Technical Validation

HPE Nimble Storage dHCI

Extending the Hyperconverged Experience to Workloads with Unpredictable Growth

By Tony Palmer, Senior Validation Analyst and Alex Arcilla, Validation Analyst

June, 2019

This ESG Technical Validation was commissioned by HPE and is distributed under license from ESG.

Contents

ESG Technical Validations

The goal of ESG Technical Validations is to educate IT professionals about information technology solutions for companies of all types and sizes. ESG Technical Validations 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 objectives are to explore some of the more valuable features and functions of IT solutions, show how they can be used to solve real customer problems, and identify any areas needing improvement. The ESG Validation Team'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.

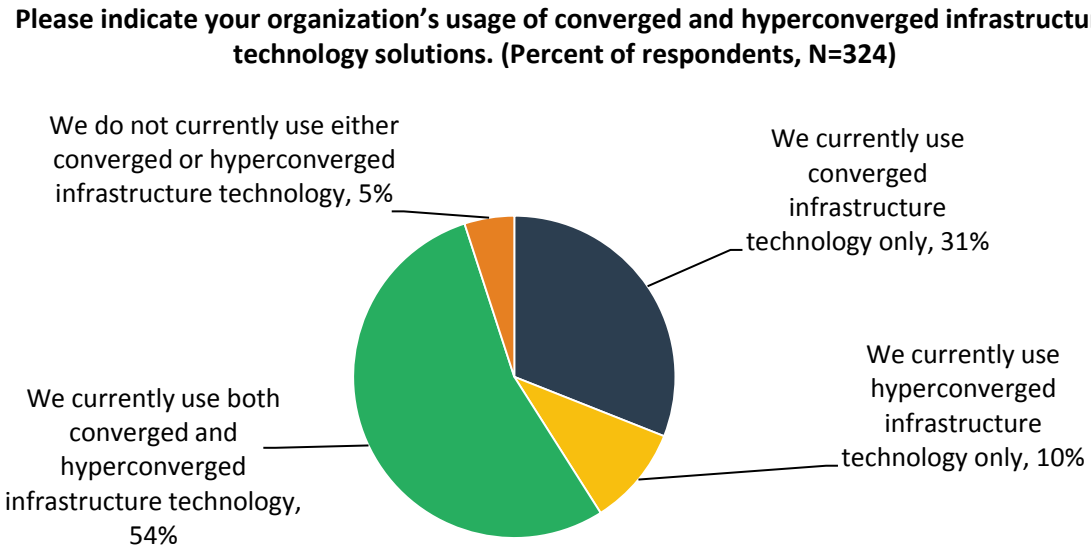
Introduction

This ESG Technical Validation documents the results of hands-on evaluation and testing of the HPE Nimble Storage dHCI platform. This report focuses on the simplicity, self-optimizing performance, and cost-effective scalability and resilience of HPE Nimble Storage dHCI for business-critical workloads.

Background

Considering the speed of business today, organizations must be extremely agile and flexible in their ability to add applications and virtual machines (VMs) to business-critical production environments quickly. This level of agility is difficult to achieve with silos of compute, network, and storage gear that are static and require individual management. This is one reason for the popularity of converged Infrastructure (CI) and hyperconverged infrastructures (HCI). HCI offers a single, centrally managed solution with software-defined compute, network, and storage that is easy to deploy, manage, and scale. ESG research reveals that organizations have reported faster deployment, simplicity of management, and scalability as benefits of HCI, with the most cited *challenges* including difficulty finding the root cause of issues and performance challenges around data locality. Organizations who chose CI over HCI reported doing so for better performance (24%) and reliability (30%), but they also state that the increased training required (25%), and service and support issues with converged platforms (24%) have both been challenges.

Figure 1. Usage of Converged and Hyperconverged Infrastructure Technology



Source: Enterprise Strategy Group

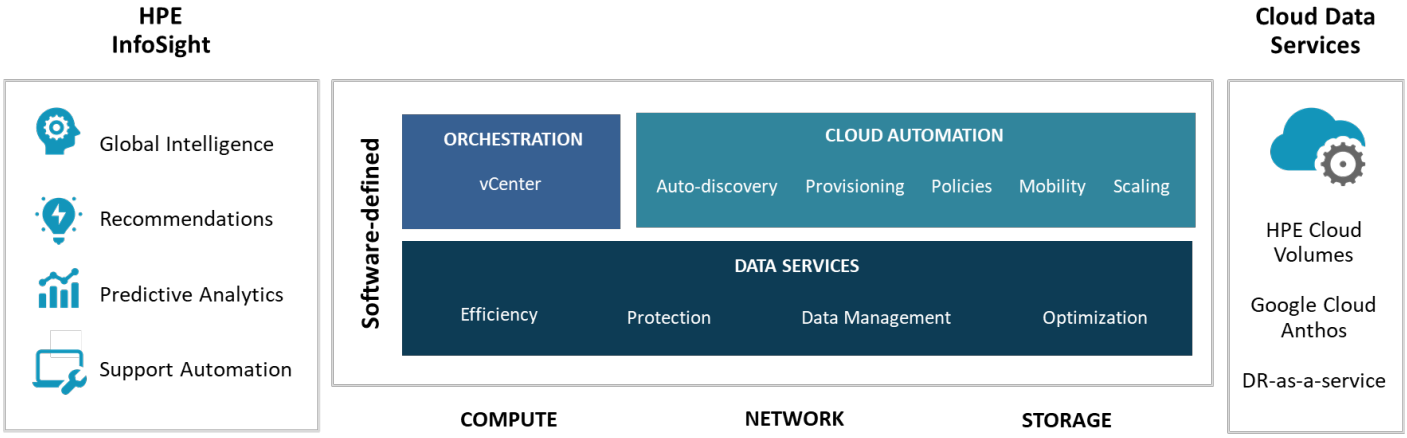
It should come as no surprise that more than half of organizations (54%) reported that they are utilizing both CI and HCI in their environments (see Figure 1).[1] And 55% of respondents to ESG's 2019 technology spending intentions survey say they will be increasing spending on both technologies in 2019.[2] What is needed to support business-critical workloads is an end-to-end solution for VMware Datacenter that combines the best attributes of both technologies, merging the simple deployment and management of HCI with the resilience, performance, granular scalability, and flexibility of CI.

