Semtation GmbH

SemTalk®
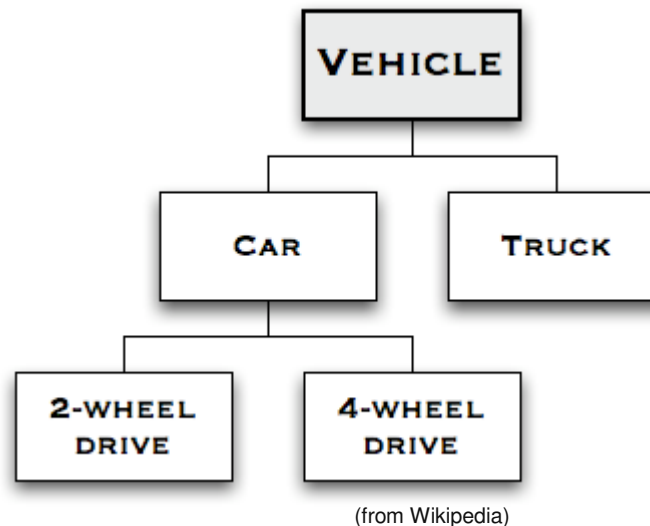
SemTalk OWL Edition

For all, who have learned that using Protégé might be perfect for engineers but not for end users
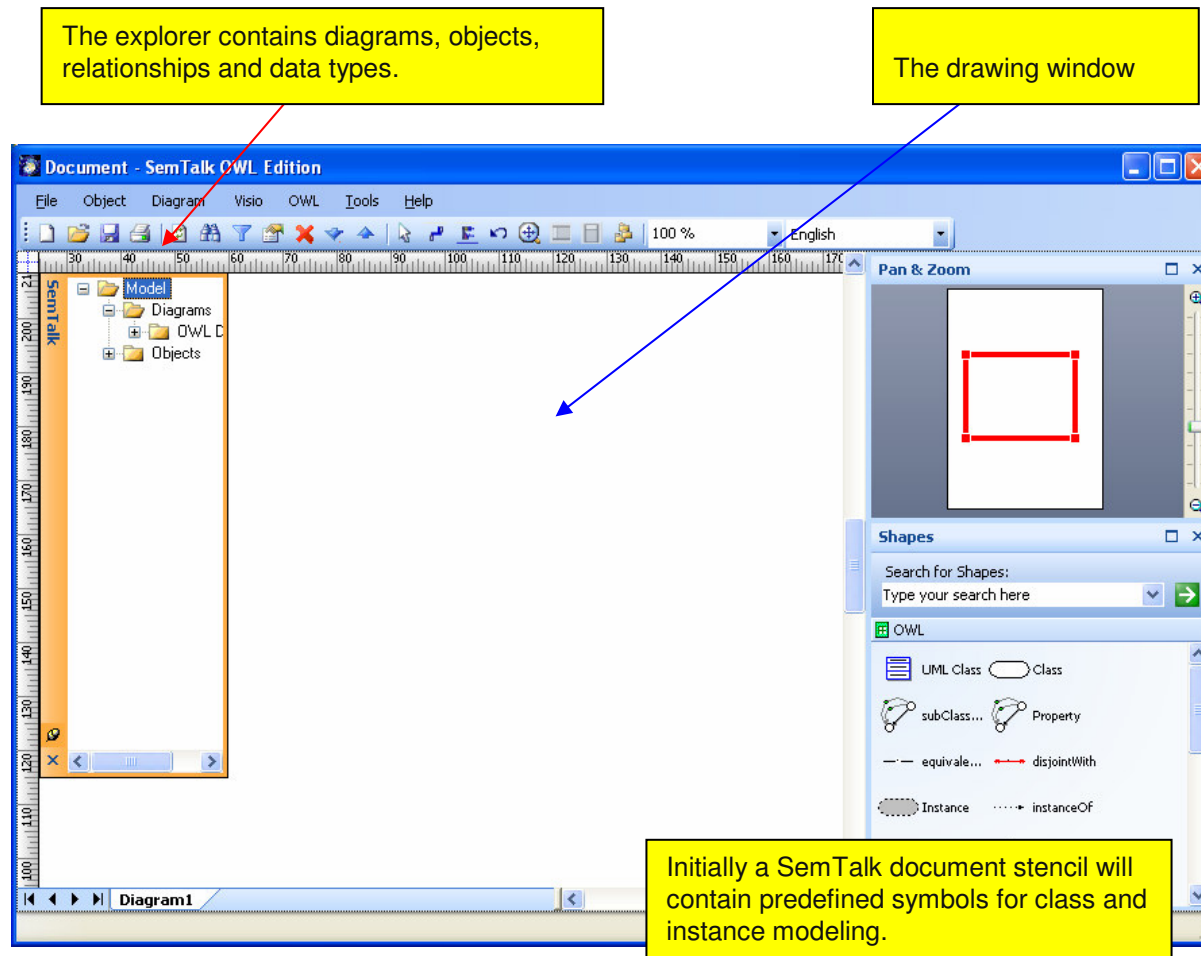
What is an Ontology?

- An *ontology* is a formal explicit description of concepts (i.e. *classes*) in a domain of discourse, properties of each concept describing various features and attributes, and restrictions on properties and attributes (i.e. relation and data types).

- In simple words, an ontology is a formal model for a specific domain of knowledge. An ontology together with a set of individual *instances* of classes constitutes a knowledge base.

- Ontologies are developed to provide a machine-understandable semantics of information sources that can be communicated between different agents (software and humans).

- We do **not** refer here to the philosophical sense of Ontology here **http://en.wikipedia.org/wiki/Ontology** but to the computer science sense **http://en.wikipedia.org/wiki/Ontology_%28computer_science%29**

(from Wikipedia)

What is SemTalk OWL Edition?

- SemTalk is a simple UML-style graphical editor for Semantic Web ontologies in Visio.

- Using Visio in Ontology workshops feels more like mind mapping rather than programming

- OWL is W3C's recommendation to specify ontologies

- OWL is a complex logical language. While modeling it makes sense to make sure that the statements which a user makes are consistent. E.g. From "Each A is a B" and "Each A is a C" and "Nothing can be a B and also a C at the same time" one can conclude that A will never exist.
  - **This actually means that the user made a mistake, because he usually wanted to make a point about A. In most cases the model is wrong and not reality is wrong. Since there might be an A directly in front of the user**
  - **Those inconsistencies occur pretty often in real world using complex logical languages. We use reasoners such as Pellet to analyze the model for logical inconsistencies**
  - **The problem is similar to process modeling where a certain branch of a process will never be reached. Simulation is used for processes in the same way.**

- Ontologies made with SemTalk OWL Edition are used in other SemTalk applications such as BPM, EAI etc.

Getting Started with SemTalk

The explorer contains diagrams, objects, relationships and data types.

The drawing window

Initially a SemTalk document stencil will contain predefined symbols for class and instance modeling.

Start SemTalk with it's icon on the desktop or select **Start** → **Programs** → **SemTalk** → **SemTalk** to begin working.

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Visio Pages are Views on the Knowledge Base

- Each page displays a set (or scenario) of classes and instances in a context which is meaningful for a human reader

- Each object can be displayed on multiple pages

- An object can be shown using various symbols available in Visio

- Classes are mostly shown using a UML style notation

Let us start with Instances, which a ordinary Visio shapes.

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Instance Diagrams

- Using instance diagrams in SemTalk you will create diagrams for concrete objects having a specific identity. Instance diagrams are used in SemTalk solutions for business processes, org. charts, data warehouse cubes, product models etc.

- Virtually any Visio drawing containing real world objects such as buildings or a subway map would be an instance diagram.

- Diagrams which are not instance diagrams are called class diagrams. Class Diagrams contain abstract objects like data types and classes.

- In the Visio world classes correspond to masters and instances to the shapes in the drawing.

Most of the millions of existing ordinary Visio documents contain just instances!

But each of them has a class: The Visio master which is used

Creating Instances
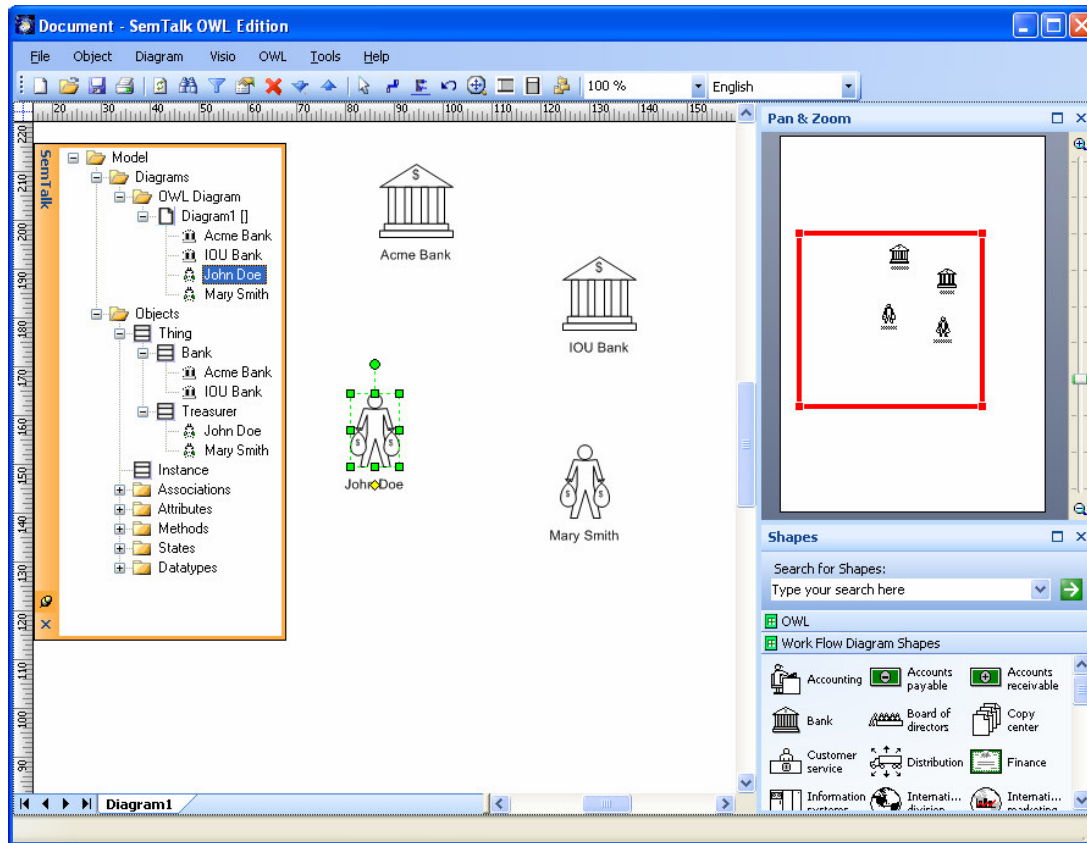
- File->New OWL.vst

- File->Open Stencil

- Browse to "C:\Program Files\Microsoft Office\OFFICE12\1033"

- Select Workflow Shapes: "WRKFLO_M.VST" or "WRKFLO_U.VST"

- Change the type of the page to "Instance" (Right Click on the background)

- Drag a Bank shape to the drawing

- Rename the object
  - Select and type
  - Right Click Edit

- Change the name of the shapes to "Acme Bank" & "IOU Bank" for the Banks and "John Doe" & "Mary Smith" for the "Treasurers" respectively.

