**Serve more customers**

40% more orders per minute*
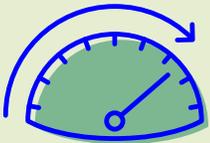
Respond more quickly to customers' needs

49% lower latency*

Get more value for your money

45% more orders per minute for every dollar*

with value SAS SSDs from KIOXIA vs. enterprise SATA SSDs

Discover life after SATA with Dell EMC PowerEdge servers equipped with value SAS SSDs from KIOXIA

A PowerEdge MX solution with RM5 Series value SAS SSDs processed more simulated customer orders, responded in less time, and provided better per-system value than the same solution with enterprise SATA SSDs

Dell EMC PowerEdge MX-based vSAN cluster running a transactional database workload

You wouldn't set out on a road trip with an outdated map. Yet many businesses are still relying on SATA SSDs, a technology that hasn't increased its transfer speed of 6Gb/s in over ten years.[1] Value SAS SSDs from KIOXIA offer businesses a connection speed that's twice as fast.[2] But can RM5 Series value SAS SSDs compete with enterprise SATA SSDs on price as well as performance?

We used hands-on testing to find out, setting up a VMware vSAN™ cluster on a Dell EMC™ PowerEdge™ MX server with two different drive configurations: enterprise SATA SSDs, and RM5 Series value SAS SSDs. On each set of drives, we configured a virtualized environment to run mixed read/write transactional database workloads that simulated customer purchases from an online store. The configuration with value SAS SSDs processed 40 percent more orders per minute, responded in roughly half the time, and delivered 45 percent more transactional database performance per dollar than the enterprise SATA SSDs we tested.

With value SAS SSDs from KIOXIA, your business can navigate toward future growth. Welcome to life after SATA.

Mapping your future with value SAS SSDs from KIOXIA

According to the Serial ATA International Organization (SATA-IO), there are no plans to extend SATA bandwidth beyond its current 6Gb/s transfer rate.[3] SAS SSDs, by contrast, have a roadmap that extends into 2029, including plans for faster speeds.[4]

With their RM5 Series value SAS SSDs, KIOXIA has introduced a SAS option that provides better transactional database performance per dollar.[5] According to KIOXIA, value SAS SSDs offer a 12Gb/s connection and provide "better performance, reliability, and features than enterprise SATA SSDs."[6]

The RM5 Series includes both read-intensive and mixed-use models to give enterprises flexibility to choose the most appropriate drive for their workloads. In our VMware vSAN cluster, we used 3.84TB read-intensive drives for our capacity tier and 960GB mixed-use drives for our cache tier to handle the more write-intensive I/O activity in our workload.

About the Dell EMC PowerEdge MX

The Dell EMC PowerEdge MX is a modular infrastructure that supports various modules for compute, storage, and networking. According to Dell EMC, the no-midplane design of the PowerEdge MX platform enables "multiple generations of technology releases,"[7] including "scalable fabric architecture to support new processor technologies, new storage types, and new connectivity innovations."[8] Each PowerEdge MX chassis supports up to eight compute sleds, but we only used four in our testing. An organization could maximize the performance of each PowerEdge MX chassis by purchasing up to four additional compute sleds, for a total of eight compute sleds, before they would need to add another chassis.

To learn more, visit https://www.dellemc.com/en-us/servers/modular-infrastructure/poweredge-mx/index.htm.

RM5 Series value SAS SSD from KIOXIA

How we tested

We wanted to learn about the performance improvements companies could experience with value SAS SSDs from KIOXIA versus enterprise SATA drives. We set up a four-node VMware vSAN cluster on a Dell EMC PowerEdge MX server using two different drive configurations:

1. Read-intensive Samsung® PM863a SATA SSDs for the capacity tier and mixed-use Micron® 5200 MAX SATA SSDs for the caching tier
2. Read-intensive RM5 Series value SAS SSDs for the capacity tier and mixed-use RM5 Series value SAS drives for the caching tier

We set up 24 VMs on both configurations. Each VM ran a mixed read/write transactional database workload that simulated customer activity on an online store, such as creating accounts, logging in, searching for products, and making purchases that affect inventory. See the science behind the report for more details on the configurations and how we performed testing.

