VEXATA FOR Kx kdb+

Solution Brief

Highest Performing Enterprise Storage System for Kx kdb+ Database

Enterprises today have to deal with increasing volumes of data that need to be analyzed and acted upon in real time. A very good example is a financial institution that implements algorithmic trading in real time by combining streaming stock data with historical records. Another example involves high speed ingest and analysis of machine data generated by IOT devices. Enterprises increasingly depend on high performance databases such as Kx kdb+ that enable them to organize, analyze and act upon such high velocity data.

Kx kdb+ partitions and load balances the incoming data streams and writes in parallel into persistent high performance storage, and analyzes in parallel to achieve the fastest actionable insights. The performance of kdb+ is therefore heavily dependent on the performance of the underlying storage system.

While servers with multi-core CPUs have been able to attain the immense parallel performance, the current state-of-the-art All Flash Arrays are unable to harness the benefits of parallelism that could result from effective usage of high-performance Flash SSDs. With faster parallel access to flash, Enterprises can achieve yet higher revenue and productivity through actionable insights.

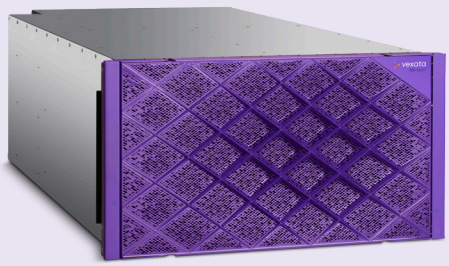
Introducing the Vexata Scalable Systems for Kx kdb+ Database

Based on Vexata's revolutionary Active Data Architecture, the Vexata VX-100 Scalable Systems are a transformative enterprise storage system that enables Kx kdb+ database platforms and applications to realize maximum performance and scale. The Vexata VX-100 comes in 2 models, the VX-100F NVMe Flash System and the VX-100M All Optane System. The VX-100 deploys simply and seamlessly into existing SAN storage environments and alongside any traditional storage arrays, requiring no custom host drivers, adapters or application changes. By leveraging best-in breed, commercially available NVMe Solid State Drives from leading suppliers, the Vexata architecture takes full advantage of advances in solid state media density, cost and performance.

VX-100F All Flash Storage System

VX-100F Specifications:

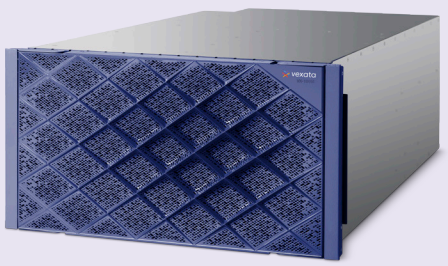
- 220µS Latency
- 150TB Usable Capacity
- 60GB/S (45R/15W) Bandwidth
- 7M IOPS (8KB 70R/30W)



VX-100M - Optane Storage System

VX-100M Specifications:

- 40µS Latency
- 30TB Usable Capacity
- 80GB/S (50R/30W) Bandwidth
- 7M IOPS (8KB 70R/30W)



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Using Vexata Scalable Systems for kdb+ solutions enables Enterprises to cost-effectively implement high rate transaction processing and analytics to significantly improve their top line without needing to create any new silos within their datacenter.

Increase Revenues

With real time actionable insights from 7× faster ingest and 4× faster analysis with Vexata Array compared to leading AFA for Kx kdb+ solution.

Reduce Risk

The Vexata Scalable Systems deliver 99.9999% availability with enterprise class encryption and data protection.

Reduce TCO

Vexata's RAID eliminates need for data duplicationacross hosts. In-chassis scale-out allows customers to deploy a minimum configuration and non-disruptively scale capacity and performance.