Delete / Remove / Insert
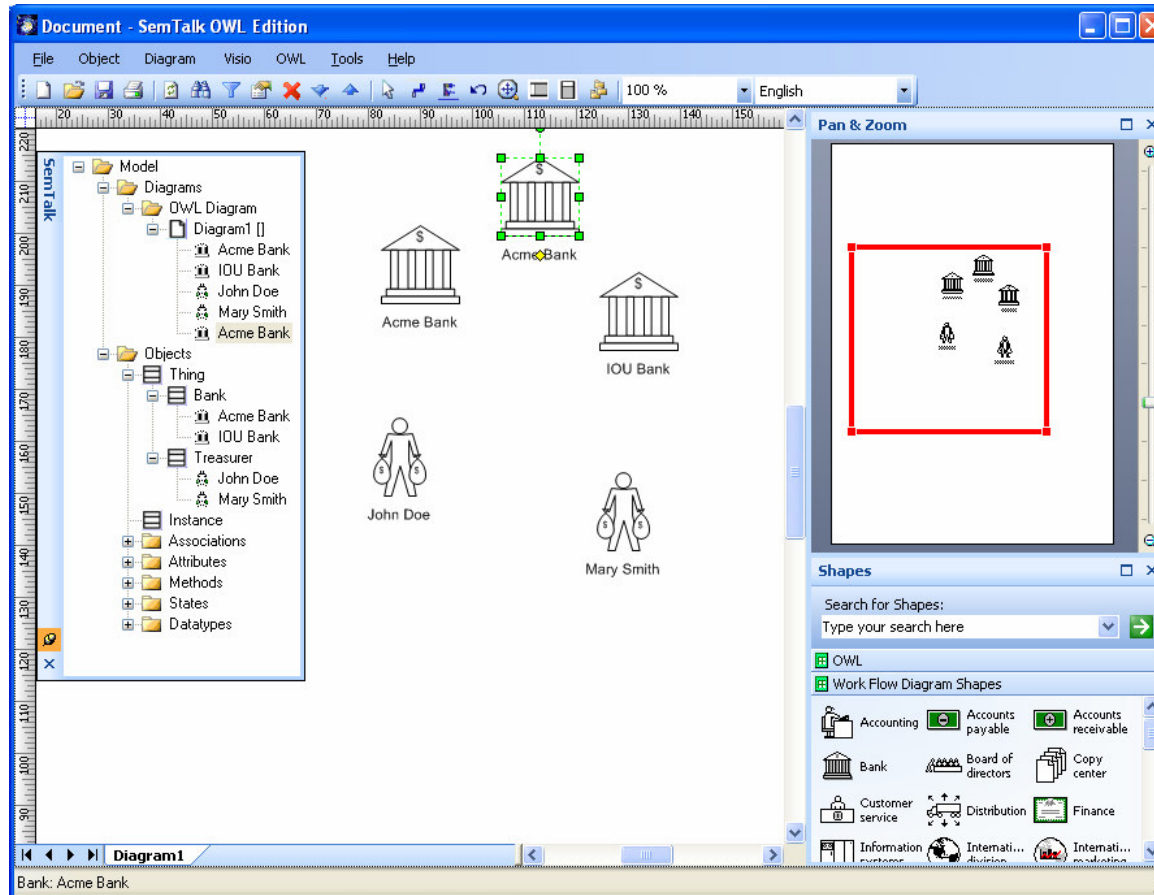
- Two different objects can not have the same name

- Copy/Paste or Insert can display the same object more than once

- "Del" deletes an object from the diagram but keeps it in the database

- "Remove" removes it from the database and all diagrams

- Use "Insert" or Drag & Drop from the explorer to add shapes to the drawing

- Drag&Drop from the stencil creates a new object

- Undo works only for Delete and NOT for Remove

Class Diagrams

- The meaning of the Visio shapes we previously used is defined in class diagrams.

- In our example, we used Visio shapes related to banks and treasurers and we gave them individual names.

- In a class diagram we can now extend the definition of our model by defining that a treasurer works at a bank. This declaration is valid for the instances we modeled before. Furthermore, in the class diagram you can define attributes that are inherited by subclasses of your class.

- For example, the subclass "Central Bank" will inherit attributes and relationships (e.g. employs - inverse relationship of "works at" - and number of branches) from the class "Bank". Abstract classes, e.g. "financial institution", have no Visio-shape (yet) and therefore, you can use the general class symbol.

Adding a Class Diagram
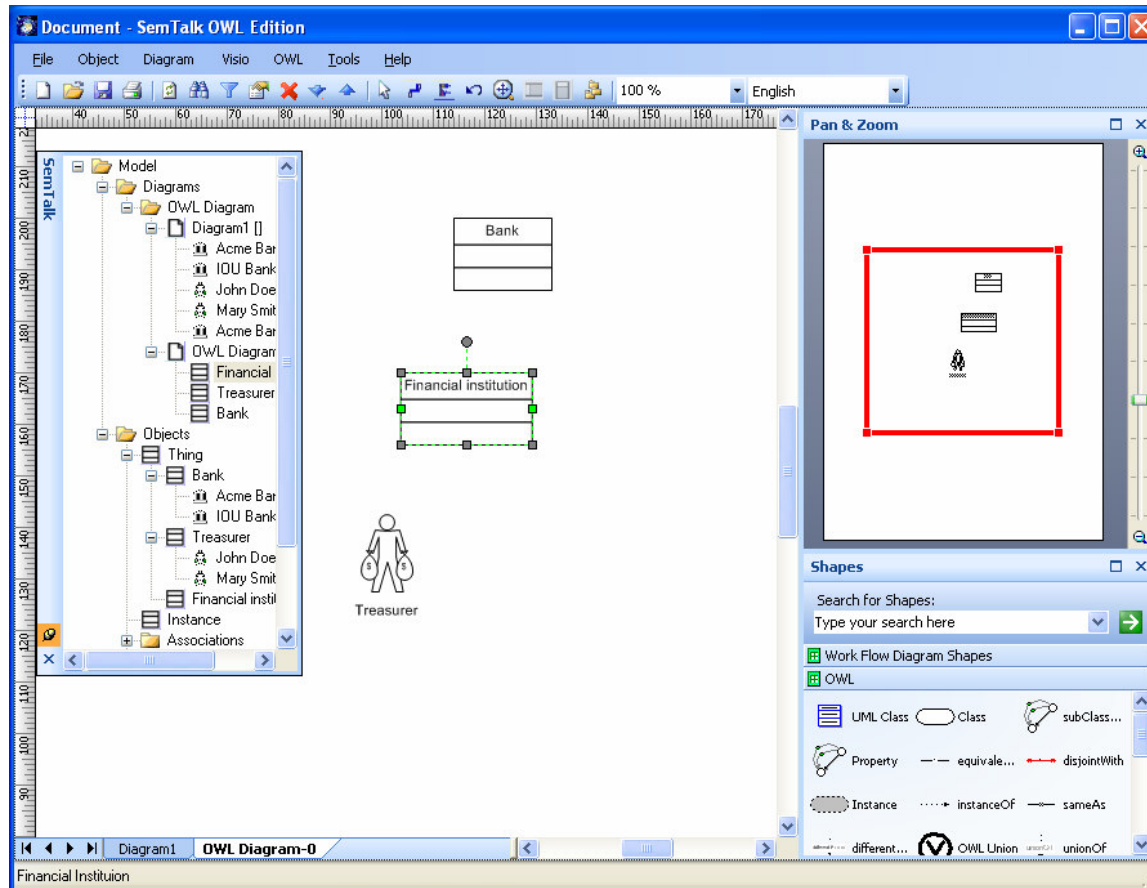
- Add a new page with Diagram->New->OWL Diagram

- Add some new Classes such as "Financial Institution" using the UML Class shape.

- Already existing classes such as Bank can be added using Drag&Drop from the Explorer or using the Insert Dialog
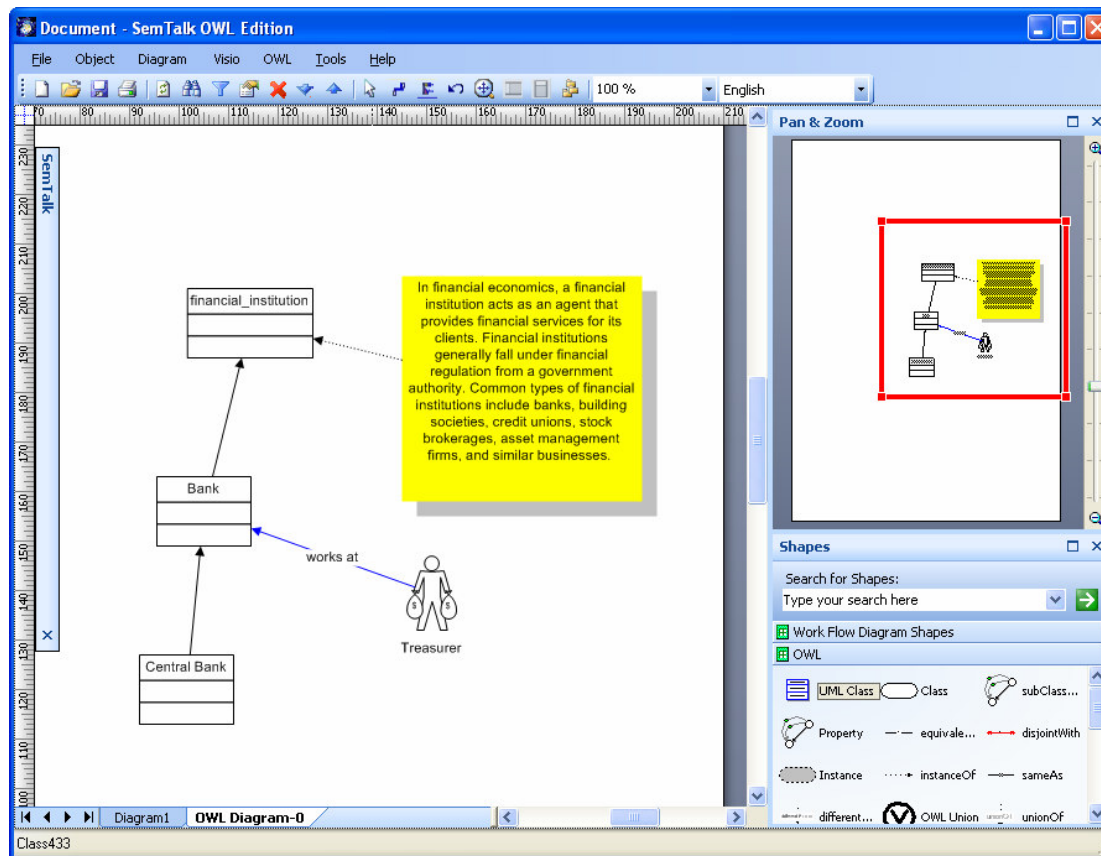
Editing a Class

- Name & Namespace = URI

- If you believe your understanding of "Bank" is the same as described in Wikipedia, you might add this as a namespace

- You could also use any other namespace of your choice or leave it blank

- Use "Links" to add documents as hyperlinks

- Audit provides some information who created or changes the class

Comments & Links

- With the yellow Comment shape you can easily visualize the Comment (or Definition) field of an object

- Editing the text of the comment shape will change directly the Comment in the object

- Use the "subClassOf" Connector to specify that each Bank is a financial institution and each Central Bank is a Bank

- For Object Properties the "Property" connector may be used

- If you use the dynamic connector tool, you will be asked which type of relation you want

Attributes
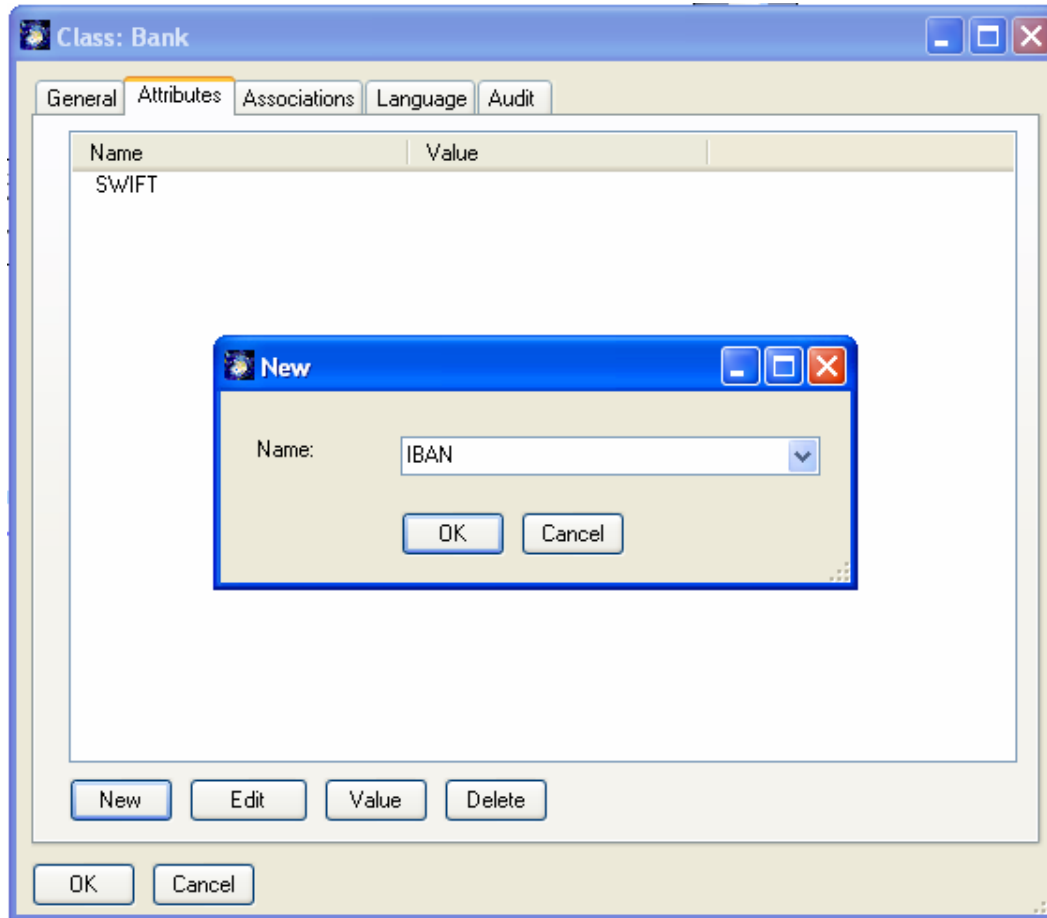
- Attributes are inherited by Subclasses and Instances

