



VEXATA ACCELERATES MYSQL PERFORMANCE



Enterprise grade, ultra-high-performance MySQL with Vexata VX-100F Flash Array

- Breakthrough Economics**
 The Vexata Array enables the best price-to-performance for MySQL deployments leading to a much lower TCO compared to solutions with traditional All-Flash Arrays (AFAs)
- Performance at Scale**
 Vexata’s MySQL solution delivers an order of magnitude higher performance over other AFA-based solutions making it suitable for enterprise class deployments of large number of consolidated databases
- Enterprise Class**
 Vexata’s arrays offer space-efficient snapshots and clones, and ultra high performance backup and recovery thereby enabling enterprise class deployments of MySQL at a fraction of the cost

MySQL is one of the most powerful open source database platforms being deployed as a preferred database solution in some of the largest enterprise environments. MySQL is the database of choice for content management by media companies. These workloads are generally of petabyte scale and need high performance storage backends to enable successful collaboration by multiple readers and writers.

To achieve enterprise grade MySQL that can consistently deliver the resilience of mission critical production databases, the underlying storage infrastructure must be capable of providing faster performance, low latency, features like data protection through RAID, encryption and space efficient snapshots/clones. Snapshots allow for periodic backup of production databases, and enable seamless deployment of test/dev, analytics and reporting platforms that are derived from the production OLTP database. MySQL databases are also generally larger in numbers than other leading databases, and therefore benefit from consolidation on to fewer storage arrays.

Consolidation of multiple MySQL databases combined with the need to match the performance of the primary enterprise applications forces the underlying storage systems to provide ultra high IOPS at very low latencies for transactional use cases, and very high read bandwidth for analytic use cases. First generation All-Flash Arrays fall short of these requirements as they are unable to utilize the full performance of solid-state media.




Parallel access to NVMe media is required to achieve dramatically higher performance. Vexata’s unique accelerated storage architecture enables significant improvements in performance and operational efficiencies compared to other AFAs. Through massive MySQL database consolidation, Vexata also enables IT to reduce the number of servers and their associated software licenses thereby leading to much lower TCO.

“After many months of testing, I confidently say the Vexata Array is outstanding in both performance and stability.”

Dan Pollack, Chief Storage Architect, Oath/AOL (a Verizon Company)

Vexata VX-100 Shared Accelerated Storage

The VX-100 family of Shared Accelerated Storage arrays is purpose-built to support large-scale block and file deployments, ideal for a high-performance MySQL application. The VX-100F block storage array Vexata unleashes the performance of NVMe storage with Fibre Channel networks. Vexata also offers the VX-100FS File Storage for NFS and GPFS deployments with 10/25/40/100GE providing customers the flexibility to deploy MySQL over clustered file systems. Vexata delivers cost/performance ratios that are far superior to any AFA on the market. Vexata’s next-generation architecture enables a **dramatic increase in performance at substantially less cost while greatly simplifying the underlying data infrastructure.**

 BREAKTHROUGH ECONOMICS	 PERFORMANCE AT SCALE	 ENTERPRISE CLASS
Reduce application spend <ul style="list-style-type: none"> •Much lower database spend with MySQL compared to industry leading solutions •Much lower spend on storage compared to incumbents •>4x reduction in servers due to increased efficiencies •Lowest TCO and best price-to-performance 	Accelerate application performance <ul style="list-style-type: none"> •Maximize database performance per server • Over 12GB/s of bandwidth and 800K SQL IOPS •10x lower latency than AFAs across 100’s of terabytes •SAN or NAS deployments •Ultra-high-throughput, ultra-low latency, and millions of IOPS 	Highest resiliency to support Oracle database-like deployments <ul style="list-style-type: none"> •HA, RAID5/RAID6 for data protection •Data-at-Rest encryption for protection of sensitive data •Space-efficient snapshots for reporting and real-time analytics •Space-efficient clones for test/dev



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MySQL Performance Testing:

Vexata’s performance engineering team set up a single server MySQL configuration with the following parameters:

- **MySQL Version:** 8.0.13 MySQL Community Server – GPL
- **Performance Tools:** Sysbench 0.4.12.10 with OLTP, File-IO Test Options
- **Server:** Dual socket x86 server Supermicro - X11DPI-N with Xeon Gold 6150 18core 2.7GHz CPUs, 4x32GB FC
- **Operating System:** Red Hat Enterprise Linux 7.4
- **Storage:** VX-100F, 16x32GB FC, 132TB, 16 ESMs in RAID 0
- **Volumes:** one XFS logical volume with 12 x 600G Vexata physical volumes

