

Semantic Web Exercise

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1. Interpretation of OWL

Given the following fragment of an OWL DL ontology

```

• <owl:Class rdf:ID="ntnu_skier">
•   <rdfs:subClassOf>
•     <owl:Restriction>
•       <owl:allValuesFrom>
•         <owl:Class rdf:ID="skier"/>
•       </owl:allValuesFrom>
•     <owl:onProperty>
•       <owl:ObjectProperty rdf:ID="hasFriend"/>
•     </owl:onProperty>
•   </owl:Restriction>
• </rdfs:subClassOf>
• <rdfs:subClassOf>
•   <owl:Restriction>
•     <owl:hasValue>
•       <university rdf:ID="NTNU"/>
•     </owl:hasValue>
•     <owl:onProperty>
•       <owl:ObjectProperty rdf:ID="studiesAt"/>
•     </owl:onProperty>
•   </owl:Restriction>
• </rdfs:subClassOf>
• <rdfs:subClassOf rdf:resource="#skier"/>
• </owl:Class>

```

Interpret the definition of NTNU skier and write a corresponding definition as a natural language sentence.

Answer

An NTNU skier is a skier that only has other skiers as friends and studies at NTNU

2. Interpretation of Abstract OWL

Interpret the following statement in abstract OWL syntax and write the corresponding statement in a natural language sentence.

- Class: Debtor
- SubclassOf:
- Person AND
- has some Loan

Answer

Debtor is a subclass of person that must have taken at least one loan.

3. Using Abstract OWL

Use OWL Abstract Syntax to define a skiing resort as a rural area that offers at least one skiing opportunity and has minimum two lifts.

Not that rural area, skiing and lifts are all defined as classes.

Answer

Class: Skiing_resort

SubClassOf:

Rural_area AND

hasActivity SOME Skiing AND

hasLifts MIN 2

4. OWL Modeling

Build a tourist ontology:

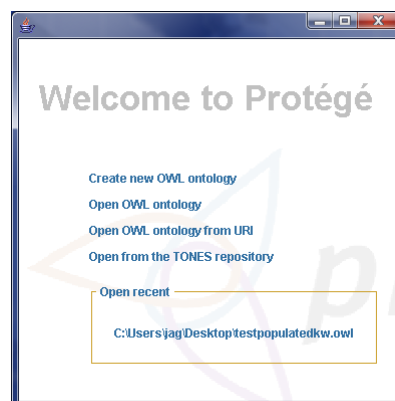
- List the 10-15 most important tourist attractions in Trondheim and the nearby regions. These should include institutions, activities and events. Identify the necessary infrastructure (accommodation, public transport, etc.) that supports tourists during their stay in Trondheim
- Form a class hierarchy in OWL and classify all the instances listed in (a). Specify disjointness where necessary.
- Define the data properties of your classes. Note that properties are inherited by the subclasses and should be specified at the highest possible level. Specify the data properties of your individuals.
- Define the object properties at the class level and apply them to link your individuals together. Use cardinalities where necessary.
- A tourist walk includes at least three attractions that are all within walking distance from the tourist office. Define the class 'Tourist walk' in your ontology.
- How would you define different types of tourists in your ontology?
- "Festninga" og "Kristiansten" are used as synonyms in Trondheim. How would you model that in your ontology?

4.1 Tourist attractions

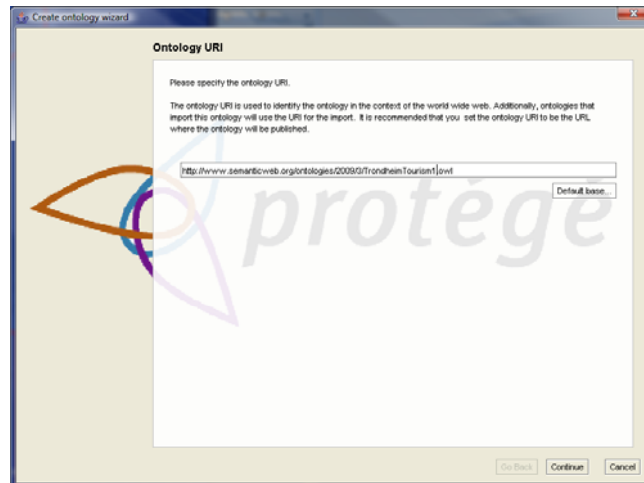
- Flybussen
- TT lokalbuss
- Sverresborg folkemuseum
- Ringve
- Nidarosdomen
- Kristiansten
- Hopping
- Langrenn
- Fiske
- Britannia Hotel
- Bakeriet Hotel
- Rica Nidelven Hotel
- Trondheim Vandrehjem