[1] Source: ESG Master Survey Results, *Converged and Hyperconverged Infrastructure Trends*, October 2017.
[2] Source: ESG Research Report, *2019 Technology Spending Intentions Survey*, February 2019.

HPE Nimble Storage dHCI

HPE Nimble Storage dHCI is a platform designed to deliver the flexibility of converged infrastructure with the simplicity of HCI to support workloads with unpredictable growth. Resources—compute (HPE ProLiant) and storage (HPE Nimble Storage)—are disaggregated and scale independently, and hyperconverged control drives software-defined automation. Powered by HPE InfoSight, Nimble Storage dHCI is architected to provide intelligence and automated administration, to predict and prevent disruptions, and to self-optimize the entire virtualization stack. HPE's ambitious goal is to give VM admins the agility they need to keep up with the demands of the enterprise.

Figure 2. HPE Nimble Storage dHCI



Source: Enterprise Strategy Group

Key capabilities of HPE Nimble Storage dHCI include:

- **Global intelligence**—leveraging HPE InfoSight for predictive analytics and performance and resource optimization. Cloud-based machine learning correlates telemetry data across infrastructure layers to predict and prevent problems and automate decision making.
- **Hyperconverged control—**collapses storage and compute silos with policy-driven automation at the VM for data services—clones, backups, restores, and moves—and native vCenter management.
- **Disaggregated resource scaling—**where compute and storage can be added to a cluster independently and transparently for maximum resource utilization and efficiency.
- **High availability—**with 99.9999% (six-nines) of measured availability, no single point of failure, and advanced data integrity to tolerate three simultaneous dive failures.[3]
- **Low-latency performance—**measured as low as 200 microseconds data response time combined with automatic QoS to eliminate noisy neighbors.
- **Data efficiency**—provides global deduplication, compression, zero pattern elimination, thin provisioning, and zero-copy clones to provide up to 21x data reduction.
- **End-to-end data protection**—via integration with Veeam and HPE Recovery Manager Central (RMC).

[3] Download this white paper to learn more about how availability was measured across the entire installed base of HPE Nimble Storage: https://www.hpe.com/us/en/resources/storage/redefining-standard-system.html

- Workload mobility—with native, bidirectional application and data mobility across multiple clouds with HPE Cloud Volumes and Google Cloud's Anthos.

ESG Technical Validation

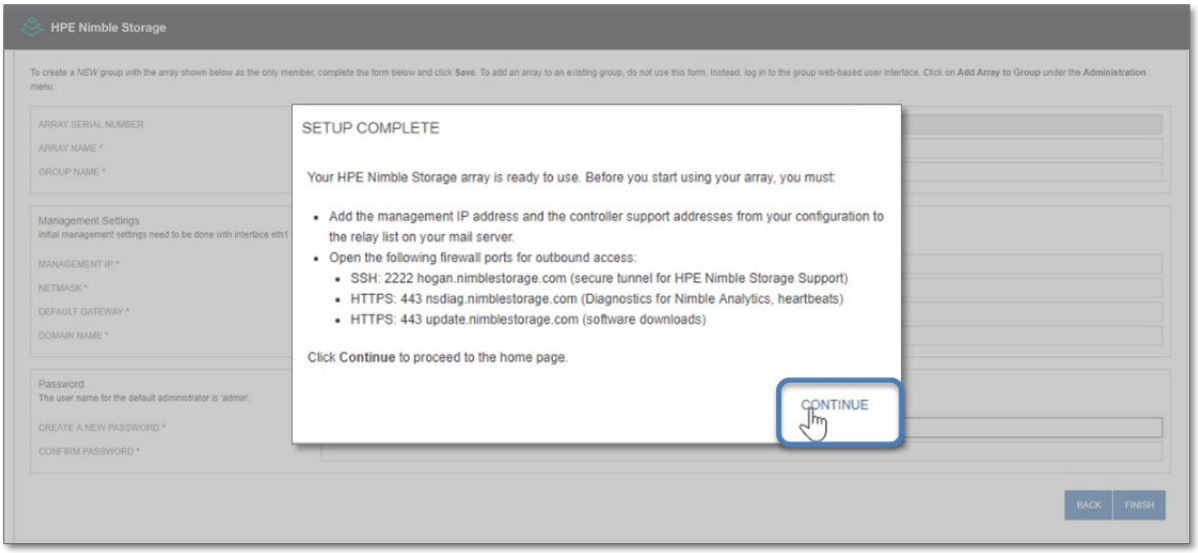
ESG performed evaluation and testing of HPE Nimble Storage dHCI. Testing was designed to validate the simplicity of deployment and management of the platform while examining the disaggregated scalability, policy-driven automation, full-stack predictive analytics, performance, availability, and hybrid cloud readiness in the context of supporting consolidation of business-critical apps and workloads.

Simplicity of Deployment and Management

ESG Testing

ESG walked through the process a customer would use to deploy HPE Nimble Storage dHCI. First, we initialized the HPE Nimble Storage arrays by connecting to the management VLAN and browsing to the management URL. We entered basic information like hostname, IP addresses, etc. When initialization was complete—in less than 60 seconds—we were redirected to HPE Nimble Storage dHCI setup when we clicked *CONTINUE*, as shown in Figure 3.