- They are called "DataProperties" in OWL

- Weak typing (as in Case-Tools)

- Editor shows a list of inherited Attributes

- Multiple value Attributes

- Attribute Options

Inheritance
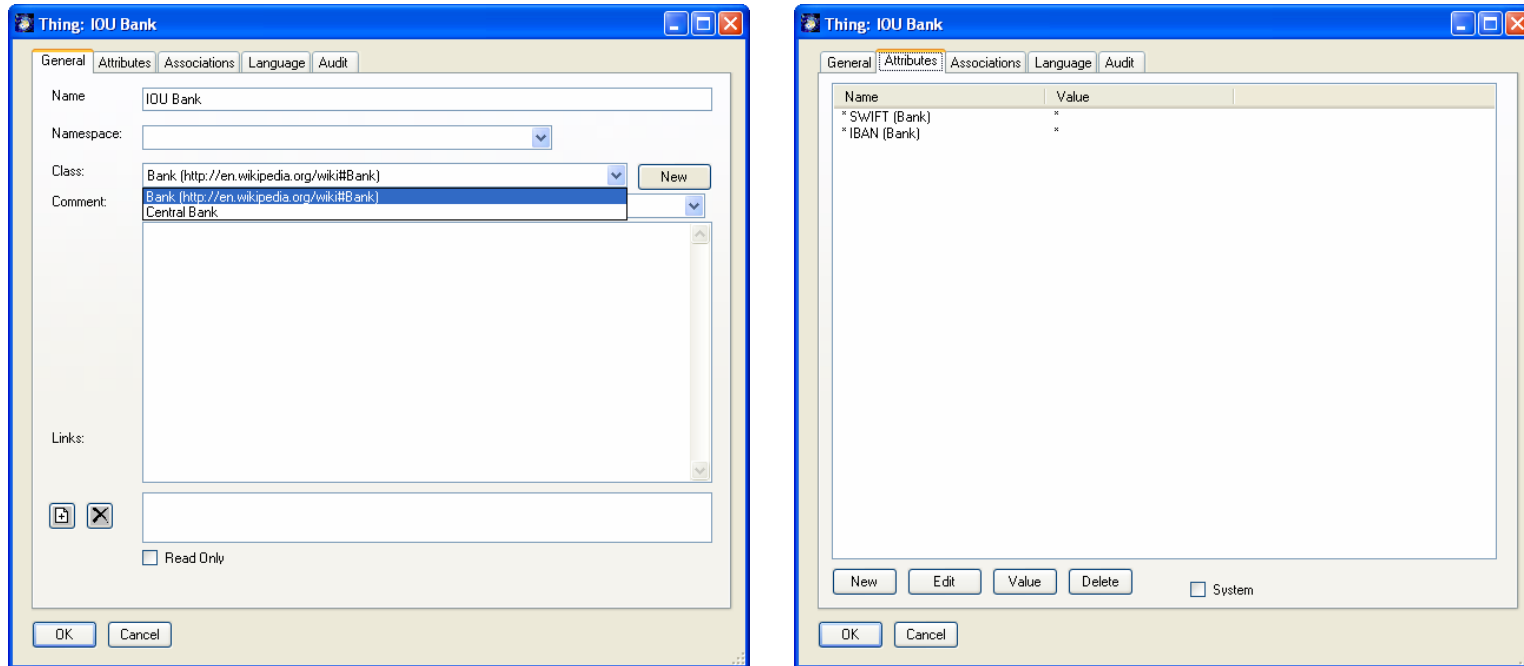
- Change the Class of an instance using the Class Combobox

- Inherited Attributes and Values are marked with a "*"

- Inherited Attributes become local, once they get a value

Associations & Subclassing
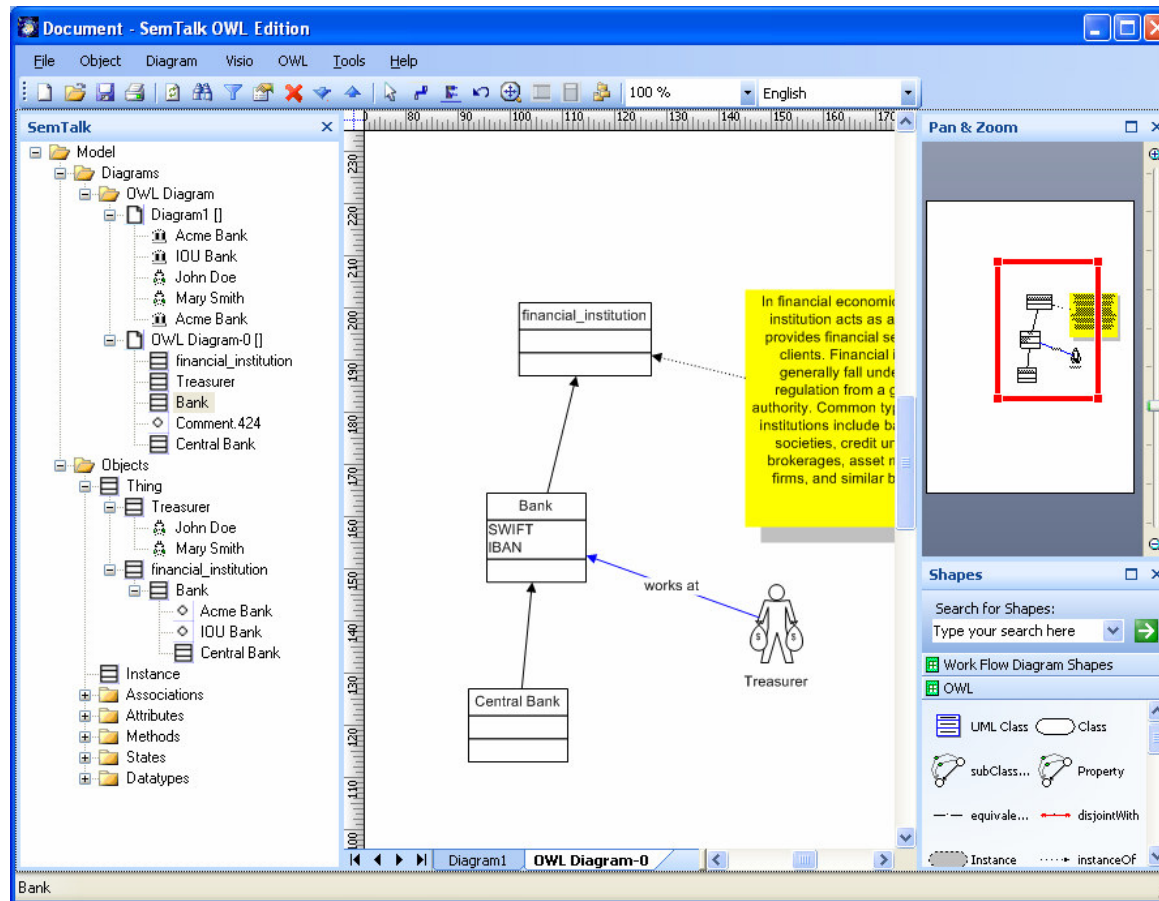
- Use "subClassOf" and "Property" connectors

- Properties are used for OWL "ObjectProperties"

- "subClassOf" Hierarchy is shown in the Explorer

- Editing Association types

- Inverse Names are specified in the Edit Dialog of an Association

- Association Details: Unique, Transitive, Tree (no cycles),..

- See (inherited) Properties in the Edit dialog

- You can add non-graphical Associations on the Associations tab of a Class or Instance
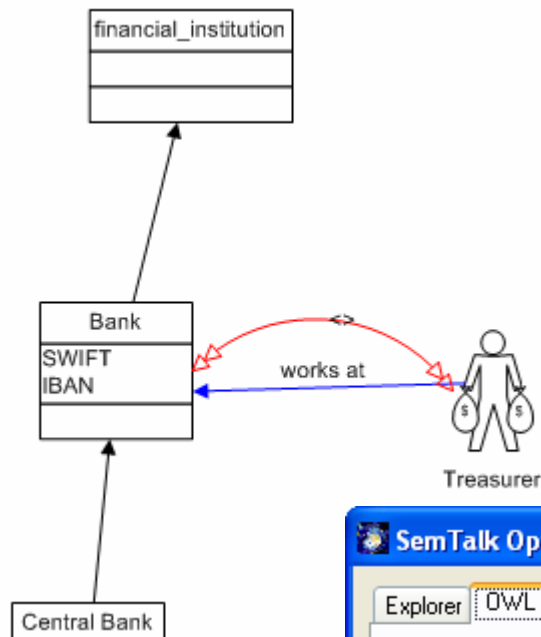
Instances & Associations
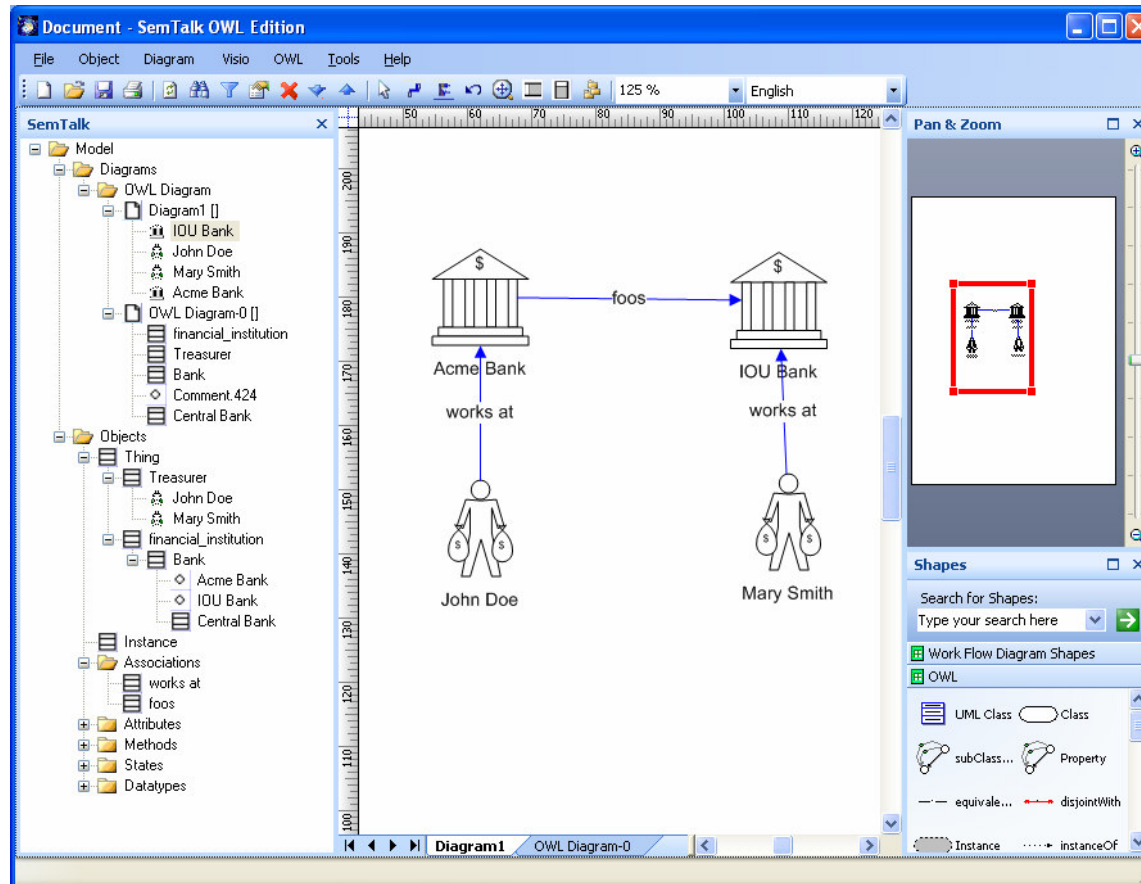
- In most SemTalk Methods associations on instances are only allowed if they are defined on their classes

