Lab Validation Report

HP ConvergedSystem 200-HC StoreVirtual

Rapidly Deploying an Easy-to-Manage, Reliable Virtualized Infrastructure

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ESG Lab Reports

The goal of ESG Lab reports is to educate IT professionals about data center technology products for companies of all types and sizes. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by HP.

Introduction

This ESG Lab Validation report documents the hands-on testing and validation of the HP ConvergedSystem 200-HC StoreVirtual hyper-converged appliance. The report highlights the ability of the CS 200-HC StoreVirtual to meet the workload, budgeting, and mobility needs of the business. Special attention will be paid to ease of deployment, manageability, efficiency, high availability, recoverability, and scalability.

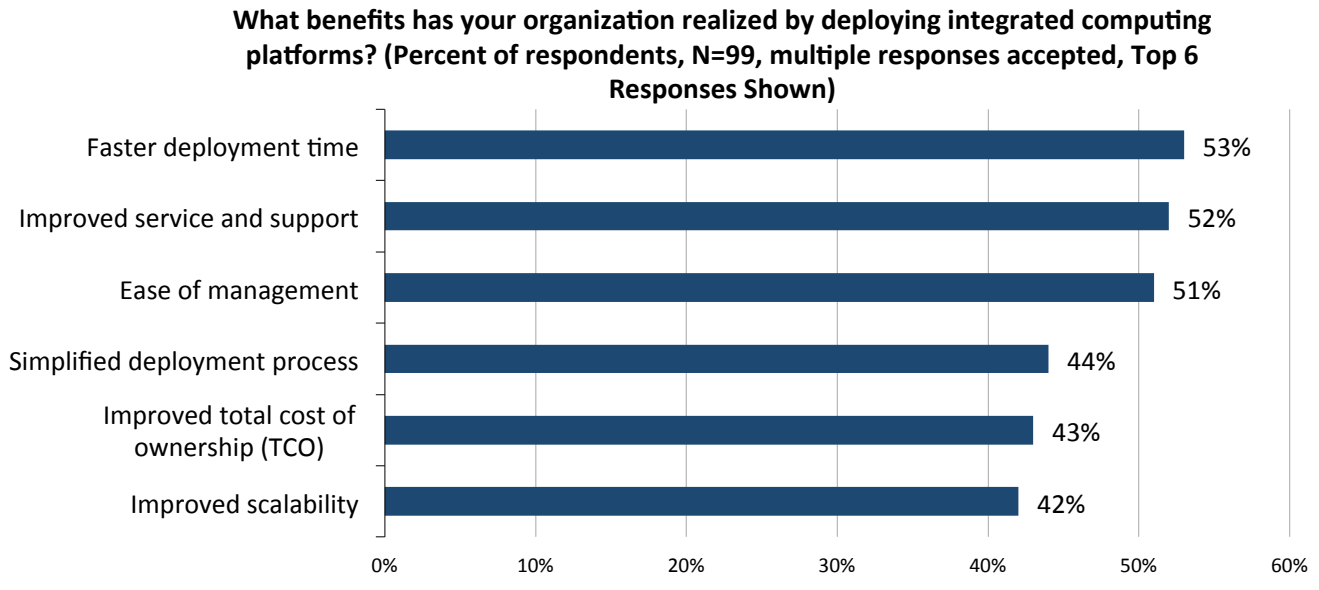
Background

Over the last few years, the adoption of virtualization within IT infrastructures has grown exponentially. Benefits like infrastructure consolidation, improved efficiency, and cost savings have been a driving force behind the trend, but complexities remain. Taking an existing infrastructure made up of independent storage, networking, and compute components and seamlessly tying them together to build an agile, virtualized infrastructure is not an easy task. Performance, compatibility, and manageability are just a few of the top concerns organizations have preventing them from moving their precious, mission-critical applications to a virtualized environment. These challenges have paved the way for proven, pre-validated IT infrastructure designs that use blueprints or reference architectures to simplify the consolidated infrastructure deployment, but pain points still exist through a lack of comprehensive management and multiple support points. Insert: Hyper-convergence.

Hyper-converged infrastructures deliver all of the infrastructure components in a single server using software-defined capabilities. This is made possible due to the increased horsepower of the latest enterprise-class servers, performance of flash storage, and larger capacity spinning drives with smaller footprints. By layering specially engineered software on top of these powerful servers, businesses can cost-effectively get fully virtualized infrastructures at a fraction of the cost. The server turns into a fully integrated infrastructure building block, complete with virtualized machines, self-contained scale-out storage, and single-pane-of-glass management.

With simplicity and cost savings being top-of-mind for organizations looking into hyper-converged solutions, ESG asked organizations that have already deployed these integrated computing platforms what benefits they have realized. As shown in Figure 1, faster deployment times, improved service and support, and ease of management were the three most-cited responses, while improved TCO and scalability also appeared in the top six responses. [1]

Figure 1. Top Six Realized Benefits of a Deployed Integrated Computing Platform



Source: Enterprise Strategy Group, 2015.