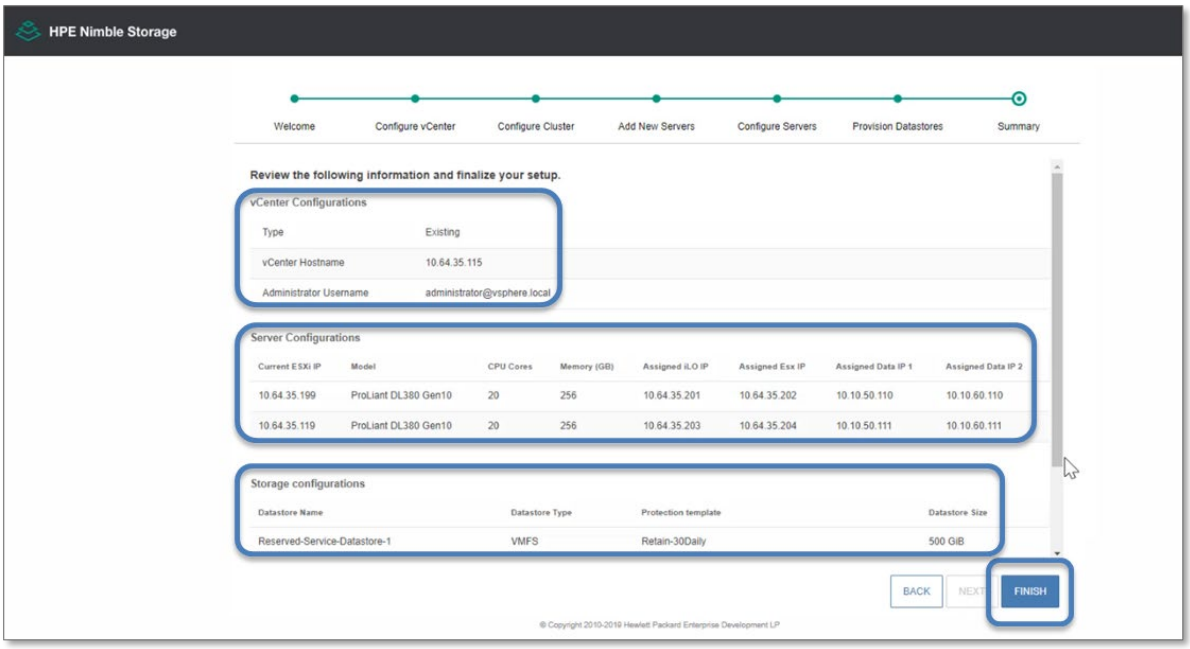
Figure 3. HPE Nimble Storage Array Initialization



Source: Enterprise Strategy Group

We were walked through HPE Nimble Storage dHCI setup step by step with clear descriptions of the information required at each step. The first step was to configure vCenter. Organizations can use an existing vCenter server or create a new one. HPE includes the vCenter OVA in the HPE Nimble Storage array, so the customer doesn't need to download or deploy it manually. If an existing vCenter is used, HPE Nimble Storage dHCI allows organizations to either create a new cluster or use an existing cluster. We created a new cluster from the discovered servers. Finally, we provisioned a datastore. HPE Nimble Storage dHCI offers the flexibility to create the datastores in setup, or via a vCenter plug-in. Figure 4 presents a summary of the configuration.

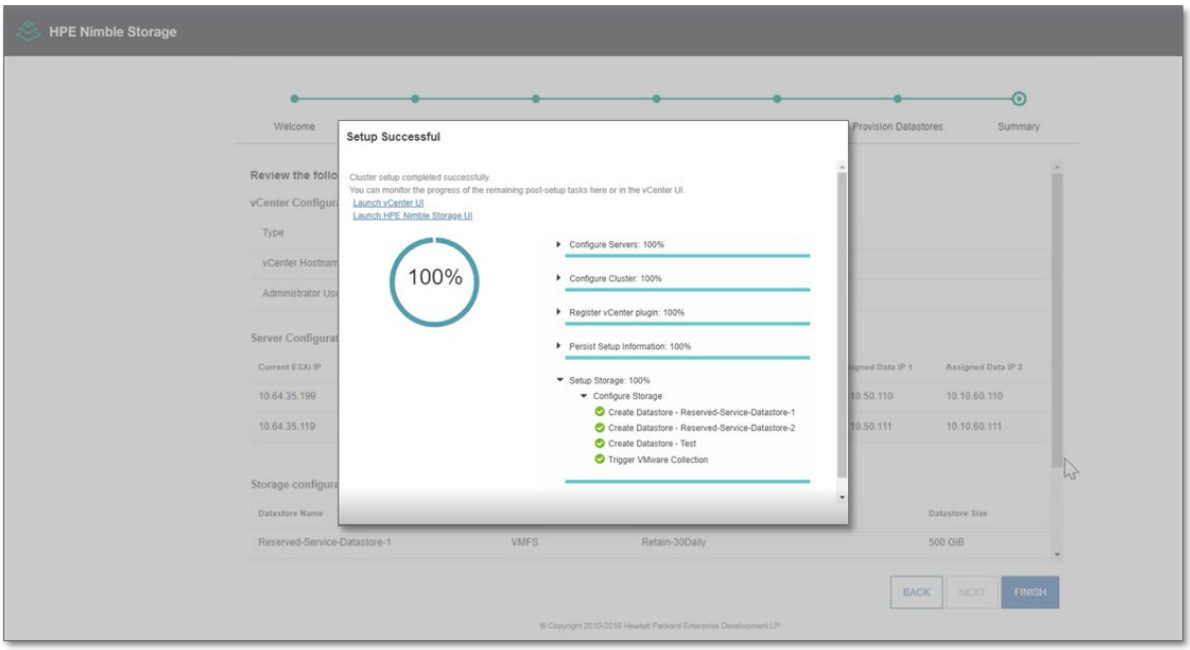
Figure 4. HPE Nimble Storage dHCI Setup Summary



Source: Enterprise Strategy Group

When we clicked *FINISH*, the system set up the environment, as shown in Figure 5.

