



Tenth International Protégé Conference, Budapest, Hungary

A PROTÉGÉ PLUG-IN-BASED SYSTEM TO MANAGE AND QUERY LARGE DOMAIN ONTOLOGIES



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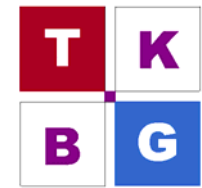
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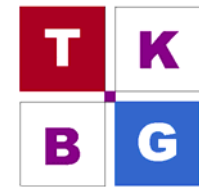


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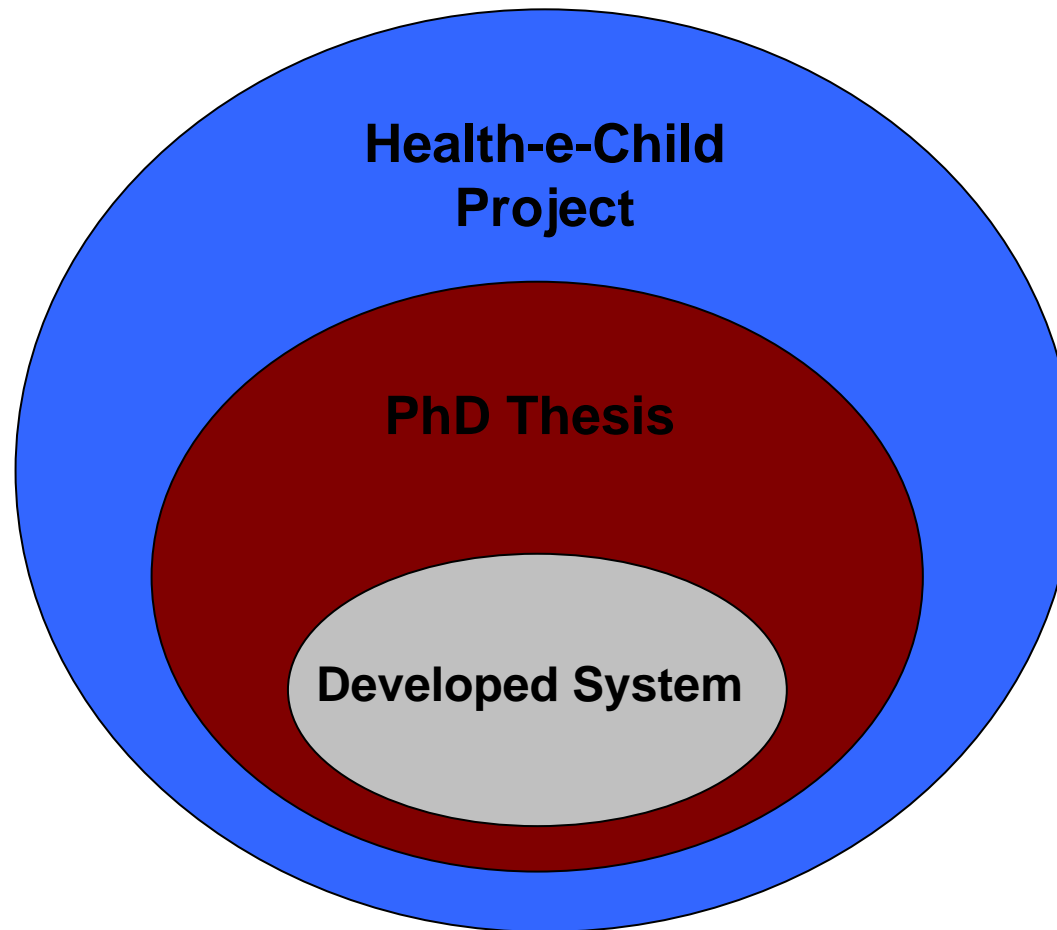


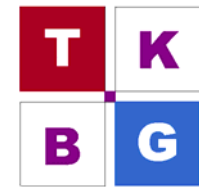
Outline

- Context and Motivation
- Ontology Management System
- Conclusions and Future Work



Bioinformatics Domain



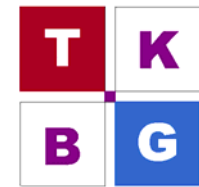


Health-e-Child Project

- General Objective: Aims to develop an integrated healthcare platform for European pediatrics, achieving a comprehensive view of children's health
 - Grid Architecture
 - Main Upper Level Applications: KDS, DSS

- Our tasks: Integration of biomedical data, information, and knowledge.

