PAVILION

Benefits

Shatter Expectations

- 2-3X reduction of flash consumption
- Reduce SQL Server licensing costs
- Cut management costs by 50%
- 2X increase in rack density, cutting footprint and lowering power/cooling costs
- 50% reduction in network traffic
- Boost backup and DR operations
- Accelerate time-to-results with high performance for OLTP and high capacity for BI and analytics
- Built-in headroom for growth
- Simplified storage environment that does not require tuning

Features

- Up to 2PB per system
- Performance of up to 120GB/s, 20M IOPS
- Ultra-low latency of 25μs
- Data integrity validation for SQL Server applications
- Multi-Platform
  - WHQL certified NVMe-oF driver for SQL Server 2016+ on WindowsServer 2016/2019
  - iSCSI and NFS for legacy applications
- Rack scale management via Web GUI, vCenter, Kubernetes, RESTful API, OpenStack, DTMF/Redfish,and Swordfish

Pavilion HyperParallel Data Platform™ for SQL Server

Improve availability while saving time, space and money

Your environment is diverse. Many organizations use a Direct Attached Storage (DAS) configuration for SQL Server that is easy to deploy, but it is difficult to manage, provision, and expand. A DAS-based configuration also lacks enterprise storage management features like RAID, thin provisioning, encryption, and snapshots. Over time, IT has to over-provision and over-purchase storage or compute to resolve these issues. This increases SQL Server licenses and drives up hardware costs.

Since 1990 the performance of a server has doubled every two years due to smaller and faster CPUs, but data center storage and flash performance has lagged. Server-based storage is often deployed with internal SSDs that limit sharing, parallelism, and require mirroring to achieve high availability. The result is 2-3x the number of SSDs to build and operate a reliable and flexible SQL Server cluster.

Moving to software-defined storage (SDS) is not the solution as SDS takes resources away from SQL Server CPU resources, impacting performance and increasing costs due to infrastructure and SQL Server licenses.

An alternative to SDS are all-flash arrays (AFAs) with NVMe SSDs, enterprise features, and centralized management/monitoring. This is the predominant SQL Server clustering solution in most data centers today. But traditional dual-controller AFAs limit application parallelism and performance. Most AFAs are also based on legacy fibre channel technology that is expensive and lacking the future performance of ubiquitous 100-200Gbps NVMe-oF and RDMA-enabled Ethernet. With Pavilion, customers have a very viable alternative.
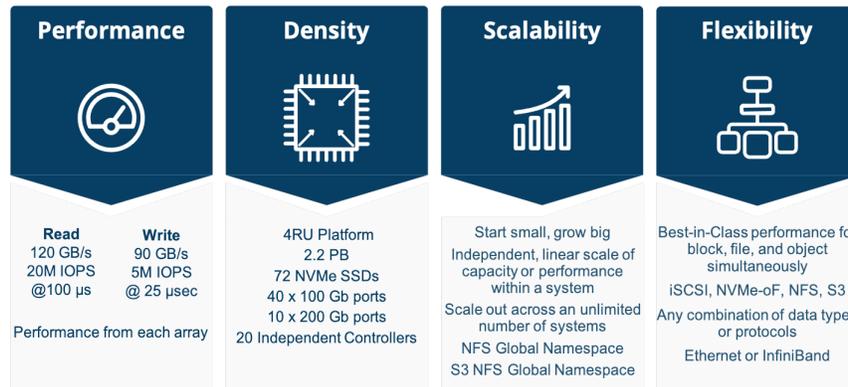
Scalable and Flexible SQL Server on NVMe-oF

Pavilion leads the industry in its support of NVMe-over-Fabrics. One of the company's many patents is "Non-volatile memory express over ethernet." Therefore, Pavilion solutions are built for NVMe from the ground up, providing high performance for OLTP and high capacity for BI and analytics. Pavilion solutions speed data analytics and enable customers to derive actionable insights from big and fast data workloads, like complex SQL Server configurations.

