Creating OWL 2 Ontologies using **Protégé**

Knowledge technologies tutorial
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Protégé

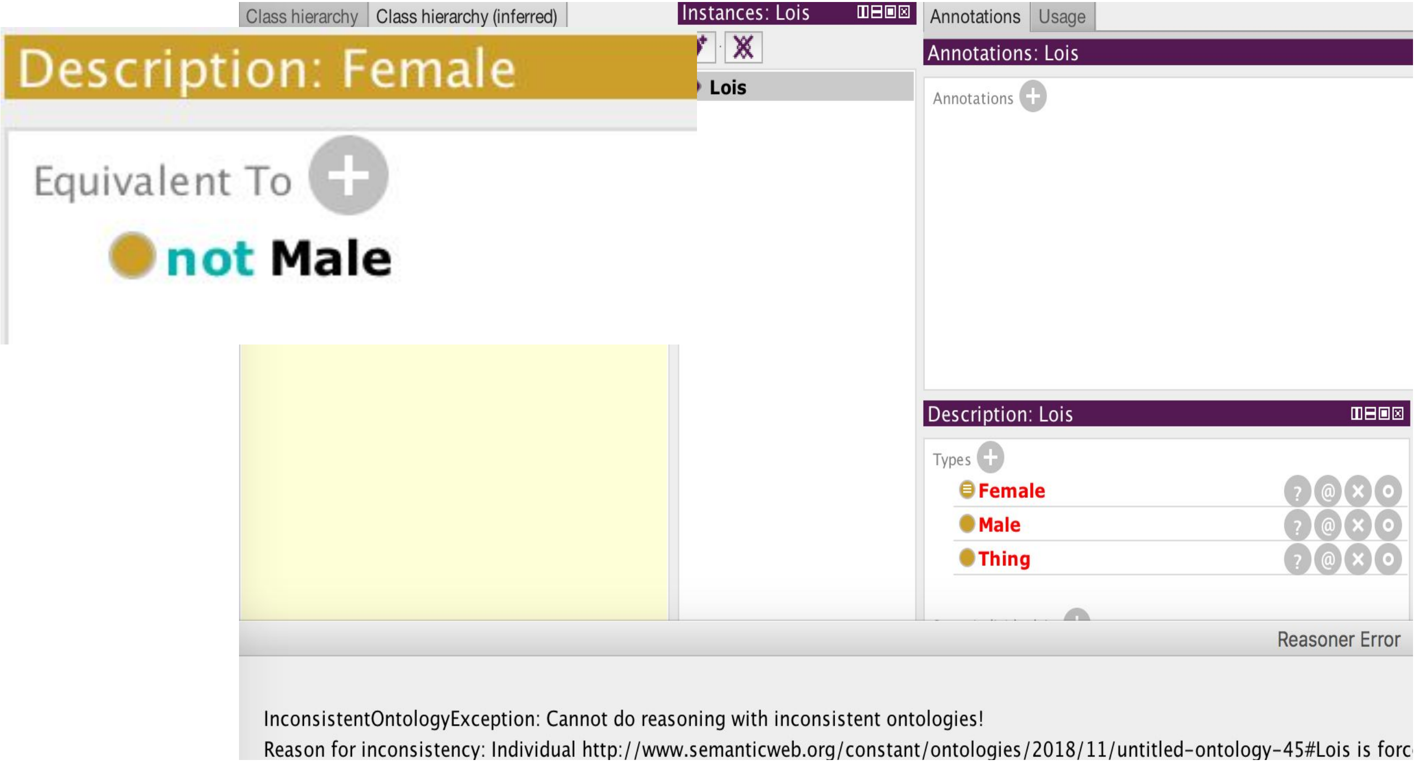
- ❑ Download: http://protege.stanford.edu/
- ❑ Install (follow the instructions)
- ❑ Open Protégé. Go to File-> Check for Plugins. Check Pellet.
- ❑ Enabling the reasoner: Reasoner -> Pellet.
- ❑ Starting the reasoner: Reasoner -> Start Reasoner
- ❑ Displaying all inferences: Reasoner -> Configure -> Displayed inferences. Check everything.