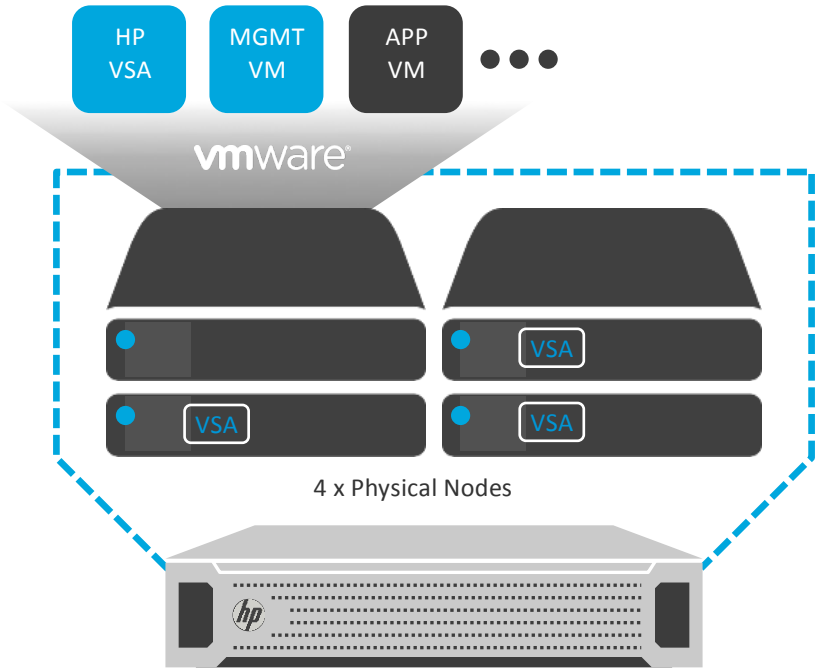
[1] Source: ESG Research Report, *Trends in Private Cloud Infrastructure*, April 2014.

HP ConvergedSystem 200-HC StoreVirtual

The HP ConvergedSystem 200-HC StoreVirtual is a hyper-converged platform that combines compute, storage, networking, and virtualization software into an easy-to-deploy, simple-to-manage, software-defined data center. Built with four, independently serviceable, preconfigured HP ProLiant servers in a small 2U footprint, the CS 200-HC delivers computational optimization, density, and efficiency for mixed, virtualized application workloads with constantly growing data sets.

Running on the HP hardware is the HP StoreVirtual VSA software, which delivers a shared storage platform from the server's internal storage to create a software-defined, scale-out storage architecture optimized for VMware vSphere. As shown in Figure 2, each of the four servers contains an HP StoreVirtual VSA, while one of the four contains an HP management VM running HP OneView. With flexibility in mind, HP offers a choice between a hybrid, auto-tiering model with 10K SAS and SSD capacity to serve performance, or an all-SAS model to meet larger capacity requirements at a lower cost. Systems can be clustered together with up to 16 nodes to pool capacity and performance capabilities.

Figure 2. HP ConvergedSystem 200-HC StoreVirtual



The system can be quickly deployed in under 15 minutes with HP OneView InstantOn serving as a guide for even the nontechnical experts, with everyday management tasks simplified by a centrally managed interface that integrates with VMware vCenter. A single console can be used to manage all appliances within an organization, whether onsite or at a remote branch office.

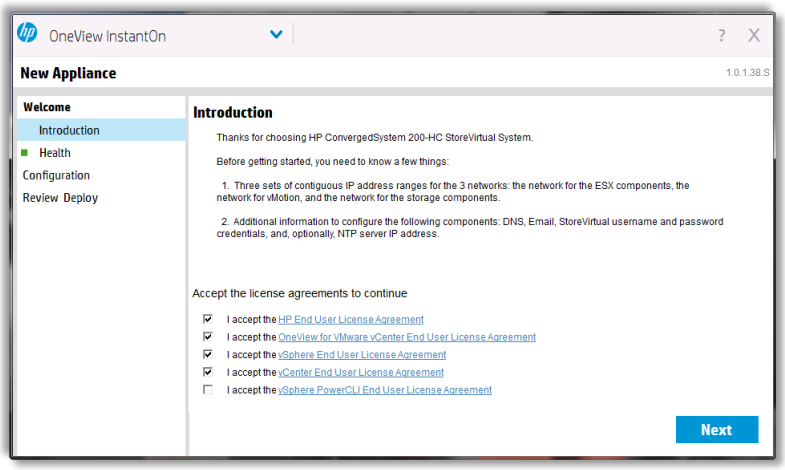
ESG Lab Validation

ESG Lab performed hands-on evaluation and testing of the HP ConvergedSystem 200-HC StoreVirtual at HP's facilities, in Fort Collins, CO. Testing was designed to focus on ease of deployment, manageability, efficiency, high availability, recoverability, and scalability.

Deployment Speed and Simplicity

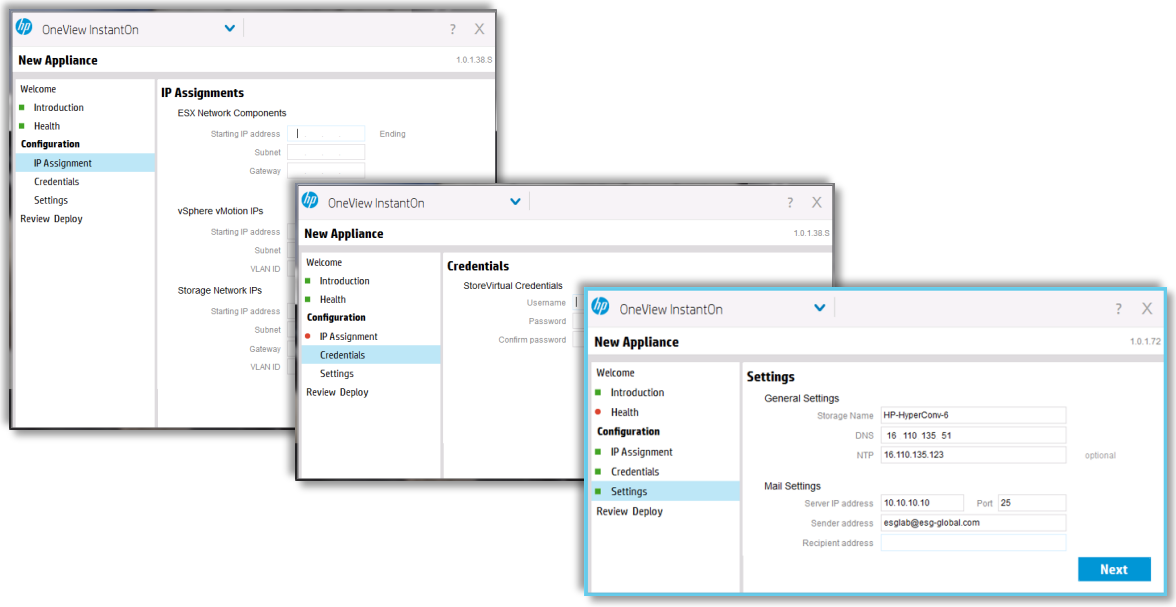
The first phase of ESG Lab testing consisted of deploying a new, bare metal CS 200-HC StoreVirtual with a focus on simplicity and deployment time. This included installing and configuring the system to a point of being able to use VMware vCenter to deploy virtual machines. After racking, cabling, and powering on the system, ESG Lab used a private network to connect via Remote Desktop to the management VM running Windows Server 2012. After connecting to the management VM, HP OneView InstantOn automatically started (see Figure 3) and was used to configure the system. HP OneView InstantOn comes preinstalled on the system and serves as an installation guide throughout the deployment process.

