vmware® READY
STORAGE

PAVILION

Benefits

- Future-proof design halves networking costs
- Cuts VM storage CapEx in half
- Cuts VM server CapEx by 40%
- Reduces license spend significantly
- Mitigates IO blender effect
- Half the rack size of the nearest competitor
- Native VMware NVMe/TCP and NVMe/RDMA (RoCE) drivers
- Cuts flash needs by 2-3X with zero footprint snapshots, thin provisioning, and data integrity validation
- Simplified management via vCenter, REST API, Kubernetes CSI, OpenStack, DTMF/Redfish, and Swordfish

Features

- Up to 2.2PB of NVMe SSDs per system
- Performance of up to 120 GB/s, 20M IOPS, and ultra-low latency of 25 μs
- Thin-provisioning, zero-footprint snapshots and data integrity validation for VMs to meet evolving requirements for data assurance, security, and compliance
- Multi-Platform
- VMware certified:
  - o NVMe/TCP on VMware 7U3
  - o NVMe/RDMA (RoCE v2) on VMware 7
  - o iSCSI and NFS on VMware 6.7 and 7
- WHQL certified NVMe-oF driver on Windows Server 2016/2019
- S3 and SMB support for other Linux, Windows, and VMware applications
- NFS & S3 Global Namespace

NVMe-oF Storage for VMware®
Slash VM Licensing Cost, Boost Performance, & Simplify Deployment

Organizations embrace VMware and Non-volatile Memory Express (NVMe) for digital transformation, performance, and operational efficiencies. Today about three-quarters of workloads are virtualized, which is only expected to increase in the coming years.

However, many organizations use a Direct Access Storage (DAS) configuration that prevents them from getting the most from their environment. DAS-based datastores use between a quarter and a half of a server's resources to manage storage. It also requires that IT perform storage monitoring and management on every VMware server, increasing overhead. DAS configurations also lack enterprise features like RAID, thin provisioning, encryption, and snapshots requiring IT to more than double the storage per VM. Finally, it can be complex to unleash the performance capabilities of an NVMe SSD, wasting NVMe flash storage CapEx.

Instead of DAS, many organizations utilize software-defined storage (SDS) for their VM datastores. SDS provides enterprise storage services and centralized storage management, but it consumes up to a quarter of each server's resources to do so. Using either a DAS or an SDS for VM datastores will reduce the number of VMs each server can support, requiring IT to purchase additional servers and VMware licenses for the additional VMs needed.

An alternative is an all-flash array (AFA). Most have NVMe SSDs, enterprise features, and centralized storage management, making AFAs the predominant storage solution for VMs in data centers today.

With VMware, IO is no longer predictable. It looks like it has gone through an IO blender. Due to their dual-controller architecture, many AFAs run into a parallelism and performance bottleneck from this IO blender effect. This requires the purchase of additional AFAs to resolve the IO bottleneck, increasing per-VM cost significantly. Most AFAs are also based on legacy fibre channel technology that is double the price of Ethernet and lacks the future growth and performance of the Ethernet-based design used by Pavilion.

Scalable and Flexible VM Performance Through NVMe-oF
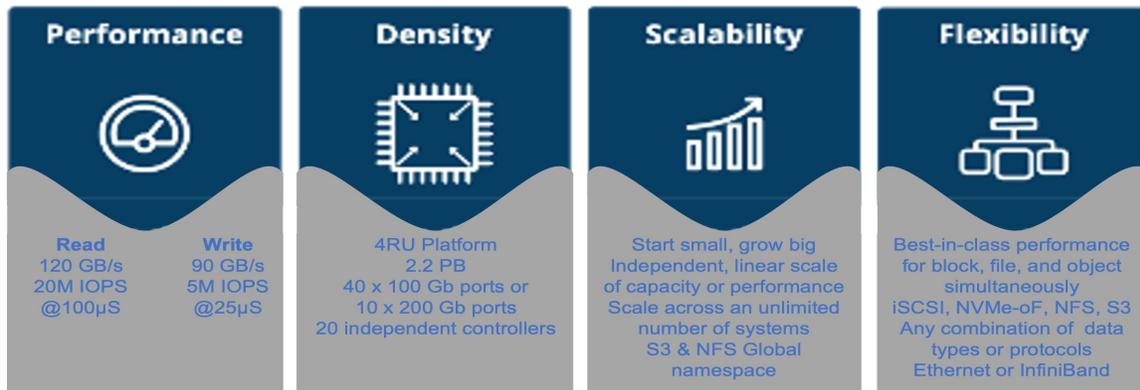
Pavilion offers a better way.

The Pavilion HyperParallel Flash Array (HFA) provides high performance and low latency to VMs, making it ideal for every workload. VMs get the performance of DAS with the enterprise features and management characteristics of a SAN. It is an AFA that uses NVMe-over-Fabric (NVMe-oF) for VMs, specifically NVMe/RDMA (RoCE v2) & NVMe/TCP.

