Delivering Nexenta Software-Based File Services to Cisco HyperFlex

White Paper

March 2019

Introduction

As companies adopt new enterprise architecture, like hyper-converged infrastructure solutions from Cisco to improve performance and simplify deployments, over time, there is a need to streamline and expand the workloads being supported by adding software-based file services.

This white paper is intended for organizations seeking to expand the uses cases of Cisco HyperFlex and remove unnecessary legacy hardware NAS from their datacenter by adding enterprise-grade file services, specifically for virtual desktop infrastructure (VDI) purposes.

In this white paper, you will gain valuable insight into how Nexenta and Cisco have partnered to help enterprises grow their businesses by providing complementary NAS and hybrid public cloud capabilities. Included are details on the certification process, configuration, and best practices when deploying this solution.

Adding File Services

Servicing workloads like VDI use block storage protocols (e.g., iSCSI, FC, InfiniBand). This works well with applications designed to use raw storage volumes, and its versatility makes it very attractive. File storage systems created from block storage are frequently needed to present users with file shares, manage user profiles, or support application virtualization. Previous methods for expanding hyper-converged use cases entailed attaching a general-purpose operating system to create file systems like NFS and SMB/CIFS. Alternatively, you can purchase a dedicated NAS hardware appliance.

Add NAS Capabilities and Extending Your Cisco HyperFlex Investment

Cisco HyperFlex is an excellent option for hosting virtual machines (VMs). Adding file services can increase the versatility of these storage systems to address user directories, virtual desktops, and back-up applications.

There is now a way to add file services to Cisco HyperFlex by using another form of software-defined storage via Nexenta's award-winning fifth-generation storage software, NexentaStor. This highly efficient option runs as a VM on a Cisco HyperFlex to form a "Virtual Storage Appliance" (VSA). By using the capacity presented to NexentaStor as a VMDK (Virtual Machine Disk), Nexenta can create a full-featured NAS for delivering NFS or SMB/CIFS shares.

Using NexentaStor provides an extremely efficient means of getting both the block storage already available from Cisco HyperFlex and the NAS features by merely adding another virtual machine. A VM hosting NexentaStor provides all of the NAS capabilities while consuming very

little overhead from the server/node.

The combination of Cisco HyperFlex and NexentaStor provides a versatile NAS and HCI solution without incremental hardware enabling these systems to broaden the use cases available via file services. The NexentaStor option integrates cleanly with VMware's vCenter console for a simplified and unified management experience without any changes to the existing HCI systems.

The NexentaStor software utilizes the existing storage contained in the Cisco HyperFlex systems by leveraging the physical elements that connect the disk media. VMware provides the hosting mechanism for running various virtual machine (VM) workloads, and NexentaStor operates in one of those VMs. Using variable capacities presented through VMware's VMDK interface, NexentaStor can create any mixture of NFS or SMB storage targets.

Cisco and Nexenta Partnering to Bring Certified Answers to VDI

As leaders in their respected markets, Cisco and Nexenta partnered to bring together independent innovation through a thorough testing and certification process to deliver a simple and validated pre-defined solution with the Nexenta's software-only storage solution, NexentaStor. This enables enterprises around the world looking to simplify and scale their complete Virtual Desktop Environment (VDI) through the combined Cisco and Nexenta Solution.

NexentaStor Virtual Storage Appliance (VSA)

NexentaStor provides an extremely efficient fit-for-purpose storage solution that includes a kernel with one focused function: providing optimized storage services. Getting full-service enterprise storage goes well beyond simply providing a protocol. NexentaStor includes all of the NAS capabilities that you'd expect from an enterprise-class physical NAS appliance. These include features like advanced caching algorithms for higher performance, life cycle management (cloning, provisioning, snapshotting), full ACL and AD user management, data efficiency services (inline data reduction), and data resiliency (software based RAID, replication, copy-on-write file system, & 256 bit checksum on all data). All combined, the NexentaStor capabilities do much more than what you get from a general-purpose operating system for providing file services.