- Web: <http://health-e-child.org>

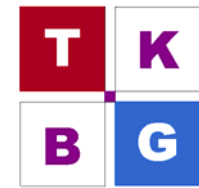


Health-e-Child Project

- The biomedical information sources will cover six distinct levels (vertical levels):
 - Molecular
 - Cellular
 - Tissue
 - Organ
 - Individual
 - Population

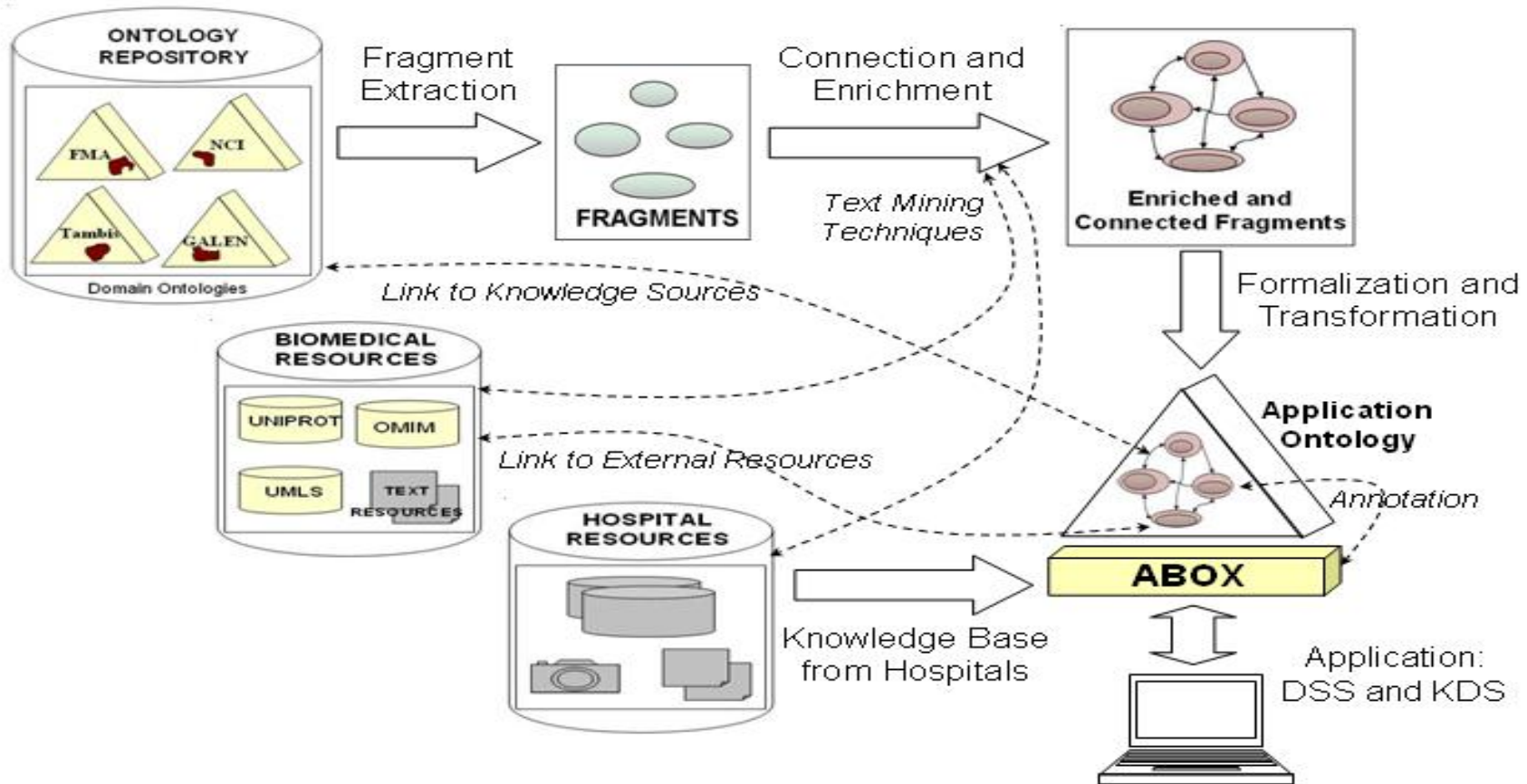
- And will focus on three representative diseases (inside paediatrics):
 - Heart diseases
 - Inflammatory diseases
 - Brain tumours.

