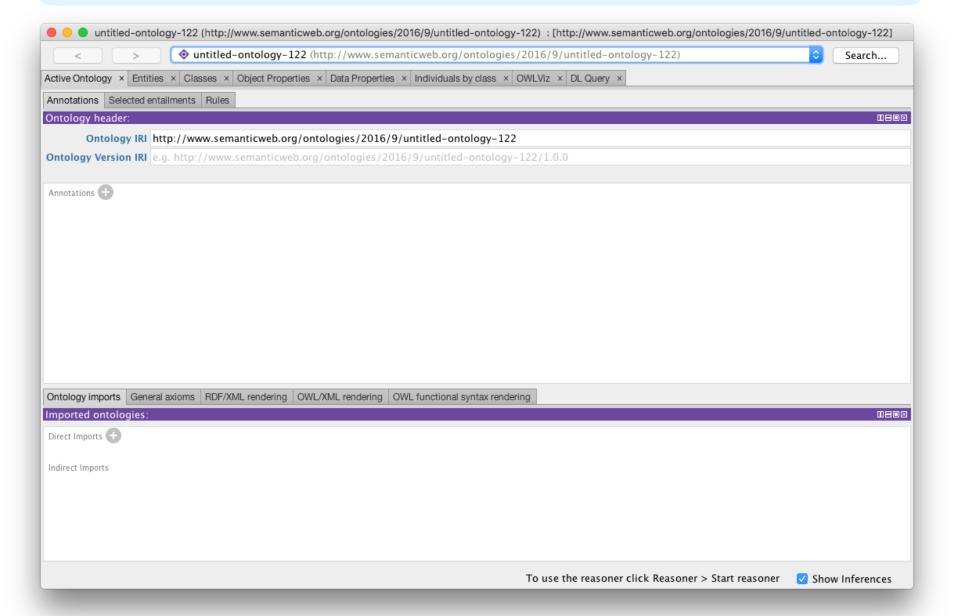
Ontology Editors

IDEs for Ontologies

- Some people use simple text editors
 - Working with XML serialization will drive you crazy
 - Using Turtle or an abstract syntax works well
- Others prefer an IDE
 - Good IDEs include support for reasoning, visualization, and more
- Protégé is a very popular IDE
 - From Stanford, free, lots of plugins
- TopQuadrant <u>Composer</u> is also good
 - Feature rich but expensive (\$600 for a single license)