Simple Plug-and-Play

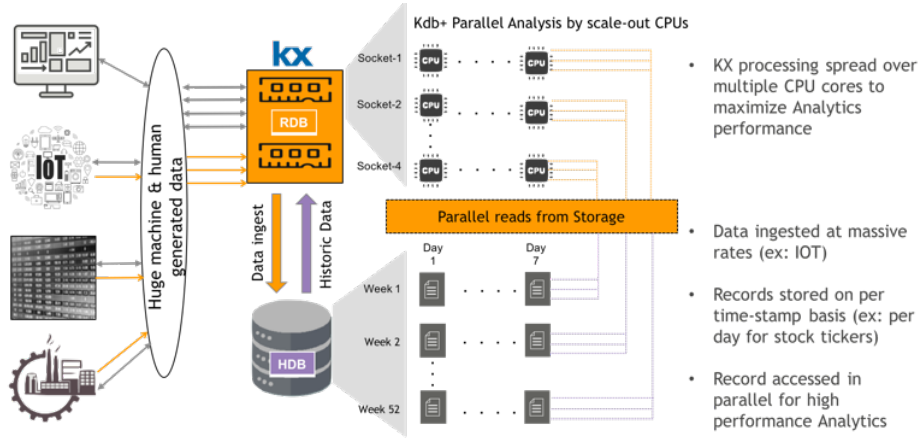
The Vexata Scalable Systems offer standard FC block interface for simple deployment. Vexata supports integration file system front ends for NFS and GPFS services.

Increasing Productivity to Kx kdb+ with Vexata Scalable Systems

Multi-core CPUs accelerate applications significantly as long as the underlying data infrastructure allows for breaking down the execution into parallel tasks that can be run on different cores. Kx kdb+ database is architected to efficiently partition the data by timestamp so that different data for different timestamps is load balanced to execute on different cores.

Kx kdb+ implementation consists of a Real Time Database (RDB) that runs on streaming in-memory data, and a Historical Database (HDB) that is mapped to persistent storage. Kx kdb+ implements a simple and powerful query language called "q" that executes parallel queries on different cores with an embedded mapreduce model. The speed of the query operations depends on how fast the data can be accessed from the HDB.

Today's All Flash Arrays (AFAs) provide a good backend for the HDB store, but their suboptimal architecture leaves an order of magnitude performance on the table. Vexata Scalable Systems provide parallel paths to solid state media thereby cutting down access times and increasing ingest and analysis bandwidth by an order of magnitude compared to the incumbent AFAs. With the reduced wait times, kdb+ can now extend the real benefits of parallelization to storage in addition to the CPUs.



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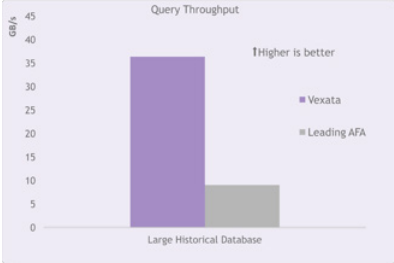
Why Vexata for Kx kdb+

MASSIVE PERFORMANCE FOR REAL TIME INGEST AND INSIGHTS

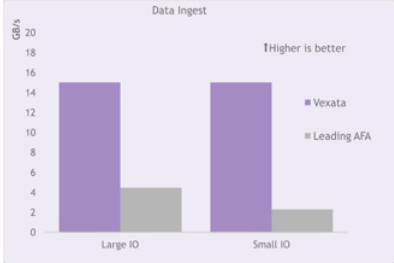
Vexata's Scalable Systems enables parallel access to flash resulting in much higher query and ingest rates compared to any AFA in the market. The charts below show Vexata performance versus an established AFA that is deployed for kdb+ use cases. Vexata performs 4× better for queries during benchmark testing of a financial application. Vexata is also capable of up to 7× faster ingest making it useful for IOT applications.