The patented architecture provides 120GB/sec bandwidth and 20M IOPS, at 25 μs latency. It packs 2.2 PB, 20 storage controllers, and 40 x 100Gb Ethernet or InfiniBand ports into a 4RU system. This makes it ideal as storage for Microsoft SQL Server and multiple Windows, Linux, and VMware applications.
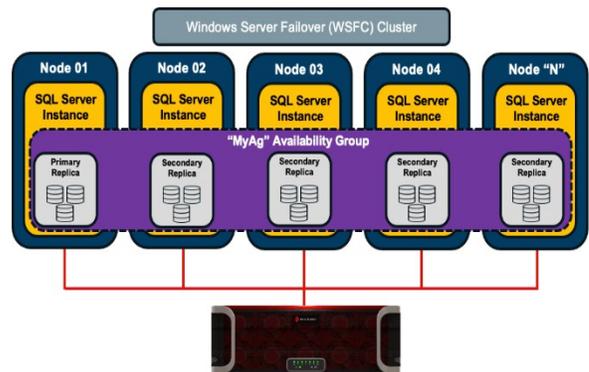
The Pavilion HyperParallel Data Platform™ powered by Pavilion HyperOS™ is ideally suited for large scale Windows and SQL Server workloads. With up to 20 storage controllers and 2.2PB of NVMe capacity in just 4 rack units, this revolutionary storage system offers the most performant, dense, scalable and flexible storage platform in the universe.

Performance	Density	Scalability	Flexibility
Read 120 GB/s 20M IOPS @100 µs **Write** 90 GB/s 5M IOPS @ 25 µsec Performance from each array	4RU Platform 2.2 PB 72 NVMe SSDs 40 x 100 Gb ports 10 x 200 Gb ports 20 Independent Controllers	Start small, grow big Independent, linear scale of capacity or performance within a system Scale out across an unlimited number of systems NFS Global Namespace 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

SQL Server and other applications on Windows Server 2016/2019 use an NVMe-oF driver, which performs similar to a local SSD. Applications get the performance of DAS with enterprise-strength management characteristics.

With the WHQL certification of our NVMe-over-TCP initiator, customers using Pavilion are assured that their storage seamlessly integrates with Windows Infrastructure with support of globally acceptable protocols and high performance. WHQL certification is evidence of thorough, independent verification of functional and operational stability.

All applications gain parallelism, performance, and low latency. Pavilion's enterprise features speed common operations like backup and DR (disaster recovery). Its Web GUI makes it simple to manage and monitor, and continuous operations ensure data is available when needed.

The Pavilion platform gives Microsoft SQL Server the benefits of NVMe's parallelism, performance, and the lowest latency. Moving from DAS-based NVMe SSDs to Pavilion frees up CPU resources that were supporting local storage. These CPU resources are applied to SQL Server, boosting operations, improving time-to-results, and lowering costs. It also saves on rack footprint, power, and cooling as 'storage-less' servers can be used to host SQL Server instances.

Pavilion's data assurance capability ensures SQL Server data remains uncorrupted. Its SwarmController™ recovery protects data residing on large SSDs by guaranteeing that data returns to protection quickly after an SSD failure. SwarmController recovery rebuilds failed SSDs at the rate of less than 5 minutes per TB.

Pavilion HyperOS™ 3.0 enables the usage of SQL Server Always On Availability Groups, to provide high-availability, instead of copying the database between nodes. This reduces East/West network traffic up to 50% and eliminates SSD over-provisioning required for copies.

HyperOS 3.0 also includes the highest performance file and object storage available per data center rack unit. With SQL Server 2019, SQL Server Big Data Clusters allows the deployment of SQL Server, Spark, and HDFS containers on Kubernetes. Now users can combine and analyze relational and unstructured data at scale. With HyperOS 3.0, it is possible to share S3 object data to SQL Server Big Data Clusters for analytics.

Our zero-footprint snapshot capability provides an instant replica of data of entire systems or an individual SQL Server database, 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 SQL Server, for operations like backup/ DR, accelerating time-to-results.

Thin provisioning eliminates SSD wasted space and costs. Our powerful ability to define arbitrary/large volume sizes to SQL Server is significantly better than DAS since the Pavilion system only allocates physical space when SQL Server needs it. Storage-provisioning time is greatly reduced, because you can create the storage for an application quickly, without depending on the actual physical space available. The result is that less storage is required, with up to 2-3X lower flash consumption.

Microsoft SQL Server is one of the most popular databases on the planet. Adding NVMF-oF support with Pavilion delivers unmatched performance and density, ultra-low latency, unlimited scalability and flexibility, providing customers unprecedented choice and control.