VO registry queries and ontologies

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Abstract: We present a prototype tool to locate relevant resources in a VO registry. This tool relies on an ontology of astronomical object types that has been developed in the european VOTech project. Thanks to the ontology, a query on specific object types can be broadened or refined, and this offers a new way to locate all the matching resources..

An ontology of astronomical objects

The construction of the ontology of astronomical objects relies on the list of SIMBAD standard object types [1]. An ontology allows to define and characterize precisely the concepts involved, and to create proper relationships and properties.

The overall structure can become quite complex (see figure on the right), but programs called reasoners, relying on description logics can perform inference on the ontology.

Metadata in the VO Registry

The resource metadata for the Virtual Observatory [2] defines a set of concepts that can be used for describing VO Resources.

We focused on the <Subject> element, which can be used to document that a Resource deals with some astronomical object types.

In the case of Resources coming from the VizieR catalogue service, the contents of the <Subject> element are normalized.

We have taken these keywords, and introduced them in the ontology as labels attached to the corresponding concept.

e.g. "Binaries:cataclysmic" was associated to "CataclysmicVariable" Note that not all concepts have associated labels.

New registry query method Concept EclipsingBinaryAlgol Keyword VizieR Keyword VizieR EclipsingBinaryBetaLyrae CataclysmicVariable EclipingBinaryWUMa Binaries:cataclysmic VariableCompositeObject LowMassXRayBinary Novae SpectroscopicBinary NovaLikeObject inaries:spectroscopi **XRayBinary** DoubleStar DoubleStar EclipsingBinaryAlgol EclipsingBinaryBetaLyrae **EclipsingBinary** Binaries:eclipsing EclipingBinaryWUMa XRaySource HighMassXRayBinary LowMassXRayBinary XRayBinary HighMassXRayBinary

We perform queries starting from one concept in the ontology. Starting from this concept:

- •The ontology is recursively explored for all subconcepts, and all the labels found are collected (upper left example: 4 labels are found)
- In the case where no label is found, the ontology is explored upwards, until we find a parent concept with a label (upper right example)

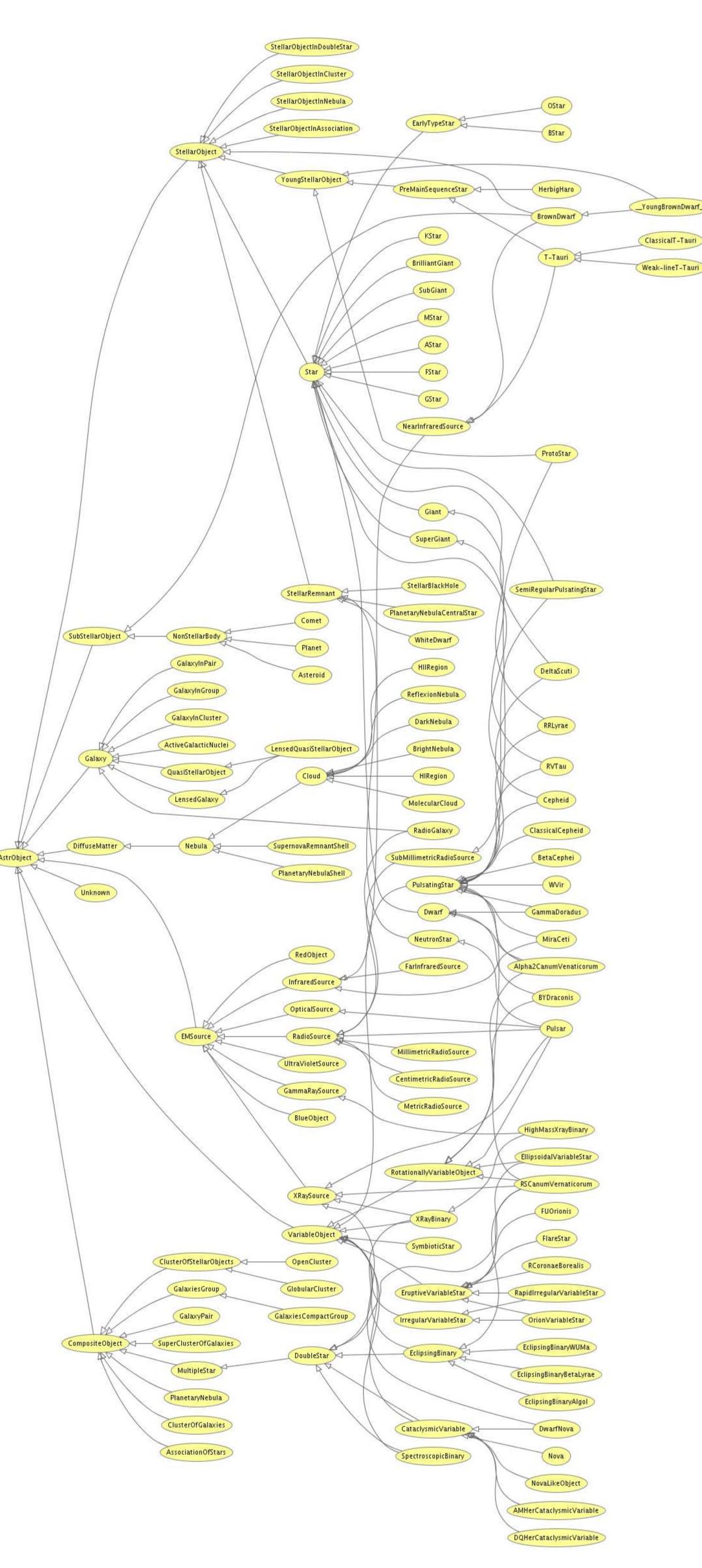
The use of the ontology makes all implicit knowledge explicit in the query process, and allows to refine/broaden the astronomer queries. In the end, all matching VO Resources are accessible through a classical VO registry (AstroGrid in our implementation).

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References:

- [1] http://simbad.u-strasbg.fr/guide/chF.htx
- [2] http://ivoa.net/Documents/REC/ResMetadata/RM-20040426.html

Hierarchy of concepts for the description of the **AstrObject** branch of the ontology.
(Image generated with the OWLViz plugin in Protégé)



Selection of a starting concept in the ontology

Select a concept :

DoubleStar

ClassicalT-Tauri
Cloud
ClusterOfGalaxies
ClusterOfStars
Comet
Compact
CosmologicalLensing
DQHerCataclysmicVariable
DarkNebula
DoubleStar
DwarfNova
Eclipse
EclipseAlgol
EclipseBetaLyrae
EclipsingBinary
EclipsingBinaryAlgol
EclipsingBinaryWUMa
EclipsingBinaryWUMa

EclipsingBinaryWUMa

List of found labels

☐ B inaries:spectroscopic
☐ B inaries:cataclysmic
☐ Novae
☐ B inaries:eclipsing
☐ Go!

Matching VO Resources

Only a max of 25 entries will be shown: AuthorityID ResourceKey Actions VizieR/J/A+A/289/871/aephe View, Edit, XEd VizieR/J/A+A/289/871/yyeri View, Edit, XEd VizieR/J/A+A/309/521/table1 View, Edit, XEdi VizieR/J/A+A/312/93/table1 View, Edit, XEd VizieR/J/A+A/312/93/refs View, Edit, XEd VizieR/J/A+A/315/384/table3 View, Edit, XEd View, Edit, XEdi VizieR/J/A+A/319/481/table3 VizieR/J/A+A/319/867/table3a View, Edit, XEd View, Edit, XEd VizieR/J/A+A/324/137/table1 View, Edit, XEdit

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