ODB-QOPTIMIZER: a tool for semantic query optimization in OODB

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Abstract

ODB-QOPTIMIZER *is a ODMG 93 compliant tool for the schema validation and semantic query optimization. The approach is based on two fundamental ingredients. The first one is the* OCDL *description logics (DLs) proposed as a common formalism to express class descriptions, a relevant set of* integrity constraints *rules (IC rules) and queries. The second one are DLs inference techniques, exploited to evaluate the logical implications expressed by IC rules and thus to produce the* semantic expansion *of a given query.*

1. ODB-QOPTIMIZER: the approach

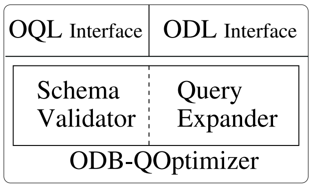
***OCDL*: a DLs for database schema with IC rules**

OCDL (Object Constraints Description Language) [2] is an extension of the DLs proposed in [1]. It extends the expressiveness of traditional DLs languages in order to represent the semantics of complex object data models [3]. Its main characteristics are: a distinction between *values* and *objects* with identity and, thus, between *value types* and *class types*; type constructors, such as *tuple*, *set* and *sequence* recursively used to define complex objects; declarative formulation of IC rules: *if then rules* whose antecedent and consequent can be expressed as *OCDL* types.

Query Optimization by DLs inference techniques

The queries referred to a single target class, including the navigation through its composition hierarchy, can be expressed as *OCDL* types. DLs inference techniques, such as subsumption computation, incoherence detection and canonical form generation [1], can be used to produce the *semantic expansion* of an *OCDL* query, which incorporates any possible restriction not present in the original query but *logically implied* by the query and by the overall schema (classes + value types + IC rules). Following the approach of [5] for semantic query optimization, but exploiting subsumption computation to evaluate logical implication, we perform the semantic expansion of the types included at each nesting level in the query description.

2. ODB-QOPTIMIZER : the tool



ODB-QOPTIMIZER [4] is a fully modular software for schema validation and query optimization in OODB. It's open component for the input/output interface, compatible with ODMG 93 (both for the schema definition language ODL and query language OQL), has been developed at the Department of Engineering Sciences of the University of Modena and is composed of four modules:

ODL Schema Interface: accepts a schema in ODL and translates it into a *OCDL* schema. The ODL syntax has been extended to allow the description of the IC rules.

OQL Query Interface: receives a query in OQL language and translates it into *OCDL* syntax (and vice-versa).

Schema Validator: automatically builds the class taxonomy and preserves the coherence with respect to the inheritance and aggregation hierarchies.

Query Expander: executes the semantic expansion of the query (by using the Schema Validator).

You can try the optimization facility with some examples or even your own schema at http://sparc20.dsi.unimo.it.

References

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