Figure 3. HP OneView InstantOn Introduction Screen



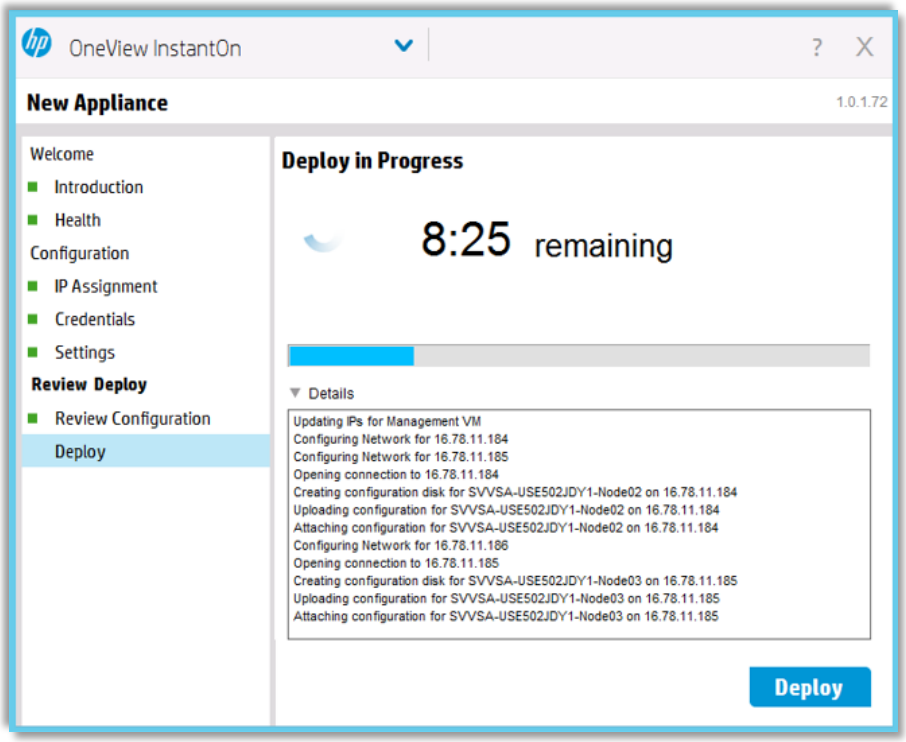
After confirming the system was in a healthy state, ESG Lab walked through the initial configuration steps. This included entering IP address information, VMware vSphere credentials, and supporting DNS/NTP/SMTP services (see Figure 4). The total time spent logging in to the management VM and entering all the information was less than five minutes.

Figure 4. Configuring the CS 200-HC StoreVirtual with OneView InstantOn



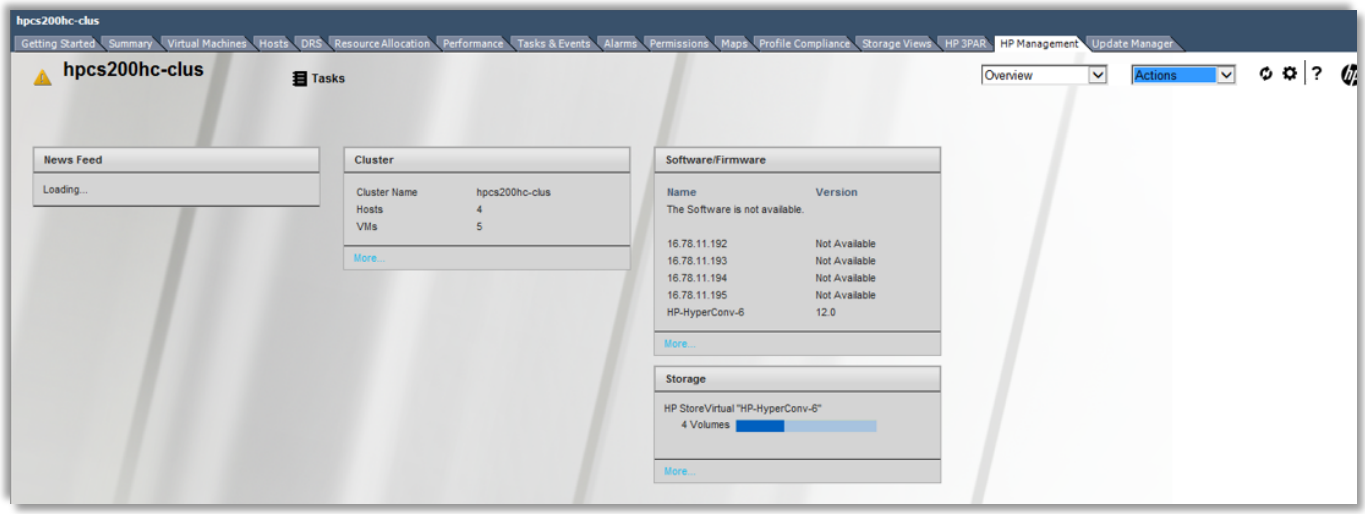
After reviewing the configuration details, ESG Lab clicked *Deploy,* which kicked off the deployment script. The deployment script stepped through various configuration tasks on each server, including configuring network information, creating the virtual storage appliance, and uploading configuration files to specific nodes in the cluster. A timer appeared on the screen from within the OneView InstantOn interface that counted down the amount of time left until the system was fully deployed. For ESG Lab, the timer counted down from nine minutes and 40 seconds. A view of the timer is shown in Figure 5.