• Enterprise-grade data integrity, scale, and performance scaling to hundreds of Terabytes
  ○ Copy on Write file system
  ○ 256-bit checksum on all data
• Unlimited file system sizes
• Unified File and Block data services
  ○ File: NFSv3, NFSv4, SMB 1.0, SMB
	• Advanced high performance caching architecture
	  ○ The filesystem was specifically designed to deliver optimal performance and availability from the extensive list of hardware found on the VMware hardware compatibility list. Excellent hybrid

2.1, SMB 3 ○ Block: iSCSI • Multiple media options ○ HDD, SSD or combinations • Client OS support ○ VMware ESXi, Microsoft Windows ○ CentOS, RHEL, Ubuntu • Ecosystem integration ○ VMware vCenter plug-in ○ SMB 3 ODX for Microsoft Hyper-V ○ OpenStack Cinder & Manila ○ Docker Volume plug-in ○ Kubernetes Persistent Volume • Inline data reduction for additional storage cost savings • Software-based RAID options for tuning capacity, performance and protection options ○ For the best performance we recommend stripping the pools • Access control ○ NexentaStor ACLs are compatible with both NFS and SMB, so that the ACL you create for a file system applies to clients using either protocol • Flexible management services ○ VMware vCenter Plug-in ○ Self-documenting REST API, CLI, SNMP ○ NexentaFusion (HTML 5 based) • Flexible capacity-based licensing	pool performance capabilities and use of isolated caching for read and write operations provide optimal speed for each individually. Leveraging local system memory, the file system adds an even faster layer of cache for all data. • Unlimited space-optimized snapshots and clones ○ Leverages the copy on write benefits for unlimited snapshotting ○ Capacity-optimized – only consuming incremental block changes ○ Configurable frequency for optimizing recovery points ○ VM level by Cisco/ file level by Nexenta • High availability ○ Utilizes VMware HA for ESX host failover. The VSA auto-restarts on an alternative active host. Downtime commensurate with ESX load levels & server performance. ○ Optional NexentaStor HA plug-in provides instant, seamless auto-restart failovers between VSA nodes for rapid VM host transition. • Periodic or continuous asynchronous long-distance replication • Simplified setup ○ Installs quickly and easily on an existing HCI node VM or on an external server connected to your SAN.

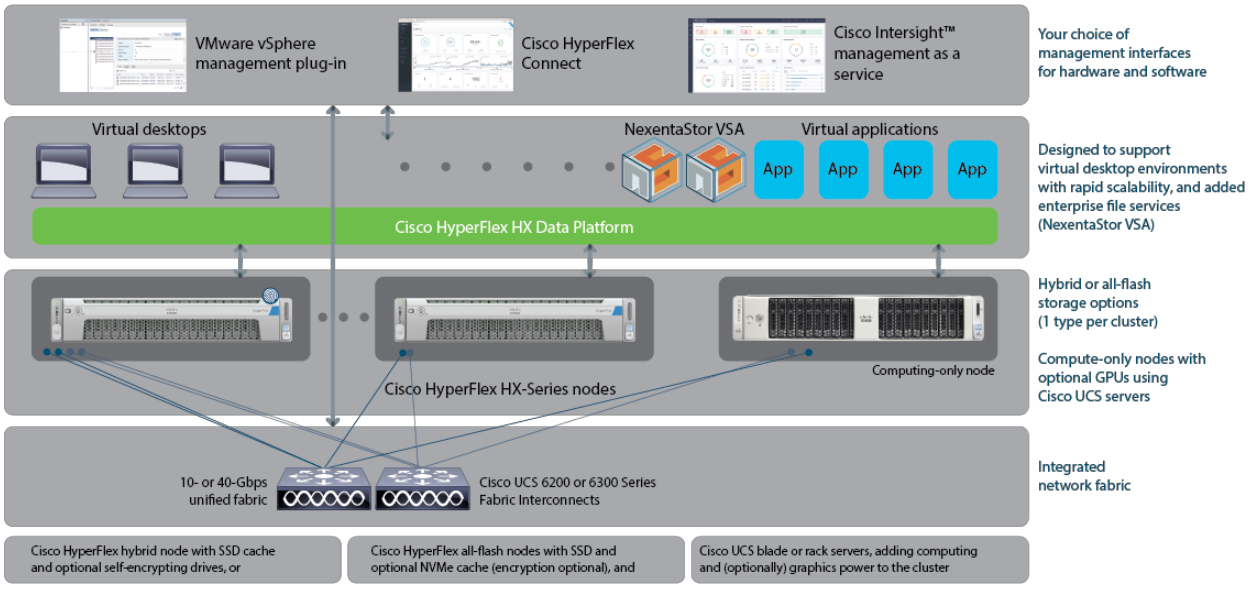
Cisco HyperFlex

Cisco HyperFlex is a fully engineered hyperconverged system that combines virtualized compute, software-defined storage, and fully integrated networking to deliver adaptive infrastructure from the core data center, to the edge, and across multiple could environments. Built on proven Cisco UCS® architecture and utilizing Cisco's HX Data Platform, HyperFlex

provides a high-performance platform ideal for supporting enterprise applications such as VDI deployments. Supporting multiple industry leading hypervisors, including VMware ESXi and Microsoft Hyper-V, it delivers an end-to-end software defined solution that is simple to deploy, easy to manage, and cost effective to scale.

