

A large, stylized white owl logo is positioned on the left side of the slide. The owl's body and head are formed by a large, rounded white shape that extends from the left edge. The wings are represented by two smaller, rounded white shapes on either side of the body. The entire logo is set against a solid green background.

OWL

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A thick, dark blue horizontal bar is located at the bottom of the slide, extending from the right edge towards the center. It has rounded ends and is positioned below the author's name.

OWL – Web Ontology Language

- **Estende RDF[S]** con costrutti aggiuntivi per modellare realtà più complesse
 - Contemporaneamente **VINCOLA** l'uso dei costrutti RDF(S) in modo da rimanere nel primo ordine
 - E' **proposizionalmente chiuso** (comprende ALC.. e molto altro)
 - E' strutturato in 3 sottolinguaggi (dialetti o specie)
 - **OWL-Lite**: permette di definire soltanto tassonomie e minimali vincoli relazionali (solo schema F)
 - **OWL-DL**: cerca di sfruttare il potere espressivo delle DL (per quanto possibile)
 - **OWL-Full**: l'utente può utilizzare tutti i costrutti di RDF[S], quindi non è una DL (Metaclassi) e non ci si può aspettare un reasoning completo, corretto e decidibile
- $\text{Lite} \subseteq \text{DL} \subseteq \text{Full}$

Simple Named Classes

- Il tipo owl:Class è un sinonimo di comodo di rdfs:Class
- Il ns owl = "http://www.w3.org&2002/07/owl#"
- rdfs:subClassOf

```
<rdf:RDF xmlns:...>
  <owl:Class rdf:ID="Winery">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="ConsumableThing"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Region"/>
</rdf:RDF>
```

Individui

- Owl:Thing rappresenta l'insieme di tutti gli individui
- Diverso da Resource perché è solo del primo ordine
- Equivale al TOP delle DL
- Owl:Nothing rappresenta il bottom

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

Proprietà (1)

- “eredita” da RDF
 - Rdfs:subPropertyOf
 - Rdfs:domain
 - Rdfs:range
- Per mantenere compatibilità verso le DL si distinguono le proprietà verso **oggetti** e le proprietà verso **letterali**
 - Owl:DatatypeProperty
 - Owl:ObjectProperty

```
<owl:ObjectProperty rdf:ID="madeFromGrape">  
  <rdfs:domain rdf:resource="#Wine"/>  
  <rdfs:range rdf:resource="#WineGrape"/>  
</owl:ObjectProperty>
```

```
<owl:DatatypeProperty rdf:ID="yearValue">  
  <rdfs:domain rdf:resource="#VintageYear"/>  
  <rdfs:range rdf:resource="&xsd;positiveInteger"/>  
</owl:DatatypeProperty>
```

Proprietà (2)

- Proprietà transitive

```
<owl:ObjectProperty rdf:ID="locatedIn">
  <rdf:type rdf:resource="&owl;TransitiveProperty"/>
  <rdfs:range rdf:resource="#Region"/>
</owl:ObjectProperty>

<Region rdf:ID="SantaCruzMountainsRegion">
  <locatedIn rdf:resource="#CaliforniaRegion"/>
</Region>

<Region rdf:ID="CaliforniaRegion">
  <locatedIn rdf:resource="#USRegion"/>
</Region>
```

Proprietà (3)

- Proprietà simmetriche

```
<owl:ObjectProperty rdf:ID="adjacentRegion">  
  <rdf:type rdf:resource="&owl;SymmetricProperty"/>  
  <rdfs:domain rdf:resource="#Region"/>  
  <rdfs:range rdf:resource="#Region"/>  
</owl:ObjectProperty>
```

- Proprietà funzionali

```
<owl:ObjectProperty rdf:ID="hasVintageYear">  
  <rdf:type rdf:resource="&owl;FunctionalProperty"/>  
  <rdfs:domain rdf:resource="#Vintage"/>  
  <rdfs:range rdf:resource="#VintageYear"/>  
</owl:ObjectProperty>
```

Proprietà (4)

- Proprietà inverse

```
<owl:FunctionalProperty rdf:ID="hasMaker">  
    <rdf:type rdf:resource="&owl;ObjectProperty"/>  
</owl:FunctionalProperty>  
<owl:ObjectProperty rdf:ID="producesWine">  
    <owl:inverseOf rdf:resource="#hasMaker"/>  
<owl:ObjectProperty>
```

- Proprietà inversamente funzionali

```
<owl:ObjectProperty rdf:ID="producesWine">  
    <owl:inverseOf rdf:resource="#hasMaker"/>  
    <rdf:type rdf:resource="&owl;InverseFunctionalProperty"/>  
<owl:ObjectProperty>
```


Restrizioni (1)

Le restrizioni permettono di definire delle “classi anonime” composte da tutti gli individui che rispettano determinati vincoli rispetto alle relazioni

- allValuesFrom

```
<owl:Class rdf:ID="Wine">
  <rdf:subClassOf rdf:resource="#food;PotableLiquid"/>
  <rdf:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hasMaker"/>
      <owl:allValuesFrom rdf:resource="#Winery"/>
    </owl:Restriction>
  </rdf:subClassOf>
</owl:Class>
```

Restrizioni (2)

- someValuesFrom

```
<owl:Class rdf:ID="Wine">
  <rdf:subClassOf rdf:resource="#food;PotableLiquid"/>
  <rdf:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#hasMaker"/>
      <owl:someValuesFrom rdf:resource="#Winery"/>
    </owl:Restriction>
  </rdf:subClassOf>
</owl:Class>
```

Restrizioni (3)