What we learned

The Dell EMC PowerEdge MX server cluster with value SAS SSDs outperformed the configuration with SATA SSDs in terms of orders per minute (OPM) and response times (latency). The value SAS-based configuration processed a total of 1,334,660 OPM across the 24 VMs, or an average of 55,611 per VM. The SATA-based configuration, by contrast, processed only 948,294 OPM, for a per-VM average of 39,512. With servers and drives that can support more orders per minute, your organization could serve more customers, increasing your ability to generate more revenue.

Total orders per minute (OPM) *higher is better*

40%
more OPM

RM5 Series value SAS SSDs

1,334,660

Enterprise SATA SSDs

948,294
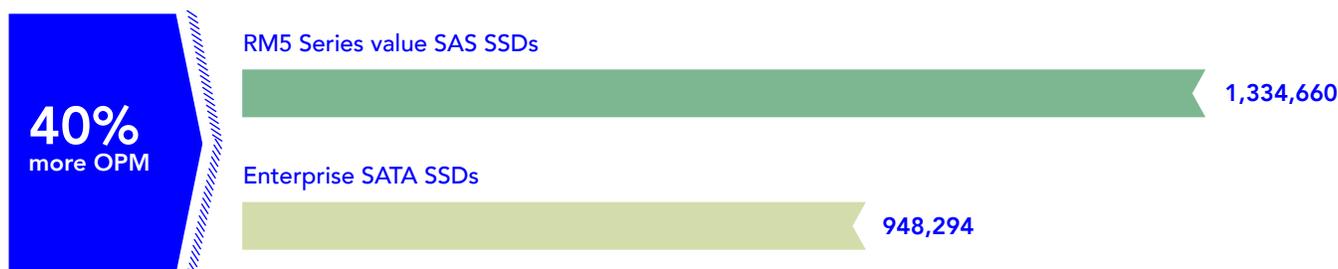
When it came to latency, value SAS SSDs boosted performance even further. The value SAS-based configuration had a total latency of 5.7 milliseconds, compared to 11.3 milliseconds on the SATA-based system. Lower latency generally indicates that a system will respond in less time, which can translate to a better customer experience.

Total latency (ms) *lower is better*

49%
better response time

RM5 Series value SAS SSDs

5.7

Enterprise SATA SSDs

11.3
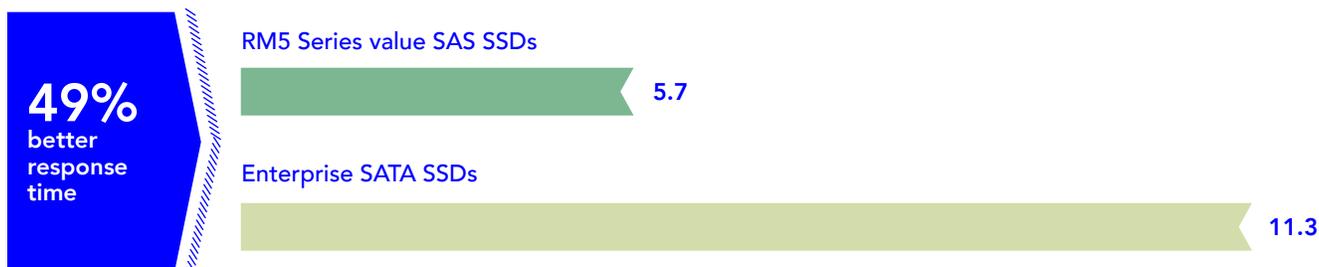
Value SAS SSDs provided better transactional database performance per dollar

To arrive at our performance-per-dollar metric, we divided the total OPM by the total solution cost of each configuration. (For more information on how we calculated our cost analysis results, see the science behind the report.) As the graph below shows, the Dell EMC PowerEdge MX server with RM5 Series SAS SSDs provided 4.9711 OPM per dollar, whereas the configuration with enterprise SATA SSDs delivered 3.4101 OPM per dollar. This means the configuration with value SAS SSDs produced 45 percent more OPM per dollar. With a solution that produces a better return on transactional database performance, your organization could serve more customers for less or invest more money in initiatives that grow your business.