Faster Real-time Analysis

4× Faster Query Rates

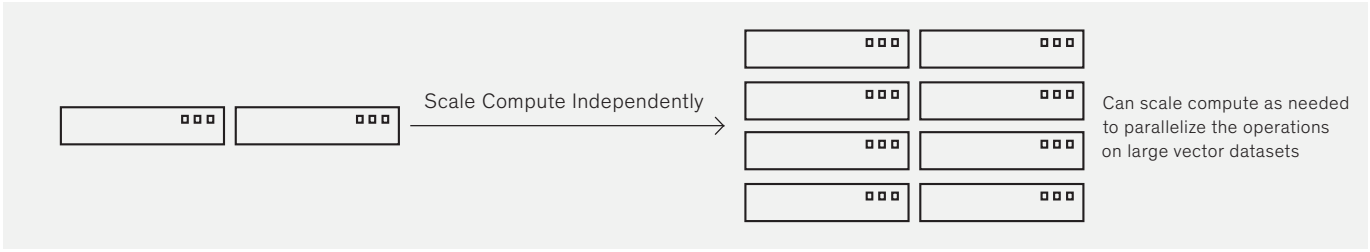


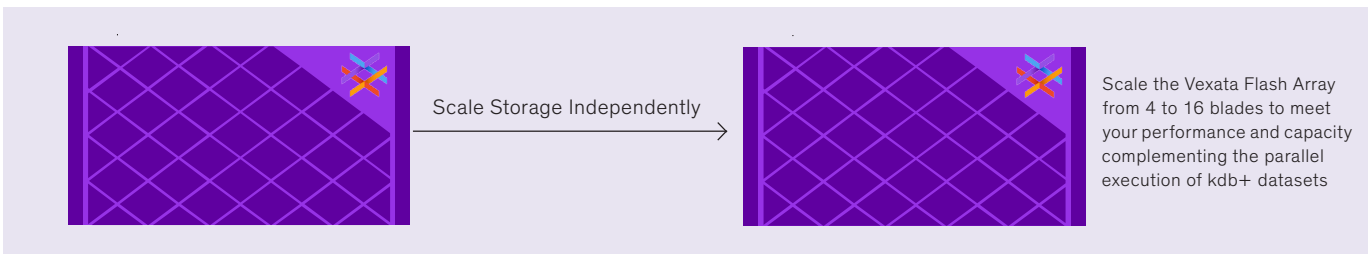
Up to 7× Faster Ingest Rates



Pay-As-You-Grow Scaling

Many financial and IOT applications need smaller historical databases (HDB) to begin with and scale to accommodate data growth resulting from addition of more users or devices or analysis timelines. Vexata enables customers to start with small HDBs and scale-out capacity and performance by adding storage modules without needing to add extra I/O controllers.





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Enterprise Class Storage Features

Vexata Scalable Systems utilize enterprise class storage features, gets customers even higher performance than in- server flash implementations while avoiding the need for data replication or data unavailability that are inherent to in-server implementations. In addition, Vexata Arrays scale over 150TB helping implement larger HDBs that are not possible with in-server flash.

HIGH AVAILABILITY

Vexata dual active/active controller architecture makes data highly accessible without replicating it across the servers.

RAID PROTECTED

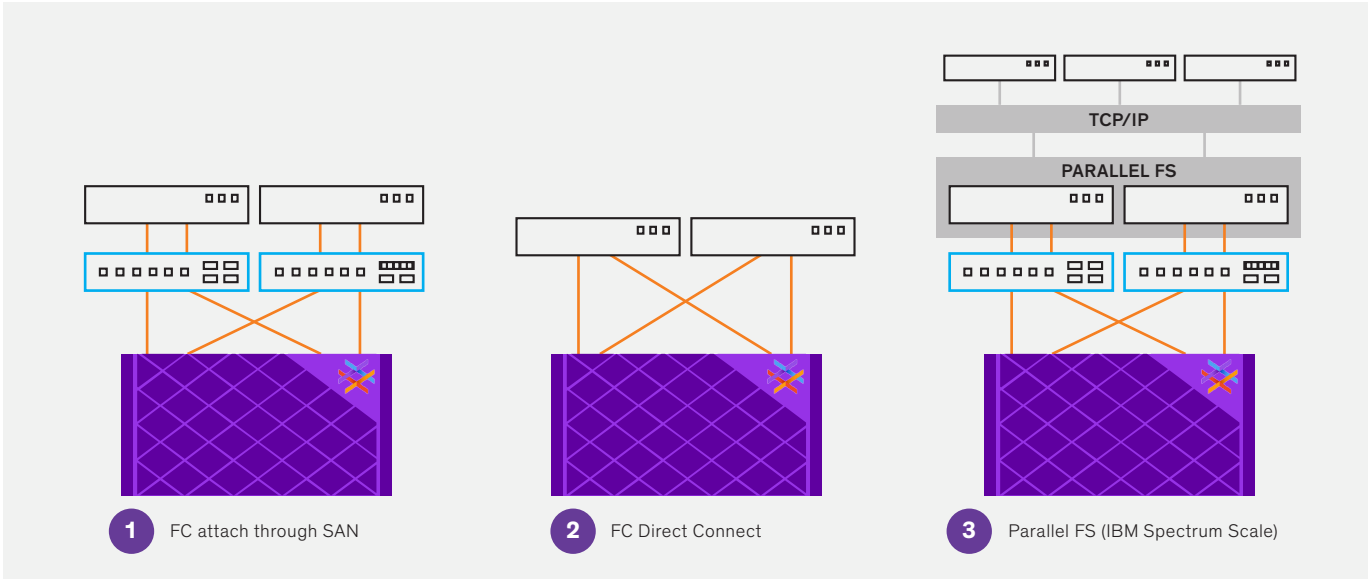
In-built RAID provides protection for up to 2 drive failures. No need of cumbersome in-system raids or multiple copies of data across servers.