- Since OWL covers RDF you can use any Property between instances ("foos")

- In OWL mode SemTalk recommends only those properties which are defined for the instances

- In OWL mode you can show instances in class diagrams

Reasoning

- So far we have no chance to create any logical errors, since we have no logical constraints such as disjointness or equivalence used

- With a disjointWith link, it is specified that nothing can be any instance of a Bank and a Treasurer at the same time

- To check if the model is still consistent we will use the Reasoner Pellet (http://pellet.owldl.com/)

- Please make sure that SemTalk has the right path to Pellet at Tools->SemTalk Option->OWL
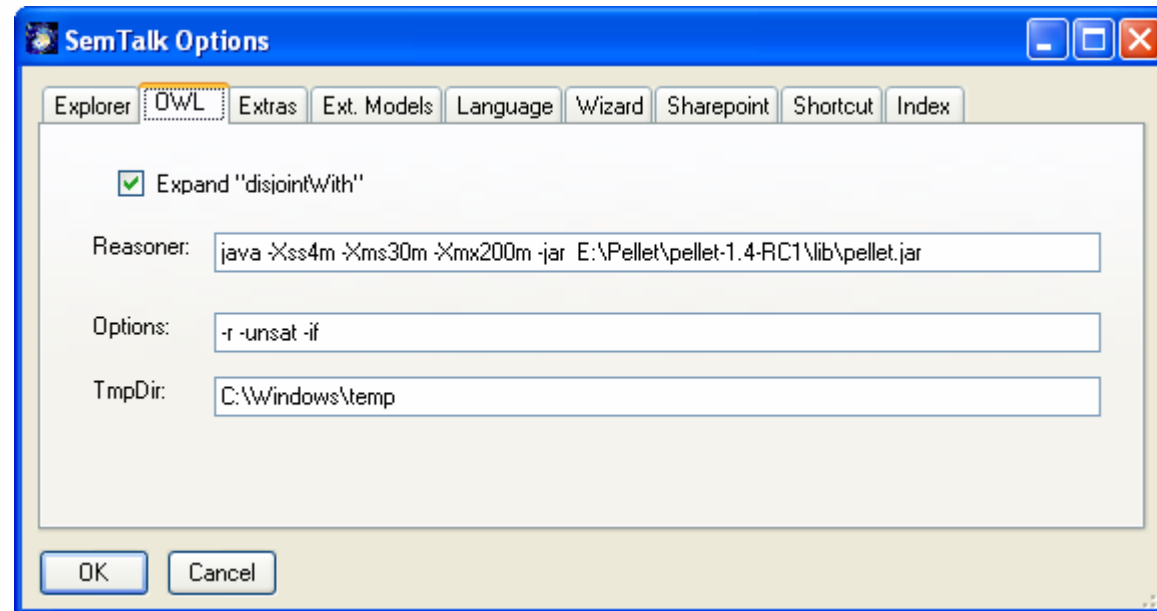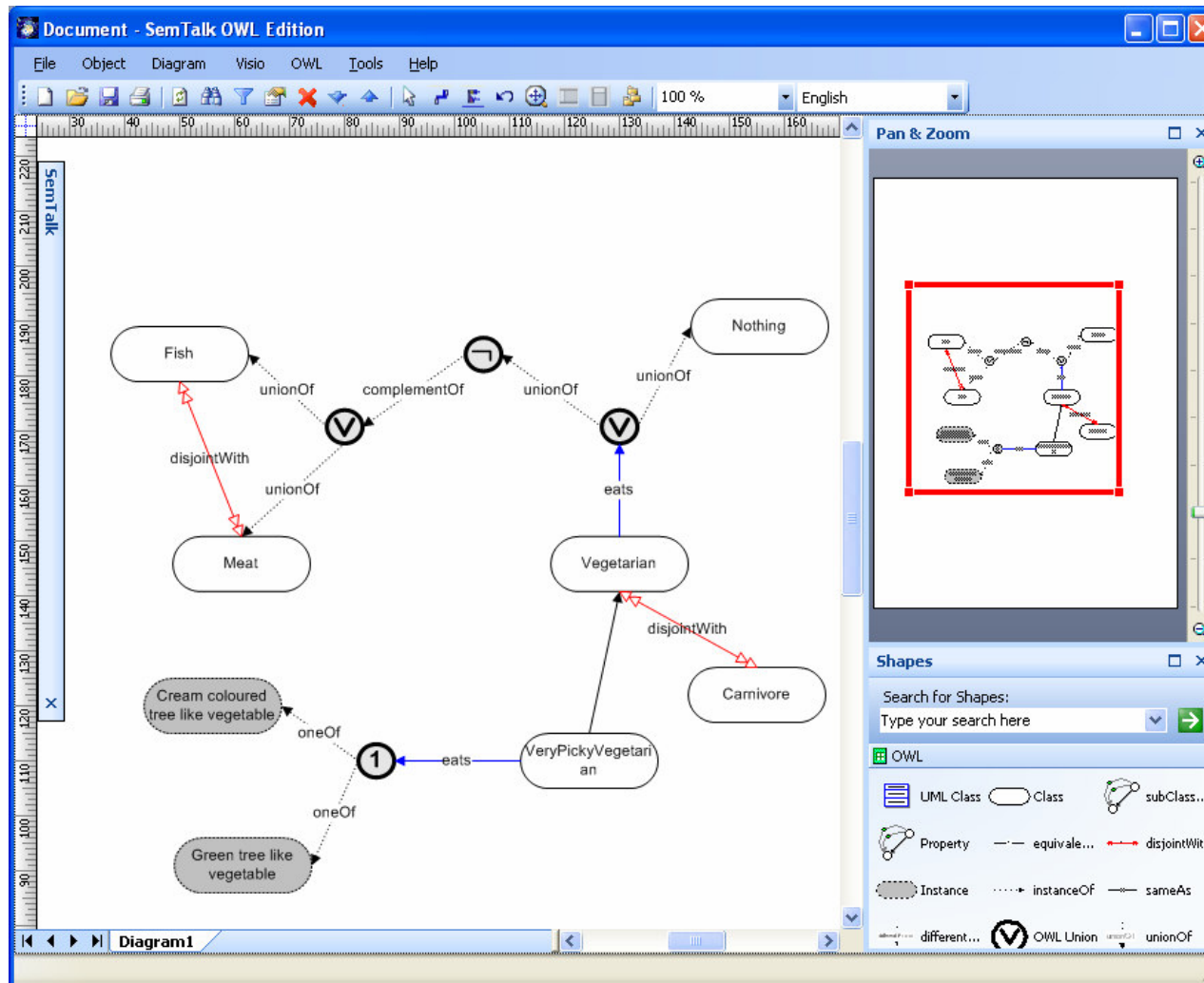
# Using a Reasoner for Consistency Checking
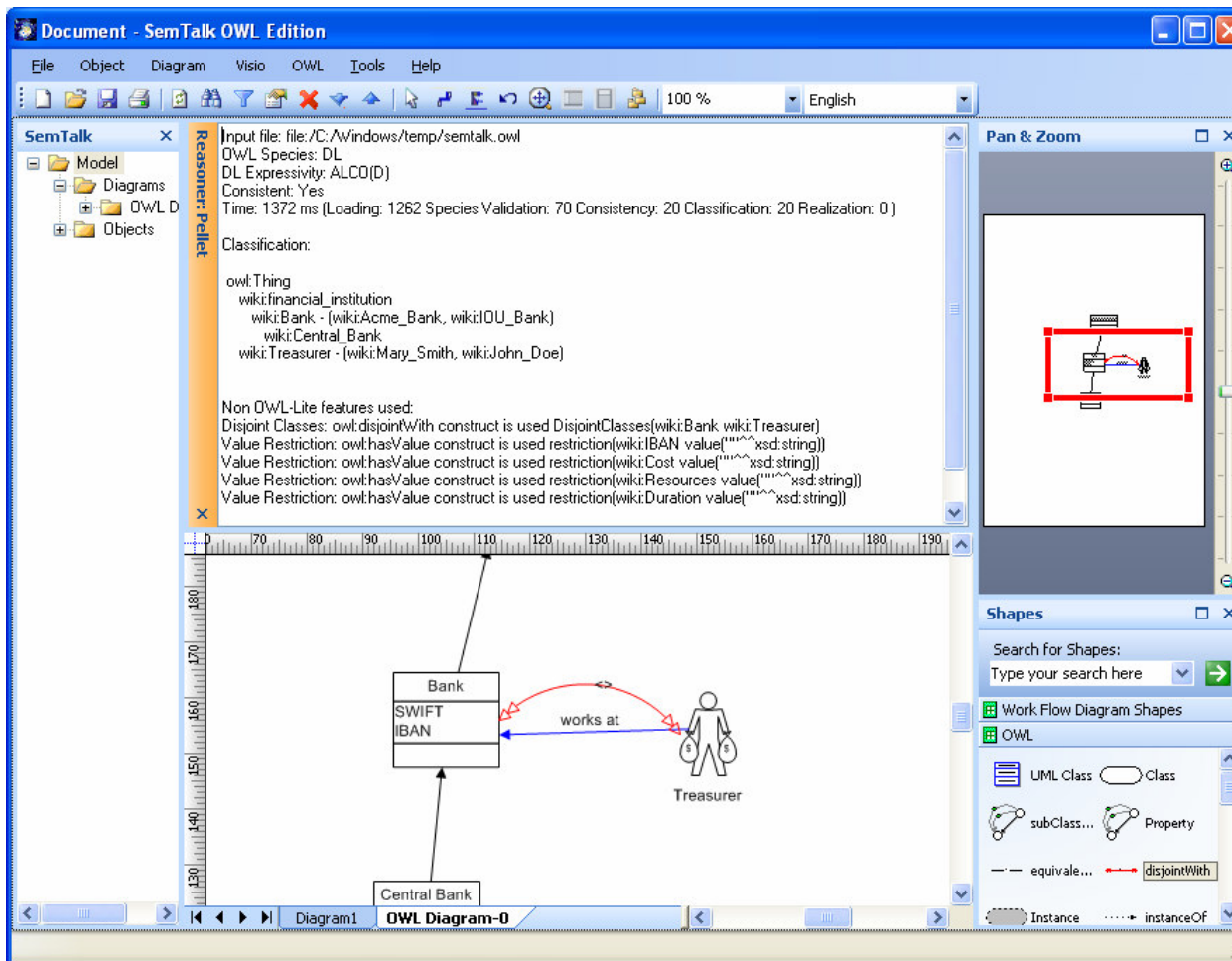
- Start Pellet using OWL->Reasoner

- (It takes a while to start Java for the first time)

- OWL -> Refresh starts the Reasoner again

- OWL -> Output File shows the generated temporary OWL file
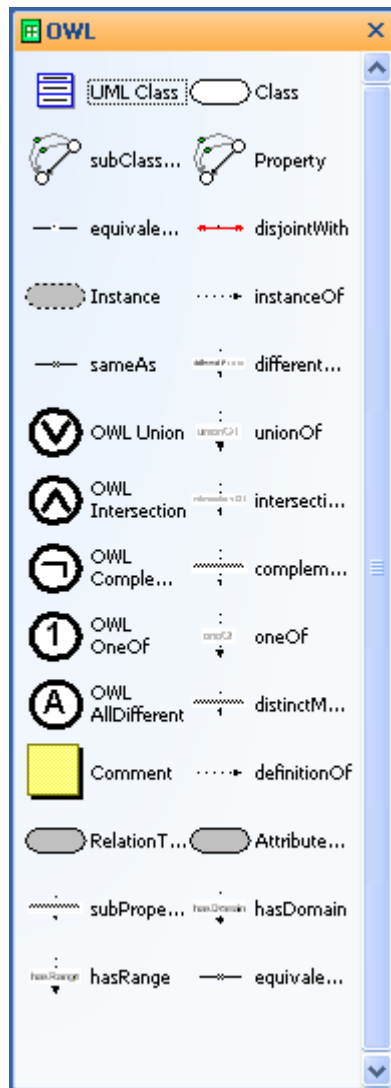
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Graphical OWL

- Developed with Cerebra Inc

- Extending the Class Shapeset with additional shapes designed for OWL

- Anonymous Classes for "UnionOf", "IntersectionOf", "OneOf"

- Object- and DataProperties can be nodes in the Drawing with "hasDomain" and "hasRange" links

