Research Abstract

PROWESS

# Making the Leap from SATA to Value SAS

## Prowess Consulting testing showed the practical performance and price performance advantages of moving from SATA to value SAS.

The installed base of enterprise storage capacity is expected to double between 2020 and 2024, reaching 13.2 zettabytes.[3] With this massive growth comes increased pressure to modernize the data center away from Serial ATA (SATA) drives. These legacy drives have limitations, such as the half-duplex inability to read and write at the same time, that make them less suitable to meet increasing performance demands.

There are two main alternatives to consider when upgrading: value Serial-Attached SCSI (SAS) and NVM Express™ (NVMe™). In making this choice, companies need to balance their requirement for performance and capacity against the need for cost-effective solutions. NVMe is a newer, high-performing interface, but it can also be costlier. This makes value SAS an ideal choice for many. But at what pace, and for what workloads, should you upgrade to SAS drives?

Prowess Consulting conducted testing to evaluate the performance differences between KIOXIA RM6 Series value SAS SSDs drives and Samsung® SATA drives on typical database workloads in a modern data center. The results help answer two questions to help companies decide whether and when to move from SATA drives to value SAS drives:

1. What practical performance advantages could be gained by moving to value SAS?
2. What is the difference in price performance between value SAS and SATA drives?

## Highlights:

KIOXIA value SAS drives delivered **between 1.33x and 1.52x better performance in new orders per minute (NOPM)** and **transactions per minute (TPM)**.[1]

KIOXIA value SAS drives saw **between 1.25x and 1.43x better price-performance** than SATA drives.[2]

At 1,000 GB tested, a system with value SAS drives completed tasks in **less than a third the time** than a system with SATA drives.[1]

# Higher Throughput with Value SAS

Our testing used Microsoft® SQL Server® running on Windows Server® 2022, and we ran HammerDB benchmarks to evaluate both online transaction processing (OLTP) workloads (with the TPROC-C benchmark) and analytic workloads (with the TPROC-H benchmark).

The TPROC-C benchmark testing simulates a real-world usage model in which a database receives both requests for data and changes to this data from several users over time. The results showed that the system with KIOXIA value SAS SSDs consistently delivered higher throughput:

- The system with value SAS drives outperformed the system with SATA drives in new orders per minute (NOPM) across every number of virtual users. The performance advantage delivered by the KIOXIA value SAS drives ranged from 1.33x to 1.52x, with the greatest advantage seen with 64 virtual users (1.52x).[1]
- The results for transactions per minute (TPM) were essentially identical to the results for NOPM. The system with KIOXIA value SAS drives showed superior performance across all numbers of virtual users tested. Here also, the performance advantage ranged from 1.33x to 1.52x, with the greatest advantage found with 64 virtual users.[1]

We also conducted TPROC-H testing for 5 and 10 virtual users at database scales of 30, 300, and 1,000 GB. This benchmark measures the kind of workloads typical of decision support, business intelligence, and data warehouse applications. For both numbers of virtual users, the KIOXIA value SAS drives delivered better performance relative to the SATA drives as the size of the workload/database increased:

- For both 5 and 10 virtual users, the tasks were completed by the system with value SAS drives in approximately 10% less time (9.9% and 11.0%, respectively).[1]
- At a scale of 300 GB, the system with value SAS drives completed the workload 30% faster than the SATA drives (74.6% for 5 users and 76.8% for 10 users).[1]
- At 1,000 GB, the system with value SAS drives completed the tasks in less than a third the time of the system with SATA drives. (Compared to the system with value SAS drives, the system with SATA drives took 3.62x as long to complete the tasks with 5 users, and 3.26x as long with 10 users.[1])

