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An integrated data structure with multiple access paths for database systems and its performance.

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Summary: In the past a number of file organizations have been proposed for processing different types of queries efficiently. To our knowledge none of the existing file organizations is capable of supporting all types of accesses equally efficiently. We have taken a different approach for designing an integrated data structure which offers multiple access paths for processing different types of queries efficiently. The data structure reported here can be implemented on disk based as well as main memory database systems, however, in this paper we report its behavior mainly in main memory database environment. Our approach is to fuse those data structures which offer an efficient access path for a particular type. To show the feasibility of our scheme we fused the B^+-tree, the grid file and extendible hashing structures, using a proper interface. We implemented and measured its performance through simulation modeling. Our results show that the data structure does improve concurrency and offers a higher throughput for a variety of transaction processing workloads. We argue that our scheme is different than creating secondary indexes for improving concurrency. In the absence of a data structure which can provide all types of access equally efficiently, an integrated data structure is an acceptable solution which offers an efficient way for increasing the performance of database management systems.

Keywords: Data structure; Concurrent transaction; Multikey; Extendible hashing; Access path; B-tree; Grid file
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