- Classes & Instances often in one Diagram

- Intended to be used with reasoners such as Pellet, Cerebra or Ontobroker

OWL Shapes
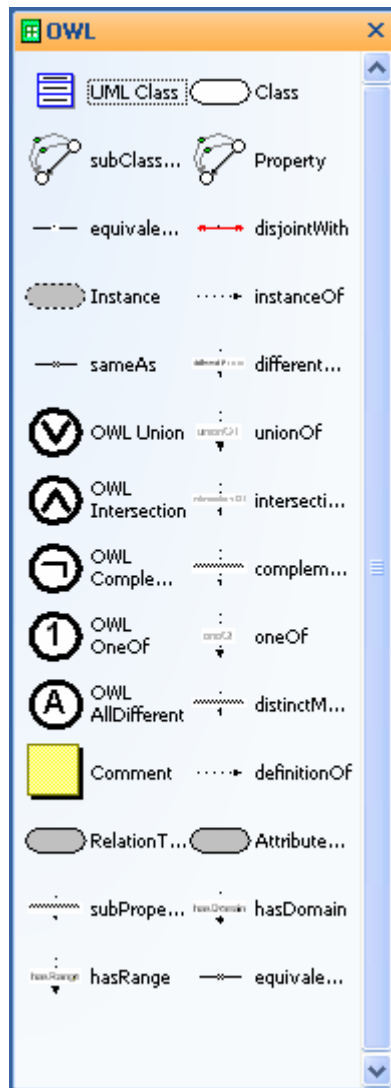
| equivalentClass	Two classes actually denote the same concept. Ignored by the SemTalk Engine but exported to OWL
disjointWith	No instance is allowed to be instance of both classes. Ignored by SemTalk Engine but exported to OWL
Instance	Just an instance
instanceOf	Graphically displays that the object is instance of a class. An instance can be instance of multiple classes. Supported by the SemTalk Engine.
sameIndivudualAs, sameAs	Two instances denote the same object. Ignored by the SemTalk Engine, which assumes closed world semantics
differentFrom	Two instances are denoting different objects. Default for SemTalk
OWL Union	An abstract class describing the union of a set of other classes. Use the unionOf relation to specify that set. Ignored by SemTalk Engine but exported to OWL
unionOf	Relation from a OWL Union class to other classes
OWL Intersection	An abstract class describing the intersection of a set of other classes. Use the intersectionOf relation to specify that set. Ignored by SemTalk Engine but exported to OWL
intersectionOf	Relation from a OWL Intersection class to other classes
OWL ComplementOf	An abstract class describing that instances of that class are not instance of another class. Use the complementOf relation to specify that other class. Ignored by SemTalk Engine but exported to OWL

OWL Shapes (2)

complementOf	Relation from a OWL ComplementOf class to other classes
OWL OneOf	An abstract class describing that instances of that class are one of a set of other instances. Use the oneOf relation to specify that set. Ignored by SemTalk Engine but exported to OWL
oneOf	Relation from a OWL OneOf class to instances defining that class
OWL AllDifferent	Operator specifying that all related instances are different. (Default in SemTalk)
distinctMember	Member of an AllDifferent Set
AttributeType	Graphically displays an Attribute Class ("DataProperty" in OWL)
RelationType	Graphically displays an Association Class ("ObjectProperty" in OWL)
equivalentProperty	Two AttributeTypes or RelationTypes have same meaning. Ignored by SemTalk Engine but exported to OWL
subPropertyOf	Subclassing of properties. Partially supported by SemTalk Engine but exported to OWL
hasDomain	Relation from a property to its domain. This can also be specified using the edit dialog Details tab. Supported by the SemTalk Engine
hasRange	Relation from a property to its range. This can also be specified using the edit dialog Details tab. Supported by the SemTalk Engine

OWL Import

- File->Export / Import -> Semantic Web

- Import of existing OWL Files

- E.g. from ProtegeOntologiesLibrary:
  http://protege.cim3.net/cgi-
  bin/wiki.pl?ProtegeOntologiesLibrary

- SemTalk objects will be created for the OWL
  objects

- Merged by name (incl. namespace)

- A Base Class (new Superclass) for the
  imported classes may be specified

- Single Objects can be selected

- Included ontologies will also be imported

- OWL files have no graphical information
  - Create a new page and add objects using drag
    & drop
  - Use the Insert Dialog (later slide)
  - Single objects may be expanded (later slide)
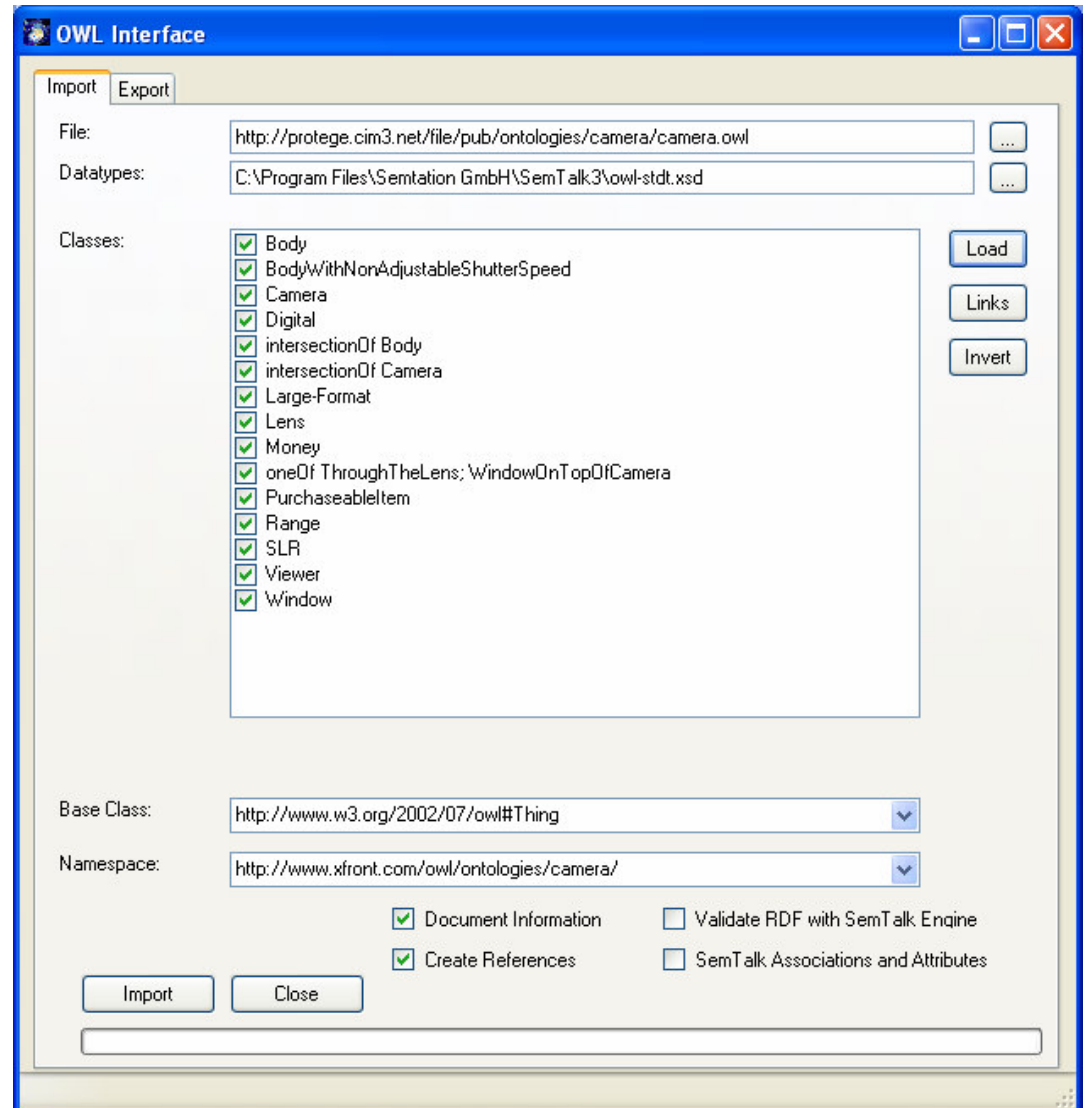
OWL Export

- File->Export / Import -> Semantic Web

- Save the selected objects to an OWL File

- If nothing is selected, the complete model will be exported

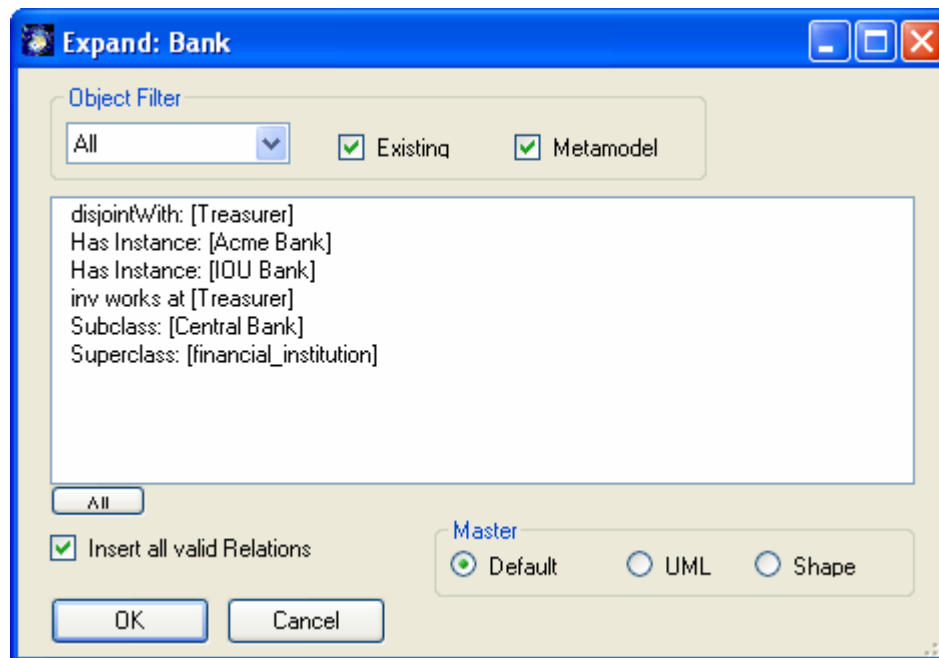# Insert Objects in a Drawing
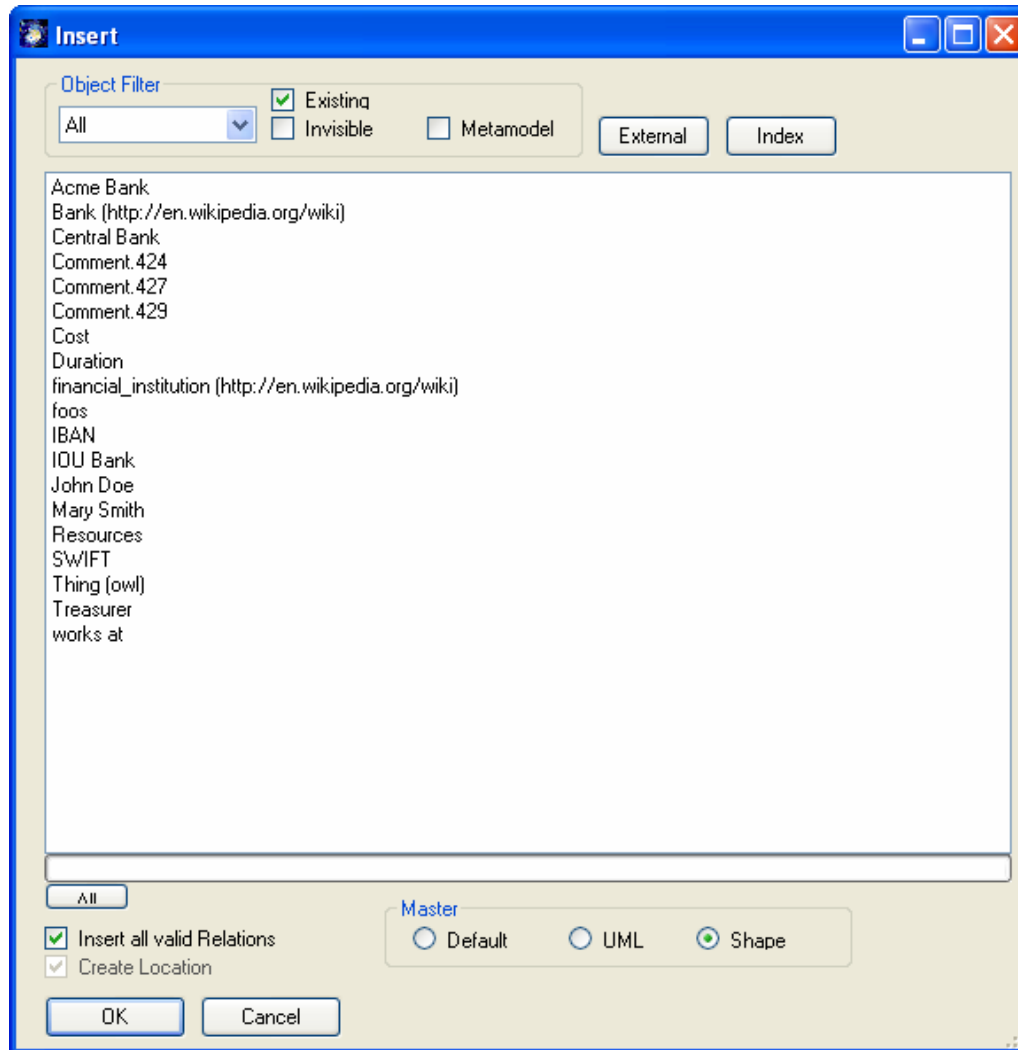
- Create a new diagram