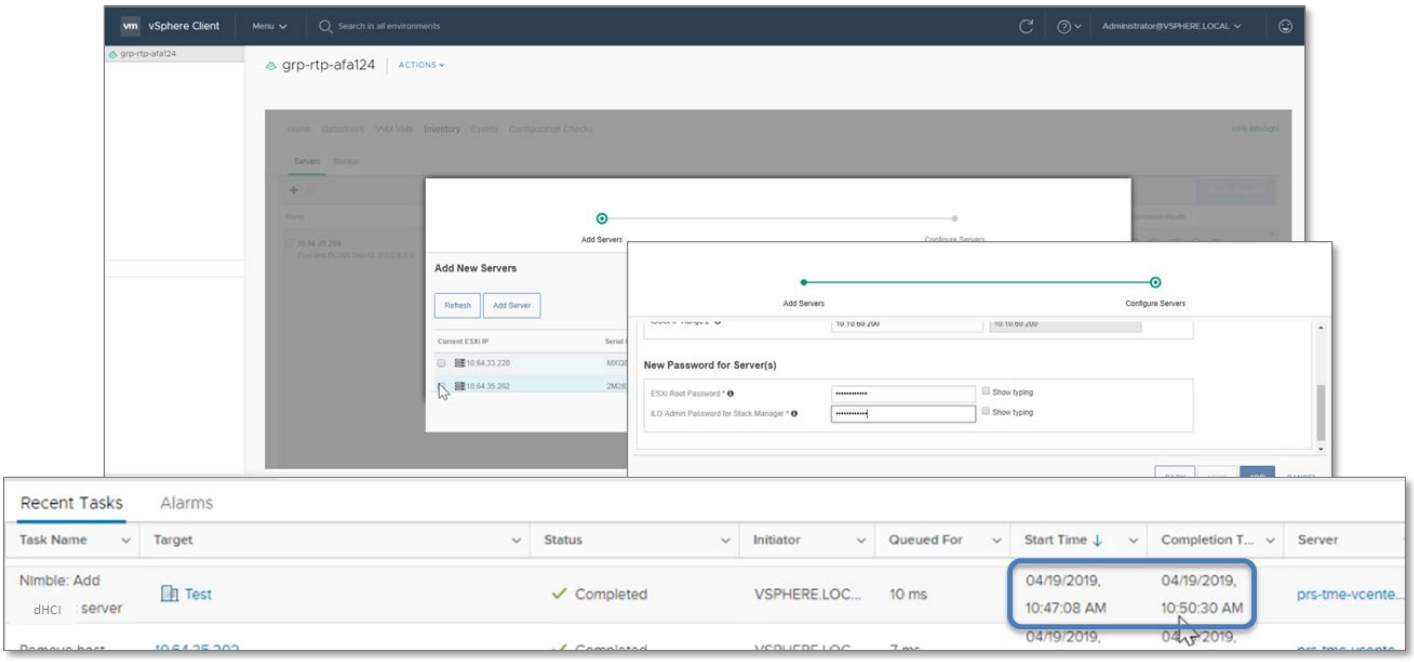
Figure 5. HPE Nimble Storage dHCI Setup Complete



Source: Enterprise Strategy Group

Setup, which required only basic host and networking information about the environment, was complete and HPE Nimble Storage dHCI was ready to begin servicing workloads less than 12 minutes after our first keystroke. Next, we tested the granular expandability of the platform by adding a server to the VMware cluster using the HPE Nimble Storage dHCI vSphere plug-in. We clicked the add symbol (+) and the system found multiple new ProLiant servers we had powered on and attached to the HPE Nimble Storage dHCI's network.

Figure 6. Scaling Compute in an HPE Nimble Storage dHCI Cluster

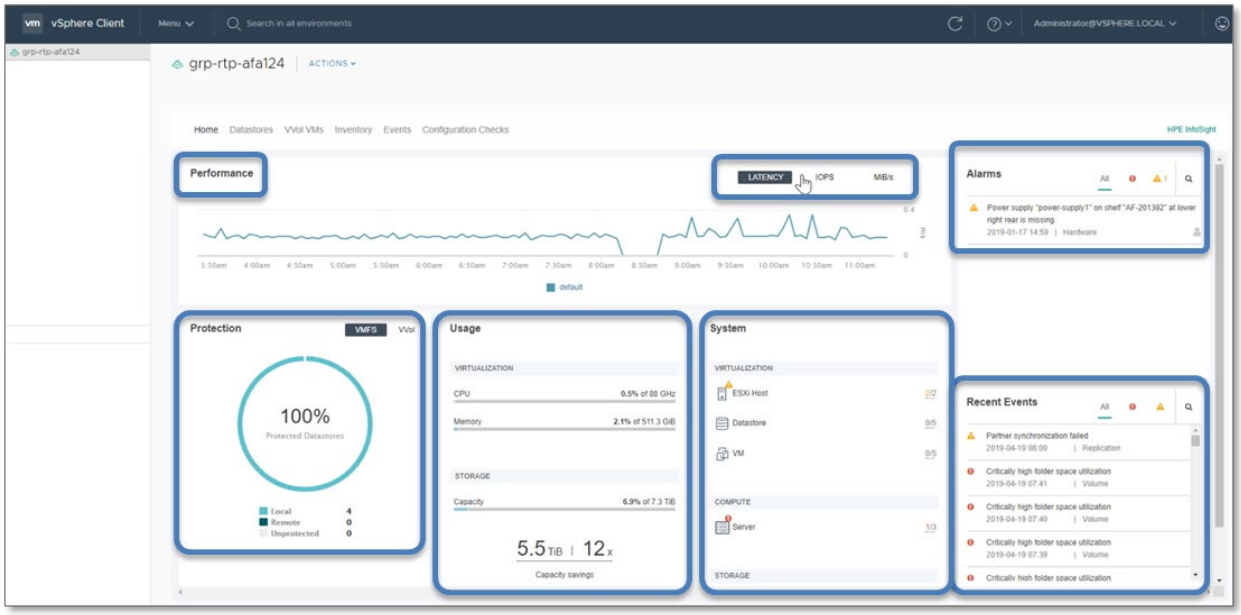


Source: Enterprise Strategy Group

We selected a server and entered the management and iSCSI IP address ranges as well as new passwords for both ESXi and HPE Integrated Lights Out (iLO) administration for a total of six clicks and less than three minutes.