Examples (borrowed from the lecture slides)

Creating Taxonomies

- Someone can be a male **or** a female
- A male cannot be a female and vice versa
- Lois is a female
- Can she also be a male?

Answer



Description: Female

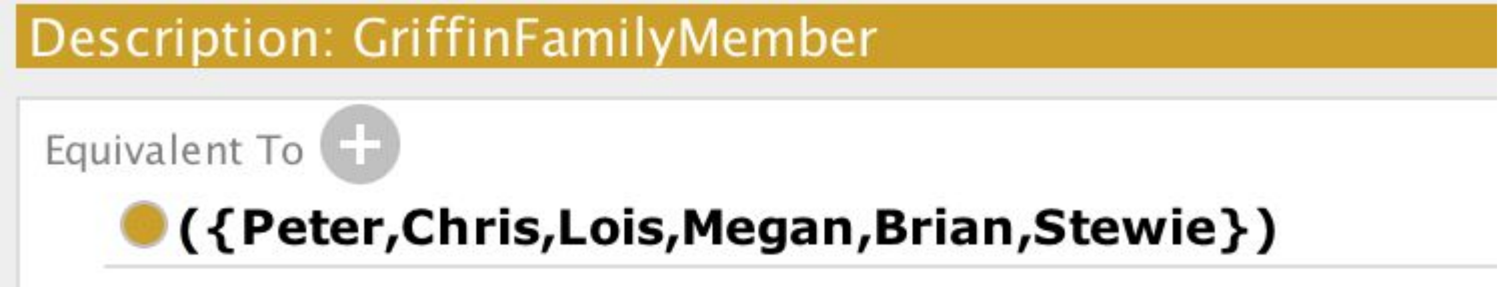
Equivalent To

not Male

InconsistentOntologyException: Cannot do reasoning with inconsistent ontologies!
Reason for inconsistency: Individual http://www.semanticweb.org/constant/ontologies/2018/11/untitled-ontology-45#Lois is forc

Creating complex concepts

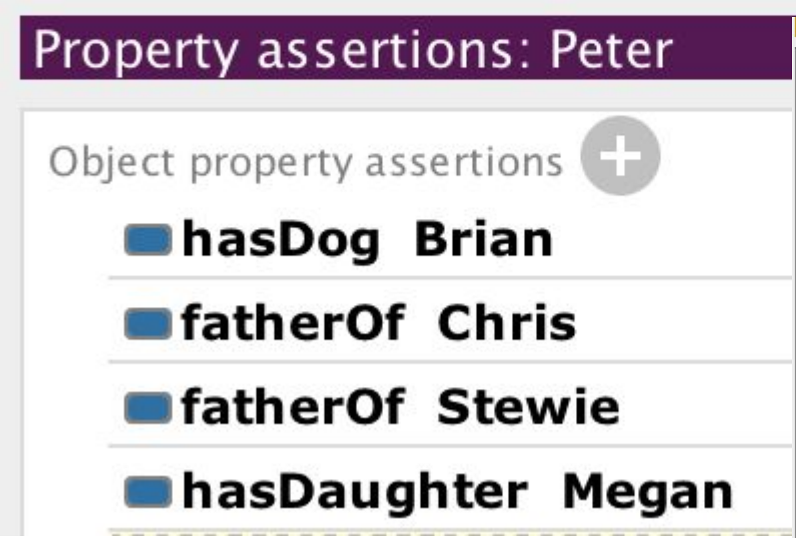
- Griffin family members: Peter, Lois, Stewie, Meg, Chris, Brian. **No one else** is a member of this family
- Father is someone that is a father of a Man
- Peter is the father of Stewie
- Stewie is a Man
- Find all fathers in the knowledge base



Description: GriffinFamilyMember

Equivalent To

({Peter,Chris,Lois,Megan,Brian,Stewie})