- Right-Click on the Background and choose "Insert"

- Show existing Objects on multiple Pages

- Choose a Shape (Visio or UML)

- Automatically inserts links

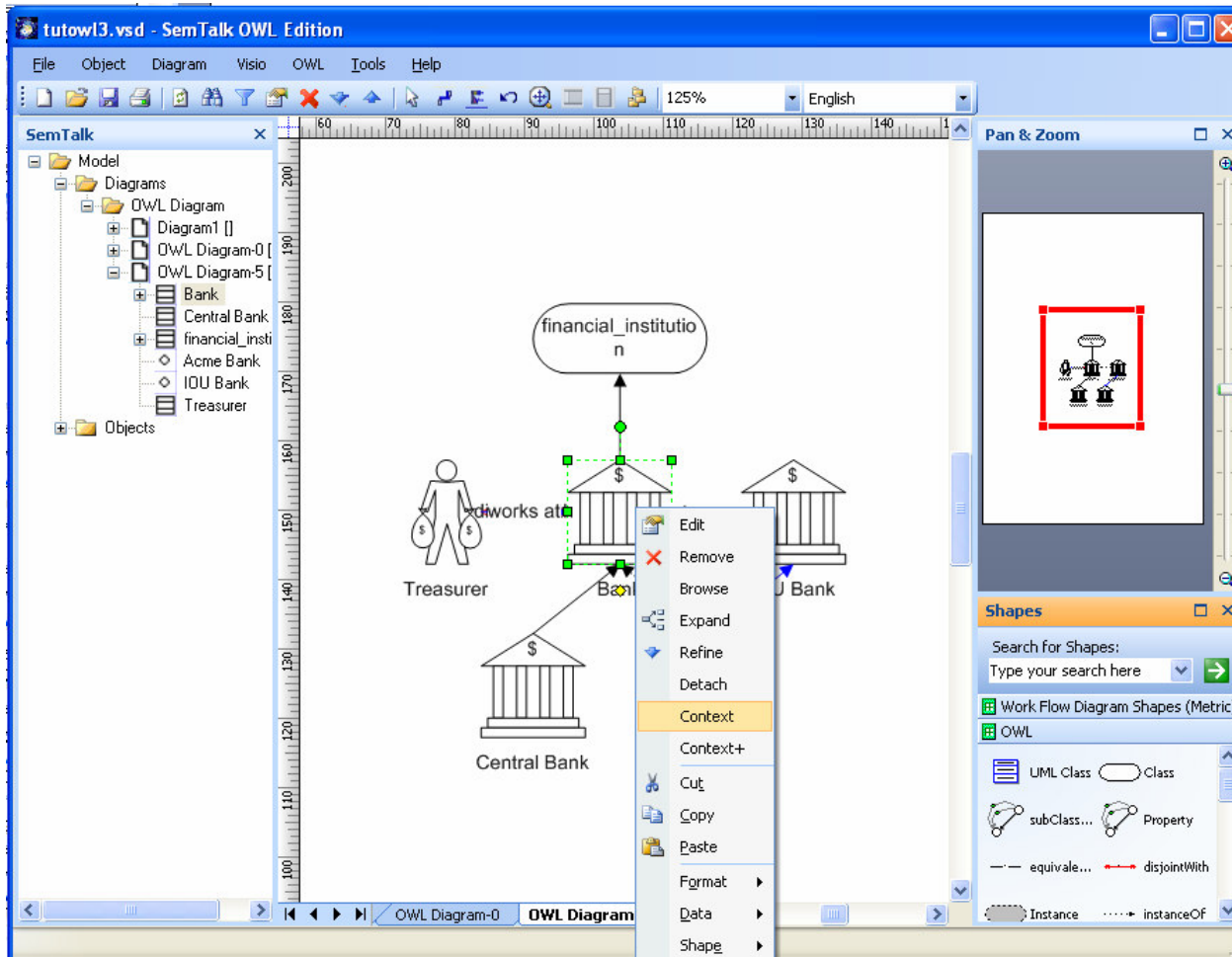- Filtering by Object Filter

- Insert "Bank"

Expand Objects on a Drawing

- Similar to Insert

- Right-Click in the Class Bank and choose "Expand"

- Expand inserts related Objects (Properties and Subclasses) into the drawing

- Optimize Layout using the Visio->Shape Menu

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Context Browsing

- Right Click-> Context on an object

- This will clear the page and insert all related object on the page: Subclasses, Superclasses etc

- Allows to navigate through an ontology which has no visualization yet

- Right Click-> Context+ just adds the context of a current object without clearing the page

- If you want to keep a picture, just add a new page to continue

(Hyper-) linking Models
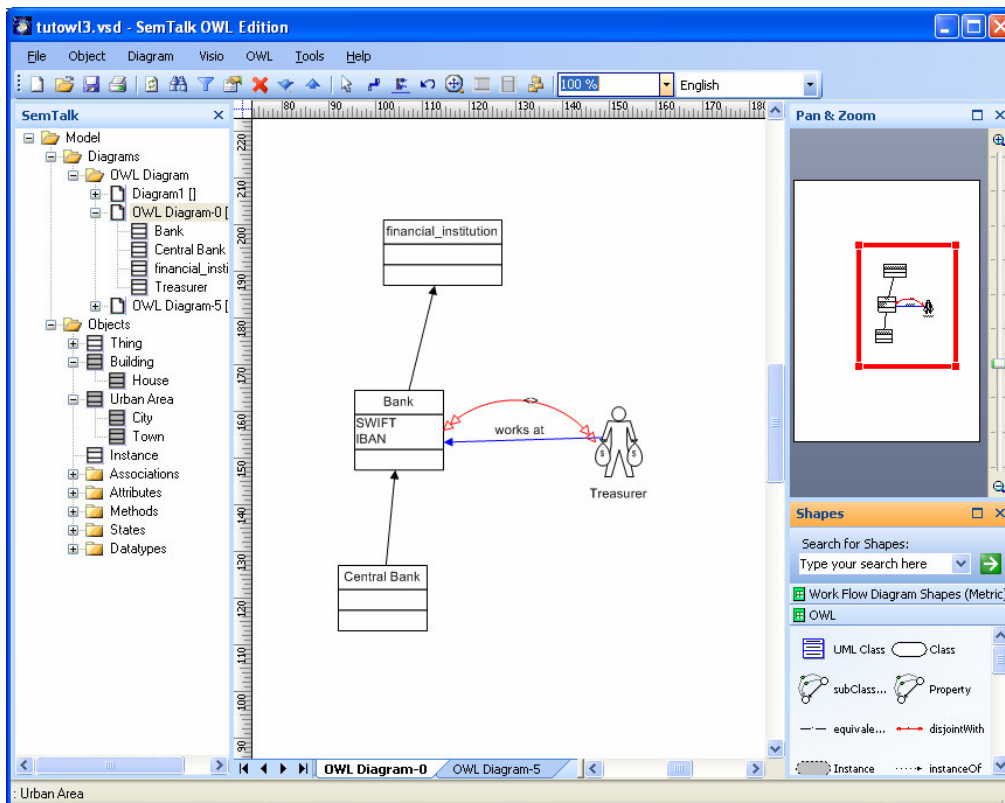
- You may work with 3rd party ontologies without importing the complete ontology into SemTalk / Visio

- File->Open External Model

- Open http://www.semtalk.com/pub/urban.xml

- The explorer contains new gray colored objects. These objects exist in the "to-be-imported" model. Until now, they exist only virtually in the "urban" model. To make them part of your model you have to import them. There are 4 ways to do this:
  - Drag & drop the object(s) in your diagram.
  - Menu Object->Import
  - Right-click over the grey colored object in explorer
  - Right-click over the drawing area of the diagram, where you want to insert the external objects and select "Insert". Once you see the dialog box click the "External" button

- External Objects can be updated from their source using „Refresh"

- Sources can be OWL or SemTalk files

- This creates a networks of linked ontologies

Browse
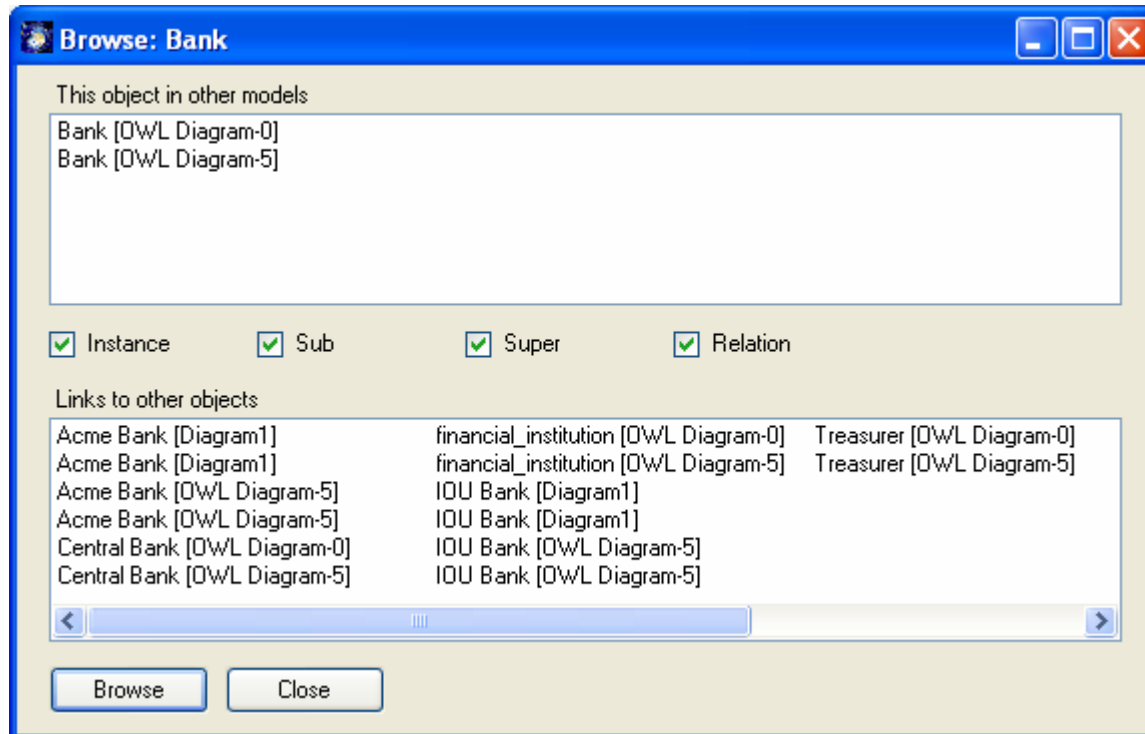
- Navigate to the same Object on different pages