Next, we navigated to the HPE Nimble Storage vSphere client plug-in where we could see the overall state of our cluster at a glance, including performance metrics, alarms, events, protection status, and resource usage. With one click we viewed an inventory of servers and storage in the cluster as well as VMware abstractions like datastores and VMware Virtual Volumes (VVols).

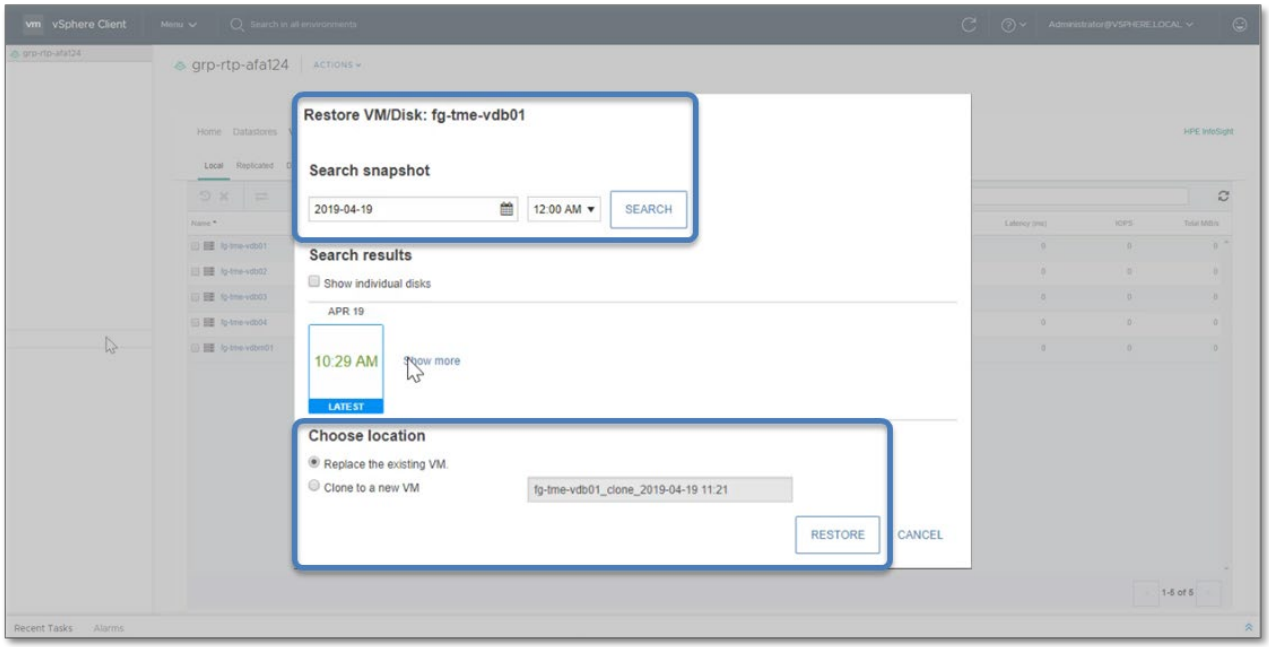
Figure 7. Managing HPE Nimble Storage dHCI with the HPE Nimble Storage vSphere Client Plug-in



Source: Enterprise Strategy Group

The HPE Nimble Storage dHCI platform is designed to provide high availability for storage infrastructure and simple data protection functionality with capacity-efficient local and remote protection for organizations' data. HPE Nimble Storage can support thousands of snapshots per volume to enable rich and deep data retention schedules. ESG looked at local snapshots and clones while running workloads to simulate an active environment. Schedules were set up to automatically create snapshots and clones of an active volume, then we restored one of them as seen in Figure 8.

Figure 8. Managing HPE Nimble Storage dHCI with the HPE Nimble Storage vSphere Client Plug-in VM Snapshots