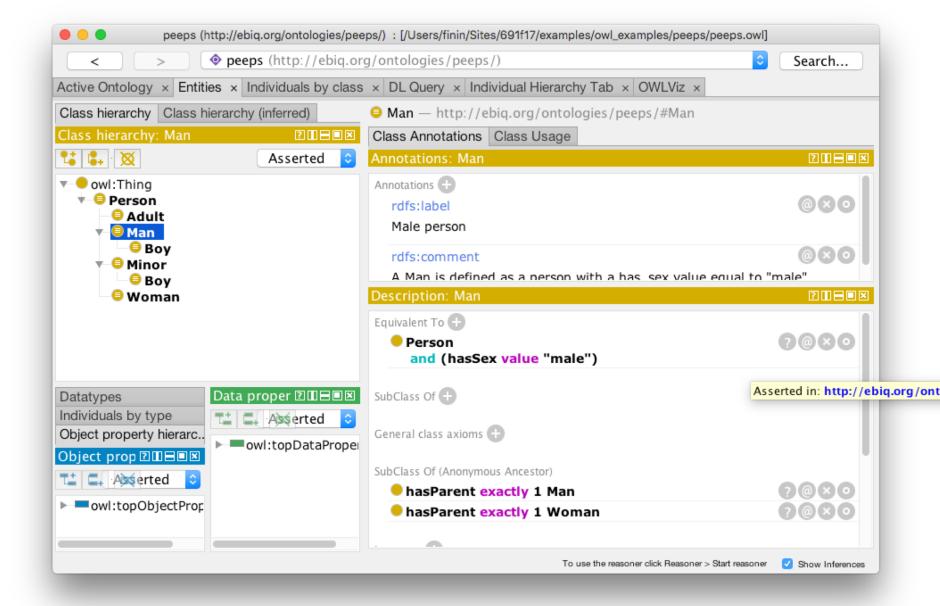
Protégé 5.1



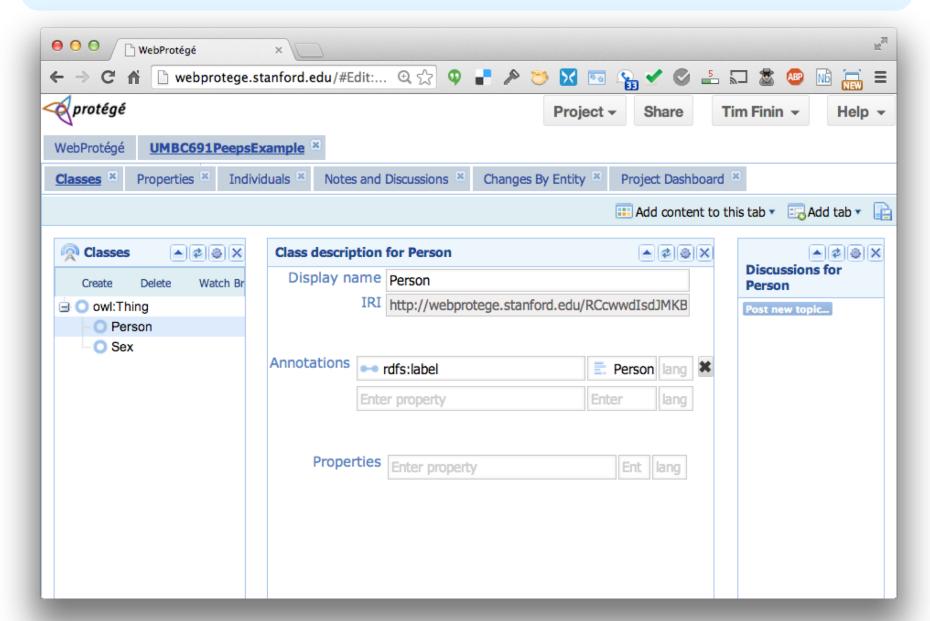
Protégé 5.2

- http://protege.stanford.edu/
- Free, open source ontology editor and KB framework
- Predates OWL, still supports earlier Frames representation
- In Java, extensible, large community of users
- <u>Desktop</u> and <u>Web</u> versions
 - Works will under Linux, Mac OS X and Windows

Desktop Protégé



Web Protégé



YAS: Yet Another Syntax

- Neither OWL's official abstract syntax nor XML serialization is easy to read or use
- Protégé uses the Manchester syntax
- Simpler and more compact: "some" and "only", not "someValuesFrom" and "allValuesFrom"
- A W3C recommendation (http://bit.ly/manSyn), used in the OWL 2 Primer (http://bit.ly/OWL2Pri)

Class: man

Annotations: rdfs:label "man"

EquivalentTo: adult and male and person

Manchester OWL syntax

OWL	DL Symbol	Manchester OWL Syntax Keyword	Example
someValuesFrom	3	some	hasChild some Man
allValuesFrom	A	only	hasSibling only Woman
hasValue	∋	value	hasCountryOfOrigin value England
minCardinality	≥	min	hasChild min 3
cardinality	=	exactly	hasChild exactly 3
maxCardinality	≤	max	hasChild max 3

Manchester OWL syntax

OWL	DL Symbol	Manchester OWL Syntax Keyword	Example
intersectionOf	П	and	Doctor and Female
unionOf	Ц	or	Man or Woman
complementOf	٦	not	not Child

Example

```
Person and
hasChild some
(Person and
(hasChild only Man) and
(hasChild some Person))
```

The set of people who have at least one child that has some children that are only men (i.e., grandparents that only have grandsons)

Data values and datatypes

- Data values typed or untyped (e.g., int, boolean, float)
- Constants with or w/o type, e.g.: hasAge value "21"^^long
- Use datatype names as classes: hasAge some int
- XSD facets, e.g.: Person and hasAge some int[>= 65]

XSD facet	Meaning		
< x, <= x	less than, less than or equal to x (more info)		
> x, >= x	greater than, greater than or equal to x (more info)		
length x	For strings, the number of characters must be equal to x (more info)		
maxLength x	For strings, the number of characters must be less than or equal to x (more info)		
minLength x	For strings, the number of characters must be greater than or equal to x (more info)		
pattern regexp	The lexical representation of the value must match the regular expression, regexp (more info		
totalDigits x	Number can be expressed in x characters (more info)		
fractionDigits x	Part of the number to the right of the decimal place can be expressed in x characters (more info)		

Demonstration

- We'll use Protégé OWL v5.2 to implement a tiny ontology for people
- Start by downloading and installing Protégé
 5.2(You will need Java)
- You may want to install Graphviz
- Configure Protégé
 - E.g., select a reasoner to use (e.g., HermiT)

A basic workflow

- Think about usecases
- Preliminaries
 - Choose namespace URL, import other ontologies used
- Identify and define classes
 - Place in hierarchy, add axioms and run reasoner to check for errors or omissions
- Identify and define properties
 - Place in hierarchy, add axioms, run reasoner
- Add individuals & reasoner to check for problems
- Add comments and labels
- Export in desired formats, maybe upload to Web

More workflow steps

- Use OOPS to find common ontology pitfalls
- Link concepts (and individuals) to common ontologies (e.g., DBpedia, Freebase, foaf)
 - Use owl:sameAs
- Generate visualizations
- Produce documentation
- Develop examples with your use case(s)
- Encode data, describe in <u>VoID</u> (Vocabulary of Interlinked Datasets), add to LOD cloud

Demonstration

Use Protégé OWL (v5.2) to build a simple ontology for people based on the following

- People have just one sex that's either male or female, an integer age, and two parents, one male, one female
- A person's grandparent is the parent of their parent
- Every person is either a man or a woman but not both
- A man is defined as any person whose sex is male and a woman as any person whose sex is female
- A boy is defined as a person whose sex is male and whose age is less than 18, a girl is ...
- A person is either an adult or (age >18), minor (age <18), ...

Test cases

AllDifferent people

Alice F

Bob M

Carol F

Don M

Edith F

Pat?

Other people

Frank M

Gwen F

Some possible test cases

- Alice parent Bob . Bob parent
 Carol
 - Alice grandparent Carol
- Alice parent Bob . Alice parent Don.
 - Contradiction
- Alice parent Bob . Pat parent Bob
 - Pat a female
- Alice parent Bob . Gwen parent Bob .
 - Alice owl:sameAs Gwen