

# Excelero NVMesh on Azure

Improve application effectiveness, agility and scalability with high-performance, elastic and protected storage while improving compute costs and reducing storage costs to a fraction

The public cloud vendors have identified artificial intelligence, machine learning, databases and analytics as key for fueling public cloud growth. These workloads, like commercial HPC in general, are posing significant technological challenges. Infrastructure-as-a-service based “lift-and-shift” strategies deliver limited benefit without agility and cost-effective infrastructure layouts. Alternative re-engineering of applications can be expensive, lengthy and deliver disappointing results.

Excelero NVMesh is a software-defined storage platform catering to data-intensive applications on bare-metal, virtual instances or in containers. Using Excelero’s solution reduces expensive idle compute cycles and eliminates overprovisioning of storage. Excelero NVMesh on Azure is an extension of the on-premise platform running data-intensive production workloads at dozens of companies and facilities such as Deutsche Bank, New York State and Technicolor.

## Why run Excelero on Azure?

- Cut down on data-intensive storage costs
- Make the most of compute cycles by avoiding waiting on storage
- Use standard compute instances for storage and leverage financial agreements with Microsoft
- Protect data while using cost-effective NVMe drives
- Simple provisioning and monitoring to facilitate agile workloads
- Use converged layouts for optimal price-performance of protected storage

## Reduce data-intensive storage costs

Excelero NVMesh is simply deployed on [HBv3-series](#) and [Lsv2-series Azure virtual machines](#) to provide data-protected block storage accessible via NVMe-oF, iSCSI, NFS, NVMesh-direct interfaces or consumable as local storage for converged applications.

In its block device form, it provides a lower latency, higher performance and more scalable alternative to current Azure storage offerings. By running on standard virtual machines, the solution is readily available on most Azure data centers. Consistently low latency storage access is achieved through storage and compute residing in the same proximity zone or in a single availability set.

Excelero provides over 25x improvements in storage price performance ratio in a scalable manner that can cater for any workload size and ensures overall TCO is greatly reduced through improvements in storage costs and compute efficiency translating into smaller compute requirements. For converged environments, with applications running on the same virtual machines, the total cost of ownership is further improved as the storage is embedded into the compute at almost no additional cost.

Storage Type	Capacity (TB)	Latency (us)	4k IO/s (k)	Bandwidth (GB/s)	Cost per hour*	Config	Free Compute Cores**
NVMesh	2.85	85-120	2,500	17.0	10.80	3x HBv3	300
NVMesh	7.6	85-120	6,600	45.0	28.80	8x HBv3	800
NVMesh	7.6	250-280	150	3.2	6.59	2x L32s_v2	32
NVMesh	11.4	250-280	225	4.8	9.88	3x L32s_v2	48
NVMesh	15.4	85-120	13,200	90.0	57.60	16x HBv3	1,600
NVMesh	15.4	250-280	300	6.4	13.18	4x L32s_v2	64
NVMesh	30.8	250-280	600	12.8	26.36	8x L32s_v2	128
NVMesh	61.6	250-280	1,200	25.6	52.72	16x L32s_v2	256

\* Based on typical HBv3 and Lsv2 series on-demand prices. Longer-term subscriptions will be lower.

\*\* The free cores can be used for running applications. For HBv3 120-core virtual machines, a generous allocation of 20 cores have been allotted for storage. For Lsv2, half the cores have been allotted for storage.

Integrated mechanisms for transferring data between the primary storage to cheaper storage for long term retention, such as Azure Blob storage, enable “bursty” data-intensive applications to enjoy the agility of the cloud model, paying for the primary storage on an as-needed basis. For instance, run intensive model training sessions in spurts with longer term retention of data as blobs while ensuring that results will not be lost in the process.

NVMesh is a software-based solution with field-proven RDMA capabilities able to maximize the utility of the state of the art networks. As Azure provides additional instances with more performance and with networking improvements, such as RDMA, Excelero will be able to directly translate this into customer benefit. Excelero NVMesh can be installed directly onto other virtual machine types such as HBv2.

## Get more out of your data

Excelero NVMesh on Azure provides high performance protected storage ensuring you can get the most value out of your data.

For databases, consistently low latency ensures mainstream databases of all sorts can achieve high transaction rates. Mixed workloads combining OLTP loads mingled with ad-hoc queries can now perform so well that “lift-and-shift” strategies of moving database workloads into the cloud become plausible. Data analytics workloads reap the benefits of high bandwidth data access without data protection concerns whether run on classical SQL databases or on nimble NoSQL platforms.

Artificial intelligence, machine learning and deep learning have all become synonymous with GPUs and high performance storage. Accuracy is achieved through large datasets. Efficiency and cost-effective model training and data cleansing are achieved with high performance storage. Large files, such as those used for medical AI or video-based training, require as much bandwidth as possible. Learning in other domains calls for billions of small files accessible by multiple GPUs with as little latency as possible and rates of millions of file accesses per second is critical. Excelero on Azure fulfills the requirements. As workloads stabilize, hybrid approaches can be employed with the same software stack deployed on-premise and on an Azure.

New modern workloads are engineered for containerized deployment while others are being redesigned. Excelero NVMe on Azure provides a K8s CSI plugin for simple generation and consumption of elastic storage. A native OpenShift operator ensures ease of deployment of Excelero's platform with natural complementary elements such as distributed file systems.

Excelero on Azure is the only simple means to deploy distributed file systems with high performance and data protection on Azure, which in turn enables commercial HPC workloads. This applies across a wide range of industries such as fintech, oil and gas and industrial design to name a few.

## Keep your data safe

Local ephemeral NVMe drives are weaved together with Excelero's software to provide enterprise data protection and performance metrics to support the most data-intensive workloads. The first version of Excelero NVMe for Azure protects data by mirroring across local NVMe drives, relieving concerns around data availability. Data can be spread across availability zones for an additional level of protection.

Self-healing and advance warning functionality assist in ensuring data longevity.

## Simple to deploy, ease to use

Deploying Excelero NVMe on Azure is a matter of a few clicks and is easily automated, leveraging Azure Resource Manager templates and an Azure marketplace image. Multiple options for storage connectivity, NFS, NVMe-over-fabrics, iSCSI and NVMe-direct make it easy to consume and integrate with leading databases and file.

A Kubernetes CSI driver and industry-leading IBM Red Hat OpenShift integration provide a second simple means of rolling out NVMe on Azure enabling hybrid cloud deployments, for instance for burst-oriented workloads.

Data compliance and security is customer maintained and controlled by limiting access to storage nodes and compute nodes using Azure IAM. Data is stored only on customer's virtual machines.

## Product Specifications

Feature	Description
<b>Capacity</b>	2.85 TB to 700 TB out of the box. For larger capacities, contact Excelero Sales.
<b>Out-of-the box Connectivity</b>	NVMe-direct NVMe-over-fabrics NFS iSCSI Multi-attach, up to 128 compute nodes
<b>Networking Support</b>	TCP and RDMA
<b>Azure virtual Machines</b>	Storage can be accessed from any virtual machine. It is recommended to employ accelerated networking for TCP or RDMA over Infiniband. Storage nodes are automatically chosen to match requirements. Primary storage is based on local NVMe drives.
<b>Data Protection</b>	Data mirroring, optionally cross availability zones. Future: data tiering and erasure coding.