Associative Access
in Persistent Object Stores

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ABSTRACT

The overall aim of the thesis is to study associative access in a Persistent Object Store (POS) providing necessary object storage and retrieval capabilities to an Object Oriented Database System (OODBS) (Delis, Kanitkar & Kollios, 1998 cited in Kirchberg & Tretiakov, 2002).

Associative access in an OODBS often includes navigational access to referenced or referencing objects of the object being accessed (Kim, Kim, & Dale, 1989). The thesis reviews several existing approaches proposed to support associative and navigational access in an OODBS. It was found that the existing approaches proposed for associative access could not perform well when queries involve multiple paths or inheritance hierarchies.

The thesis studies how associative access can be supported in a POS regardless of paths or inheritance hierarchies involved with a query. The thesis proposes extensions to a model of a POS such that approaches that are proposed for navigational access can be used to support associative access in the extended POS. The extensions include (1) approaches to cluster storage objects in a POS on their storage classes or values of attributes, and (2) approaches to distinguish references between storage objects in a POS based on criteria such as reference types – inheritance and association, storage classes of referenced storage objects or referencing storage objects, and reference names.

The thesis implements Matrix-Index Coding (MIC) approach with the extended POS by several coding techniques. The implementation demonstrates that (1) a model of a POS extended by proposed extensions is capable of supporting associative access in an OODBS and (2) the MIC implemented with the extended POS can support a query that requires associative access in an OODBS and involves multiple paths or inheritance hierarchies. The implementation also provides proof of the concepts suggested by Kirchberg & Tretiakov (2002) that (1) the MIC can be made independent from a coding technique, and (2) data compression techniques should be considered as appropriate alternatives to implement the MIC because they could reduce the storage size required.

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