="1">
<daml:onProperty rdf:resource="#hasFather"/>
       <daml:hasClassQ rdf:resource="#Man"/>
       </daml:Restriction>
    </rdfs:subClassOf>
</daml:Class>
```

Restrictions

- **General:**
  - `daml:Restriction`
  - `daml:onProperty`
- **Value and Type Restrictions**
  - `daml:toClass`
  - `daml:hasValue`
  - `daml:hasClass`
- **Number Restrictions**
  - `daml:cardinality`
  - `daml:maxCardinality`
  - `daml:minCardinality`
- **Combinations:**
  - `daml:cardinalityQ`
  - `daml:maxCardinalityQ`
  - `daml:minCardinalityQ`

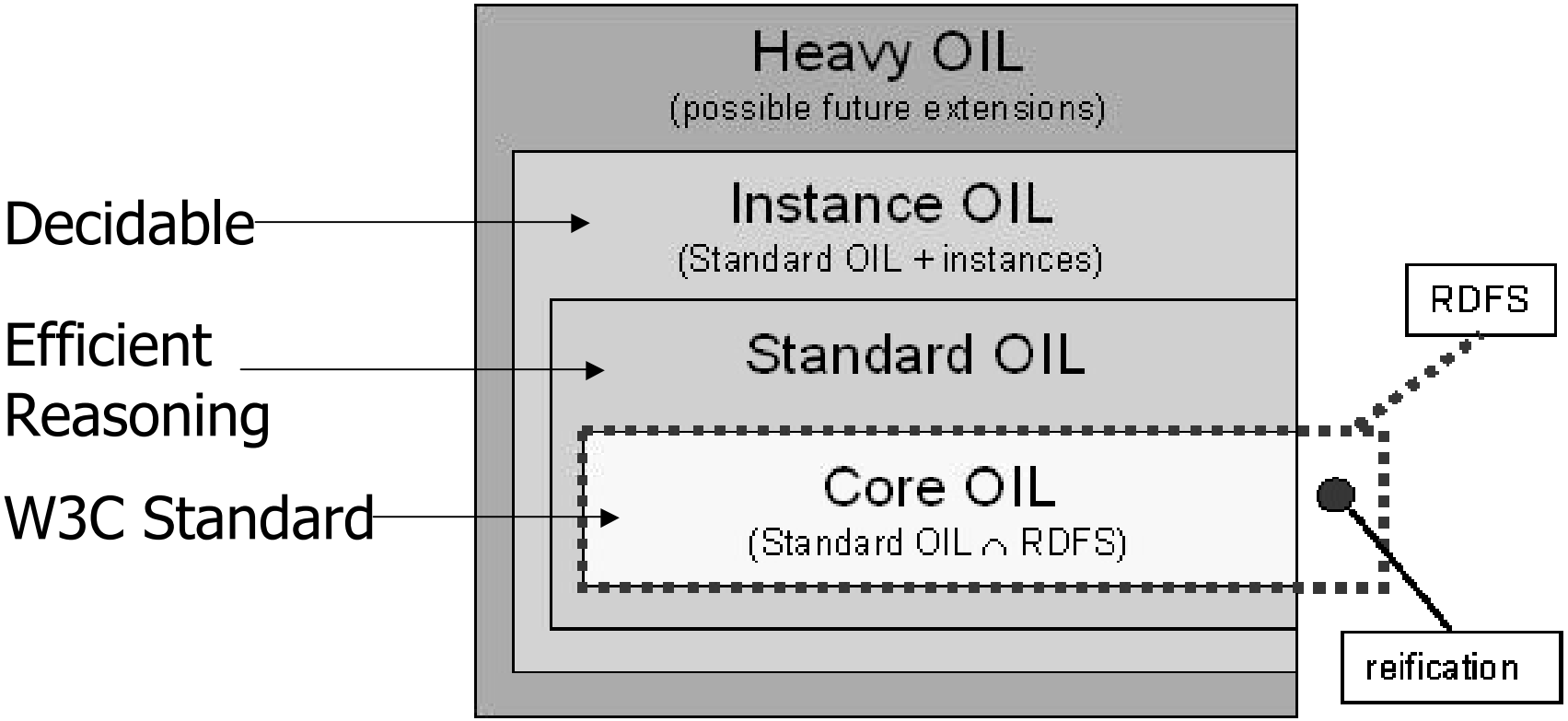
DAML+OIL: Individuals

```
<rdf:Description rdf:ID="Asia">
    <rdf:type>
      <rdfs:Class rdf:about="#continent"/>
    </rdf:type>
    <daml:differentIndividualFrom rdf:resource="#Europe"/>
</rdf:Description>

<continent rdf:ID="Asia"/>

<rdf:Description rdf:ID="India">
    <is_part_of rdf:resource="#Asia"/>
    <daml:sameIndividual
            rdf:resource="#IndianSubcontinent"/>
    <inhabitants><xsd:integer
            rdf:value="700.000.000"/></inhabitants>
</rdf:Description>
```

DAML+OIL: Datatypes

```
<xsd:simpleType name="over17">
    <xsd:restriction base="xsd:positiveInteger">
      <xsd:minInclusive value="18"/>
    </xsd:restriction>
</xsd:simpleType>


<daml:Class rdf:ID="Adult">
    <daml:intersectionOf rdf:parseType="daml:collection">
      <daml:Class rdf:about="#Person"/>
      <daml:Restriction>
          <daml:onProperty rdf:resource="#age"/>
          <daml:hasClass rdf:resource="...#over17"/>
      </daml:Restriction>
    </daml:intersectionOf>
</daml:Class>
```

Beyond DAML+OIL: A Layered Approach



[Fensel et.al. 2001]