OPM per dollar *higher is better*

45%
more OPM
per dollar

System with RM5 Series value SAS SSDs

4.9711

System with enterprise SATA SSDs

3.4101
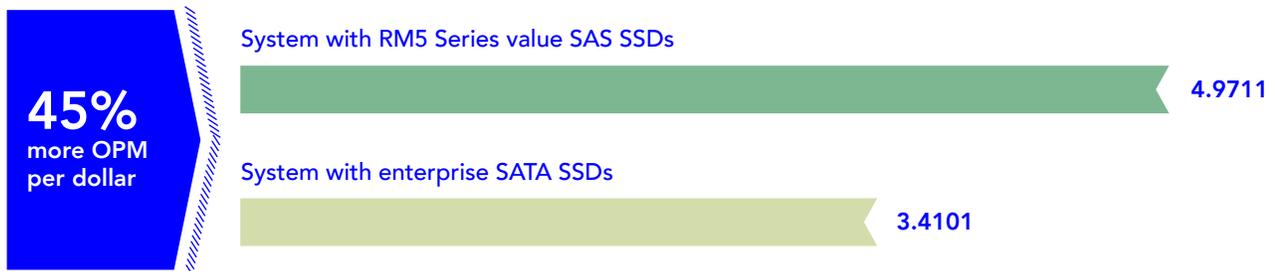
About VMware vSAN

VMware vSAN is a software-defined storage solution for large enterprises. VMware vSAN pools physical storage together in a virtual environment, enabling more efficient resource management without the complexity of traditional storage arrays. On an all-flash configuration, VMware vSAN uses a caching tier as a high-performance, write-only buffer, and a capacity tier as a read cache and a place for storing data.

To learn more, visit https://www.vmware.com/products/vsan.html.

Conclusion: Support more customers and get more per-system value

In our transactional database testing, a Dell EMC PowerEdge MX server cluster with RM5 Series value SAS SSDs outperformed the same server solution with enterprise SATA SSDs. The value SAS-based configuration processed more orders per minute, responded in less time, and provided better database performance per dollar than the configuration with SATA drives.

Your organization may be wondering what storage options lie beyond SATA. With its RM5 Series value SAS SSDs, KIOXIA provides an answer.

1   The Serial ATA International Organization (SATA-IO), which describes itself as "an independent, non-profit organization developed by and for leading industry companies" ("About SATA-IO," accessed October 3, 2019, https://sata-io.org/about-sata-io), last announced a doubling of maximum transfer speeds on SATA (from 3Gp/s to 6Gp/s) in August 2008 ("New SATA Spec Will Double Data Transfer Speeds to 6 Gb/s," accessed October 3, 2019, https://sata-io.org/system/files/member-downloads/SATA_6Gb_Phy_PR_Finalv2.pdf). SATA-IO states on their FAQ page that "there are no plans to extend SATA bandwidth beyond the current 6Gb/s transfer rate" ("SATA-IO Frequently Asked Questions," accessed October 3, 2019, https://sata-io.org/sata-io-frequently-asked-questions).

2   KIOXIA, "Life After SATA," accessed October 3, 2019, https://business.kioxia.com/en-us/ssd/life-after-sata.html#value-sas.

3   SATA-IO, "SATA-IO Frequently Asked Questions," accessed October 3, 2019, https://sata-io.org/sata-io-frequently-asked-questions.

4   SCSI Trade Association (STA), "Serial Attached SCSI Technology Roadmap," accessed October 3, 2019, http://www.scsita.org/content/library/serial_attached_scsi_technology_roadmap/.

5   See our cost comparison results on page 4. According to our testing, RM5 Series value SAS SSDs delivered a 45 percent better performance-to-cost ratio than the enterprise SATA SSDs we tested.

6   KIOXIA, "Life After SATA," accessed October 3, 2019, https://business.kioxia.com/en-us/ssd/life-after-sata.html#value-sas.

7   Ravi Pendekanti, "Meet PowerEdge MX, the First Platform Designed with Kinetic Infrastructure," accessed October 3, 2019, https://blog.dellemc.com/en-us/announcing-poweredge-mx/.

8   Dell EMC, accessed October 3, 2019, https://www.dellemc.com/en-us/servers/modular-infrastructure/poweredge-mx/index.htm.

Read the science behind this report at http://facts.pt/l93coni ▶

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This project was commissioned by KIOXIA