Application of current Ontologies in HeC

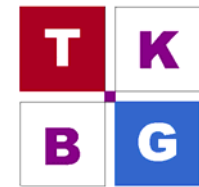


- HeC *vertical abstraction levels expressed by Ontologies*
- Available several large biomedical ontologies and taxonomies, e.g: GO, GALEN, FMA], NCI-Thesurus, Tambis, BioPax[, etc.
- Difficult too apply in concrete applications like HeC:
 - Scalability in reasoning.
 - Specificity: local view of the domain
 - Visualization and treatment

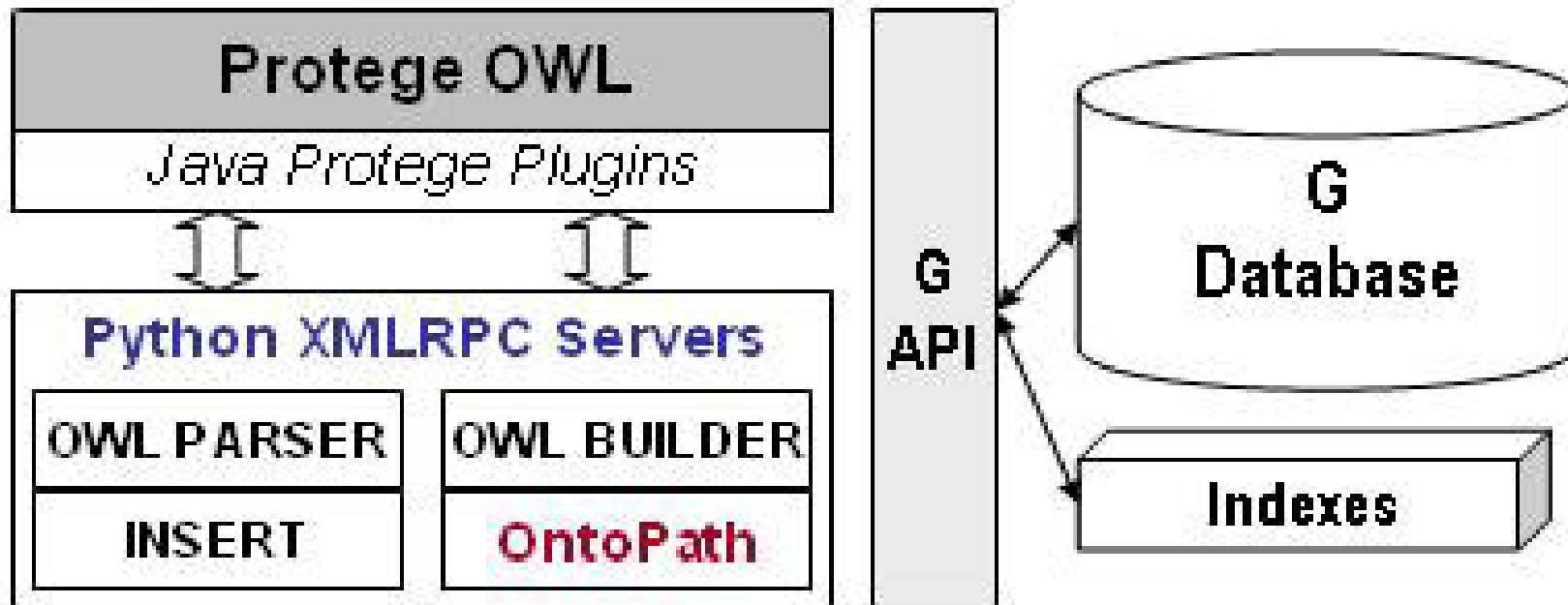
From Domain Ontologies to Applications (PhD Topic)

