

Hope Bay and Mellanox Deliver High-Performance Bulk Data Storage Solution for Enterprise Clouds



Introduction

For enterprise IT, managing cloud infrastructure is not as simple as it seems. Not only does resource provisioning of cloud storage and computing need to scale efficiently as the data volume grows, the performance also has to linearly scale to enable real-time analysis of petabytes of data. To address these challenges, Hope Bay Tech takes an innovative approach to providing a scale-out cloud storage solution for enterprise private clouds.

In this paper, we demonstrate that Hope Bay Tech's solution, enabled by high-speed Mellanox Ethernet products, provides petabyte scalability, high performance, and enterprise-class reliability that combine to greatly simplify enterprise private cloud build-out and management.

"High IOPS applications have been a pain point for distributed storage systems. Combining ArkFlex U's unique cache technology and Mellanox's high-performance and versatile Ethernet solution, ArkFlex U delivers unmatched performance and reduces the total cost of ownership for our customers."

*- Ben Jai
CEO
Hope Bay Tech*

Solution Overview

The Hope Bay solution, ArkFlex U, distributes data in a multi-node storage cluster. Through a distributed file system and high-speed Ethernet, ArkFlex U effectively delivers scalability economically,

whereas traditional AIO storage solutions cannot, and eliminates the business risk of data loss associated with hardware failure. Figure 1 illustrates the ArkFlex U solution.

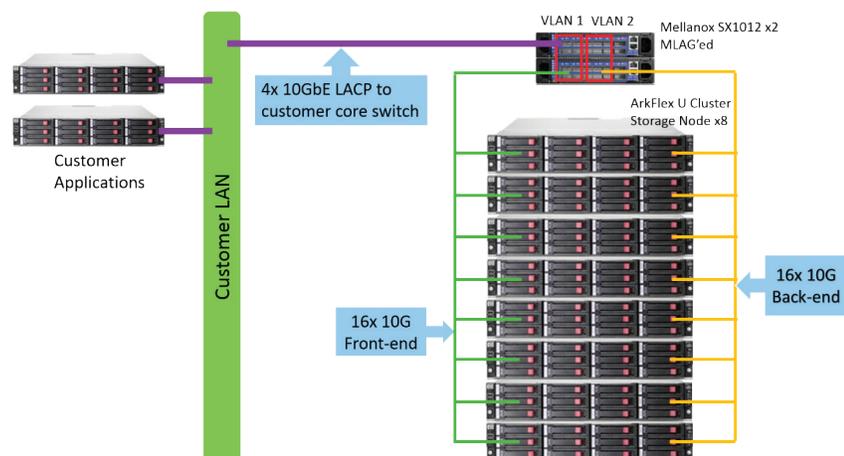


Figure 1. ArkFlex U Network Diagram

ArkFlex U Features

Differentiated from other scale-out solutions, ArkFlex U provides the following unique features:

- NAS, SAN, and object storage services, and compatible with OpenStack. Comprehensive support of CIFS, NFS, iSCSI, S3, and Swift, fulfilling most storage demands
- Storage volume scalable to petabytes, completely removing the constraints of scale-up storage architectures. Scale-out on demand, requiring investments only when necessary
- Up to 75% storage capacity utilization, enabled by optimized erasure coding implementation. Reduces more than 50% of hard drive expenditure
- Always available data, protected by the high-availability and multiple storage-node design. Data secured from hardware failures – up to two nodes or 24 HDDs failure without data loss in an eight-node set
- Unified management interface providing user-friendly operation and maintenance experience. Easy access from your browser, enabling management of the PB storage cluster with tens of nodes via a single portal
- SSD storage and data-tiering support, to meet any type of storage demands. Stores cold data on cost effective HDDs and keeps hot data on high performance SSDs

Mellanox Ethernet Switches and Adapters

Mellanox Ethernet switches and network adapters are an integral part of the ArkFlex U solution, to support the distributed and very-large-volume storage across the cluster nodes. As shown in Figure 1, two Mellanox SX1012 switches are deployed to connect eight ArkFlex U storage nodes. Each storage node is equipped with dual Mellanox 10G network adapters. Two VLANs form the front-end

and back-end networks. While the front-end network connections are for data I/Os from applications, the back-end network is used for bandwidth-intensive data transmission and re-balancing in the background. Within a VLAN, each switch connects to the eight nodes through 10Gb/s links, which provides another level of network redundancy and load balancing.

