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Distinguished Lecturer Series



Dr. Edward Bortnikov

Yahoo Labs Haifa, Israel

Mediator: Reconciling Transactional and Non-Transactional Operations in NoSQL Key-Value Stores

NoSQL databases have been initially designed to provide extreme scalability and availability for Internet applications, often at the expense of data consistency. The recent generation of Web-scale databases fills this gap, by offering transaction support. However, transaction processing implies a performance overhead that is redundant for many applications that do not require strong consistency. The solutions offered by state-of-the-art technologies, either static separation of the data accessed by transaction-enabled and native applications, or transforming all native operations into transactions in the latter, are both inadequate. We present a novel scalable transaction processing system, Mediator, that accommodates both transactional and native operations in the same database without compromising data safety. Our work introduces a lightweight synchronization protocol that enables conflict resolution between transactions and native operations that share the same data. We evaluate Mediator's implementation on top of the HBase NoSQL database on a large-scale distributed testbed. Our results show that despite a slight overhead to the transactional traffic, Mediator substantially outperforms the best-in-class traditional system on a vast majority of mixed workloads – in particular, on all workloads in which the fraction of native operations exceeds 50%.

Edward Bortnikov is a senior researcher at Yahoo!, where he leads scalable systems research at Yahoo! Labs Haifa. His interests broadly span large scale distributed systems, search, big data analytics, and networking technologies. He published 20+ scientific papers in these areas. He received his PhD in Electrical Engineering from the Technion - Israel Institute of Technology in 2008. Prior to that, he worked in technical leadership positions at IBM Research, Mellanox Technologies, SANGate Systems, and HP Labs.

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