

Quality of Service and Predictability in DBMS

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ABSTRACT

DBMS are a ubiquitous building block of the software stack in many complex applications. Middleware technologies, application servers and mapping approaches hide the core database technologies just like power, networking infrastructure and operating system services. Furthermore, many enterprise-critical applications demand a certain degree of quality of service (QoS) or guarantees, e.g. wrt. response time, transaction throughput, latency but also completeness or more generally quality of results. Examples of such applications are billing systems in telecommunication, where each telephone call has to be monitored and registered in a database, Ecommerce applications where orders have to be accepted even in times of heavy load and the waiting time of customers should not exceed a few seconds, ERP systems processing a large number of transactions in parallel, or systems for processing streaming or sensor data in realtime, e.g. in process automation of traffic control. As part of complex multilevel software stack, database systems have to share or contribute to these QoS requirements, which means that

guarantees have to be given by the DBMS, too, and that the processing of database requests is predictable. Today's mainstream DBMS typically follow a best effort approach: requests are processed as fast as possible without any guarantees: the optimization goal of query optimizers and tuning approaches is rather to minimize resource consumption instead of just fulfilling given service level agreements. However, motivated by the situation described above there is an emerging need for database services providing guarantees or simply behave in a predictable manner and at the same time interact with other components of the software stack in order to fulfill the requirements. This is also driven by the paradigm of service-oriented architectures widely discussed in industry. Currently, this is addressed only by very specialized solutions. Nevertheless, database researchers have developed several techniques contributing to the goal of QoS-aware database systems. The purpose of the tutorial is to introduce database researchers and practitioners to the scope, the challenges and the available techniques to the problem of predictability and QoS agreements in DBMS.

ABOUT THE AUTHORS

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He continued his studies as research assistant at the database system group until 1998, when he earned his Ph.D. degree (Dr.-Ing.) with a dissertation on the optimization of aggregate processing in multidimensional database systems. Since 10/2002, Prof. Lehner is conducting his research, teaching his students, and is involved in multiple industrial projects at the TU Dresden. Wolfgang Lehner was also visiting scientist at IBM Almaden Research and at Microsoft Research. Up to now, Wolfgang Lehner published four text books, more than 80 reviewed research papers, and is editor of journals and four other books. His current research interests are clustered around the issue of bringing database methods into the world of service-oriented systems. He is also involved in the most prestigious nation-wide German research project on Next Generation Internet platforms (Theseus), where he contributed concepts on 'data management as a service'.

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