Transaction Management for Mobile Objects
using Optimistic Concurrency Control

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Abstract

We present the design of a new transaction mechanism for an object-oriented database system called Thor. We also describe a mechanism that allows objects to migrate from one server to another.

Our transaction management approach is different from other systems because we use optimistic concurrency control to provide serializability. Optimistic schemes have been suggested in the literature but they do not address issues such as space and logging overheads. In this thesis, we consider these problems and propose a scheme that has low space overhead per object and also has low delays. We take advantage of system characteristics such as loosely synchronized clocks and high availability to achieve these goals. We also present a novel mechanism that allows applications to increase the transaction throughput by overlapping the commit of a transaction with the execution of the next transaction.

Our work on object migration is different from previous work because we provide transaction semantics with respect to movement of objects; if a user moves a set of objects, our scheme guarantees that either all or none of the objects are moved to their destination sites. In addition, object migration is orthogonal to reading and writing of objects; this feature avoids unnecessary aborts caused by conflicts between the migration primitives and reads/writes. We accomplish these goals by a simple modification to the basic validation scheme and commit protocol.

Keywords: transaction, optimistic concurrency control, validation, object mobility, two-phase commit, distributed systems, object-oriented databases.

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