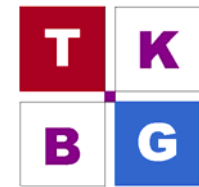


Thesis Proposal Available at: <http://krono.act.uji.es/people/Ernesto>



System Architecture





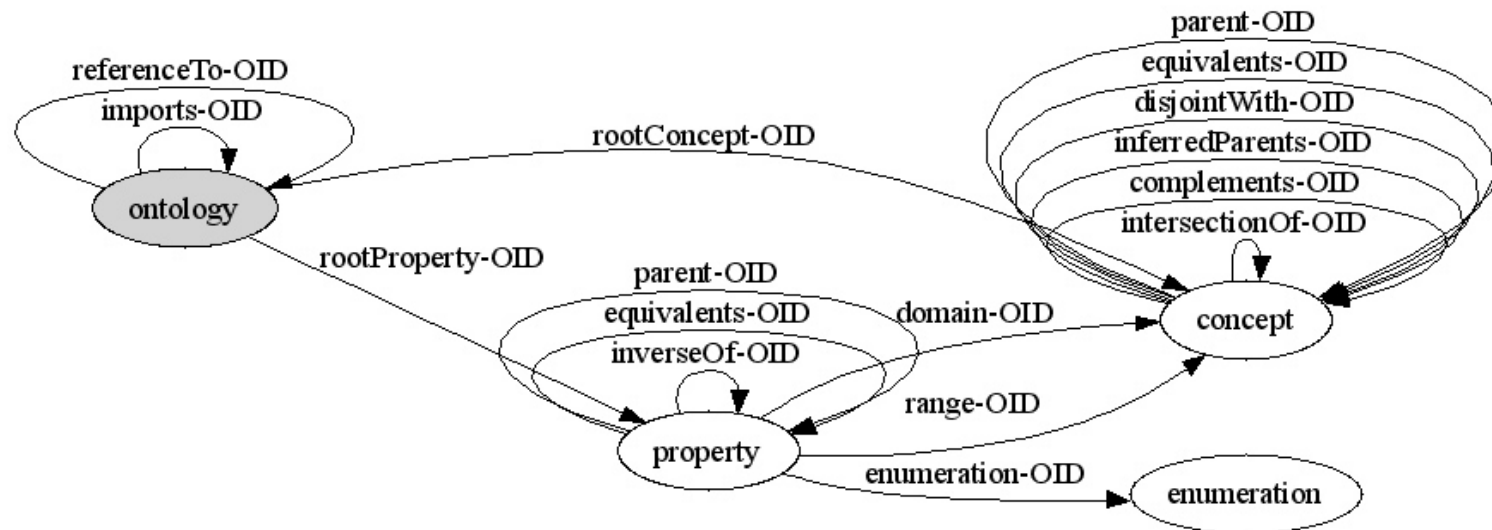
OWL Parser and Constructor

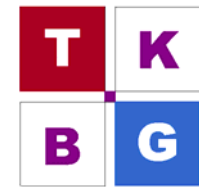
- Greater flexibility in the **OWL *treatment*** and storage capabilities (e.g. indexes)
 - “OntoPath: a Language for Retrieving Ontology Fragments.”
Submitted to OTM-ODBASE 2007
- The OWL parser creates from the OWL file a set of structures for classes, properties, nominal and individuals.
- These structures will be stored in the graph-based database G.