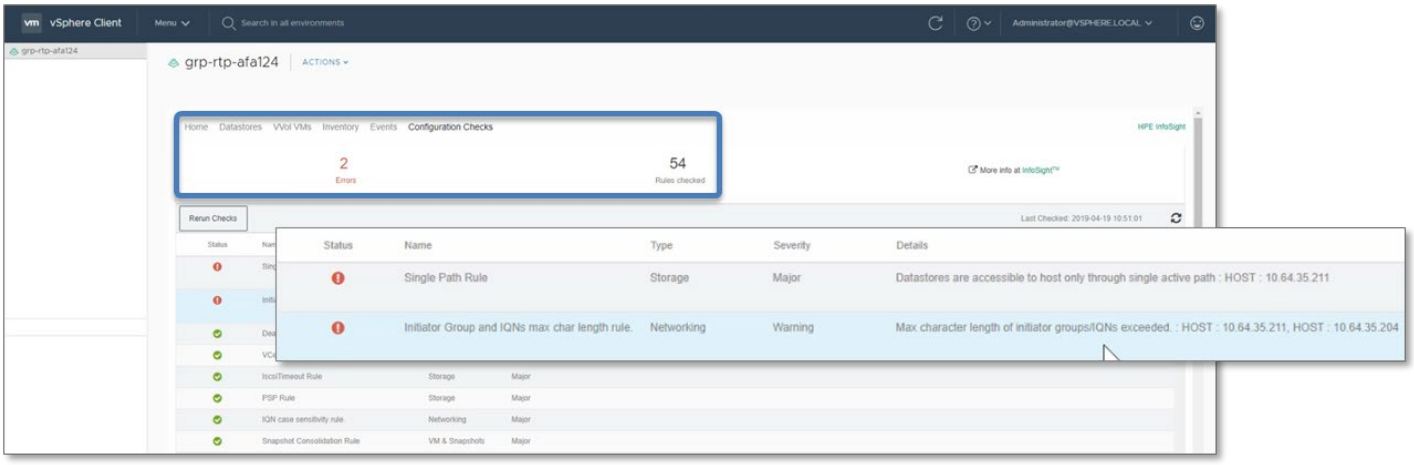


Source: Enterprise Strategy Group

HPE Nimble Storage dHCI enables organizations to create policies that define the frequency and retention period for local snapshots, clones, and remote copies of production data. These policies can be applied to single volumes or groups of volumes. Pointer-based snapshots and zero-copy clones leverage flash to eliminate impact on production performance. HPE Nimble Storage replication moves changed data on a set schedule, leveraging the existing reduction and compression of data to minimize required bandwidth.

Next, we clicked on ***Configuration Checks*** to validate our configuration. As Figure 9 shows, the server we just added violates two of the 54 rules checked: There is only one path from the server to datastores—a serious availability issue—and it violates the initiator group/iSCSI qualified name (IQN) maximum character length rule.

Figure 9. Managing HPE Nimble Storage dHCI with the HPE Nimble Storage vSphere Client Plug-in Configuration Checks



Source: Enterprise Strategy Group

Once identified, both issues were easy to correct in seconds with a couple of clicks.

Why This Matters

Traditional virtualized infrastructures made up of multi-vendor components are complex to plan, install, configure, manage, and maintain. Fully integrated hyperconverged solutions emerged with a goal of simplifying management, reducing time to deployment, and lowering total cost of ownership, but at the cost of flexibility and performance in business-critical, mixed workload environments. Converged infrastructure systems offered the flexibility and performance of traditional infrastructure, but organizations paid for that flexibility with more deployment and management complexity than hyperconverged systems. ESG research has found that organizations choose converged infrastructure when scalability (30%), reliability (30%), and the ability to fit into their management structure and workflows (33%) are important, while hyperconverged is chosen when supporting tier-2 workloads (37%) and ease of use (35%) are top of mind.[4]

ESG validated that HPE Nimble Storage dHCI was exceptionally easy to deploy and manage. The installation process was simple with the help of a configuration wizard that automated the usually complex tasks associated with setting up a complete virtual infrastructure. This included the setup of servers, storage, networking, and a fully clustered HA VMware environment in less than 12 minutes. ESG quickly expanded compute capacity transparently by adding a server to the cluster online in less than three minutes.

The HPE Nimble Storage dHCI vCenter plug-in was complete and robust, enabling total management of all infrastructure directly from the vCenter console with policy-based automation of key management functions.

HPE InfoSight—AI-driven Operations and Management

To maximize uptime, businesses must automate themselves away from the manual cycle of break, fix, tune, and repeat. A solution that can automatically minimize disruption to applications, optimize dynamically changing workloads, and tune the infrastructure for improved performance would be a welcome change. When identifying and remediating the root causes of performance-impacting issues that occur in hyperconverged infrastructure, an administrator can benefit from a platform that can identify and resolve issues holistically without requiring the use of separate diagnostic tools. HPE InfoSight leverages cloud-based machine learning and is designed to provide global insights that reveal how the server,

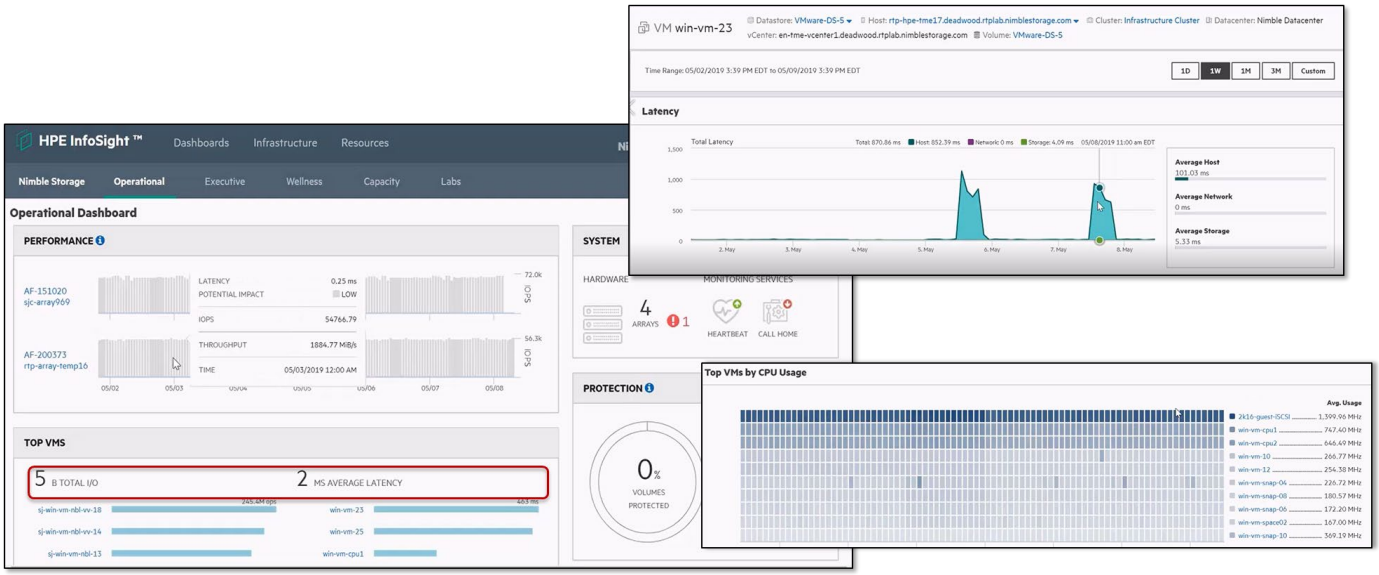
[4] Source: ESG Master Survey Results, *Converged and Hyperconverged Infrastructure Trends*, October 2017.

storage, and networking components of HPE Nimble Storage dHCI interact, identifying and automating prediction and resolution of issues. This can significantly decrease time spent manually working with diagnostic tools and coordinating with separate server, storage, and networking teams to determine root causes and decide upon the proper remedial actions.

