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Distributed discovery services in heterogeneous federations

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The implementation of discovery services is one of the most current challenges toward the deployment of operational Spatial Data Infrastructures (SDIs).

In fact, the growing availability of rich data amounts is of little use, if such data are hard to found by the users.

At present, several global- or regional-scale initiatives, both horizontal and vertical (e.g. GEOSS, GMES, INSPIRE, GBIF), are just focusing on the experimentation and the deployment of discovery services. In general, such services imply the hierarchical structuring of resources, the use of metadata and the distribution of queries. This approach lends itself well to Web technologies such as XML, HTTP, etc.

The emerging standard for discovery services is the OGC CSW specification.

CSW requires the support to a few operations and to a small set of core properties, allowing user community profiles to add relevant information (improving data completeness) and remove irrelevant information (improving data accuracy).

Actually, several of these so-called *application profiles* are being defined. Each application profile, in turn, may be further complemented by application packages.

Due to the evolution of the base specification and of the individual profiles and application packages, the generic discovery service, implemented on one of the emerging SDIs, must either cope with the existence of heterogeneous catalogues, or draw back to the core profile of CSW, when crossing the border of its own federation.

Hence, the problem of catalogue heterogeneity is strictly related to the feasibility of

query distribution, as well as to the feasibility of catalogue service chaining, through either opaque or translucent pattern strategies.

In this work, we start from the issues currently investigated in the framework of CSW revision and present our solution for distributed discovery in an heterogeneous environment.

In particular, we illustrate our experiences on these topics:

- Advanced discovery use-cases, e.g. incremental queries (i.e. query over dataset collections, to be subsequently refined) and opaque/translucent chaining of catalogues;
- Extension to the current CSW functional decomposition, exposing and highlighting a high-level distribution functionality;
- Implementation of query distribution via a strategy of distributed resource identification, to mitigate cyclic query issues on a federation scale.