

# Accelerate Workflows and Maximize Data Value with Low-Latency NVMe™ Flash and Flexible Software-Defined Storage

## Challenges

- Cloud-scale data centers are reaching the practical limits of DAS deployments.
- Flash storage is frequently under utilized where deployed and not so by applications that could benefit from high performance storage.
- Providing consistent, cost effective, and fast access to data is difficult to achieve.
- Many enterprises struggling to support widespread deployment of applications that span clouds and to break free of silos.

## Highlights

- Enables existing applications to access pooled NVMe storage across a network at local speeds and latencies.
- Enables 100% converged infrastructure by full logical disaggregation of storage and compute.
- Distributed block storage enables customers to leverage NVMe at scale without having to change workflows.
- Delivers deterministic performance that scales linearly at near 100% efficiency.

## Solution

- Together, Excelero and Western Digital deliver high-performance NVMe over Fabrics™ flash storage, enabling customers to improve performance of enterprise mission critical applications as well as new cloud-scale applications that traditionally have relied on DAS.
- Exclero's MeshConnect™, utilizing RDMA over converged Ethernet (RoCE), delivers up to a 50% potential increase in storage performance for ethernet customers with a 50% latency reduction compared to iSCSI.

## Deterministic Application Performance

The shift of data services from centralized CPU to complete client-side distribution enables linear scalability and provides deterministic performance for applications. Supporting both converged and disaggregated architectures gives customers full freedom in their architectural design.

## Latency is the Last Storage Challenge

Leading IT organizations have redefined infrastructures for web-scale applications, leveraging standard servers and shared-nothing architectures to ensure maximum operational efficiency and flexibility. For their cloud-scale applications, enterprises and service providers are seeking to optimize their infrastructures. For storage, this means those who want to deploy scale-out storage infrastructures leveraging standard servers and software-defined storage solutions.

On the application side, the quest for zero-latency storage is real. In this era where technology is ubiquitous, the multitudinous latency-sensitive applications that surround us require fast and efficient processing of data at massive scale. Providing near-zero latency at such scale is one of the last remaining storage challenges and, by extension, the most pressing technology challenge for cloud-scale data centers.

New-generation flash media such as NVMe are moving the bar on storage latency: single-digit  $\mu$ s (microseconds) latency is a reality when deployed locally. This is setting expectations for application developers, who often get much better performance from one local NVMe flash device than an entire enterprise-grade all-flash array.

But the real challenge is to share NVMe across the network, deploy NVMe at scale with the same low-latency as when attached locally. This cannot be done with traditional controller-based architectures as those can only do low levels of IO processing before reaching their design limitations which slows down, increases latency, and eventually tops out.

## New Storage and Networking Technologies Enable Scale-Out In-Server NVMe Flash Architectures

By deploying NVMe as in-server flash in distributed, shared-nothing architectures, IO processing does not suffer traditional controller limitations: as you scale devices and network bandwidth, you linearly scale performance. Applications benefit from the low-latency of NVMe in a scale-out fashion, leveraging standard networking or new-generation networking such as RDMA for ultra-low latency.

Excelero radically changes the way digital businesses design storage infrastructures for low-latency, scale-out applications by providing high performance with efficiencies akin to those of the most efficient data centers.

Excelero NVMesh® enables low-latency distributed block storage for cloud-scale applications and shared NVMe across any network. The solution features an intelligent management layer that abstracts underlying hardware with CPU offload, creates logical volumes with redundancy, and provides centralized, intelligent management and monitoring. Applications can enjoy the latency, throughput and IOPs of a local NVMe device with the convenience of centralized storage while avoiding proprietary hardware lock-in and reducing the overall storage TCO.



