The Current Issue

The characteristics of the hardware upon which modern database systems run have change dramatically since the early years of relational database systems. We have gone from uniprocessor machines of a few MIPS to SMP machines and dual core machines executing at several GIPS. Disks have grown from hundreds of megabytes to hundreds of gigabytes. Main memory has grown from the megabyte range to the gigabyte range. Memory latency has grown from a few machine cycles to over a hundred cycles. Disk latency in machine cycles, has exploded from thousands of machine cycles to millions of cycles.

It is a tribute to the architecture of database systems, which has changed very little, that they continue to execute "reasonably well" on modern hardware. Larger memories have been exploited for larger database caches so as to reduce the number of disk accesses. We have worked hard to make more I/O sequential. Database page size has increased modestly. These simple things have worked fairly well, and have been successful in causing database system performance to increase enormously as hardware capabilities have grown. Nonetheless, the ratio of peak machine performance to realized machine performance has has grown.

We are simply not exploiting modern machines as well as we had exploited the hardware of the 1970's on which the first database systems were implemented. This performance "gap" has attracted the attention of database systems providers as well as the research community. The research community has been very active from quite early in doing the more adventuresome "tuning", such as for processor cache characteristics, e.g AlphaSort, a paper on which was published in SIGMOD'94. Work in this area continues with papers appearing regularly in the leading database conferences. Indeed there is a community of database researchers who have focused on the problem, with interesting and useful results.

I was enthusiastic about an issue on this topic when Gustavo Alonso, this issue's editor, first proposed it. Gustavo has solicited and assembled an interesting collection of papers on this important topic which are well worth serious study. I want to thank Gustavo for his efforts and I encourage you to read the issue. I am confident that you will find the papers presented here both interesting and useful.