The Mellanox SX1012 presents an elastic networking solution to meet the needs of cloud storage – high performance and scalability support storage capacity from GBs to PBs, spanning over the entire spectrum of storage demands by SMBs and large enterprises. As such, the Mellanox SX1012 is the perfect fit for the ArkFlex U solution. In particular, it provides the following benefits:

- Up to 48x 10GbE ports: SX1012 has the option to scale with splitter cables, supporting additional nodes being added in the cluster
- Two SX1012s in 1RU rack space: The half width, 1RU form factor allows installation of two SX1012s side-by-side in an 1RU slot to support HA
- 40/56GbE ready: SX1012 provides the extra bandwidth needed for the data exchange between 4-22 ArkFlex U nodes
- Ultra-low latency and zero packet drop at any packet size: No-jitter and best-in-class performance meets the requirements by real-time applications
- Simple to use and manage: Web-based network management GUI makes it easier to configure and monitor networking devices; and REST-based APIs support integration into 3rd-party management software

In addition, Mellanox 10/40G network adapters accelerate storage nodes by delivering high network performance and offloading network functions to improve CPU utilization for applications

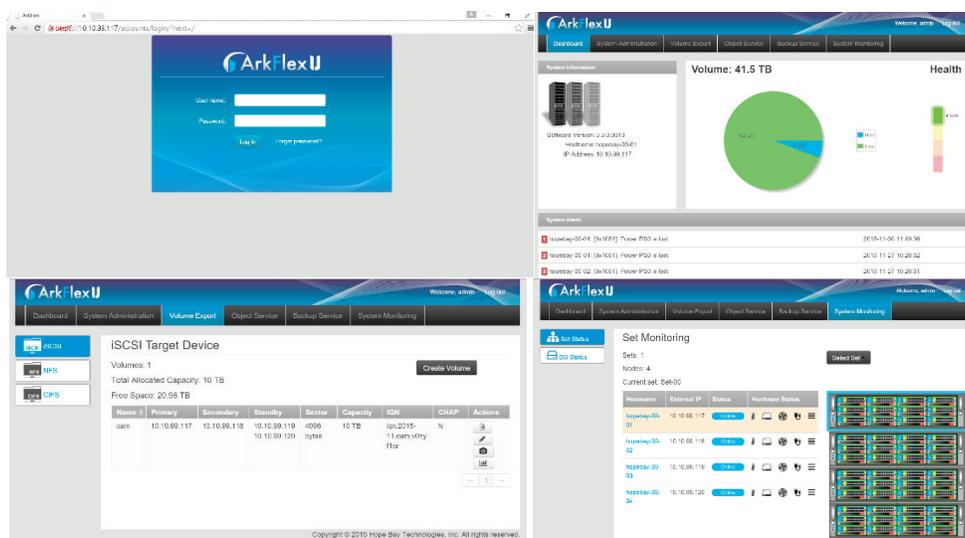


Figure 2. ArkFlex U Unified Management

ArkFlex U Performance

High IOPS was measured in the following test. Using SSDs with ArkFlex U’s unique cache technology, the ArkFlex U hit 98,927 IOPS on 100% 4KB random write, close to the performance of native SSDs.

Test Environment

The configuration of the test environment was as follows, based on the network topology shown in Figure 1. The storage nodes were directly connected to the existing front-end network.

IOmeter was run for the test. 4KB block I/Os were transferred across the nodes using the iSCSI protocol. Each of the 4 clients had 4 workers. Each worker had 32 outstanding I/Os (queue depth).

Conclusion

As demonstrated in the performance test above, ArkFlex U, with Mellanox Ethernet switches and adapters, delivers unmatched performance for a distributed storage system. At the same time, ArkFlex U provides up to 75% storage capacity utilization with HA on storage nodes, thus lowering

the CAPEX for customers. For applications such as VDI, the high performance of ArkFlex U can be utilized to improve the VDI density, or be used to address IOPS-intensive workloads.

About Hope Bay

Hope Bay Technologies, Inc. (Hope Bay Tech) is devoted to researching and developing cloud computing products and services. By turning integrated concepts of hardware, software, and services into actual useful applications, ArkFlex U is a leading scale-out cloud storage solution of Hope Bay Tech.

Visit <http://www.hopebaytech.com> for more information.

About Mellanox

Mellanox Technologies is a leading supplier of end-to-end Ethernet interconnect solutions and services for enterprise data centers, Web 2.0, cloud, storage and financial services. More information is available at www.mellanox.com.

Component	Item	Description	QTY
Storage Node	Form Factor	2U node with 12x 3.5" bays in the front	8
	CPU	Intel Xeon E5-2620 v2 *2	
	Memory	32GB RDIMM	
	HBA	Avago SAS 9207-8i	
	HDDs	7200 RPM Enterprise SATA 2TB *6	
	SSDs	Intel DC S3610 400G *2	
	NICs	Mellanox dual-port 10G MCX312B-XCCT	
Back-end Network	10GbE Switch	Mellanox 10/40GbE SwitchX®-2 SX1012	1
Client Node	Form Factor	2U node with 12x 3.5" bays in the front	4
	CPU	Intel Xeon E5-2603 v1*1	
	Memory	16G RDIMM	
	NIC	Intel X520-DA2	



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