Database Architecture (R)evolution: New Hardware vs. New Software

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I. Panel Overview

The last few years have been exciting for data management system designers. The explosion in user and enterprise data coupled with the availability of newer, cheaper, and more capable hardware have lead system designers and researchers to rethink and, in some cases, reinvent the traditional DBMS architecture. In the space of data warehousing and analytics alone, more than a dozen new database product offerings have recently appeared, and dozens of research system papers are routinely published each year. Among these efforts, one school of thought promotes research on exploiting and anticipating new hardware (many-core CPUs [4, 7, 8], GPUs [3], FPGAs [5, 11], flash SSDs [6], other non-volatile storage technologies). Another school of thought focuses on software and algorithmic issues (column and hybrid stores [1, 10, 13], scale out architectures using commodity hardware [2, 9, 10, 13], optimizations in network and OS software stack [9]). And, at the same time, there are approaches that combine hardware-specific optimizations with from-scratch database software design [12].

In this panel, we will ask our panelists, a mix of industry and academic experts, which of those trends will have lasting effects on database system design, and which directions hold the biggest potential for future research. We are particularly interested in the differences in views and approaches between academic and industrial research.

Some of the questions that will be addressed during the panel are the following:

- Is the use of non-conventional CPUs, from GPUs to FPGAs and to custom chips, a research exercise, or a glimpse of things to come?
- In a few years, a computing node will feature 10s to 100s of cores, and data will fit in fast non-volatile storage. Data volume and workloads will scale orders of magnitude. How well are existing systems prepared for this?
- Scalability means different things to different people. What is it to you? Do academic researchers think "big" enough?
- Column-store start-ups are flourishing, yet "big" database vendors so far adhere to row-oriented data processing. Why?
- Are flash SSDs simply faster disks, or a whole new and exciting research playground?
- Scale out (shared nothing) database architectures are constantly gaining ground against scale up (shared memory/disk) ones. Will this trend hold or will history repeat itself?

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