G Semi-structured Database

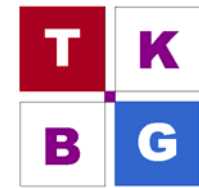
- Backend to store, index and retrieve the OWL ontologies as graphs.
- Four database object types are needed: *ontology*, *property*, *concept*, and *enumeration (nominals)*





Ontology Editor Protégé

- Selected as the front-end to visualize and manipulate ontologies
- Flexibility to be extended
- Some plug-ins and GUIs has been created



Protégé Extensions


- Storing Ontologies
- Retrieving full ontologies or fragments
- Representation in a definition hierarchy
- Connection with Python codes

Storing Ontologies



Save Ontology into Hierarchy

SAVE OWL ONTOLOGY INTO THE ONTOLOGY-VIEW HIERARCHY REPRESENTATION



OWL Ontology File:

Referenced ontologies-views	Coverage of the Ontology over the HeC Levels
1-cell.owl	Population
1049-disease_ontology.owl	Individual
20188-diseaseVic.owl	Organ
20201-galen.owl	Tissue
25514-hec_onto_drugs.owl	Cellular
25592-nciOncology.owl	Molecular
67278-openGalen-Anatomy.owl	HeC Database
76823-PatientOntology.owl	
76935-tambis-full.owl	

Without References Without HeC Levels

Console:
 Inserting ontology: tambis-full.owl...
 This operation may take several minutes.
 Ontology tambis-full.owl inserted

