

OWL

CSC480: Semantic
Web Technologies

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OWL

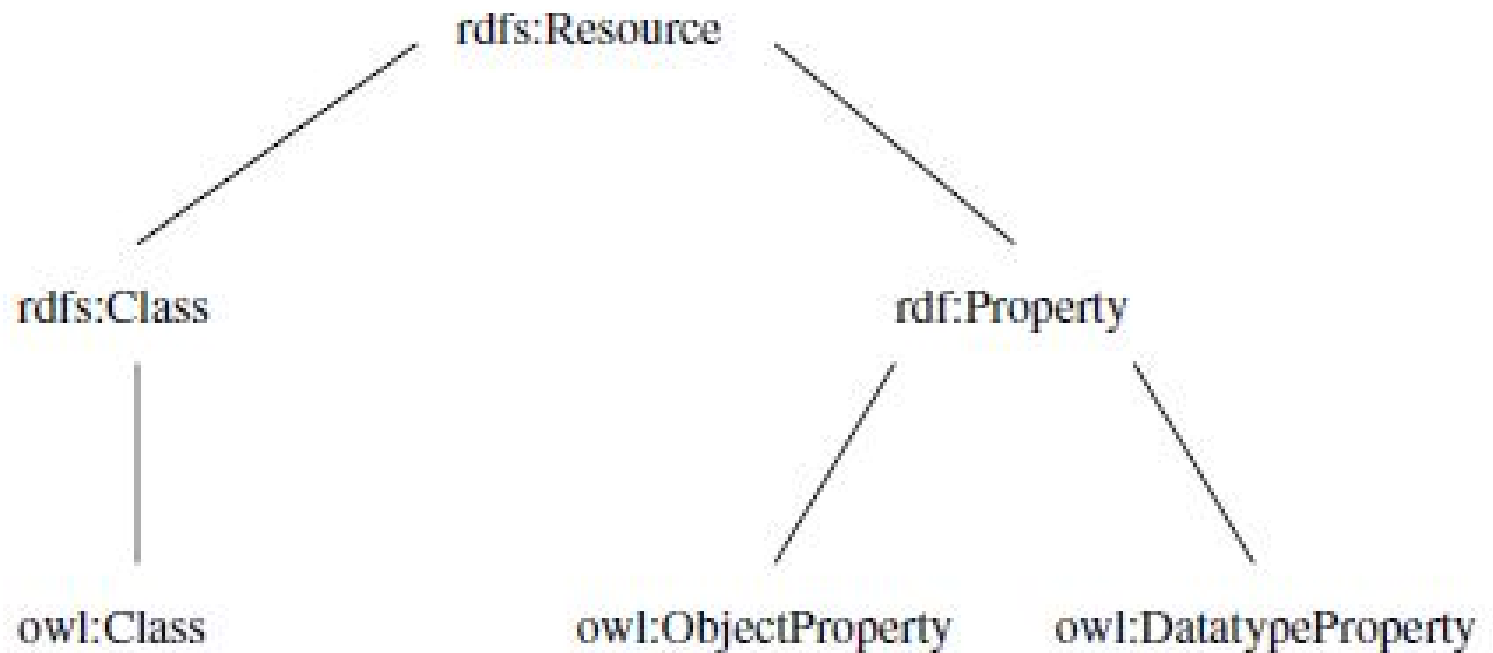
- OWL Web Ontology Language
- Two versions
 - OWL (2004)
 - OWL2 (2009)
- Relationships.xml
 - What additional definitions might be helpful?

OWL Variations

- OWL Lite
 - Classification hierarchy
 - Simple constraints
 - OWL construct restrictions
- OWL DL
 - Computational completeness
 - Decidability
 - All OWL constructs but with some restrictions
- OWL Full

RDF and OWL

Subclass Relationships



OWL Document

OWL Ontology Document

Header

XML Declaration and RDF Start Tag

```
<?xml version="1.0"?>  
<rdf:RDF  
  > Namespace Declarations  
>
```

Ontology Element

Version Information

Imports Element

Body

Class, Property, & Individual Statements

Footer

RDF End Tag

</rdf:RDF>

Namespace Declarations

- XML Schema Datatypes namespace (xsd prefix)
- RDF namespace (rdf prefix)
- RDFS namespace (rdfs prefix)
- OWL namespace (owl prefix)
- Imported namespace (user-defined prefix)

Header Example

```
<rdf:RDF
```

```
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
```

```
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
```

```
  xmlns:rdfs=http://www.w3.org/2000/01/rdf-schema#
```

```
  xmlns:owl=http://www.w3.org/2002/07/owl#>
```

owl:Ontology Statement

- Comments
 - rdf:comment
- Label
 - rdf:label
- Imports
 - owl:imports
 - transitive

OWL Classes

- owl:class
- Boolean combinations
 - intersectionOf
 - unionOf
- Special classes
 - owl:Thing
 - owl:Nothing
- Individuals or instances

OWL Terms

- Assertion
 - Stating a resource is of a certain type
- Expressions
 - Combine classes, properties and instances in a meaningful way
- Axioms
 - Relating a definition to a class

OWL Properties

- Datatype property
 - Has a value
- Object property
 - Individual
- Annotation
 - Additional information

Open-World Assumption

- airport.owl
- “A flight can be an airport” → T or F?

