



Research Computing

Unleash Performance in Scale-Out, Software-Defined Clouds

High-speed Ethernet delivers the performance required for full featured cloud storage services

Executive Summary

The landscape has changed for this generation of analytics-based researchers. Today they require access to unprecedented volumes of data, coupled with the need to provide quick

and secure access to compute and storage resources. Facing these new infrastructure challenges many are turning to an OpenStack-based scientific research cloud. The research community fuels and continues to drive momentum behind the OpenStack community. Partially because OpenStack cloud seems to be tailor-made for scientific research. To do it efficiently, a solution must scale at different speeds to accommodate greater than 10GbE, and possibly up to 100 Gigabit Ethernet. This requires unparalleled high-speed networking and storage performance.

Open Platform

With the relentless growth of unstructured data, solutions specifically designed to scale and run on low cost shared cluster servers are needed to deliver high capacity and availability at low costs to meet scale-out requirements of a Software-Defined cloud. By adopting an agile Cloud service model centered around OpenStack, Universities are able to optimize storage services through Nexenta to run on commodity hardware that disrupts traditional storage economics. Moving all this data requires higher performance networks that are capable of scaling to support the speeds that flash-based storage provides. Efficiencies are gained by using 25GbE or greater speeds. For example, running over 25GbE reduces the number of switch ports and the number of

cables required, compared to 10GbE, by a factor of 2.5. Access to storage is then accelerated at a lower overall system cost.

Scalable Performance

Mellanox Ethernet interconnect solution of switches, adapters, connectors and software enable the network to scale linearly

as bandwidth requirements increase. By leveraging advanced offload and acceleration capabilities such as SR-IOV, RDMA, and VXLAN, the Mellanox solutions mitigate network and virtualization penalties and minimize CPU burdens to achieve maximum network efficiencies. Building and deploying an OpenStack cloud is made easier due to single sourced reliable components that are tested to work together. Allowing for a high-throughput, low-latency cloud network that converges storage onto a single integrated network. A single, high performance, network capable of scaling from 25 to 50 and even 100 Gbps Ethernet.

Universities with existing Infiniband investments can leverage Mellanox Ethernet solutions to bridge traditional HPC interconnects and high performance Ethernet networks. High-performance is the basis for the delivery of all cloud services. This allows Universities to converge HPC and Cloud through high-speed networks at 25/50/100Gb/s throughput. University can then utilize a single high-performance network as a basis for the delivery of all educational research computing services.

Delivering Predictability

In a benchmark completed by Mellanox and Nexenta, 2x higher performance was demonstrated when scaling from 25Gbps to 50Gbps Ethernet. The testing used three all-flash storage nodes with Micron SSDs and a single block gateway configured as a NexentaEdge Block Device (NBD). Four servers were clustered and connected with Mellanox ConnectX-4 Lx adapters which were ran at 25Gbps and then 50Gbps Ethernet. They were in turn connected using Mellanox LinkX cables to a Mellanox SN2000 Series Spectrum switch that supports non-blocking speeds up to 100GbE. 100% random write I/O was used at 128KB block size. Bandwidth on the NBD storage device scaled from 1.3GB/s at 25Gbps speeds to 2.8GB/s at 50Gbps speeds. As the Mellanox fabric line rate increased from 25Gbps to 50Gbps the test results correspond with linear scaling from 25Gbps to 50Gbps line rate performance.

Petabyte Scale

To reach up to a petabyte scale, which some of the larger Universities require, efficiencies are necessary at the storage platform as well as the network.

BUSINESS BENEFITS

A simple solution for researchers across multiple disciplines, without campus borders.



Linear Scalability



Software Defined



Open Platform



Multi-petabyte



Future Proof

SHOWCASE CUSTOMER



UNIVERSITY OF
CAMBRIDGE

NexentrEdge offers an Open Source-driven Software-Defined Storage (SDS), software-only solution, which scales to multi-petabyte repositories within OpenStack environments. This allows for delivery of high-performance storage services over truly economical hardware of your choosing. By decoupling storage software from hardware, the solution is able to deliver resiliency and performance – all at an unprecedented low cost.

Storage in the Cloud

Universities are re-evaluating their storage deployment methodologies and in doing so, are investigating solutions that

provide a foundation for managing exponential data growth while improving on economics. Nexenta optimizes storage services over OpenStack cloud environments by combining robust block and object storage services with off-the-shelf hardware. Pair this with Mellanox enterprise Ethernet solutions to deliver Universities cloud research computing and storage services that scale to meet performance requirements now and well into the future.

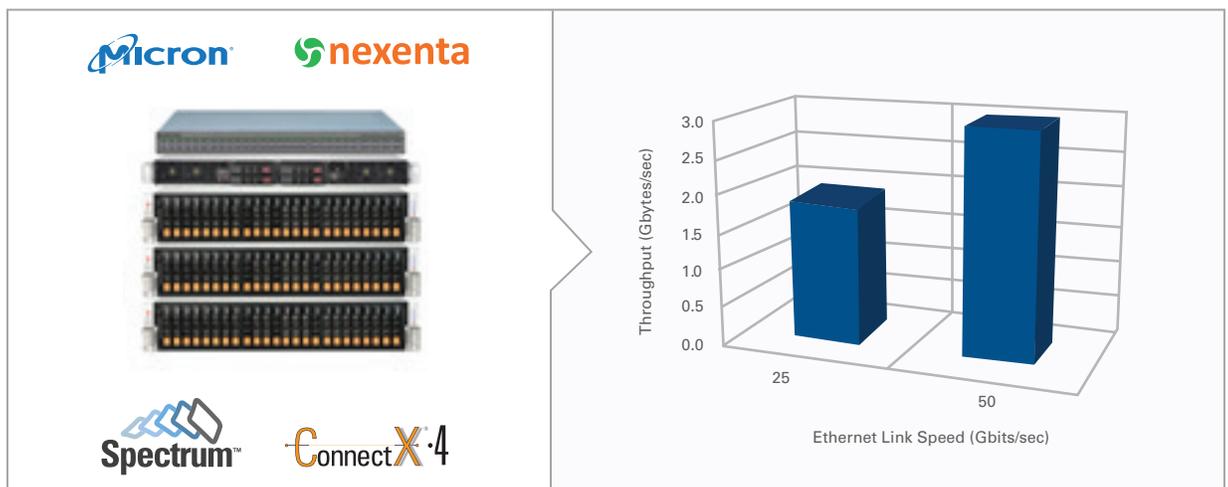


Figure 1. Testing by Mellanox and Nexenta show linear scaling from 1.3GB/s at 25Gbps speeds, to 2.8GB/s at 50Gbps speeds.

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<http://www.mellanox.com/solutions/storage>

http://www.mellanox.com/page/press_release_item?id=1711

To learn more about NexentaEdge cloud storage:

<https://nexenta.com/products/nexentaedge>

Download the Mellanox and Nexenta Solution Brief

http://www.mellanox.com/related-docs/solutions/SB_Nexenta_Mellanox.pdf

About Mellanox

Mellanox Technologies (NASDAQ: MLNX) is a leading supplier of end-to-end Ethernet and InfiniBand intelligent interconnect solutions and services for servers, storage, and hyper-converged infrastructure. Mellanox intelligent interconnect solutions increase data center efficiency by providing the highest throughput and lowest latency, delivering data faster to applications and unlocking system performance.



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