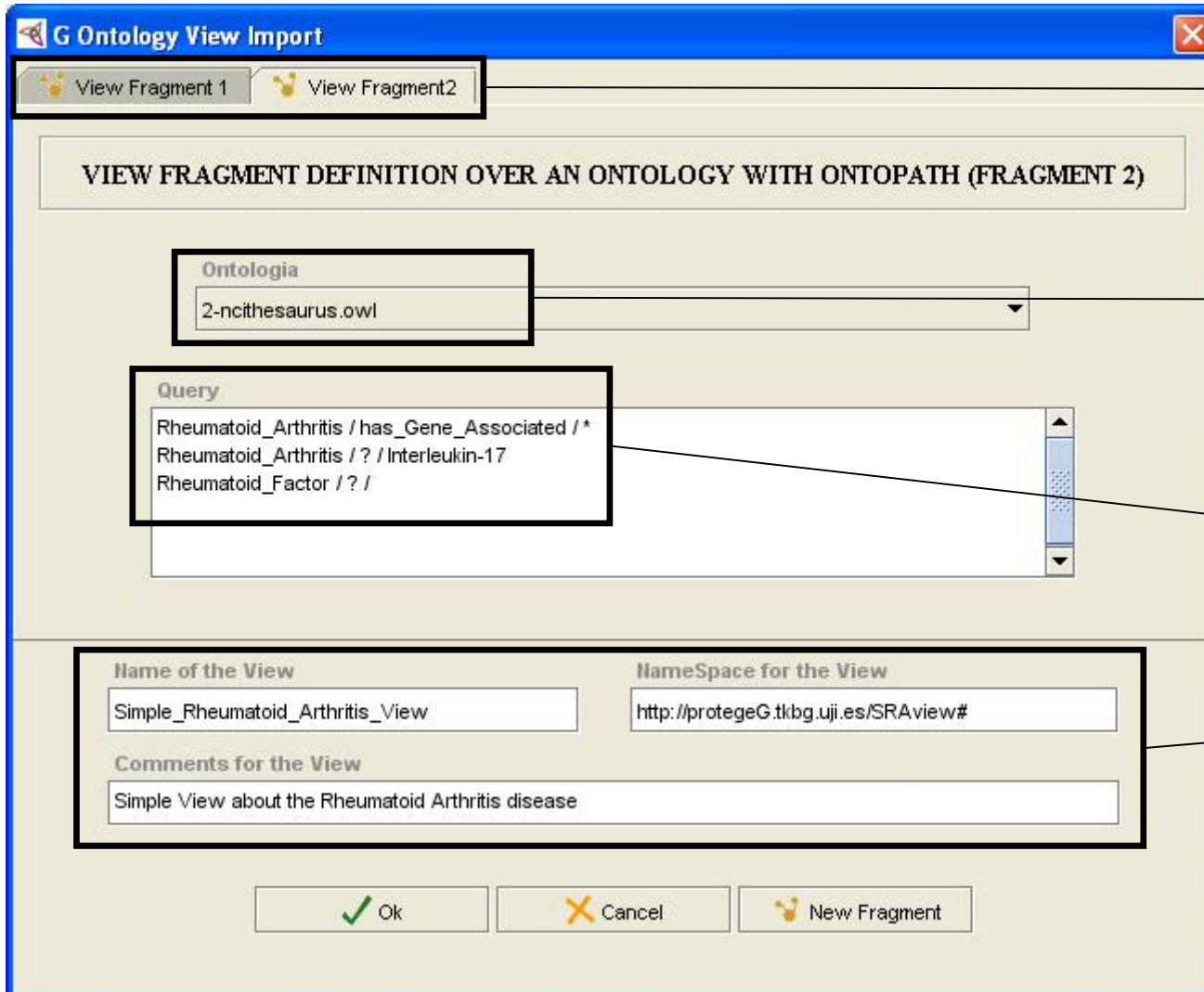
OWL File Selection

Biomedical (HeC) Coverage

References to other Ontologies (Views)