- Navigate to related objects on different pages

- Often used the check if an objects found in the explorer is still used

Find
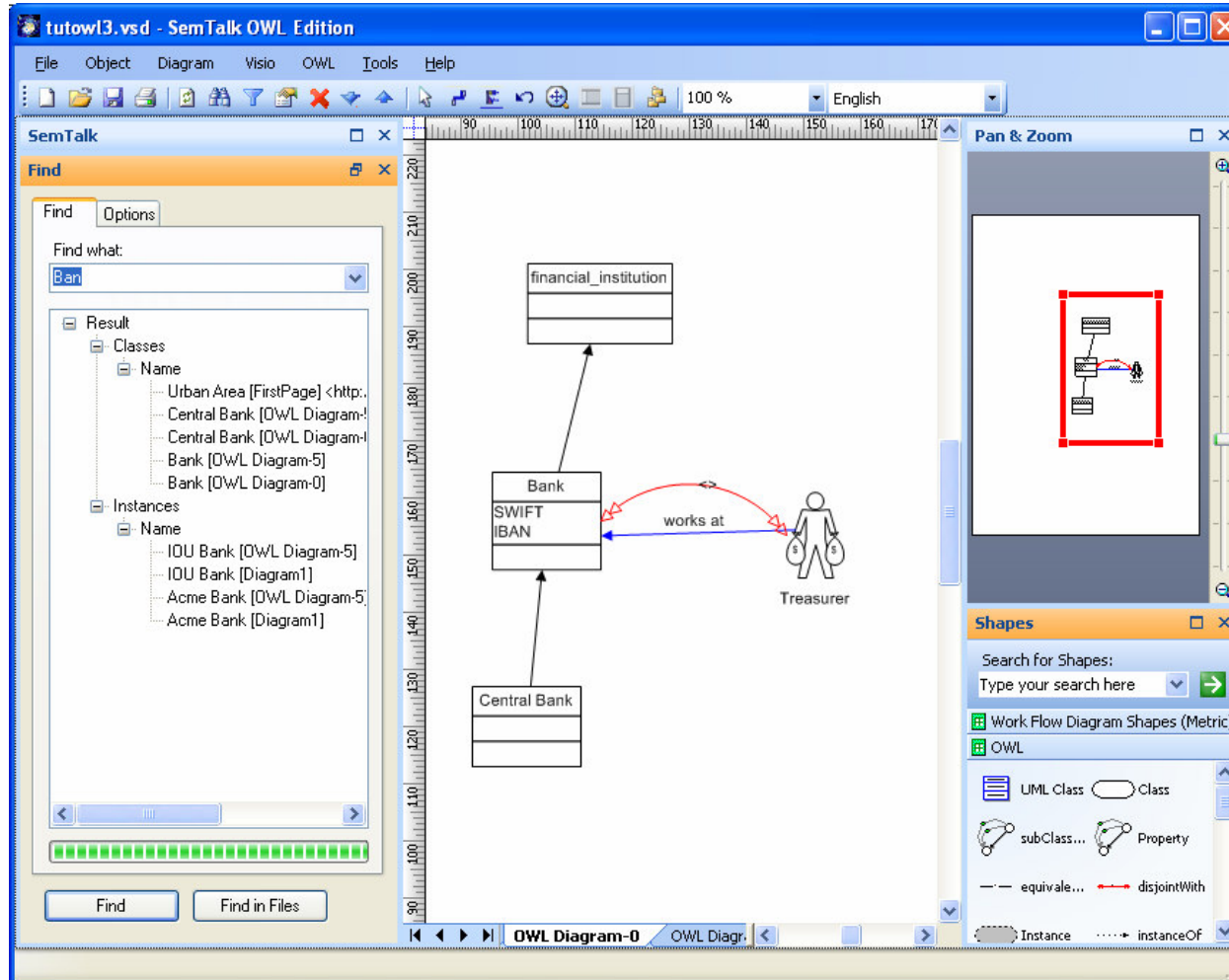
- Find an Object by Name, Substring etc.

- Lots of Options where to search:
  - Name
  - Attributes, Values…
  - By Type
  - Comments
  - …

- You may edit objects directly from the result list

- Drop them on the drawing area

- Find in Files will search on your file system

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Refine / Detach
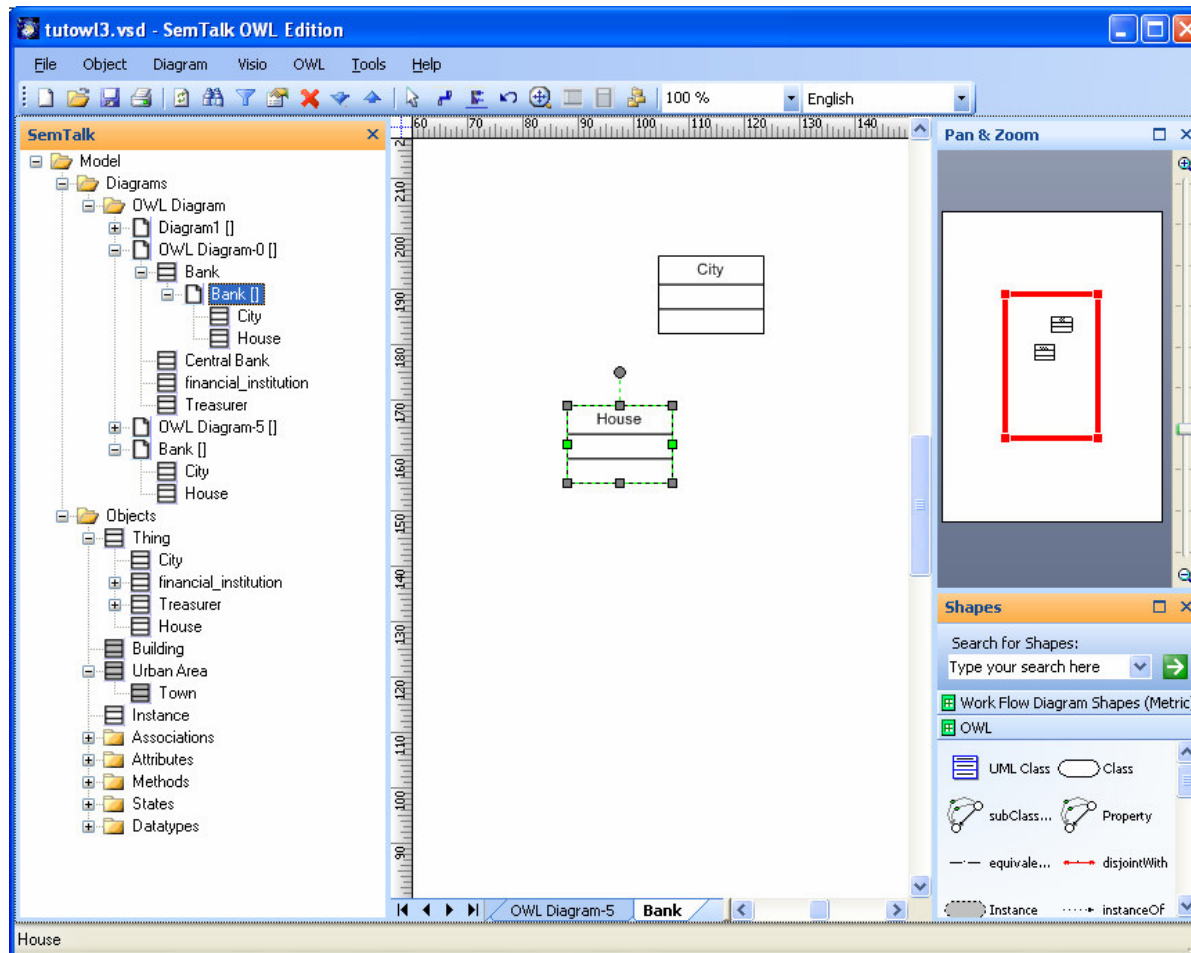
- You can attach a diagram as a hyperlink to an object for purpose of navigation

- Objects with a refinement are usually underlined (not for UML Shapes)

- External Refinements are Diagrams in a separate Visio Drawing

- If there is no refinement yet, "Refine" attaches a new diagram

- If there is already a refinement, it will be opened. "Go Up" will navigate upward from the refinement to the refined object

Customize
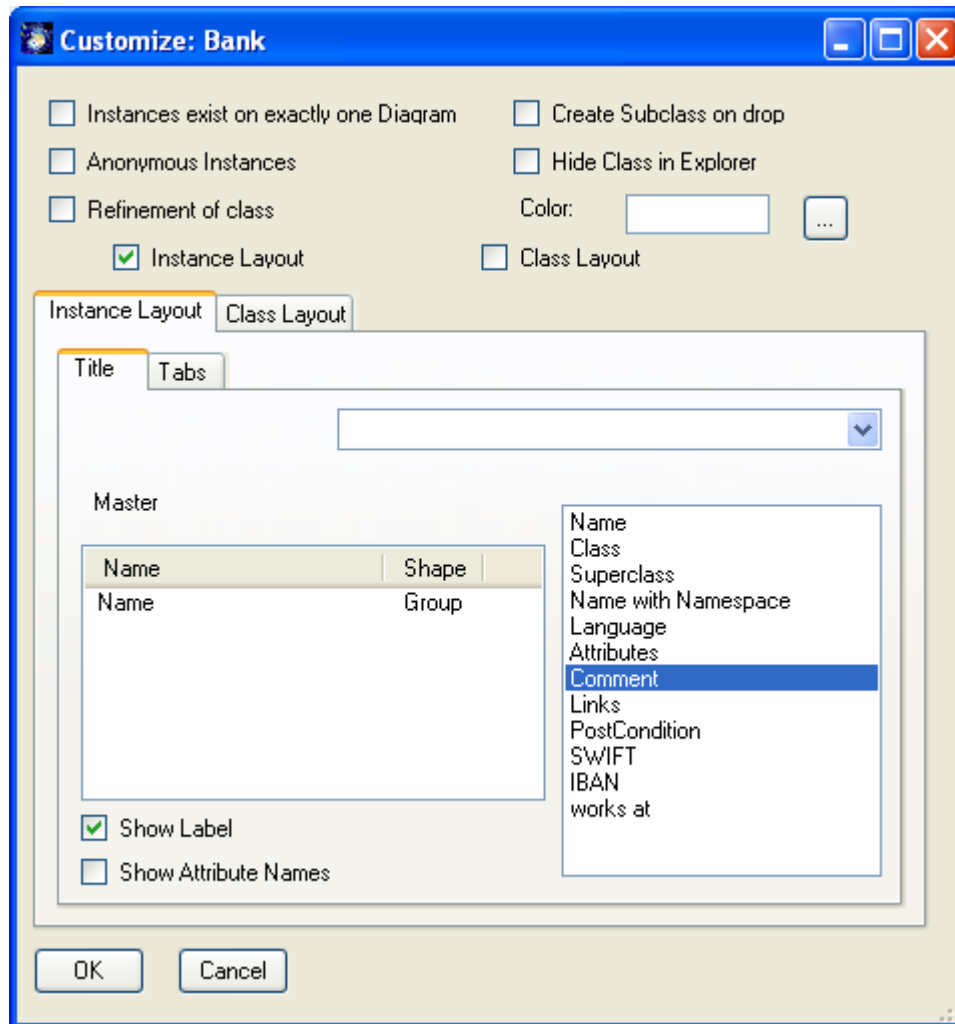
- Customize Behavior
  - What happens on drop
  - What happens on deletion
  - Displayed in the Explorer