Open-World Assumption



- “Return a list of airports in the model”

Common Constructs

- subClassOf
- oneOf
- disjointWith
- equivalentClass
- Complement

Property Restrictions

- cardinality
 - minCardinality
 - maxCardinality
- subPropertyOf
- inverseOf
- equivalentProperty
- allValuesFrom
- someValuesFrom
- hasValue

Special Properties

- TransitiveProperty
- SymmetricProperty
- FunctionalProperty
- InverseFunctionalProperty

OWL2 Features

- disjointUnionOf
- hasKey

Special Properties in OWL2

- AsymmetricProperty
- Reflexive
- Irreflexive

OWL2 Property Chains

- Shortcuts
- `:livesIn` `rdf:type` `owl:ObjectProperty`;
 `Owl:propertyChainAxiom`
 (`:rents` `:isPartOf` `:location`) .

Distinct Resources

- Uniquely-named individuals are not different
- differentFrom

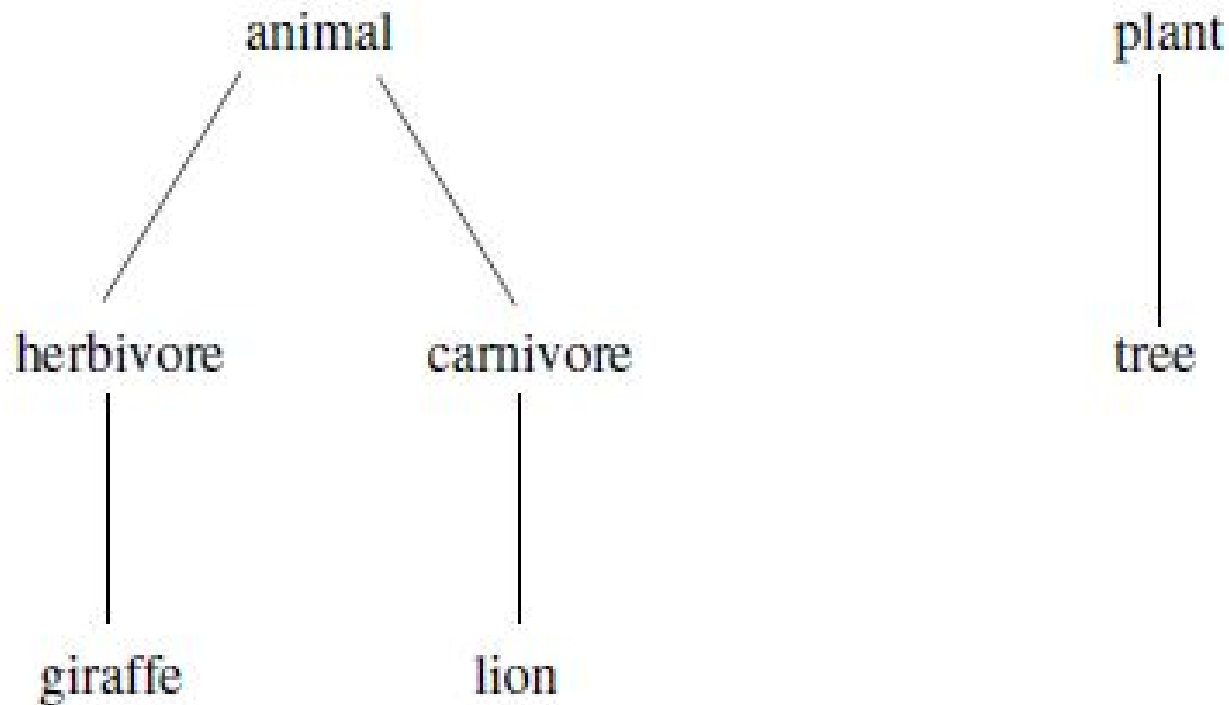
RDF Collections

- Groups of items that contains only the specified members
- Boolean combinations
- `rdf:parseType=Collection`