For more information see the Cisco HyperFlex 3.0 for Virtual Server Infrastructure with Microsoft Hyper-V and Cisco HyperFlex 3.0 for Virtual Server Infrastructure with VMware ESXi.

Cisco HyperFlex provides a fully contained virtual server platform, with compute and memory resources, integrated networking connectivity, a distributed high-performance log-based file system for VM storage, and the hypervisor software for running the virtualized servers, all within a single Cisco UCS management domain.



Cisco HyperFlex for VDI

The testing and performance validation for these solutions uses a common Virtual Desktop Infrastructure–like (VDI-like) workload to ensure that performance and reliability of the SMB file share access are met when running on Cisco HyperFlex.

The test environment consists of five VMs, with four as test clients to simulate a distributed workload.

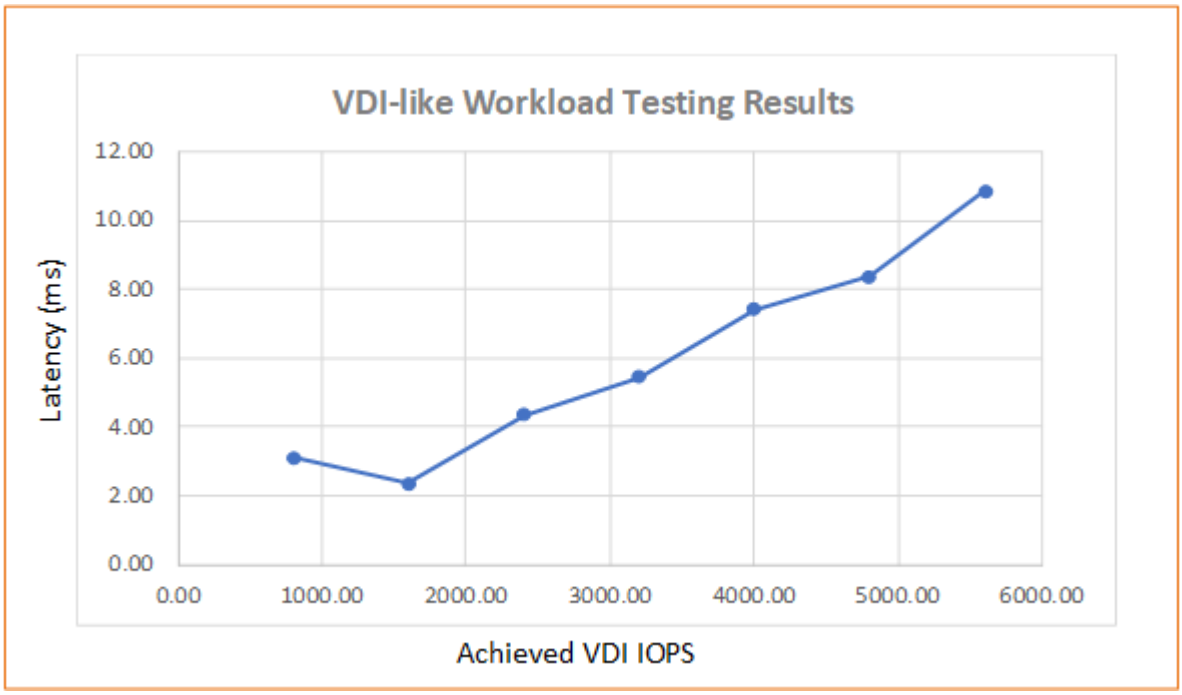
The SUT VMs are described below:

- VM1: SUT driver VM for controlling of the test clients
- VM2: Test client 1
- VM3: Test client 2

- VM4: Test client 3
- VM5: Test client 4

Virtual Desktop Infrastructure (VDI) workload
This workload simulates a steady-state high-intensity knowledge worker in a VDI environment that uses full clones. This workload does not simulate a linked-clone environment. This is the behavior that was seen in traces between the hypervisor and storage when the VMs were running on ESXi, Hyper-V, KVM, and Xen environments.

