

Accelerating Complete Decision Support Queries Through High-Level Synthesis Technology

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Recently, with the rise of Internet of Things and Big Data, acceleration of database analytics in order to have faster query processing capabilities has gained significant attention. At the same time, High-Level Synthesis (HLS) technology has matured and is now a promising approach to design such hardware accelerators. In this work, we use a modern HLS, Vivado to design high-performance database accelerators for filtering, aggregation, sorting, merging and join operations. Later, we use these as building blocks to implement an acceleration system for in-memory databases on a Virtex-7 FPGA, detailed enough to run full TPC-H benchmarks completely in hardware. Presenting performance, area and memory requirements, we show up to 140x speedup compared to a software DBMS, and demonstrate that HLS technology is indeed a very appropriate match for database acceleration.

ACM Categories & Descriptors: C.1.3 Other Architecture Styles

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