Geophysical Research Abstracts,
Vol. 11, EGU2009-4172-7, 2009
EGU General Assembly 2009

GI-cat extensions for OGC 06-131 and OGC 07-038 support

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In this presentation we discuss the extensions developed in order to enable GI-cat to support the OGC CSW ebRIM application profile and its extension packages: EO (Earth Observation) and CIM (Cataloging of ISO Metadata).

In an Service-Oriented Architecture (SOA) framework, GI-cat implements a distributed catalog service providing advanced capabilities, such as: caching, brokering and mediation functionalities. GI-cat applies a distributed approach, being able to distribute queries to the remote service providers of interest in an asynchronous style, and notifies the status of the queries to the caller implementing an incremental feedback mechanism. GI-cat functionalities were made available through two standard catalog interfaces: the OGC CSW ISO and CSW Core Application Profiles. The presented extensions will add two new and standard interfaces: the CSW ebRIM CIM and EO interfaces. GI-cat is able to interface a multiplicity of discovery and access services serving heterogeneous Earth and Space Sciences resources. They include international standards like the OGC Web Services – i.e. OGC CSW, WCS, WFS and WMS, as well as interoperability arrangements (i.e. community standards) such as: UNIDATA THREDDS/OPeNDAP, SeaDataNet CDI (Common Data Index), GBIF (Global Biodiversity Information Facility) services, and SibESS-C infrastructure services.

The GI-cat distributed catalog service has been successfully deployed and experimented in the framework of different projects and initiative, including the SeaDataNet FP7 project, GEOSS IP3 (Interoperability Process Pilot Project) and GEOSS AIP-2 (Architectural Implementation Project – Phase 2).

Commonly, a catalog application profile and/or extension package introduces a specific data model. Hence, an important objective of the developed expansion module is to define and implement an effective and flexible strategy to support the new data model, in the context of the existing information model – i.e the GI-cat data model. Besides, the expansion module is required to implement the new interface defined by the application profile/extension-package. Usually, this implies the definition of a new system loosely-coupled components – e.g. a mediator for the new interface. Several different extension strategies were identified and analyzed:

1. Model Mapping strategy: to define a mapping between the new data model entities and the internal GI-cat ones.
2. Model Extension strategy: To extend the GI-cat internal data model, adding extension points which are the roots of the new concepts introduced by the profile/extension specification. Where possible, suitable extension points are useful to preserve the existing code and minimize the impact of the new concepts on the internal model.
3. Model Modification strategy: To modify the GI-cat internal data model accommodating the new concepts introduced by the profile/extension specification. Generally, this option does not preserve the existing code changing the internal model in a structural way.

Depending on the data model to be supported an approach may be preferable to another. To implement the CIM extension package, the full mapping strategy (i.e. Mapping strategy) was conveniently used. While, to support the EO extension package a two step strategy was needed: GI-cat data model was extended to accommodate a set of some new concepts introduced by the EO data model (i.e. Model Extension strategy), while the others were mapped to the existing GI-cat internal model to assure basic interoperability (i.e. Model Mapping strategy).

This work was developed in the context of ESA HMA project, whose main objective is to involve the stakeholders, namely National space agencies, satellite or mission owners and operators, in an harmonization and standardization process of their ground segment services and related interfaces.