Example: Baseball Ontology

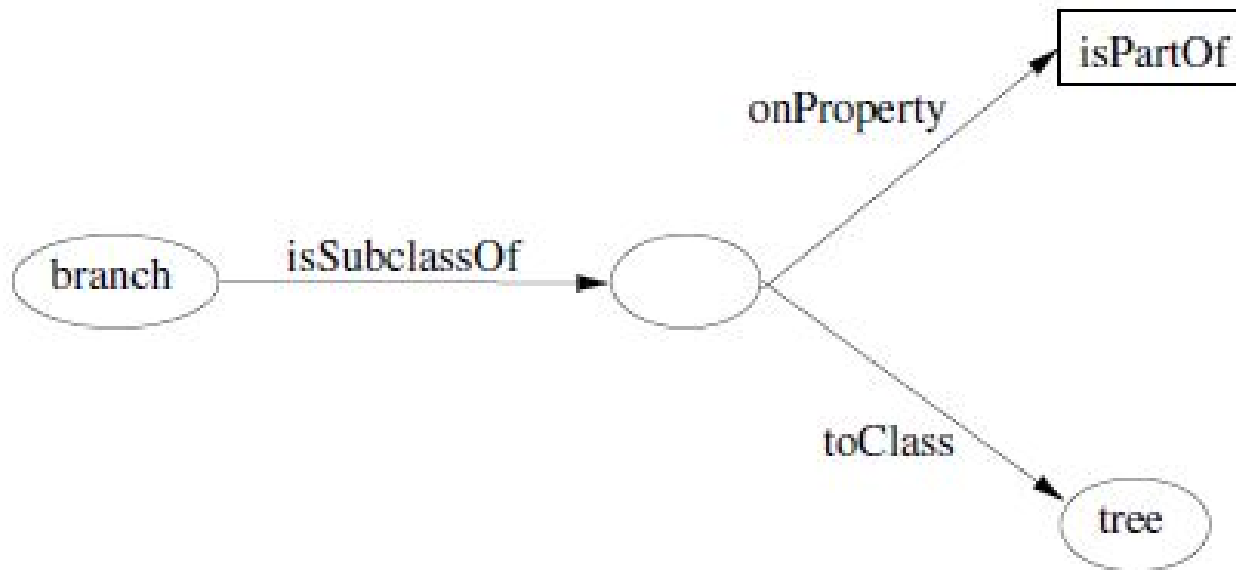
- `baseball.owl`
- N3 syntax – `baseball_n3.owl`

An African Wildlife Ontology – Class Hierarchy



An African Wildlife Ontology – Schematic Representation

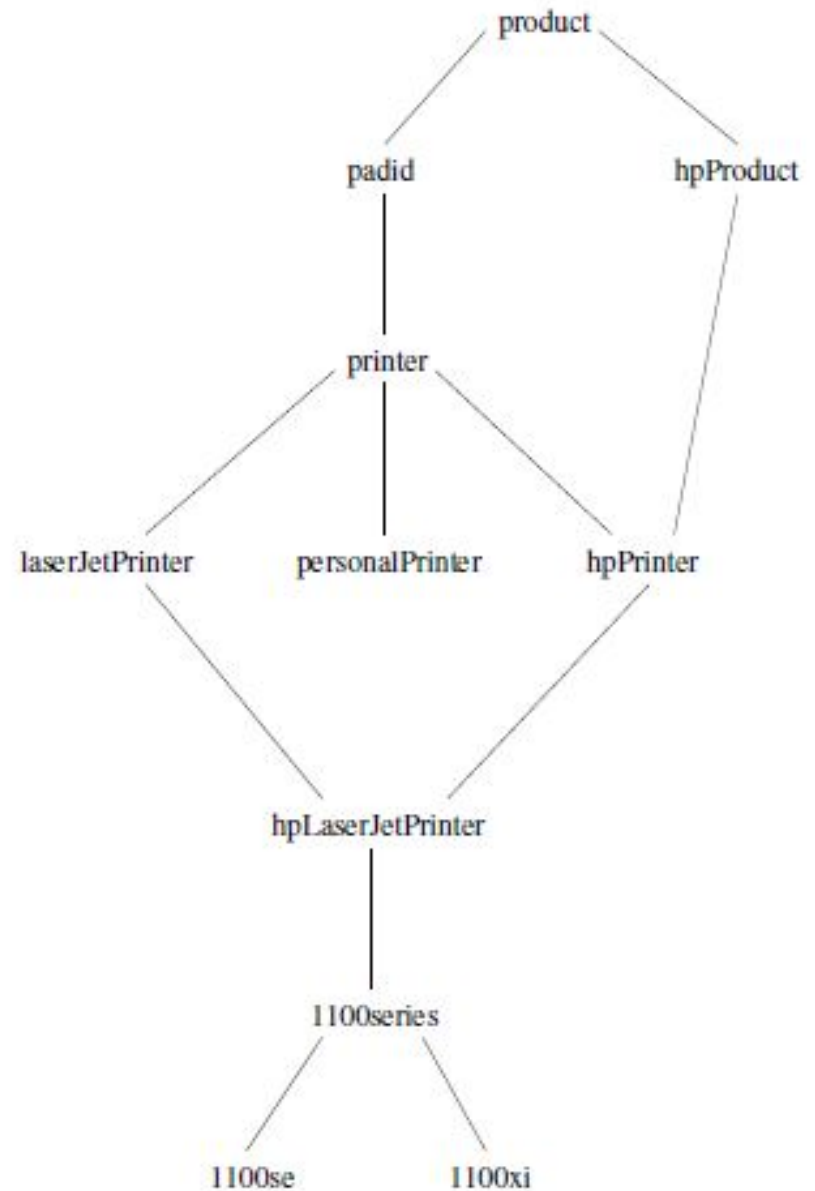
Branches are parts of trees



An African Wildlife Ontology – Code

- AfricanWildlifeOntology.owl

A Printer Ontology – Class Hierarchy



Example

- relationships.xml
- Add additional definitions identified