Starting Protege 4

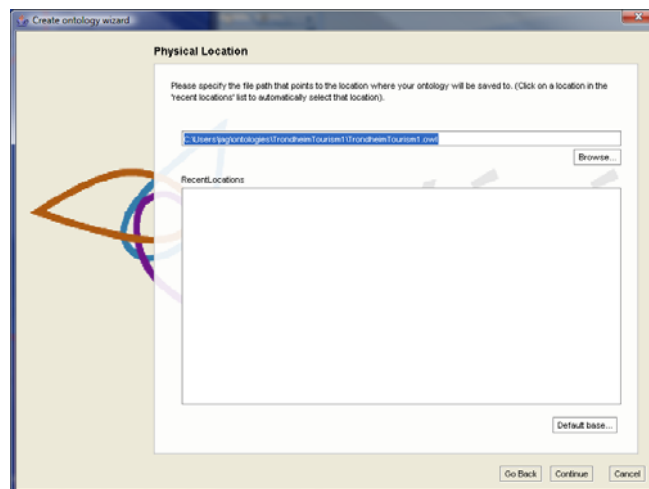
Welcome window....



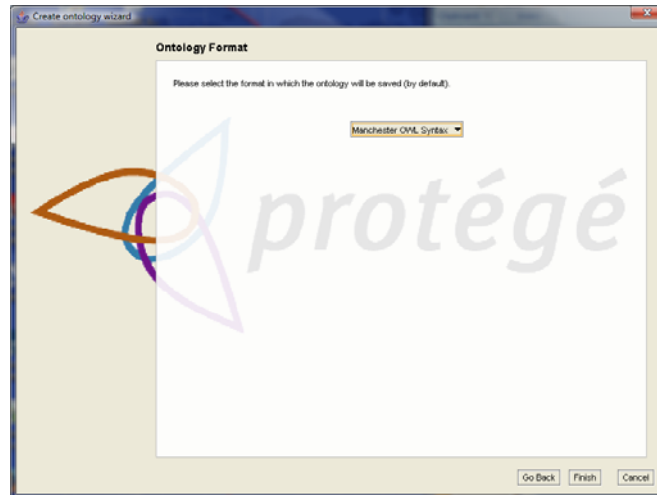
Ontology URI



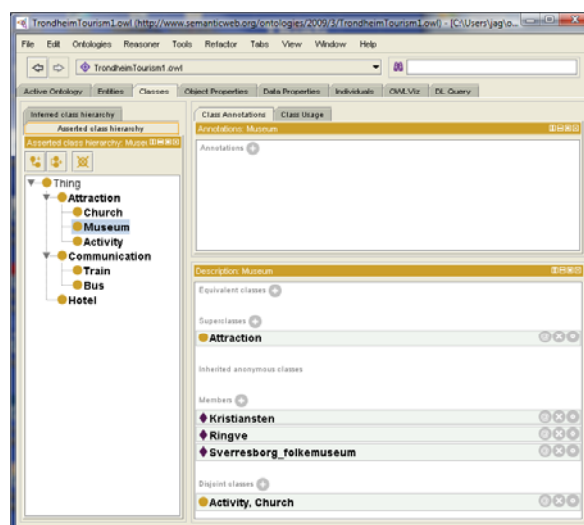
Physical Location



Ontology Format



Simple Class Hierarchy



Manchester OWL Syntax

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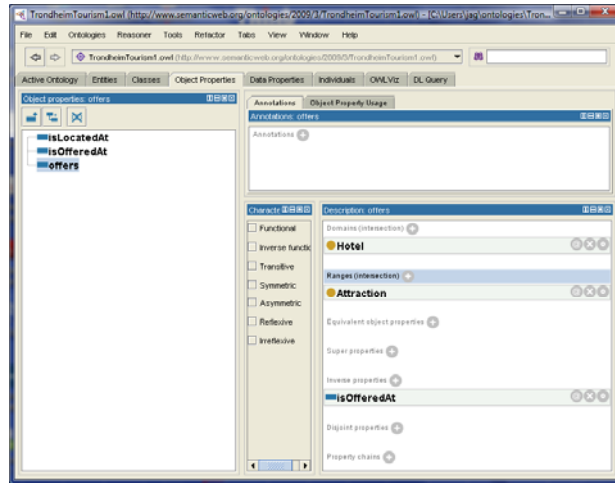
Untitled - Notepad
File Edit Format View Help
Namespace: owl2xml <http://www.w3.org/2006/12/owl2-xml#>
Namespace: TrondheimTourism1 <http://www.semanticweb.org/ontologies/2009/3/trondheimTourism1.owl#>
Namespace: xsd <http://www.w3.org/2001/XMLSchema#>
Namespace: rdfs <http://www.w3.org/2000/01/rdf-schema#>
Namespace: rdf <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
Namespace: owl <http://www.w3.org/2002/07/owl#>
ontology: <http://www.semanticweb.org/ontologies/2009/3/trondheimTourism1.owl#>
class: owl:Thing
class: Attraction
  SubClassOf:
    owl:Thing
class: Museum
  SubClassOf:
    Attraction
class: Activity
  SubClassOf:
    Attraction
class: church
  SubClassOf:
    Attraction
individual: kiringsve
  Types:
    Museum
individual: kristiansten
  Types:
    Museum
individual: sverresborg_folkemuseum