Figure 5. OneView InstantOn Deployment Timer



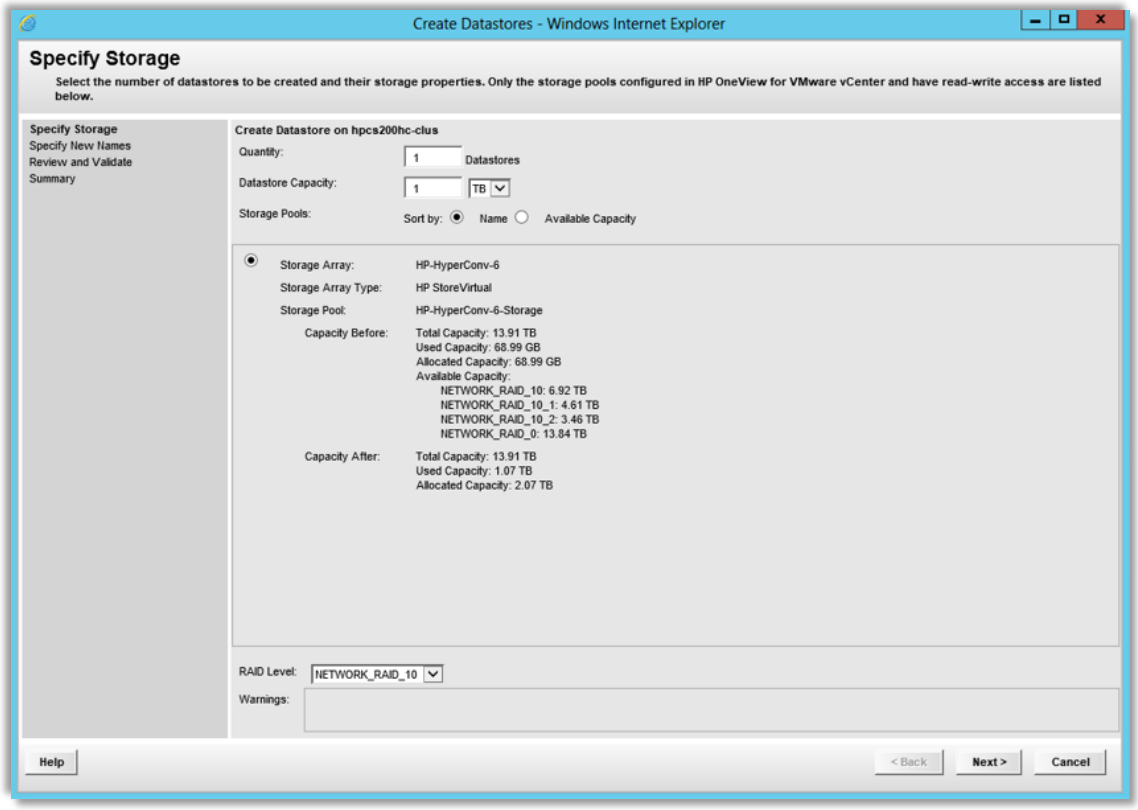
Once the deployment script completed, ESG Lab was able to log in to the VMware vSphere client and leverage the HP OneView plugin to view the newly deployed cluster.

Figure 6. HP OneView for vCenter



The final step in completing the deployment process was creating a new datastore. ESG Lab used a short wizard to specify information related to the new datastore, including the number of datastores to create, the size of the datastore, and RAID level. As shown in Figure 7, ESG Lab created a single 1TB datastore configured with Network RAID10. This completed the process of the initial deployment. ESG Lab was particularly impressed with the minimal time required to go from power-on to newly created datastore. The process took less than 15 minutes, which included the keyboard time of entering IP addresses, VMware license information, and credentials.

Figure 7. Configuring a New Datastore



Why This Matters

Deploying a traditional virtualized infrastructure is not an easy task. It takes significant coordination between IT administrators with varying responsibilities. One IT administrator may be responsible for storage, while the other handles compute or networking. Factoring in the virtualization administrator makes it clear that if there is a communication breakdown at any point during the planning or deployment process, it could be months before a system is up and running. And that is just the initial deployment. An additional pain point comes in terms of scalability. The coordination and communication between IT administrators becomes paramount as adding a new hardware resource in these traditional siloed infrastructures could have a major impact on already deployed virtualized applications.