The following chart shows the NexentaStor VSA ability to scale as the workload increases when running a VDI-like workload during stress testing.



Predefined NexentStor VSA Packages for Cisco HyperFlex

Nexenta and Cisco have built four standard configurations designed to fit an enterprise's different Virtual Desktop needs. From Remote Office/ Branch Office (ROBO) to the Large configuration you have the flexibility to choose the package that supports your VDI requirements for today and in the future.

	Max Capacity	Potential Target use cases(*)	vCPU/ Memory	High Availability
ROBO	8 TB	• 163 Task Workers • 109 Knowledge Workers • 82 Heavy Home Directory Users	1 vCPU/ 8 GB RAM	
Small	16TB	• 326 Task Workers • 218 Knowledge Workers • 164 Heavy Home Directory Users	1 vCPU/ 8 GB RAM	✓
Medium	32TB	• 652 Task Workers • 436 Knowledge Workers • 328 Heavy Home Directory Users	2 vCPU/ 24 RB RAM	✓
Large	64TB	• 1304 Task Workers • 872 Knowledge Workers • 656 Heavy Home Directory Users	2 vCPU/ 32 GB RAM	✓

For larger deployments or special configurations, contact cisco_sales@nexenta.com.

Deploying NexentaStor VSA on Cisco HyperFlex

To install NexentaStor VSA on Cisco HyperFlex there are three simple steps to get started:

Step 1: Download and Install NexentaStor VSA VMware OVA file. Best practices can be found:

- Nexenta YouTube Video, https://youtu.be/xc_cAgTAILE
- Nexenta Blog Posting, https://blog.nexenta.com/2018/07/25/taking-the-ez-pass-lane-to-a-hybrid-storage-cloud/

Step 2: Get and Install License Key. For trials you can request a 45-trial key, https://nexenta.com/products/downloads/nexentastor-5-enterprise/register

Step 3: Start creating file systems and sharing with your users via VMware vCenter Plugin.

If you have questions or need help during the installation, contact cisco_sales@nexenta.com

Solution Summary

Adding NexentaStor to Cisco HyperFlex systems provides a cost-effective, software-only solution that brings together all of the enterprise-class NAS features you need without additional stand-alone storage systems. NexentaStor provides all of the enterprise features you expect using an extremely efficient virtual storage appliance that simply occupies a virtual machine on existing systems.

Trials and More Information

To trial, the NexentaStor VSA solution for Cisco HyperFlex request a 45 day trial on the Nexenta website, https://nexenta.com/products/downloads/nexentastor-5-enterprise/register.

If you have more questions or need assistance email the Nexenta Cisco HyperFlex Team, cisco_sales@nexenta.com.

About Nexenta

Nexenta is the original market maker and leader in Open Software-Defined Storage (OpenSDS) market for multi-cloud enterprise environments; with nearly 3,000 enterprise customers, 300 partners, 50 patents, and more than 2,000 petabytes of storage capacity under management. Nexenta democratizes one of the most oligopolistic hi-tech market segments nearing $120B in size by 2020. Nexenta uniquely integrates its hardware-agnostic software-only OpenSDS innovation with deep “open source” collaboration via some of the most active communities with thousands of members worldwide. Nexenta flexibly enables a wide variety of legacy, enterprise and next-gen cloud-native apps, on any cloud platform, protocol and hardware infrastructure to power the most cost/performant cloud and traditional data centers. Nexenta portfolio is 100% software-based that can be used as a “Bare-Metal Appliance” on a partner hardware, as a “Virtual Storage Appliance (VSA)” on a partner virtual machine or container, or as a cloud-based “Software as a Service (SAAS).” Nexenta provides enterprises with total freedom and flexibility via its industry-leading multi-cloud software innovation, multi-channel collaboration, distribution and enterprise-class support, 24x7x365, globally.

About Cisco

Cisco (NASDAQ: CSCO) is the worldwide technology leader that has been making the Internet work since 1984. Our people, products, and partners help society securely connect and seize tomorrow's digital opportunity today. Discover more at thenetwork.cisco.com and follow us on Twitter at @Cisco