Pavilion leads the industry in supporting NVMe-oF, patenting NVMe over Ethernet. It is designed from the ground up for NVMe, providing high performance and low latency for every VM in a compact form factor that is over twice as small as its nearest competitor. It unleashes the performance capabilities of an NVMe SSD, slashing DAS storage CapEx by 50% in terms of $/GB/s.

In addition to saving money, the Pavilion HFA helps scale VM-based key business processes, providing VMs with ultra-high performance, ultra-low latency, and enterprise capabilities that are superior to DAS, SDS, and AFAs.

The Pavilion HFA unlocks the power of NVMe to enhance the parallelism and performance of VMs, supporting 40% more VMs (and hosted applications like SQL Server) while cutting VM storage needs by over half compared to DAS. It reduces vSphere and hosted application licensing costs appropriately. Its multiple controller architecture helps mitigate IO bottlenecks caused by VMware's IO blender.

The Pavilion HFA integrates with VMware vCenter, REST API, Kubernetes CSI, OpenStack, Redfish, and Swordfish. It is certified with VMware's native drivers, including NVMe/RDMA (RoCE v2), NVMe/TCP, iSCSI, and NFS v3/v4. Pavilion frees up host resources for processing, eliminates deployment complexity, and slashes costs with unified block, file, and object operations. This revolutionary storage system offers the most performant, dense, scalable, and flexible storage in the universe.

Performance	Density	Scalability	Flexibility
Read 120 GB/s 20M IOPS @100µS **Write** 90 GB/s 5M IOPS @25µS	4RU Platform 2.2 PB 40 x 100 Gb ports or 10 x 200 Gb ports 20 independent controllers	Start small, grow big Independent, linear scale of capacity or performance Scale across an unlimited number of systems S3 & NFS Global namespace	Best-in-class performance for block, file, and object simultaneously iSCSI, NVMe-oF, NFS, S3 Any combination of data types or protocols Ethernet or InfiniBand

The Pavilion HFA needs no custom drivers; instead, customers access the Pavilion HFA's NVMe SSDs with its certified support of VMware's native driver. For example, VMs can use NVMe/RDMA (RoCE v2) on a vSphere 7.x infrastructure or utilize VMware's NVMe/TCP driver on a vSphere 7U3 infrastructure. They can also use VMware's iSCSI and NFS drivers on vSphere 7.x and 6.7, as well as the S3, SMB, and Kerberos CSI interfaces. In addition, VMware Ready Storage certification ensures customers that Pavilion's NVMe drives will seamlessly integrate with a VM datastore on a VMware 7U3, 7U2, 7U1, 7, and 6.7.

The Pavilion HyperParallel Flash Array eliminates the need to have a separate storage appliance for block, file, and object applications. It supports all three simultaneously and provides the highest performance storage available per data center rack unit to every application. Bring your business and its data together in one intuitive platform. With the Pavilion HFA, you can deploy scalable clusters of VMs and applications such as MongoDB, kdb+, Spark, and HDFS on Kubernetes. In addition, the Pavilion HFA enables users to analyze relational and unstructured data side-by-side.

Zero-footprint snapshot capability provides an instant replica of data of entire systems or an individual VM for use by developers, testers, and other organizations that need access to real-time data. The snapshot can also be used for backup or replication, removing the need to quiesce the VM application for operations like backup, business continuance, and DR.

Pavilion HFA's thin provisioning allocates fast and unlimited storage on-demand to VMs, and it is deallocated when the VM is deleted. As a result, Storage-provisioning time is significantly reduced because you can create the storage without depending on the actual physical space available. In addition, data integrity validation assures that a VM gets the data that was written, and the risk of bit-rot is reduced by the Pavilion HFA's integrity checking and its built-in RAID error correction algorithms. The result of snapshots, thin provisioning, and data integrity validation is that 2-3X less storage is required for operations than DAS.

VMware is one of the most popular hypervisors on the planet. Pavilion's NVMe-oF support enables VM customers to reduce license and hardware costs, simplify management, and boost operations with its exceptional density, scalability, high performance, ultra-low latency, and non-blocking data IO. Use the Pavilion HyperParallel Flash Array to accelerate time-to-results with VMs and other data-driven applications with the most performant, scalable, dense, and flexible storage platform in the universe.

Learn More

Pavilion shatters customer expectations and resulting organizational outcomes by revolutionizing data processing for modern AI/ML, HPC, Analytics, Enterprise Edge, and other data-driven applications. The Pavilion HyperParallel Data Platform™, powered by Pavilion HyperOS™, delivers unmatched performance and density, ultra-low latency, unlimited scale, and flexibility, providing customers unmatched choice and control. Learn why Fortune 500 companies and federal government agencies choose Pavilion. To schedule a demo, visit www.pavilion.io. Follow the company on LinkedIn.