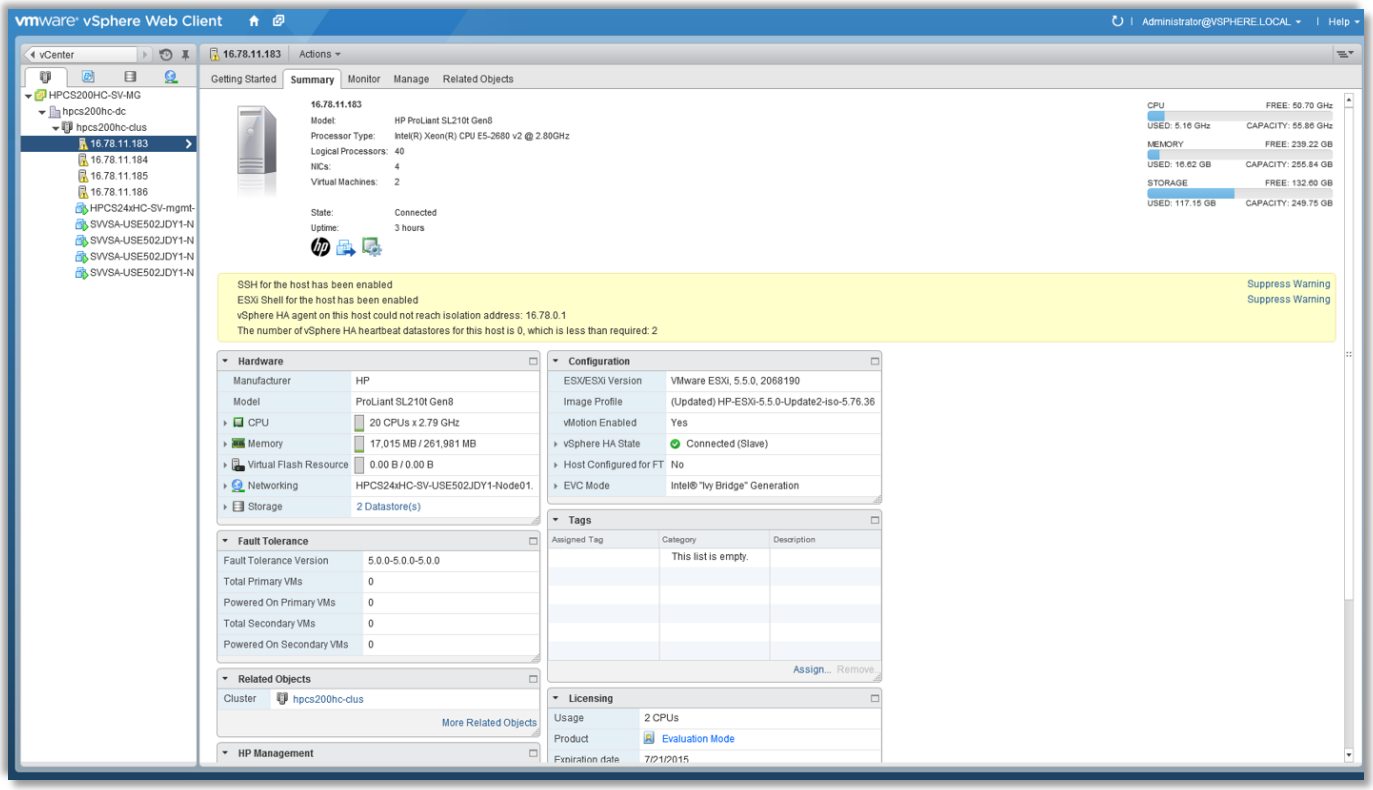
ESG Lab validated that the deployment process of an HP ConvergedSystem 200-HC StoreVirtual was quick and easy. The HP OneView InstantOn configuration wizard came preinstalled on the system, serving as a guide throughout the initial deployment process. This enabled ESG Lab to go from power-on to data store creation in less than 15 minutes.

Centralized Management with HP OneView

HP OneView for VMware vCenter provides VMware administrators with easy access to all the HP hardware in their VMware vSphere environments. More specifically, the HP OneView vCenter plugin allows the administrators to monitor and manage both physical and virtual resources, including storage, servers, data stores, and virtual machines from directly within the vCenter interface. This enables a clear, single-point-of-management view into the complete infrastructure, helping virtualization administrators better deliver virtualized, mission-critical application service levels.

Both a VMware vSphere web client and regular client can be used to access HP OneView. The web-based client utilizes tabs to navigate HP OneView for vCenter, with HP Management content appearing on the Monitor, Manage, and Summary page. A view of the vSphere web client with the freshly deployed StoreVirtual VSAs is shown in Figure 8.