  Types:
    Museum
disjointClasses:
  Activity,
  Church,
  Museum

```

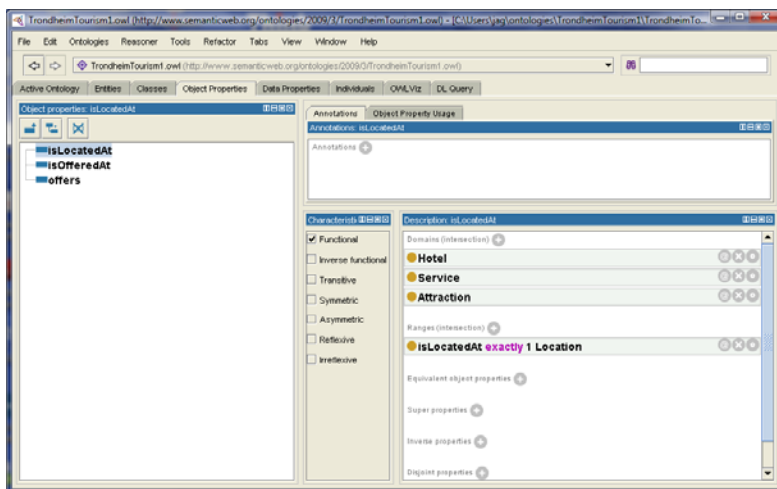
Data Properties

The screenshot displays a web ontology editor interface. On the left, there are two tree views: 'Affected class hierarchy' and 'Inferred class hierarchy'. The 'Affected class hierarchy' shows a tree starting with 'Thing' at the root, which branches into 'Location', 'Attraction', 'Church', 'Museum', 'Activity', 'Communication', 'Train', 'Bus', and 'Hotel'. 'Attraction' further branches into 'Church' and 'Museum'. 'Activity' branches into 'Fishing', 'Cross-country_skiing', and 'Ski_jumping'. 'Communication' branches into 'Train', 'Bus', and 'Hotel'. The 'Inferred class hierarchy' is currently empty. Below these trees is a 'Data property hierarchy' showing 'Address', 'Rooms', and 'Stars'. On the right side of the editor, there are several panels: 'Annotations' (empty), 'Data Property Usage' (empty), 'Character' (with 'Functional' checked), and 'Description: Stars' (with 'Domains (Intersects):' set to 'integer').

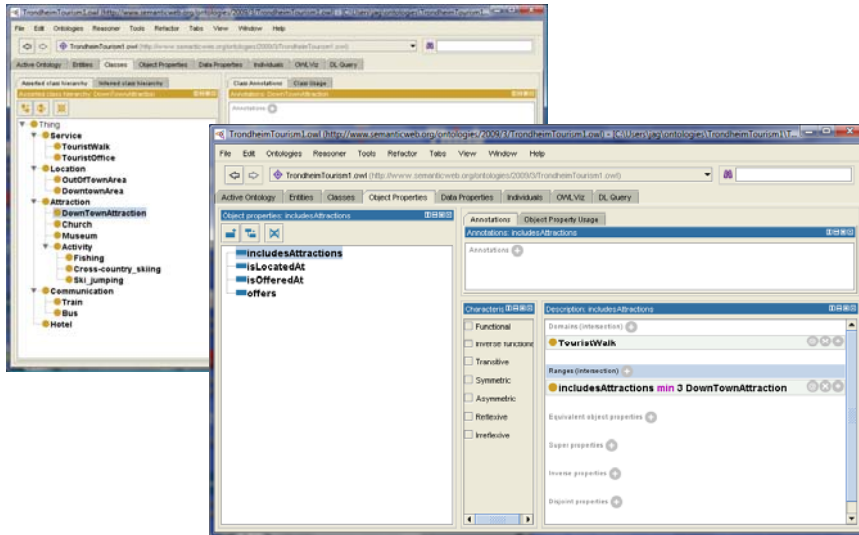
Object Property



Cardinality



Tourist walk



Festninga vs. Kristiansten

