

Preface

When I started this research, no commercial database system supported both object-relational features and parallelism. In the meantime this situation has changed dramatically. All major vendors now offer a parallel, object-relational DBMS as their high-end product. However, there is still a lot to do. Firstly, object-relational (or extensible) DBMS have yet to mature fully. Secondly, the integration of parallelism and extensibility has not yet been completed. This work is my attempt to make a contribution to both issues.

Some of the concepts and techniques developed have been implemented in a prototypical parallel database system called MIDAS. This system is the result of a team effort to which many people have contributed. My own contributions to the system are the user-defined functions and user-defined table operators, the extension of the system tables for those user-defined objects and for detailed statistics, and the new query optimizer, for which I worked with Clara Nippl. She contributed especially to the cost model, the physical operators, and implementation rules. Furthermore, I provided support for the development of concepts for the query parallelizer, the query execution control system, and the send/receive operators of the execution system.

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scheduler and benchmarking, and performance. Clara worked on the parallelization of the execution system, the scheduler, the parallelizer, and the optimizer. Giannis focussed on the lock manager and the buffer management. I also thank Prof. Rudolf Bayer, who led the project together with Prof. Mitschang, for his support.

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Abstract

During the last few years parallel object-relational database management systems have emerged as the leading data management technology on the market place. These systems are extensible by user-defined data types and user-defined functionality for the data. This work focuses on the efficient parallel execution of user-defined functionality. The main contributions describe techniques to support data parallelism for user-defined scalar and aggregate functions, to support intra-function parallelism for the execution of a scalar function on a large object, and a new technology to provide extensibility with regard to new set-oriented database operations that can efficiently implement user-defined functionality in parallel object-relational database management systems. Some of these techniques have been implemented in the MIDAS prototype or on top of a commercial object-relational database management system.



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