ESG Testing

First, ESG navigated to the main portal of HPE InfoSight (see Figure 10). We viewed summary information about this specific customer's HPE Nimble Storage dHCI implementation, such as metrics related to the entire system, data protection, and VMs. We noted that the *Top VMs* window sorted VMs according to largest average latency over a predefined timeframe, giving the administrator the insight to prioritize a potential issue. It also gave us the option to sort by activity, which identified inactive VM resources that administrators can reclaim.

Figure 10. HPE Infosight Portal and Drill-down Views



When we clicked on the VM listed at the top, InfoSight presented detailed metrics associated with it. We noted that InfoSight analyzes the entire system to determine exactly where the latency may originate, from a server, storage, or networking perspective. Line graphs such as these can be viewed over historical timelines to note trends. Rather than accessing separate diagnostic tools, ESG used InfoSight to consider the entire infrastructure to narrow down root causes.

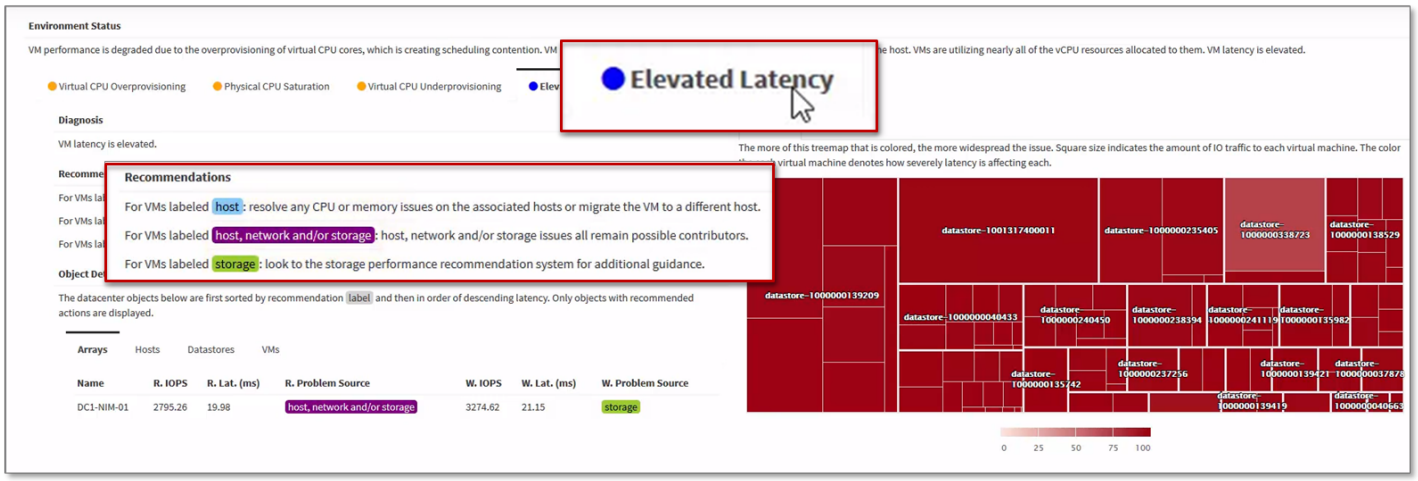
InfoSight applies visualizations to offer a better illustration of possible root causes of the large average latency. As we drilled into other metrics associated with this specific VM, we saw graphs such as a "shower tile," which illustrated top VMs by CPU usage. These color-coded graphs offer another way to point out possible root causes easily, decreasing the time to investigate. In this example, the darker colors illustrate the VMs consuming the most CPU processing power. VMs consuming more processing power may be causally related to the latency issues found in our previously defined VM.

HPE InfoSight enables administrators to leverage the collective experience of numerous customers who may have faced similar issues. With HPE InfoSight cross-stack recommendations, an administrator can uncover possible root causes and execute actions based on prescriptive advice. The advice is based on HPE's collection of data regarding issues faced by its current installed base. This can help an administrator decrease issue resolution time, thus reducing operational costs.

ESG accessed the cross-stack main page to view how root causes and recommended courses of action are presented. We specifically noted two charts. The first, a tree map, illustrated those affected VMs in a specific vCenter experiencing latency

