

NVMe and SATA SSDs Bring Major Benefits to Applications and Workloads in Tiered Storage

Overview

High-performance NVMe™ SSDs have transformed data centers and cloud operations with fast IOPS, low latency, and tight quality of service (QoS). Enterprise SATA SSDs have been the backbone of performance IT deployments for generations. Combining these two technologies can produce amazing, affordable results in tiered architectures. We'll show you how.

NVMe



SATA



Responsive

Consistently fast throughput and near real-time access to data to meet the demands of cache tiers



Flash-Optimized

Streamlined efficient queuing protocol, flash-optimized command set



High Performance

Very high IOPS and GB/s with low and consistent latency



Scalable

Immense capacity and small, thin form factors for scale up, scale out results



Affordable

Latest generation NAND technology builds affordable back-end storage with standard, economical interconnects



Maximized Throughput

Enough bandwidth to fill the SATA interface—reading or writing data

NVMe—The Performance Leading Interface

Non-Volatile Memory Express (NVMe) is a host-to-storage device protocol designed from the ground up to take full advantage of flash storage technology on solid state drives (SSDs). NVMe is different from previous host-to-storage device protocols (like SATA) because NVMe uses the PCI Express® (PCIe®) bus for data transfer.

Because PCIe enables additional bandwidth compared to other busses, NVMe transfers data extremely fast (typically in gigabytes per second, GB/s) with very low latency. NVMe SSDs often demand a higher price point than legacy interface SSDs.

SATA—Affordable, High Capacity Back-End Storage

Serial ATA (SATA) SSDs are built using a standard hard disk drive (HDD) bus and interface to build performance and budget-focused SSDs. SATA SSDs combine the benefits of flash, a standard and well-adopted interface, and a more approachable price point with form factor flexibility.

Combining NVMe and SATA SSDs in Tiered Storage

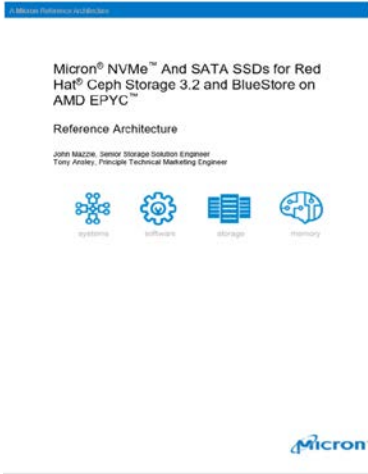
Since its inception, NVMe storage has grown at an amazing rate, becoming the majority of SSDs deployed in data centers as of 2019. Cache-tier NVMe SSDs deliver high speed, low latency and endurance bringing data closer to the processor. They minimize latency and provide consistently fast throughput. SATA SSDs help disrupt the data deluge that can overwhelm a traditional IT infrastructure and are tailored for the needs of read-intensive deployments with attractive price points.



Figure 1: NVMe and SATA SSDs

Combining NVMe and SATA SSDs in a tiered architecture can bring the advantages of both interfaces to help solve the most demanding IT deployments across a broad range of applications, workloads and use cases like those shown below. Each link below downloads a complete, validated Reference Architecture that combines NVMe and SATA SSDs to demonstrate the clear advantages combining these two interfaces can bring.

Combining NVMe and SATA SSDs for Great Results



Red Hat® Ceph Storage

Micron collaborated with Red Hat and AMD to create a solution using a combination of Micron’s fastest NVMe SSDs (providing a high-performance tier) and cost-effective SATA SSDs with Micron’s latest quad-level cell (QLC) NAND technology.

Micron’s unique hardware, coupled with recent performance increases in Red Hat Ceph Storage using the BlueStore storage engine, provides a solution for block and object storage architectures.

For more details, visit <https://www.micron.com/solutions/micron-accelerated-solutions/micron-accelerated-solutions-for-ceph-storage>



Apache Hadoop® with Apache Spark™ Big Data

Big data is a big deal. We are generating, capturing and managing data from new sources with immense volume at unprecedented rates. Our virtualized environments, media streaming services, cloud-based infrastructures and distributed workforce want more from that data.

Historically, one of the major challenges for data scientists has been providing CPUs with data fast enough to reduce idle times and fully utilize these expensive resources. CPU idle time is not only inefficient, it's detrimental to getting real-time, actionable results.

Attaining the benefits of real-time analytics requires faster storage than hard disk drives (HDDs). This tiered NVMe + SATA solution is optimized to maximize performance in a compact, rack-efficient design.

For more details, visit <https://www.micron.com/solutions/micron-accelerated-solutions/micron-accelerated-solutions-for-hadoop-and-big-data>



Microsoft® Azure Stack HCI

For customers with complex IT environments, Microsoft’s intention is to provide solutions that offer the right technology for the right business need. By bringing it into the Azure Stack family, Microsoft has started to offer new options to connect seamlessly with Azure for infrastructure management services.

Micron Azure Stack HCI Reference Architecture combining NVMe and SATA SSDs offers simplicity, performance, fault tolerance, scalability and flexibility that is within budget.

For more details, visit <https://www.micron.com/solutions/micron-accelerated-solutions/micron-accelerated-solutions-for-microsoft-hyper-v-and-storage-spaces-direct>

A Micron Reference Architecture

Micron® Accelerated All-Flash NVMe™
and SATA vSAN™ Solution

Reference Architecture



Micron

VMware® vSAN™

Data-intensive businesses that thrive in today's environment move quickly, and data platforms must move quickly with them. Technologies such as NVMe SSDs and advanced DRAM, in conjunction with standard servers, multicore processors and state-of-the-art virtualization like VMware® vSAN™, are chasing application lethargy out of the data center.

Most vSAN deployments today are all-flash, proving the need for high performance nodes to enable dense, cost-effective virtualized application environments. Like the standard AF-6 all-flash VMware vSAN Ready Node™ definition, this reference architecture combines low-latency NVMe SSDs in its cache tier with high-capacity, enterprise-grade SATA SSDs in its capacity tier, along with advanced Micron® DRAM in standard 2-socket rackmount servers to optimize compute, capacity, cost and performance with vSAN 6.6.

For more details, visit <https://www.micron.com/solutions/micron-accelerated-solutions/micron-accelerated-solutions-for-vmware-vsan-ready-nodes>

Learn More

Micron enterprise SSDs scale to meet cloud and data center demands, delivering performance, reliability, and data protection—all with energy savings over rotating media to power a new generation of faster, intelligent, global infrastructures that make mainstream artificial intelligence possible. Micron's fast, vast storage and high-performance, high-capacity memory and multichip packages power AI training and inference engines—whether in the cloud or embedded in mobile and edge devices. Micron innovation accelerates AI to enrich business and lives beyond what we can yet imagine.

Micron NVMe SSDs: Built for performance, efficiency and low latency to access and process massive amounts of data at sustained speeds of 3.5 GB/s—for both sequential reads and writes—with high-capacity and accelerated performance. For the latest technology, developments and products using NVMe, visit <https://www.micron.com/products/solid-state-drives/bus-interfaces/nvme-ssds>.

Micron SATA SSDs: Optimize your business-critical virtualized workloads the easy way—with the industry-leading performance, reliability, capacity and infrastructure value of Micron enterprise SATA SSDs. For the latest storage products built with the SATA interface, visit <https://www.micron.com/products/solid-state-drives/bus-interfaces/sata-ssds>.

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