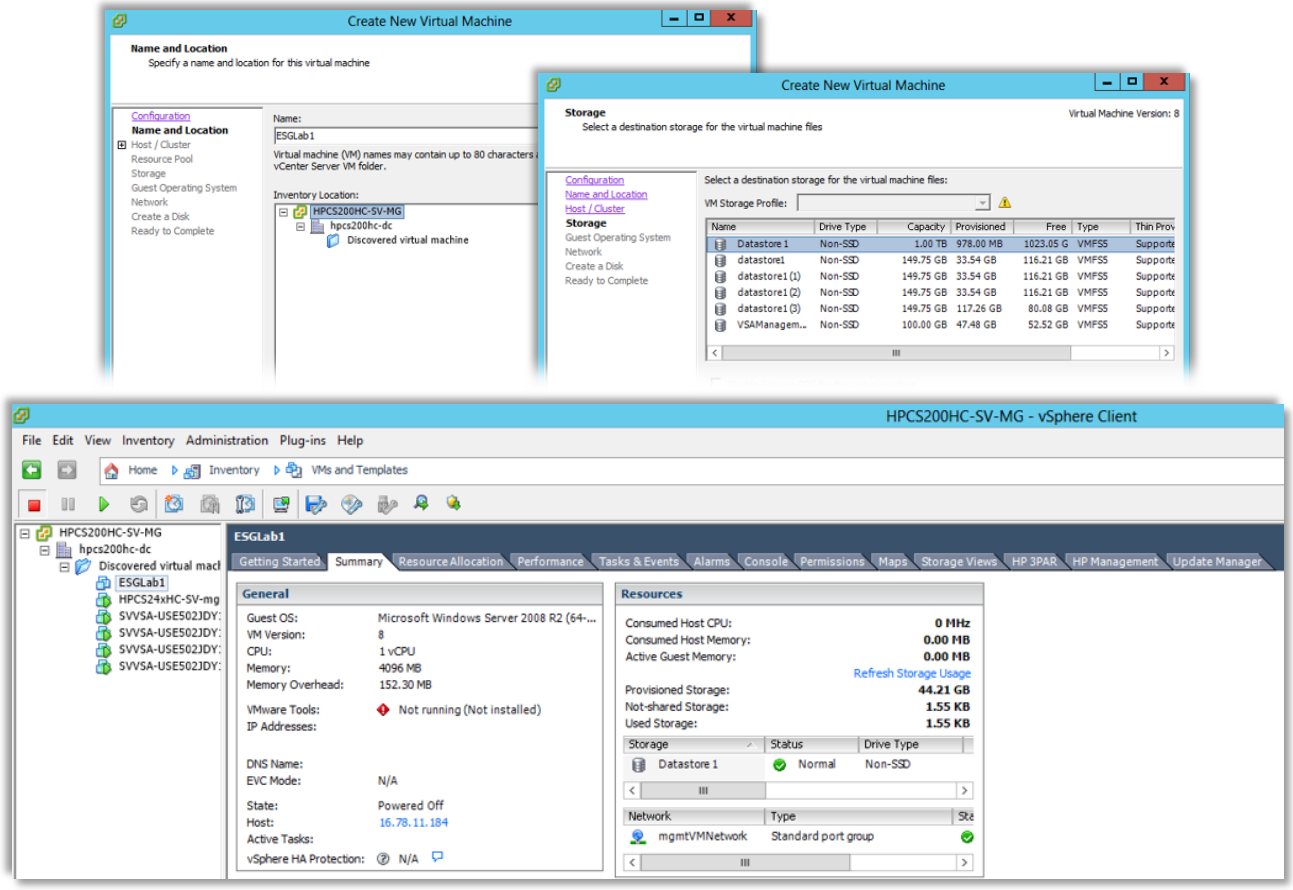
Figure 8. HP OneView for vCenter – vSphere Web Client



ESG Lab transitioned back to the standard VMware vSphere client to navigate through the various HP OneView integration points. By clicking on the HP Management tab, ESG Lab was brought to the Cluster Overview page, which displayed information from the four servers and VSAs in the cluster. This included information about the cluster, infrastructure, networking, software/firmware, and newsfeed. ESG Lab could also see the new datastore that was created during the deployment process.

The next step in ESG Lab testing was to deploy a new virtual machine. This process was all done using the familiar VMware interface and wizard. A typical VM configuration was selected and the new VM was given the name *ESGLab1*. After confirming the host/cluster information, ESG Lab selected the newly created 1TB datastore. A Microsoft Windows 2008 R2 operating system was selected, networking was configured, and a new virtual disk was configured with 40GB of thinly provisioned capacity to help with storage optimization and efficiency. A view of two of the wizard steps is shown in Figure 9. The selected CS 200-HC StoreVirtual cluster is shown on the left, while the 1TB datastore is shown on the right. The bottom of the figure displays the newly deployed VM.

Figure 9. Deploying a VM on a CS 200-HC StoreVirtual



Why This Matters

Virtualization has paved the way to a more efficient, consolidated IT environment, but hardware resource silos have made managing such an environment overly complex. Hyper-converged solutions have addressed the issue head on by combining storage, compute, and networking resources into a pre-integrated solution that is not only easy to deploy, but also easy to manage, which is especially important in constantly growing and changing virtual environments. In fact, ESG research shows that ease of management is the most-cited factor driving organizations to deploy or consider deploying a hyper-converged solution. [2]

ESG Lab validated that HP OneView seamlessly integrated with VMware vSphere to deliver a comprehensive view of the four-node CS 200-HC StoreVirtual. The VMware vSphere client served as a familiar interface to centrally manage all aspects of both the physical and virtual resources of the system, including storage, compute, networking, and virtual machines. ESG Lab deployed a VM within minutes of logging in to vSphere for the first time—going from power-on to deploying the first VM took less than 20 minutes. This simplicity and speed combined with the consolidation and efficiency improvements of hyper-convergence in general work together to easily meet customer expectations related to deployment and management. The fact that this is being delivered by an industry-proven technology provider like HP further validates these powerful benefits.

[2] Source: ESG Research Report, *Trends in Private Cloud Infrastructure*, April 2014.

