SOLUTION BRIEF

Financial Services
Intel® Optane™ Technology

Analytics and Trading Benefit from a New Class of Memory

Multiple STAC-M3* benchmark records were set using Intel® Optane™ SSD DC P4800X drives with the Kx kdb+* database on Lenovo servers, powered by Intel® Xeon® Scalable processors.[1]

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Market data analytics are the lifeblood of financial-services institutions. Trading analysis relies on rapid processing of real-time events occurring with nanosecond precision. These results are then compared to related historical data, potentially reaching back years or even decades. Getting fast access to the right data is critical for a range of business needs, from risk management to implementing trading strategies to triggering alerts related to meeting regulatory requirements. Those organizations that can most quickly process and analyze securities data are the ones most likely to outpace the competition.

Companies face significant pressure to keep up with this deluge of historical and real-time data. After all, just five years of trading records can add up to petabytes of data that need to be stored or staged, rapidly accessed on demand, and then processed affordably, reliably, and with minimal latency.

A New Paradigm for Data Management: Intel® Optane™ DC SSDs

Kx is a global corporation that creates tools for processing real-time and historical data. The company's database platform, kdb+*, is designed to handle both in-memory and disk-resident data as a single entity. That enables the platform to support workloads like stock trading, pharmaceuticals, and energy exploration that need to draw data from current and historical data stores for real-time analysis.

Intel® Optane™ DC Solid State Drives (SSDs) are a great fit for platforms like kdb+ because they provide a completely new way of approaching data storage and access. Unlike traditional SSDs, Intel Optane DC SSDs are not NAND-based. Built on innovative Intel Optane memory and storage media, Intel Optane DC SSDs allow for high reliability, high throughput, and consistent low latency. In particular, Intel Optane DC SSDs excel at handling the random read workloads that are typical for analysis of time-series tick data.

"Our financial-services customers are looking for latency to come down for multiple reasons. It can mean the difference between making a trade and not making a trade or making a profit and not making a profit."

— Mark Sykes,
Chief Operating Officer, Kx

Putting Intel Optane DC SSDs to the Test

Intel wanted to demonstrate that Intel Optane DC SSDs could be used to augment NAND-based SSDs to drive down latencies for real-time processing of financial-services data. In collaboration with the Securities Technology Analysis Center (STAC*), Intel conducted real-world analytics tests using kdb+. kdb+ is the database of choice for STAC-M3* tests because of its consistently high performance for market data analytics.

To simulate real-world performance of tick analysis, Intel used the STAC-M3* test suites. Investment banks and hedge funds in the STAC Benchmark Council created the STAC-M3 benchmark test suites to enable comparative testing of technology stacks suitable for managing financial time-series data such as tick data. The benchmarks provide a common basis for quantifying the extent to which emerging hardware and software innovations improve the performance of tick storage, retrieval, and analysis.

Five STAC-M3 Benchmark Records for kdb+ with Index Files on Intel Optane DC SSDs

Intel wanted to simulate a practical deployment of Intel Optane DC SSDs for financial-services organizations. Many financial-services workloads are tens of terabytes in size, so Intel performed a suite of tests using the demanding scaling suite of STAC-M3, code named Kanaga. A 50 TB database was used, but only the "time" index file was stored on Intel Optane DC SSDs; all other data was stored on Intel® 3D NAND SSDs, as shown in Figure 1. The STAC-M3 test results were impressive, with the Intel Optane DC SSD configuration setting five records, compared to all other systems tested using kdb+.

5 PERFORMANCE RECORDS

STAC-M3* benchmark tests with index files on Intel® Optane™ DC SSDs running on systems powered by Intel® Xeon® Scalable processors[1]

The records were set on market snapshot tests, which involve querying the prices on baskets of stocks across random dates throughout a given year of data. This type of query entails large numbers of random reads from multiple columns of time values to identify pricing data on specified dates for a specified company. Moving the "time" index file to the Intel Optane DC SSDs accelerated performance for this workload, because Intel Optane technology excels at maintaining extremely low latency for random read requests, even as stress builds from increasing queries by large numbers of people.