Property assertions: Peter

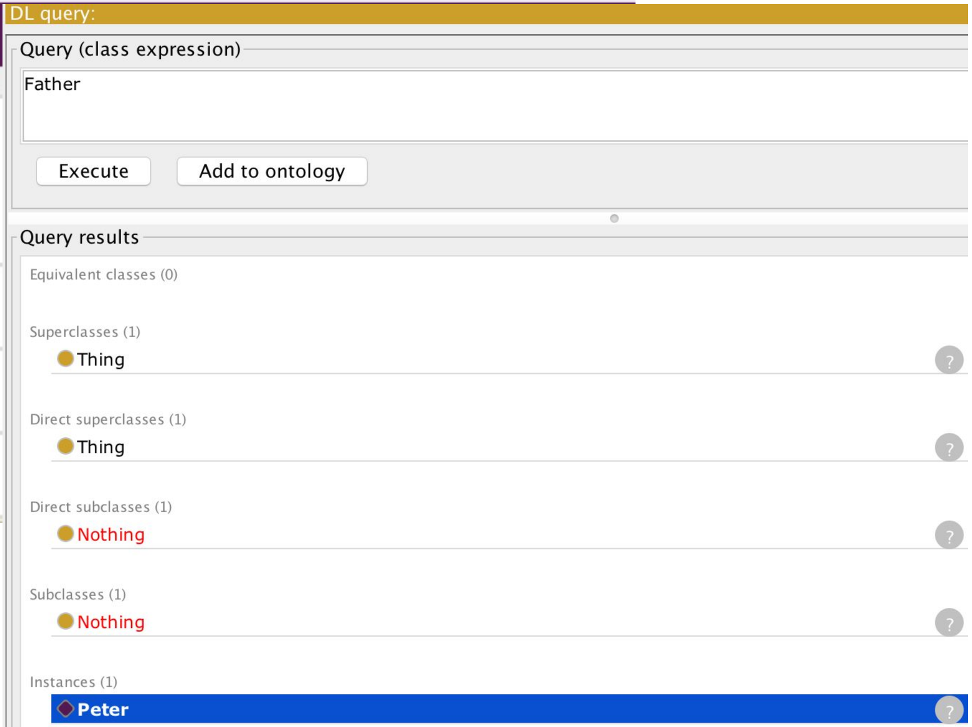
Object property assertions

hasDog Brian

fatherOf Chris

fatherOf Stewie

hasDaughter Megan



DL query:

Query (class expression)

```
Father
```

Query results

Equivalent classes (0)

Superclasses (1)

Thing

Direct superclasses (1)

Thing

Direct subclasses (1)

Nothing

Subclasses (1)

Nothing

Instances (1)