Which NVMe Storage Servers are best? Being a 100% software-based solution, NVMesh was built to give customers maximum flexibility in designing storage infrastructures. Although NVMesh supports a wide variety of backend storage solutions, Western Digital offers two integrated NVMe Storage Servers, the Ultrastar® Serv24 and Serv24-HA, which deliver a performance-optimized platform for Software Defined Storage (SDS.) Chipset, core count, and power can be customized to match varying data workload and performance requirements.

Whether as a stand-alone file server or part of a scale-out deployment, the dual socket, single-node Ultrastar Serv24 and quad socket, dual-node Serv24-HA deliver high performance for SDS environments.

Flash technology has revolutionized the performance of storage systems; NVMe extends flash storage to its full potential. Built upon our expertise, the Ultrastar NVMe storage servers deliver screaming performance for SDS environments.

## Excelero NVMesh Components

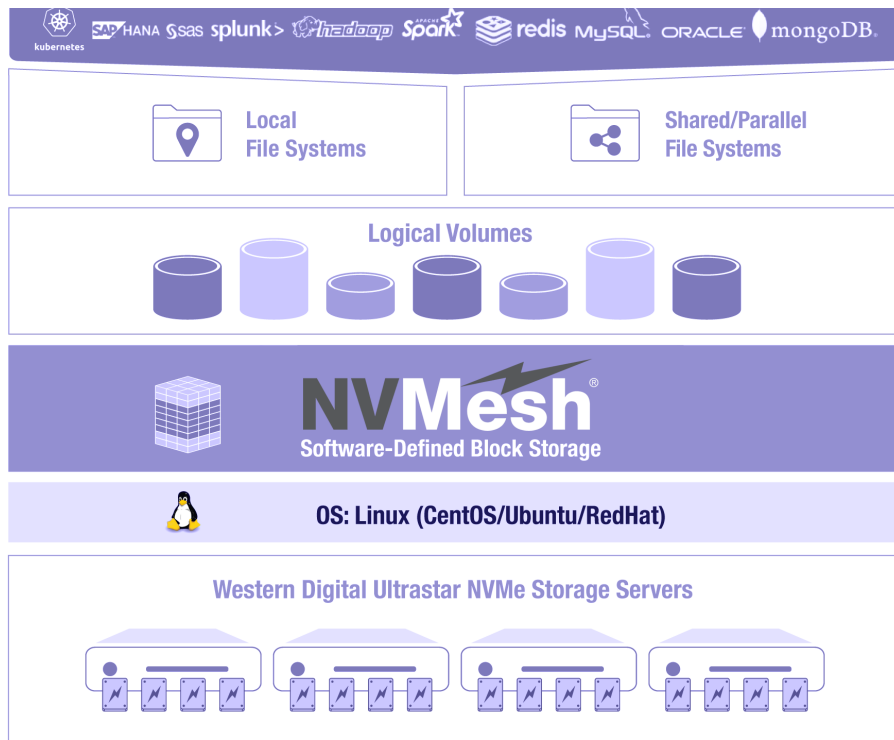
- **MeshConnect™** enables customers to choose the network fabric and protocol that best meets their performance or efficiency requirements. NVMesh supports the widest selection of supported protocols and fabrics, including TCP/IP and Fibre Channel, InfiniBand, RoCE v2, RDMA, and NVMe-oF.

- **MeshProtect™** offers flexible protection levels for differing application needs, including mirrored and parity-based redundancy.

- **MeshInspect™** provides performance analytics for pinpointing anomalies quickly and at scale. NVMesh is deployed as a virtual, distributed non-volatile array and supports both converged and disaggregated architectures, giving customers full freedom in their architectural design.

## Summary

Designed from the ground up to enable customers to maximize NVMe utilization (capacity, performance, and endurance) across their infrastructure, Excelero provides a distributed block layer that allows unmodified applications to utilize pooled NVMe storage devices across the network at local speeds and latencies. When combined with Western Digital's high-performance NVMe-oF Flash storage, the solution provides superior performance, parity-based data protection, and improved storage efficiency to enable customers avoid further investments in new networking technologies.



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