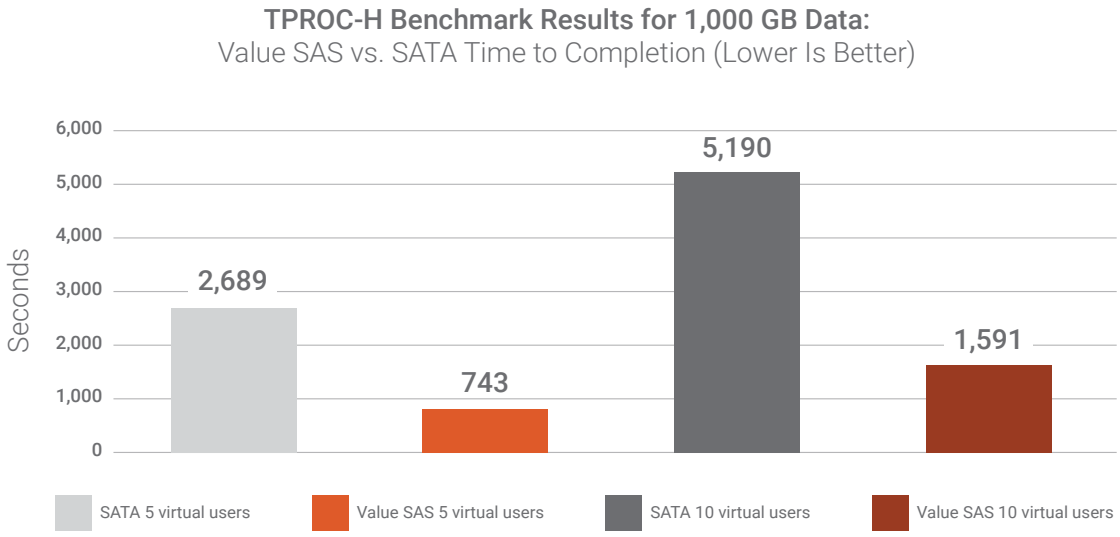


Figure 1 | The value SAS drives complete analytics tasks on 1,000 GB data faster than the SATA drives

# Better Price Performance with Value SAS

When considering a technology upgrade, such as moving from SATA drives to value SAS drives, price performance can be of equal value to performance. We adjusted the raw performance results from our study to account for pricing differences between the two kinds of drives tested, and we then normalized the results. The system with value SAS drives delivers between 1.25x and 1.43x better price performance than the system with SATA drives.[2]

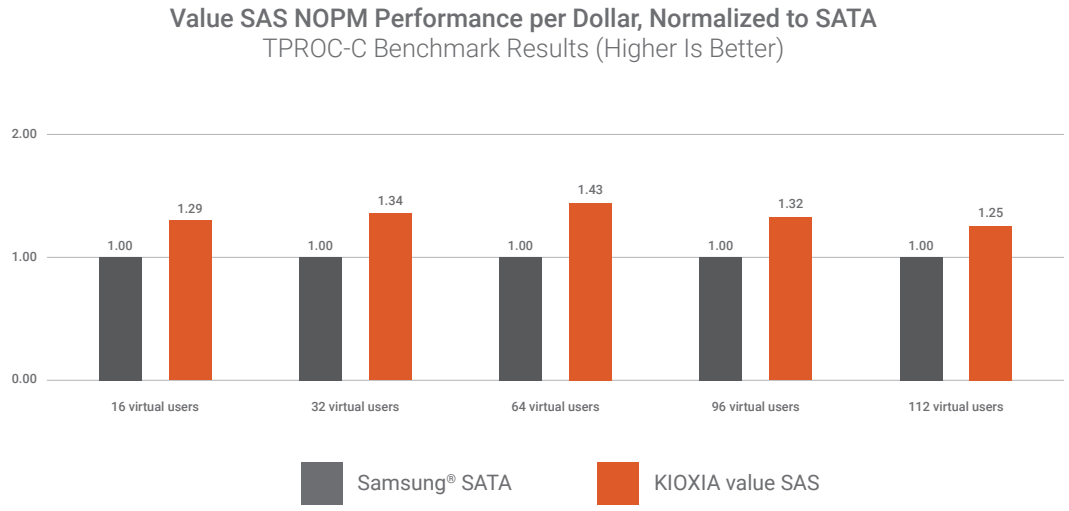


Figure 2 | Value SAS drives deliver more NOPM performance per dollar than SATA drives

Prowess Consulting testing demonstrates the performance benefits of deploying KIOXIA RM6 Series value SAS SSDs in the data center, compared to traditional 6 Gb/s SATA SSDs. These performance advantages translate directly into price-performance advantages as well, given that the KIOXIA value SAS SSDs are similar to the SATA drives in price, power consumption, and expected lifespan.

KIOXIA value SAS drives represent a significant step up in performance over SATA drives, with only a minimal step up in cost. Companies seeking higher performance at similar prices should consider upgrading from aging SATA drives to today's value SAS option.

## Learn More

Get the full story by reading the technical research report, "A Big Step Up from SATA: Testing KIOXIA RM6 Series Value SAS SSDs."

[1] Based on testing by Prowess Consulting as of December 2022. For configuration details, see "A Big Step Up from SATA: Testing KIOXIA RM6 Series Value SAS SSDs." April 2023. https://prowessconsulting.com/wp-content/uploads/2023/05/220148-kioxia-sas-value-ssd-outperforms-sata-technical-research-report.pdf.

[2] Based on testing by Prowess Consulting as of December 2022. For configuration details, see "A Big Step Up from SATA: Testing KIOXIA RM6 Series Value SAS SSDs." April 2023. https://prowessconsulting.com/wp-content/uploads/2023/05/220148-kioxia-sas-value-ssd-outperforms-sata-technical-research-report.pdf. Product and vendor pricing fluctuates over time. This pricing is offered as a representative example.

[3] IDC. "Enterprises Rely on Public Cloud Object Storage to Manage Data Growth, Ensure Resilience, and Generate Value." February 2021. www.ibm.com/downloads/cas/ZW9Z057J.



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