Peter

Cardinality

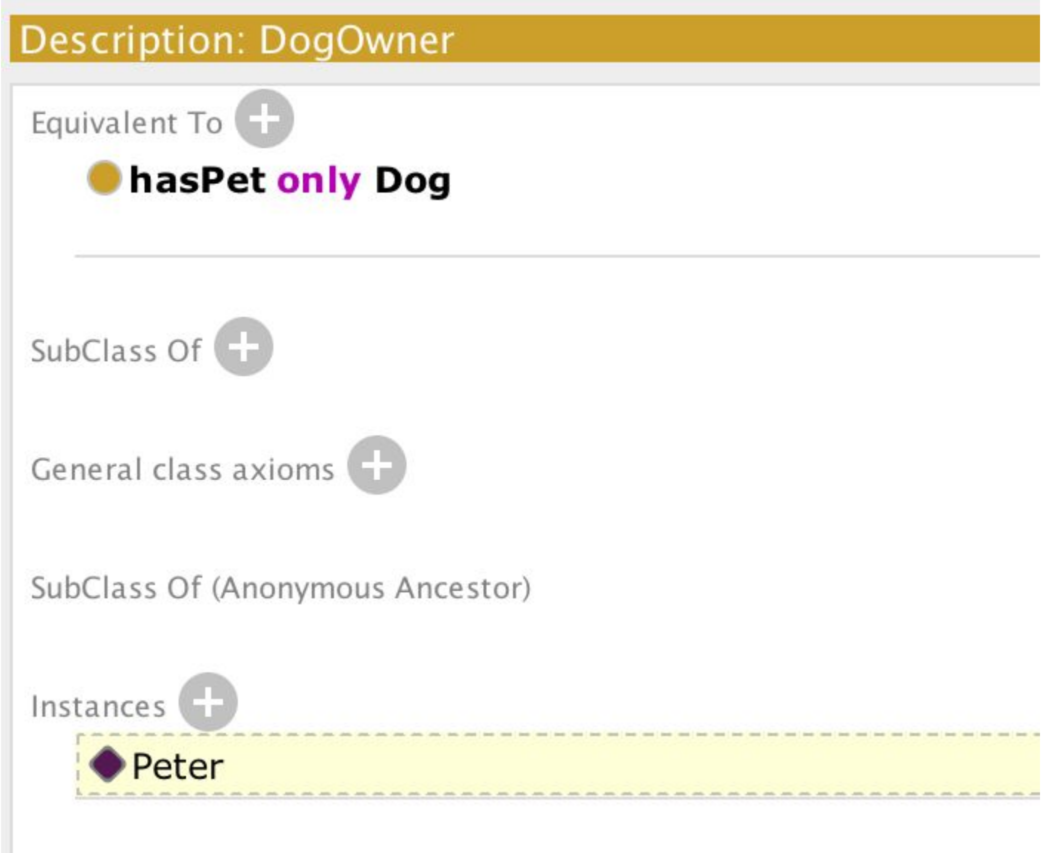
❑ Peter has a pet named Brian

❑ Brian is a dog

❑ A dog owner owns **only** dogs

❑ Peter has **maximum one** pet

❑ Is Peter a dog owner?



Description: DogOwner

Equivalent To

● hasPet only Dog

SubClass Of

General class axioms

SubClass Of (Anonymous Ancestor)

Instances

◆ Peter

Cardinality (cont.)

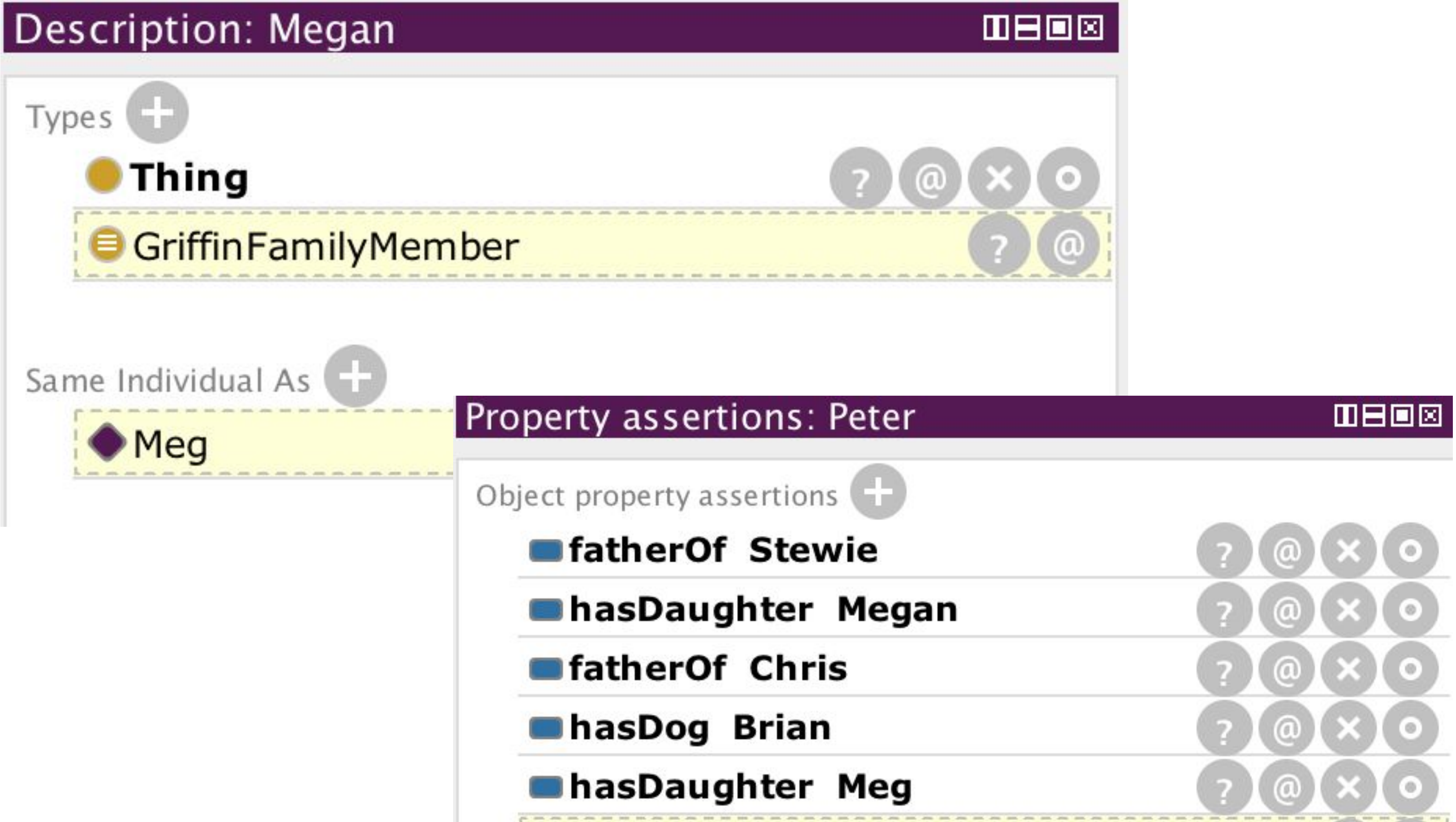
❑ Peter is the father of Stewie and Chris