Outpace the Competition with Intel Optane DC SSDs

The traders, quants, and data scientists who use kdb+ are valuable resources whose time is at a premium. Intel Optane DC SSDs help increase the productivity of these high-value knowledge workers because these drives enable kdb+ users to analyze more data in a given window of time, or the same volume of data in less time, for a rapid return on investment (ROI).

The combination of kdb+ and Intel Optane DC SSDs helps financial-services organizations innovate faster to outpace the competition. By simply adding Intel Optane DC SSDs to their existing platforms, companies can analyze more data, faster, without a major hardware or software redesign and without re-architecting the data center.

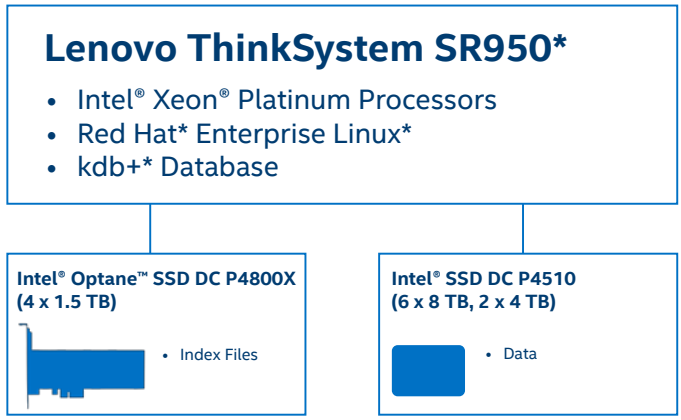


Figure 1. Moving index files to Intel® Optane™ DC SSDs can significantly accelerate performance for complex analytics

Accelerate Analytics with Lenovo ThinkSystem SR950* Servers, Powered by Intel® Xeon® Scalable Processors

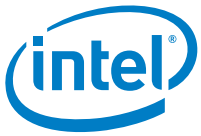
Lenovo ThinkSystem SR950 servers, powered by Intel Xeon Scalable processors, help boost Kx kdb+* database performance by offering more cores, support for greater memory capacities, and improved handling of vector instructions for faster database queries.

For example, simultaneous software threads, running on multiple multicore Intel Xeon processors, are ideal for handling the demanding analytics tasks required by a kdb+ database. And support for large amounts of RAM can boost the performance of memory-intensive workloads, like analytics.

When businesses combine this powerful platform with Intel® Optane™ DC SSDs, they can significantly accelerate analytics of broad, complex sets of data to extract comprehensive insights and make better business decisions.

More Information

- **Intel Optane technology: intel.com/content/www/us/en/architecture-and-technology/intel-optane-technology.html**
- **Intel Optane SSD DC P4800X: intel.com/content/www/us/en/products/memory-storage/solid-state-drives/data-center-ssds/optane-dc-p4800x-series.html**
- **Kx: https://kx.com/**
- **STAC: https://STACresearch.com**



[1] Performance results are based on testing as of October 31, 2018, and may not reflect all publicly available security updates. See configuration disclosure for details. No product can be absolutely secure. Source: STAC. "STAC Report: kdb+ scale tests on a single Lenovo server." (SUT ID: KDB181009 Stac-M3) October 31, 2018. stacresearch.com/news/2018/10/31/kdb181009. Configuration: Kx kdb+ 3.5*, Red Hat* Enterprise Linux* (RHEL*) 7.5 with ext4, Lenovo ThinkSystem SR950*, 4 x 28-core Intel® Xeon® Platinum 8180 processors with 3 TB of DDR4 DRAM, 6 x 8 TB Intel® SSD DC P4510 (3D NAND), 2 x 4 TB Intel SSD DC P4510 (3D NAND), and 4 x 1.5 TB Intel® Optane™ SSD DC P4800X.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit intel.com/benchmarks.

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