Efficient Compute Node-Local Replication Mechanisms for NVRAM-Centric Data Structures

Non-volatile random-access memory technology NVRAM is about to hit the market and will require significant changes to the architecture of in-memory database systems. Since such hybrid DRAM-NVRAM database systems will keep the primary data solely persistent in the NVRAM, efficient replication mechanisms need to be considered to prevent data losses and to guarantee high availability in case of NVDIMM failures.

In this talk, I am presenting a compute node-local replication approach to provide the building blocks for an efficient NVRAM replication with a low latency and throughput penalty. Within our evaluation using a hybrid HW scenario of DRAM and (real) NVRAM next to each other, we measured up to 10x less overhead for our optimized replication mechanisms compared to the basic replication mechanism of the Intel persistent memory development kit PMDK. Based on the empirical findings, I will also sketch a lightweight switching approach for enabling the online selection of the best replication mechanism for a given situation.