❑ Stewie and Chris are men

❑ Peter has **at least two** children

Same individuals

- Peter has a daughter named Meg
- Peter has a daughter named Megan
- Peter has at **most one** daughter
- Is the knowledge base described above **inconsistent**?



Description: Megan

Types

- Thing
- GriffinFamilyMember

Same Individual As

- Meg

Property assertions: Peter

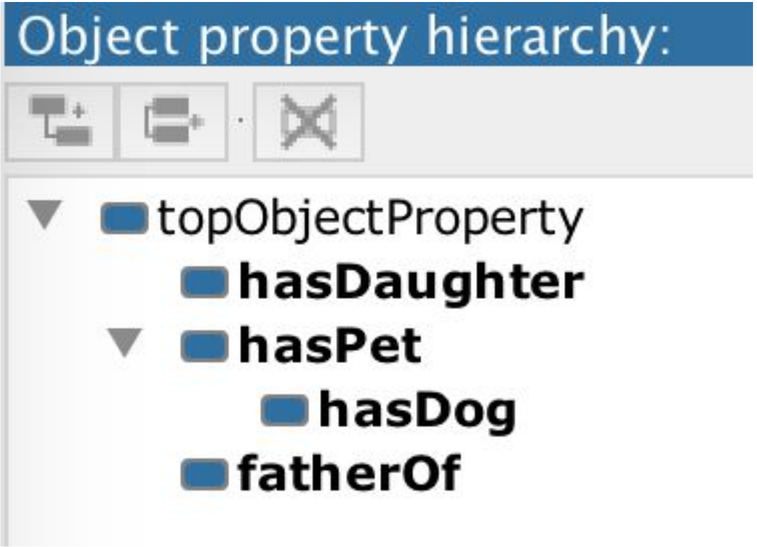
Object property assertions

- fatherOf Stewie
- hasDaughter Megan
- fatherOf Chris
- hasDog Brian
- hasDaughter Meg

Subproperties

- ❏ Someone’s dog is their pet
- ❏ Peter has a dog named Brian
- ❏ Find Peter’s pets

Object property hierarchy



- topObjectProperty
  - **hasDaughter**
  - **hasPet**
    - **hasDog**
  - **fatherOf**

Properties of properties

- Functional: Someone has only one father
- Reflexive: e.g., *knows*
- Irreflexive: e.g., *parentOf*
- Symmetric: e.g., *friend*
- Transitive: Tim is the father of Peter. Someone’s father is their anscestor as well

Links

- ❑ Download Protégé: http://protege.stanford.edu/
- ❑ Manual: http://protegewiki.stanford.edu/wiki/Protege4GettingStarted
- ❑ OWL 2 specification: http://www.w3.org/TR/owl2-overview/