Sysbench-File IO Results from running on single server:

With a single server, FileIO performance was 12GB/s of read performance at ultra low latencies of 320 microseconds. Mixed read/write performance exceeded 12GB/s per server at even lower latencies of 160 microseconds (see Figure 1). The table below provides a summary of the read and write performance with synchronous and asynchronous IO for 64KB block size IO with 16 threads

Type	Sync/ Async	Throughput	Response Time
100% Reads	Sync	3.2GB/s	0.30 milliseconds
100% Writes	Sync	4.8GB/s	0.19 milliseconds
Mixed	Sync	3.0GB/s	0.30 milliseconds
100% Writes	Async	6.5GB/s	0.11 milliseconds
100% Reads	Async	12.2GB/s	0.08 milliseconds
Mixed	Async	11.0GB/s	0.04 milliseconds

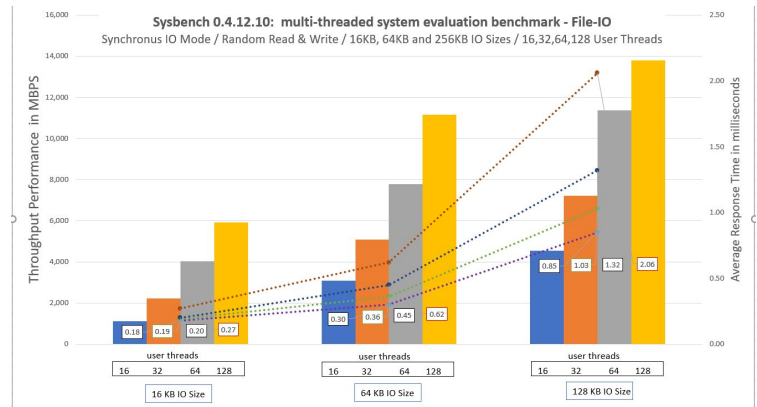


Figure 1 MySQL File IO Mixed Read/Write Performance

Sysbench-OLTP Results from running on single server:

With a single server, MySQL OLTP database performance of 811K Transactions/IOPS was achieved at less than 230 microseconds of end-to-end latency. Write performance is lower at 35K IOPS due to MySQL database and FileSystem limitations. The mixed read/write performance at 635K IOPS shows that MySQL is suitable for read-heavy workloads with infrequent database updates such as for content management use cases.

Type	IOPS	Response Time
100% Reads (128 Threads)	811,000	0.23 milliseconds
100% Writes (128 Threads)	35,000	2.70 milliseconds
Mixed R/W (64 Threads each)	635,000	3.40 milliseconds

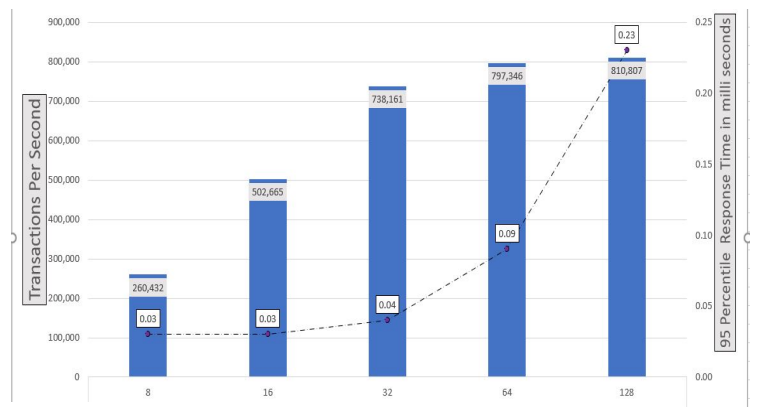


Figure 2 MySQL Database Read Performance

Summary of performance

The Vexata VX-100F array is capable of 50GB/s of read performance and 20GB/s of write performance. The benchmarking indicates that with 4 servers with the configuration shown above running MySQL database would be able to achieve:

- 3.2M SQL Read IOPS at less than 250 microseconds of latency
- Read bandwidth close to 50GB/s for OLAP use cases or equivalently 180TB/hour for recovery
- Ingest performance of 20GB/s or equivalently 72TB/hour for backup
- Mixed read/write performance of close to 44GB/s

About Vexata: Founded on the premise that every business is challenged to deliver cognitive, data-intensive applications, Vexata delivers 10x performance AND efficiency improvements at a fraction of the cost of existing all-flash storage solutions.