NON-DISRUPTIVE UPGRADE

Vexata dual controller architecture provides mechanism to perform rolling update online – So no downtime.

Simple Plug-and-Play

Vexata Scalable Systems offer simple plug-and-play into the existing SAN environments. Additionally, the arrays can be connected directly to servers, or can be consumed as backend to file systems such as IBM's SpectrumScale.



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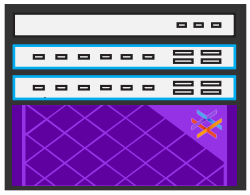
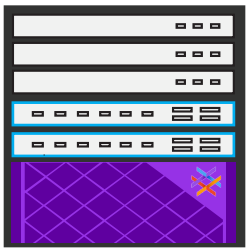
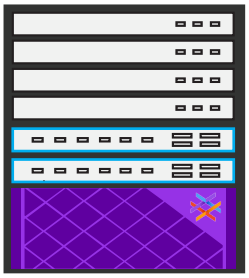
Kx kdb+ Solution Configuration Guide for SAN Connectivity

Vexata offers a range of options for kdb+ deployment using Vexata Scalable Systems. Customers can estimate their I/O requirements and use the right-sized configuration to meet their needs.

1 KDB host[1] 5GB/s Ingest 12 GB/s Query throughput[2]	2 KDB host 10 GB/s Ingest 24 GB/s Query throughput	3 KDB host 15 GB/s Ingest 36 GB/s Query throughput	4 KDB host 20GB/s Ingest 48 GB/s Query throughput
			
4 ESMs[3]	8 ESMs	12 ESMs	16 ESMs
Up to 87TB[4]	Up to 203TB	Up to 319TB	Up to 435TB

1. Each KDB host is a dual socket, 14-core, x86 server with 4 × 32Gb FC connections to FC switch.
2. Used nano tool provided by Kx systems for calculating query throughput.
3. Vexata Array supports 8TB SSDs on 1-16 Enterprise Storage Modules (ESMs).
4. RAID 5 data protected, uncompressed usable capacity with always-on encryption and thin provisioning. RAID 6 also available.

STAC-M3 RESULTS

STAC-M3 benchmark results audited by STAC council are available at:

[1] STAC Report: "Kx Systems kdb+ 3.5 with Vexata VX-100 Flash Array and 4 × Intel S2600WT2 Servers with Intel Xeon E5-2699 v4 ", STAC-M3 Benchmarks", Antuco Suite, https://stacresearch.com/KDB170421

[2] STAC Report: "Kx Systems kdb+ 3.5 with Vexata VX-100 Flash Array and 4 × Intel S2600WT2 Servers with Intel Xeon E5-2699 v4 ", STAC-M3 Benchmarks", Kanaga Suite, https://stacresearch.com/KDB170421

ABOUT VEXATA

Vexata is the leader in active data management solutions. Vexata's unique breakthrough enterprise offerings enable transformative performance and scale from database and analytics applications. With unparalleled ability to consume the latest in media like NVMe Flash and now with Optane™ SSDs, Vexata systems deploy simply and seamlessly into existing storage environments. Learn more at www.vexata.com

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