

How System 11 SQL Server Became Fast

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High performance and SMP scalability were key goals for the System 11 release of Sybase SQL Server. With System 11, Sybase has gone from about 1400 tpmC to 14000 tpmC. This leap in performance was achieved as a result of new features as well as extensive detailed performance studies and rework of the core server. Logical memory management via multiple buffer caches helped to fine tune the use of memory. The log bottleneck was alleviated to a large extent, while still maintaining the log as a table. Private log caches minimized the synchronization for group commit. Parallel lock manager eliminated a key single point of contention in the server. Spinlock data structures were aligned to cache line sizes for various hardware platforms. Performance monitoring was made less intrusive. Critical regions were drastically reduced. Idle ticks were mopped up by the use of a housekeeper thread for issuing writes. Writes were balanced across disks to reduce impact of checkpoint.

The extensive rework has made Sybase SQL server among the fastest in the industry. This work has already created big performance wins in many real-world applications. Future holds a big set of challenges for real systems: to understand and improve the performance on DSS, Web and other application workloads, to optimize for response time, to handle VLDB, main memory database and other extreme environments, to handle automatic parallelism based on available hardware, to handle NUMA, cluster and other new hardware architectures, and eventually to build a self-tuning high-performance server.

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