Retrieving full ontologies or fragments



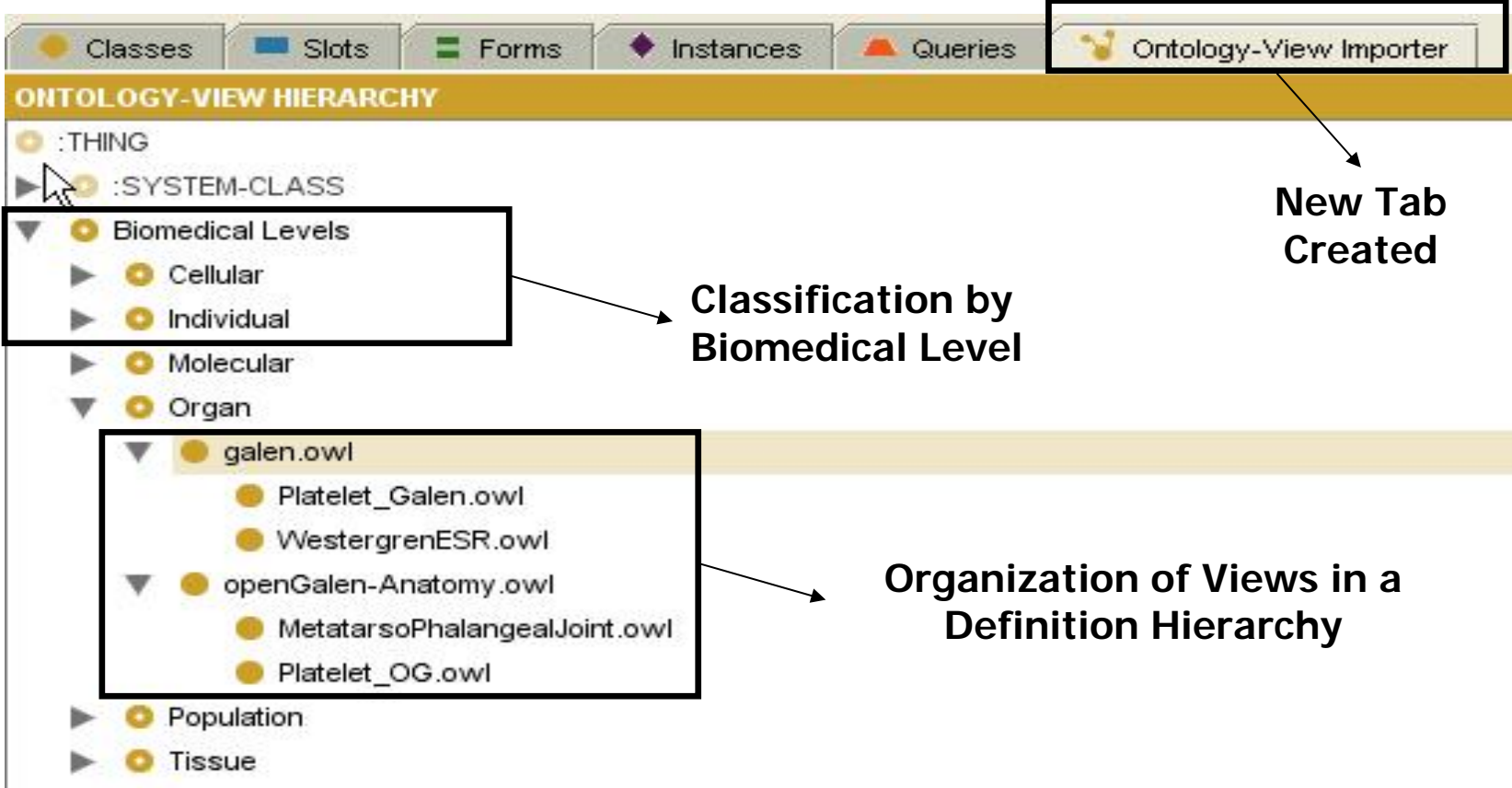
Several Fragments

Source Ontology

Set of OntoPath Queries

Metadata

Representation in a definition hierarchy



The screenshot displays the 'Ontology-View Hierarchy' in a software application. At the top, a navigation bar includes tabs for 'Classes', 'Slots', 'Forms', 'Instances', 'Queries', and 'Ontology-View Importer'. The 'Ontology-View Importer' tab is highlighted with a black box and an arrow pointing to the text 'New Tab Created'. Below the navigation bar, the hierarchy is shown as follows:

- :THING
 - ▶ :SYSTEM-CLASS
 - ▼ Biomedical Levels
 - ▶ Cellular
 - ▶ Individual
 - ▶ Molecular
 - ▼ Organ
 - ▼ galen.owl
 - ▶ Platelet_Galen.owl
 - ▶ WestergrenESR.owl
 - ▼ openGalen-Anatomy.owl
 - ▶ MetatarsoPhalangealJoint.owl
 - ▶ Platelet_OG.owl
 - ▶ Population
 - ▶ Tissue

Annotations with arrows point to specific parts of the hierarchy:

- 'Classification by Biomedical Level' points to the 'Biomedical Levels' folder.
- 'Organization of Views in a Definition Hierarchy' points to the 'galen.owl' folder and its sub-items.

Conclusions

- The system is work in progress

- Some improvements needed
 - Formalizations of connections between fragments and source knowledge.
 - e-connections? → Manchester
 - Enrichment by text mining techniques
 - Work at EBI: form text to ontologies
 - Draft: <http://krono.act.uji.es/people/Ernesto>
 - Apply the ontology: evaluation and validation

Questions and Feedback

- Ernesto Jiménez-Ruiz
 - <http://www3.uji.es/~ejimenez> , ejimenez@uji.es

- Resources:
 - Plug-in (beta): http://krono.act.uji.es/people/Ernesto/G_Protege_Plugin
 - Thesis proposal: <http://krono.act.uji.es/people/Ernesto>
 - “OntoPath: a Language for Retrieving Ontology Fragments.” Submitted to OTM-ODBASE 2007

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