Open Ontology Repository: Architecture and Interfaces

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Outline

- Requirements
- Architecture
- Interfaces
- Data Model
- Future Work
Requirements

- Goals
- Nonfunctional requirements
- Use case descriptions
OOR Goals

- A well-maintained persistent store (with high availability and performance) where ontological work can be stored, shared and accessed consistently;
- Mechanisms for registering and “governing” ontologies, with provenance and versioning, made available (logically) in one place so that they can be browsed, discovered, queried, analyzed, validated and reused;
- Services across disparate ontological artifacts supporting cross-domain interoperability, mapping, application and inferencing; and
- Registration of semantic services to support peer OORs
Nonfunctional Requirements

- The repository architecture shall be scalable.
- The repository shall be distributed.
- The specification of the repository shall be sufficiently detailed and platform independent to allow multiple implementations.
- The repository shall be capable of supporting ontologies in languages that have reasoners [supporting inferencing].
- The repository architecture shall support distributed repositories.
- The repository architecture shall not require a hierarchical structure.
Use Cases
Architecture

- Goals
- Modularity Targets
- Proposed Architecture
Architecture Goals

❖ OOR requires an open and well documented architecture to
   – Allow multiple communities and organizations to participate in the OOR
   – Produce standard OOR functionalities and behaviors.

❖ OOR Architectural Principles
   – Decoupling of responsibilities – To support multiple knowledge representations/languages
   – Implementation/Platform independence – To support acceptance, multiple instances, and evolution
   – Ontologically driven – To allow for evolution of the OOR and reduce overall development costs
Modularity Targets

- Registry functions
- Repository functions
- KR languages
- Gatekeeping policies
- Intellectual Property Rights policies
- Federation mechanisms
- Value-added services
Interfaces

❖ WADL (REST)
  - Uses URL formatting of parameters
  - Parameters are strings of various kinds: path, query, form, matrix, header, cookie

❖ WSDL (SOAP)
  - Uses XML format for parameters and return values
  - Maps operations to methods
  - Maps XML parameters to objects
BioPortal core was refactored to use JAX-RS
URL mapping specified by annotations
WADL generated from the JAX-RS resource classes
Resource methods call the WSDL/SOAP methods.
Refactored OOR core runs in Tomcat.
WSDL/SOAP

- Derived from the BioPortal Service classes
- WSDL generated using JWS
- There are 126 methods:
  - Ontology Registration (6)
  - Find Ontologies (25)
  - Search and Navigation within one ontology (18)
  - Differences between ontologies (5)
  - Evaluations and Metrics (16)
  - Notification and Subscriptions (8)
  - Generation of RDF (5)
  - Ontology Development (22)
  - Administration (21)
WSDL/SOAP

- WSDL and SOAP SEI available at OOR Interface
- Examples:

  ```java
  public List<OntologyBean> findLatestActiveOntologyViewVersions() throws Exception;

  public Page<SearchBean> executeQuery1(String expr, boolean includeProperties, boolean isExactMatch, Integer pageSize, Integer pageNum, Integer maxNumHits) throws Exception;

  public Page<SearchBean> executeQuery2(String expr, boolean includeProperties, boolean isExactMatch, Integer maxNumHits) throws Exception;
  ```
Data Model

- Data stored in MySQL
- UML class diagram shown on next two slides.
Suggestions for Future Work

- Refactor database component
- Split core into two components
- Integrate the gatekeeper
- Develop and integrate the federator