High Availability and Recovery

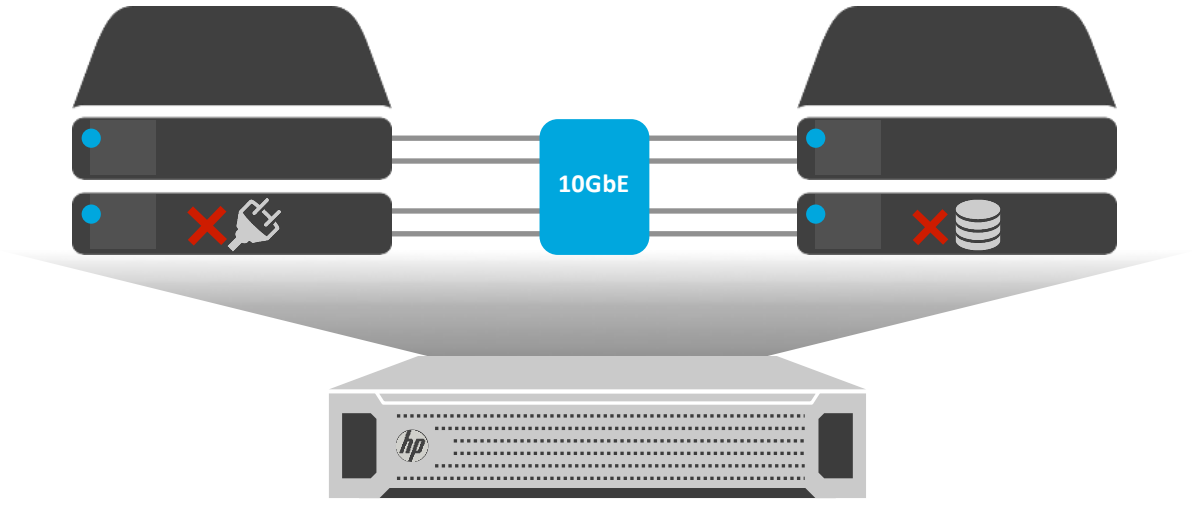
The HP StoreVirtual architecture addresses availability at multiple levels. Hardware-based RAID technology is used within each server in the storage cluster as a first line of defense against hard drive failures. Data is striped across all of the nodes in a cluster. In addition, the Network RAID feature provides the option of spreading one or two extra copies of data throughout the cluster to protect against data loss due to the failure (or loss of connectivity) of a server participating in the cluster. The ConvergedSystem 200-HC also provides the transparent failover of VMs in the case of a failure, whether across nodes, systems, or sites. These stretch cluster capabilities support business continuity by keeping applications online during appliance, rack-level, or site-wide outages, while simplifying backup and recovery with synchronous and asynchronous replication, certified vMSC stretch cluster, and array-based snapshots with granular-level recovery.

Previous ESG Lab testing of the HP StoreVirtual technology has verified its ability to handle various failures while remaining fully available. In one particular past test case, ESG Lab provisioned two types of volumes: a hyper-redundant Network RAID-10 volume accessed from a Windows 2008 server as the E: drive, and an unprotected Network RAID-0 volume accessed as the F: drive. Files were copied to both volumes as power cables were unplugged. The unprotected RAID-0 volume stopped working and was no longer accessible from Windows Explorer, while the RAID-10 volume remained accessible. Once the failed node was powered back on, the cluster automatically healed itself and the F: drive became usable again. The test was repeated using a pulled network interface card between the server and one of the nodes. As expected, the RAID-0 volume was inaccessible until after the network cable had been plugged back in and the RAID-10 volume was available for the duration of the test. Past ESG Lab testing also validated fault tolerance using a stretched cluster configuration within labs located on different floors within the same HP facility. ESG Lab:

- Pulled a team-bonded redundant Ethernet back-end interface;
- Pulled two drives;
- Powered off the entire upstairs half of the cluster;
- Re-plugged Ethernet;
- Powered up the entire upstairs half of the cluster;
- Replaced the two failed drives.

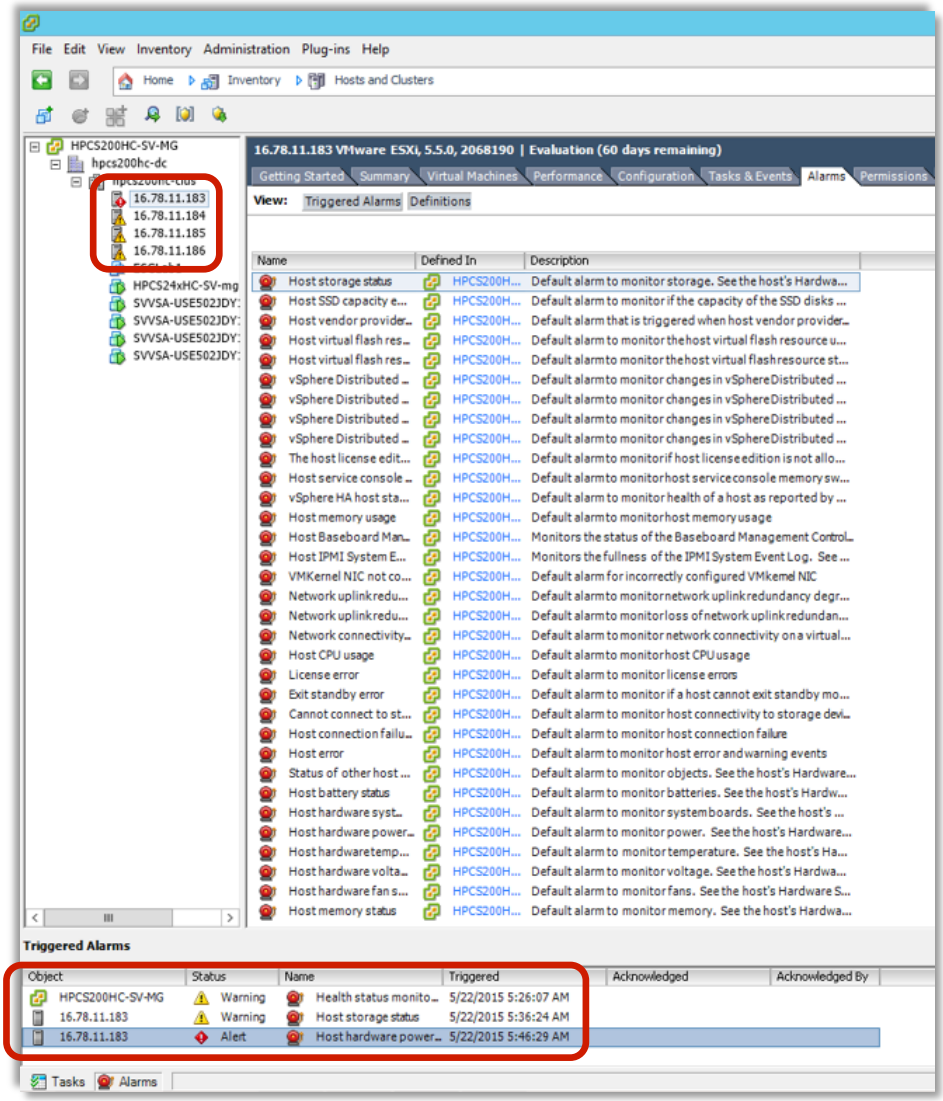
For testing of the CS 200-HC StoreVirtual, ESG Lab validated fault tolerance and high availability by simulating two hardware failures in the four-node cluster. As shown in Figure 10, a drive failure and a power failure were injected. VMware vCenter was used to verify the failures, while also verifying that access to the earlier provisioned VM was still possible.