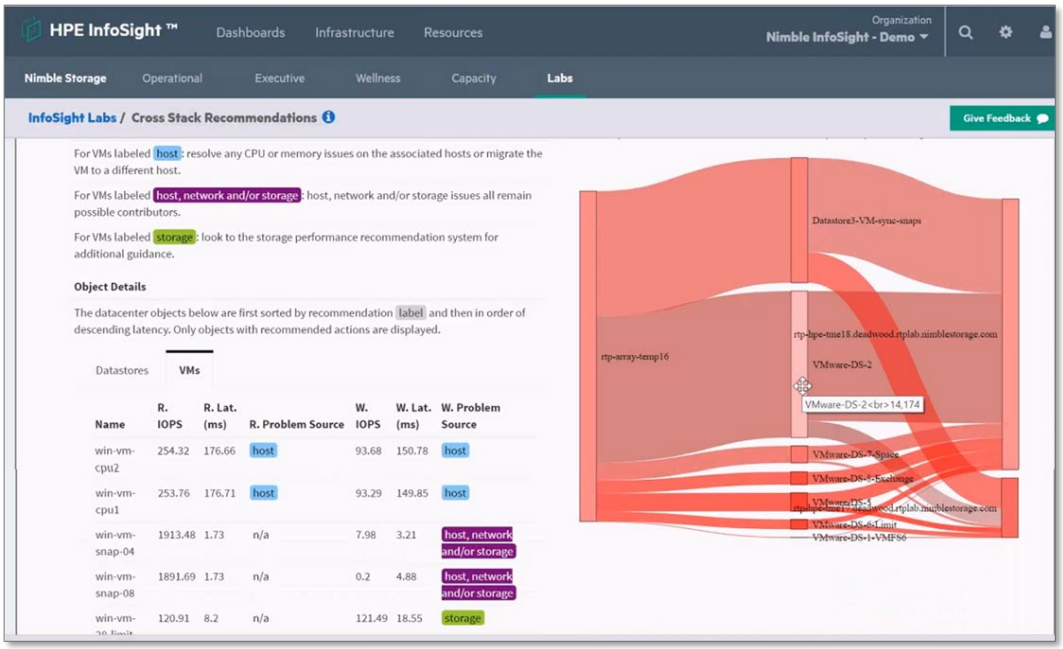
(see Figure 11). The size of each block showed the amount of I/O to each machine, and the intensity of color indicated the severity of the latency. The spread of color indicates how widespread the issue is based on the possible causes.

Figure 11. Cross-stack—Tree Map Illustrating Latency in VMs of a Specific vCenter



Another powerful visualization included in HPE InfoSight is the Sankey (shown in Figure 12). Here, we viewed the latency issue via the relationship between storage arrays, datastores, and hosts, from left to right. The width of the horizontal lines correlated to the amount of I/O traffic, while the colors of the arrays, datastores, and hosts represented the severity of the latency issue.

Figure 12. Cross-stack—Sankey Illustrating Latency in VMs of a Specific vCenter



With each graphical representation, HPE InfoSight cross-stack recommendations presented a list of the most likely root causes along with possible actions to remediate, color-coded to communicate whether the problem was related to the server, storage, or networking components of HPE Nimble Storage dHCI. Organizations can implement policies to automate remediation where appropriate.

Why This Matters

Identifying and resolving issues quickly is only one way to decrease overall downtime. Organizations are focused on maintaining application performance levels so that workers can complete critical business tasks and customers have a great experience. Having the ability to proactively identify issues that can impact application performance, tune the infrastructure, and optimize the workloads themselves can further decrease downtime and contribute to business continuity.

ESG validated that HPE Nimble Storage dHCI with HPE InfoSight can provide organizations with a single-pane, data-centric view of all VMs, identify the causes of performance-impacting issues, and anticipate what actions will prevent performance obstacles from arising.

We saw how an administrator can leverage HPE InfoSight to see how an identified issue relates to the entire infrastructure—identifying the root cause of an issue whether it comes from the server, storage, network, or VM—while pinpointing other possible affected areas. We also verified the ease with which an administrator can see how an identified issue potentially impacts other areas so that any impact to business continuity is minimized. Finally, we saw how forecasting the behavior of metrics against predefined thresholds can help the administrator plan and budget accordingly for future resource requirements.

The Bigger Truth

It's old news that data centers have become too complex and too expensive. Technological demands from the business have increased over the years, and organizations have invested in specialized technologies that perform a single function and then integrated them into an existing infrastructure, adding layers of complexity. Each technology requires separate management panes, manual workflows to set up and configure, and a set of dedicated administrative resources capable of maintaining the components for each layer.

Consolidation of technologies into a single unit—the hyperconverged model—can minimize both capital and operational expenditures. The architecture of HCI is ideal for applications with predictable, homogeneous growth—where it makes sense for compute and storage to grow together. But for workloads with unpredictable growth, the flexibility of scaling compute and storage independently can be a key requirement.

HPE Nimble Storage dHCI technology is efficient, reliable, and highly scalable, while maintaining the simplicity of the hyperconverged model. ESG validated that HPE Nimble Storage dHCI can greatly increase the speed of deployment and common operations, while reducing the administrative complexity associated with those same operations. Offering the same level of administrative simplicity, data efficiency, and native bidirectional data movement across data centers and public cloud providers with HPE cloud volumes, HPE Nimble Storage dHCI is noteworthy.

ESG deployed a new HPE Nimble Storage dHCI cluster with vSphere in less than 12 minutes and scaled compute resources by adding a server non-disruptively in less than three minutes. Management was clean and simple using the vSphere plug-in, enabling day-to-day operations to be handled by a VM administrator, without involving storage and network teams. HPE InfoSight identified issues and their root causes regardless of their place in the infrastructure—whether from the server, storage, network, or VM—while pinpointing other possible affected areas. The ease with which an administrator can identify the potential overall impact of an issue minimizes disruption to the business. Forecasting the behavior of metrics against predefined thresholds helps administrators plan and budget accordingly for future resource requirements.

Hyperconverged systems have been successful in simplifying operations for organizations of all sizes through software-defined infrastructure, increased effectiveness of both physical and human resources, and decreased complexity. Converged systems have offered much of the flexibility of traditional architectures but have lacked the simplicity of hyperconverged systems. HPE Nimble Storage dHCI can help organizations take on the challenges of maximizing efficiency, uptime, and performance, while reducing complexity. If your organization is looking to hyperconverged technology to simplify operations but needs to support business-critical workloads, HPE Nimble Storage dHCI powered by HPE InfoSight offers the flexibility to support business-critical workloads with the simple deployment and management of a hyperconverged platform.

Enterprise Strategy Group is an IT analyst, research, validation, and strategy firm that provides market intelligence and actionable insight to the global IT community.

 www.esg-global.com

 contact@esg-global.com

 P. 508.482.0188