- Customize Dialog Tabs

- Customize what and how information is shown in a shape

- Specify this for (sub-) classes and for instances

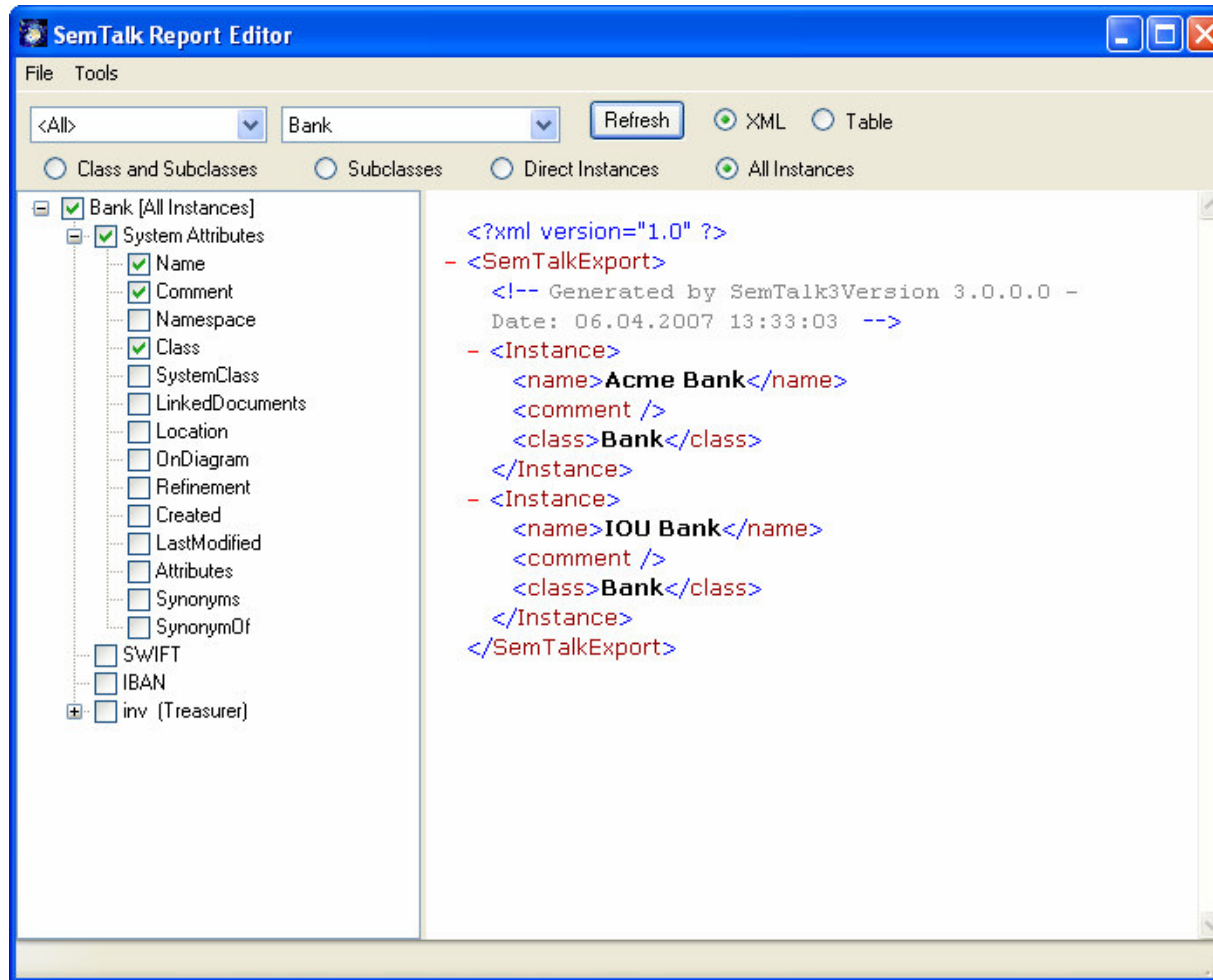- Customizing Information is inherited

HTML Export
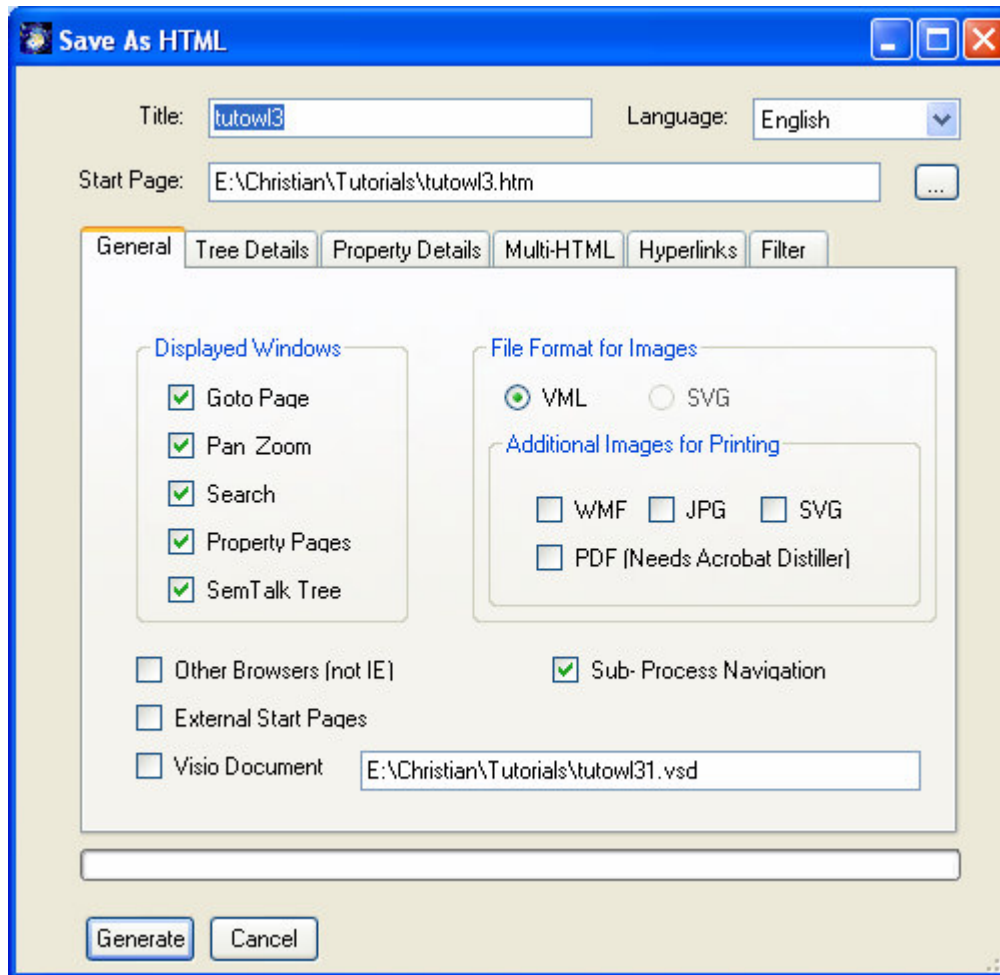
- Export to HTML

- IE preferred

- Lots of Options what is going to be included

- Relative Path to external documents

- "Merging" of multiple SemTalk HTML Models, linked together
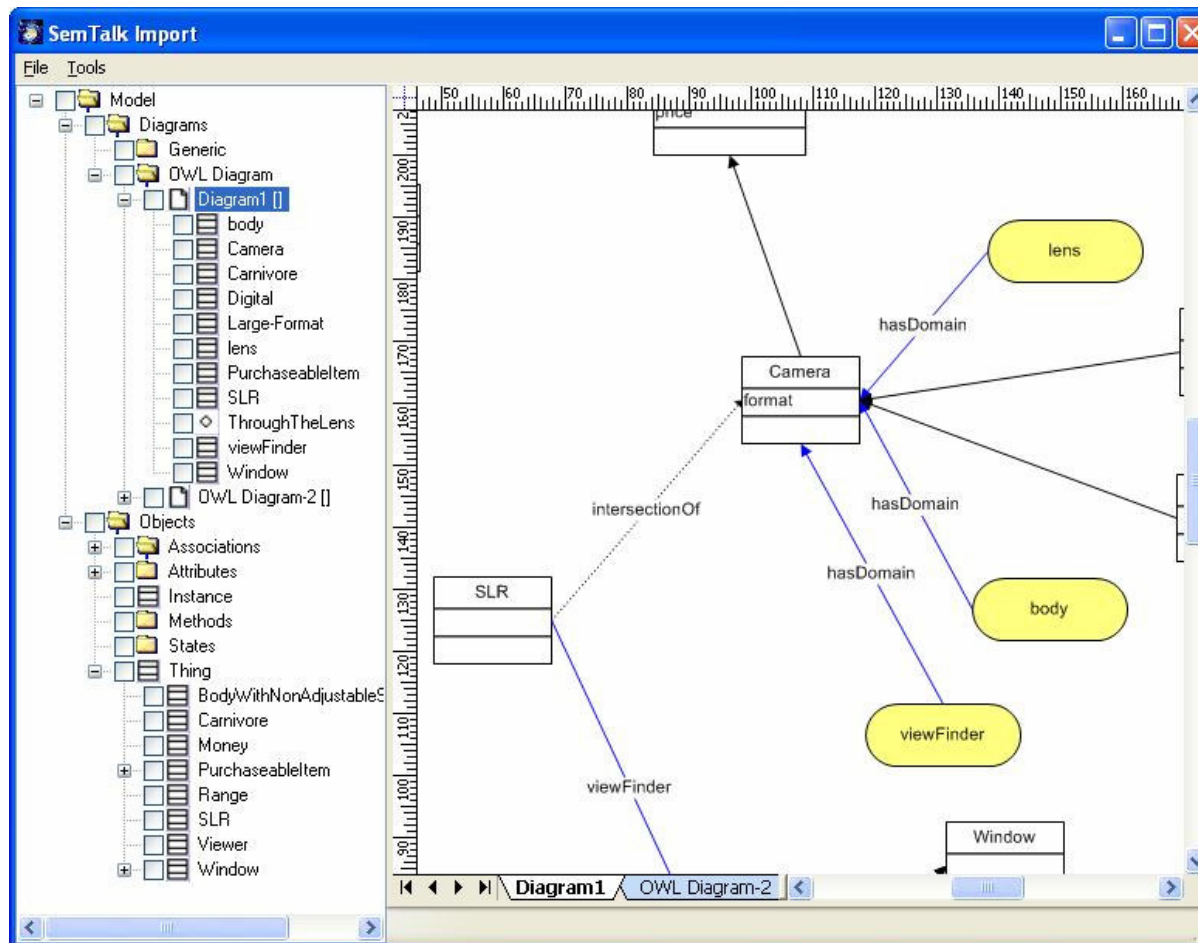
- PDF, SVG…

Reports

- Meta Model driven Reporting Tool

- Exports to XML and HTML

- Select objects and related objects in a XPATH style from the left hand treeview

- Preview on the right side

Merging: SemTalk Import

- Merging of SemTalk Models with or without graphical information

- Additional to "Open External Model"

- Can be used to convert SemTalk Class Diagrams to new diagram classes. Especially useful for Ontologies

- Import as copy or as reference

Association Classes

- If you edit an Association (OWL Object Property) you can specify some OWL relevant features:
  - Transitive
  - Unique

- You can also specify global from domain and to domain restriction

- SemTalk relevant features are
  - Aggregation
  - Cyclic
  - Symmetric
  - Multiple

Table Editor
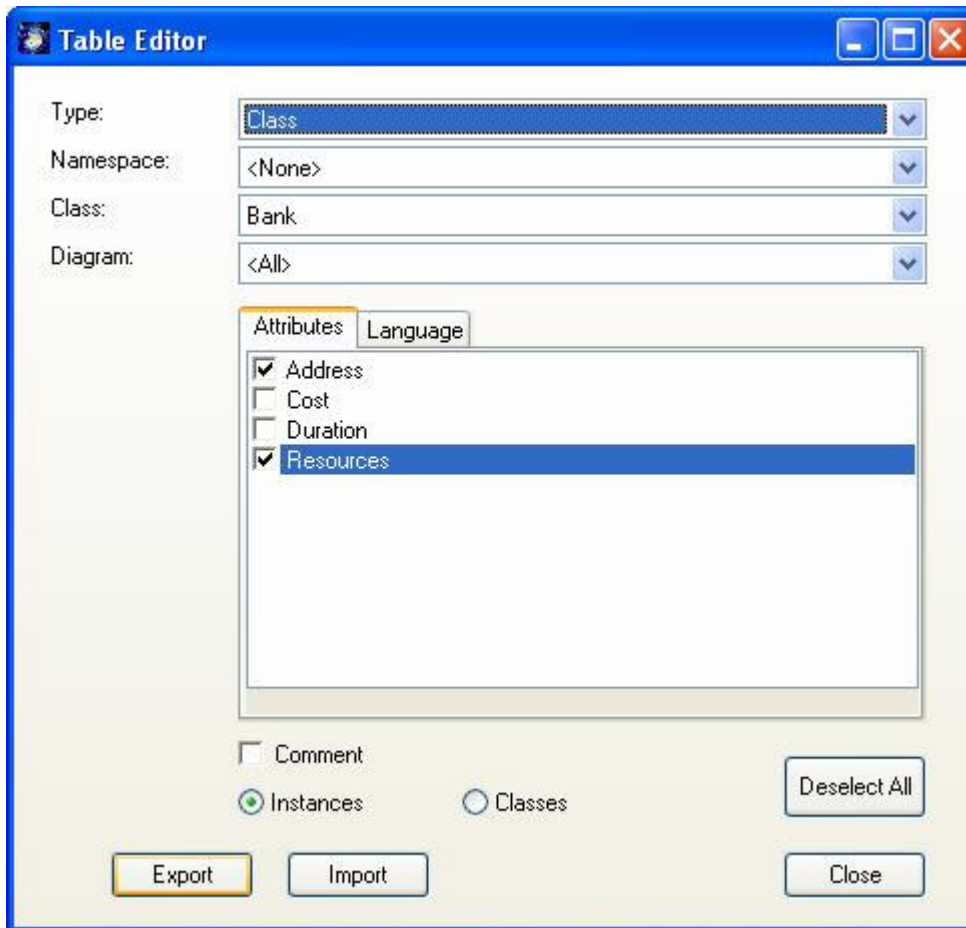
- Edit attribute values of classes and instances in MS Excel

- Translate the objects easily to multiple languages

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Do you want to test drive SemTalk?

Please download our 30 day demo free of charge.

Or make an appointment for an online demo:

www.semtalk.com

If you do not have Visio, you may download a trial version from Microsoft's website. Please let us know if you need assistance.

These slides are intended to be used in a tutorial session. Please refer to our manuals for written details not mentioned here

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