Figure 10. High Availability and Fault Tolerance Simulation



The disk drive was pulled first, followed by disconnecting the power supply. Both failures triggered warnings and alerts that eventually appeared in VMware vCenter. Figure 11 shows the two places from the vCenter interface where IT administrators can view the alarms. Also shown are the various alerts that can be triggered when other failure types occur. It should be noted that ESG Lab continued to have access to the earlier provisioned VM during both failures.

Figure 11. Alerts in VMware vCenter



Why This Matters

As virtual server and storage deployments grow in size and complexity, so too do the consequences of things going wrong. Regardless of the number and types of hardware failures that may occur during the lifecycle of electronically stored information assets, organizations expect that their data will always be available. With downtime having a direct impact on business profitability and revenue, losing access to data for any period of time has become simply unacceptable.

ESG Lab has confirmed that the hyper-redundant cluster architecture of the CS 200-HC StoreVirtual can be used to create a highly available, self-healing virtualized infrastructure that never needs to be turned off. Features like Network RAID help maintain access to data during failures, while alerts allow IT administrators to quickly diagnose and fix problems.

ESG Lab Validation Highlights

- ☑ From power-on to provisioning a datastore, ESG Lab completed the deployment process of a CS 200-HC StoreVirtual in under 15 minutes.
- ☑ The HP OneView for vCenter plug-in was tightly integrated into the VMware vSphere client to enable ESG Lab to quickly provision and deploy a new VM.
- ☑ Previous ESG Lab testing showed how the HP StoreVirtual VSA software with a Network RAID-10 provisioned volume remained online during a hardware failure, while self-healing capabilities of a RAID-0 volume were confirmed once the simulated failure was fixed.
- ☑ ESG Lab maintained access to a freshly provisioned VM during two failure simulations where a power supply was unplugged and a disk drive was unplugged from a CS 200-HC StoreVirtual. Warnings and alerts displayed in the VMware vSphere interface.

Issues to Consider

- ☑ The test results/data presented in this document are based on testing in a controlled lab environment. Due to the many variables in each production data center, it is important to perform planning and testing in your own environment to validate the viability and efficacy of any solution.
- ☑ Though both the web and full VMware vSphere client could be leveraged for configuration and management, ESG Lab used the full VMware vSphere client with the HP OneView management plugin. HP documentation defaults to using the web client.
- ☑ When testing high availability and fault tolerance, ESG Lab did not follow best practices of setting up SNMP e-mail alerts for instantaneous notification of when a failure occurs. Though failures and warnings eventually displayed through the VMware vSphere client, they were not instantaneous.

The Bigger Truth

Virtualized IT infrastructures have delivered on the promise of higher levels of efficiency and resource utilization, but management complexity due to VM sprawl has created a new problem. With traditional IT infrastructure relying on silos of hardware resources, the management complexity extends well past the virtualized applications and into the hardware itself. As these virtualized infrastructures grow, collaboration between server, storage, networking, and virtualization IT administrators is required to meet dynamically changing business needs. This leads to lengthy communication cycles between all of these administrators before anything is actually accomplished, putting various business initiatives at risk before they even begin. And then comes the cost in both CapEx for the siloed hardware itself and OpEx for the various levels of infrastructure management, which requires its own set of technical expertise.

The CS 200-HC StoreVirtual offers a one-stop shop to hyper-convergence, with all the hardware and software coming directly from HP, an enterprise technology leader in server, storage, and networking components. This includes VMware components, which come optimized with HP server firmware integration for improved installation and management capabilities. By combining HP server technology with the extensively deployed HP StoreVirtual storage software and HP OneView management stack, the preinstalled, preconfigured CS 200-HC helps reduce infrastructure cost by having a small footprint and being entirely software-defined. Additional features like Adaptive Optimization for auto-tiering, thin provisioning, capacity reclamation, Network RAID, smart clones, and replication work together to deliver the high levels of efficiency desired by organizations looking to the future.

ESG Lab validated the speed at which a new CS 200-HC StoreVirtual can be brought online. The HP OneView InstantOn configuration wizard came preinstalled on the system, which served as a guide through the initial setup. The deployment took under 15 minutes from power-on to completing the configuration of a new datastore. HP OneView integrated seamlessly with the VMware vSphere interface to serve as a centralized point of management for the newly deployed four-node cluster, while deploying a new VM took minutes. Fault tolerance and high availability were also validated through the simulation of hardware failures, including losing power to a controller and losing a hard drive. In both failure scenarios, ESG Lab maintained access to a powered-on VM.

HP recognizes that simplicity, manageability, efficiency, and uptime are key to a successful hyper-converged deployment. By combining these industry-proven products into a simple-to-deploy, easy-to-manage system, organizations gain peace of mind that their virtualized, mission-critical applications can seamlessly work together to meet demanding SLAs, scale to meet those demands as they grow, and minimize cost while doing so with a small hardware footprint.

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