- minCardinality

```
<owl:Class rdf:ID="Poligamo">
  <rdf:subClassOf><owl:Restriction>
    <owl:onProperty rdf:resource="#coniuge"/>
    <owl:minCardinality>2</owl:minCardinality>
  </owl:Restriction></rdf:subClassOf>
</owl:Class>
```

- maxCardinality

```
<owl:Class rdf:ID="Sultano">
  <rdf:subClassOf><owl:Restriction>
    <owl:onProperty rdf:resource="#coniuge"/>
    <owl:maxCardinality>7</owl:minCardinality>
  </owl:Restriction></rdf:subClassOf>
</owl:Class>
```

Restrizioni (4)

- cardinality

```
<owl:Class rdf:ID="Bigamo">  
  <rdf:subClassOf><owl:Restriction>  
    <owl:onProperty rdf:resource="#coniuge"/>  
    <owl:cardinality>2</owl:minCardinality>  
  </owl:Restriction></rdf:subClassOf>  
</owl:Class>
```

- hasValue

```
<owl:Class rdf:ID="Burgundy">  
  <rdf:subClassOf><owl:Restriction>  
    <owl:onProperty rdf:resource="#hasSugar"/>  
    <owl:hasValue rdf:resource="#Dry"/>  
  </owl:Restriction></rdf:subClassOf>  
</owl:Class>
```

Mapping

- equivalentClass

```
<owl:Class rdf:ID="Computer">  
  <rdf:equivalentClass rdf:resource="#Elaboratore"/>  
</owl:Thing>
```

```
<owl:Class rdf:ID="Bigamo">  
  <rdf:equivalentClass><owl:Restriction>  
    <owl:onProperty rdf:resource="#coniuge"/>  
    <owl:cardinality>2</owl:minCardinality>  
  </owl:Restriction></rdf:equivalentClass>  
</owl:Class>
```

- equivalentProperty

```
<owl:ObjectProperty rdf:ID="compostoDa">  
  <owl:equivalentProperty rdf:resource="#hasComponent" >  
</owl:ObjectProperty>
```

Classi disgiunte

- disjointWith

```
<owl:Class rdf:ID="Pari">  
    <owl:disjointWith rdf:resource="#dispati"/>  
</owl:Class>
```

Asserzioni sugli individui

- sameAs: nota diverso da equivalentClass se nel secondo ordine FULL

```
<Rum rdf:ID="MarioFavoriteRum">  
  <rdf:sameAs rdf:resource="#Anniversario"/>  
</Rum>
```

- differentFrom

```
<Rum rdf:ID="Havana">  
  <rdf:differentFrom rdf:resource="#Anniversario"/>  
</Rum>
```

- allDifferent

```
<owl:AllDifferent>  
  <owl:distinctMembers rdf:parseType="Collection">  
    <Rum rdf:resource="#Anniversario"/>  
    <Rum rdf:resource="#Havana"/>  
    <Rum rdf:resource="#Bacardi"/>  
  </owl:distinctMembers>  
</owl:AllDifferent>
```

Classi complesse

- intersectionOf / unionOf

```
<owl:Class rdf:ID="Man">
  <owl:intersectionOf rdf:parsetype="Collection">
    <owl:Class rdf:about="#Person"/>
    <owl:Restriction>
      <owl:onProperty rdf:Resource="#gender"/>
      <owl:hasValue rdf:Resource="#male"/>
    </owl:Restriction>
  </owl:intersectionOf>
</owl:Class>
```

- complementOf

```
<owl:Class rdf:ID="Woman">
  <owl:intersectionOf rdf:parsetype="Collection">
    <owl:Class rdf:about="#Person"/>
    <owl:complementOf rdf:resource="#Man"/>
  </owl:intersectionOf>
</owl:Class>
```


Classi per enumerazione

- Fissa l'estensione della classe elencandone i componenti

```
<owl:Class rdf:ID="GiornoDellaSettimana">
  <owl:oneOf rdf:parsetype="Collection">
    <GiornoDellaSettimana rdf:about="#lunedì"/>
    <GiornoDellaSettimana rdf:about="#martedì"/>
    <GiornoDellaSettimana rdf:about="#mercoledì"/>
    <GiornoDellaSettimana rdf:about="#giovedì"/>
    <GiornoDellaSettimana rdf:about="#venerdì"/>
    <GiornoDellaSettimana rdf:about="#sabato"/>
    <GiornoDellaSettimana rdf:about="#domenica"/>
  </owl:oneOf>
</owl:Class>
```

Equivalenza con le DL

Owl:functionalProperty	$\leq 1R$	F
owl:equivalenClass	$A=B$	
Owl:TransitiveProperty	$R \in \mathbf{R^+}$	S
Owl:Inverseproperty	$S=R^-$	I
Owl:SymmetricProperty	$R \subseteq R^-$	HI
Owl:subPropertyOf	$S \subseteq R$	H
Owl:min/max/Cardinality	$\leq nR / \geq nR / =nR$	N
Owl:oneOf	$\{a1, \dots, an\}$	O
Owl:intersectionOf	$C1 \sqcap C2$	
Owl:disjointWith	$C1 \sqsubseteq \neg C1 / C1 \sqcap C2 = \text{bottom}$	
Owl:differentFrom	$\{a1\} \sqsubseteq \neg \{a2\}$	O

In conclusione

- OWL-DL risulta equivalente alla logica descrittiva SHOIN
- In realtà non basta, bisogna rendere conto delle DatatypeProperty
- Si dice che la logica è estesa con dei domini concreti, che non rappresentano individui, ma istanze di tipi XSD
- Quindi, la logica diventa SHOIN(D)