

White Paper

HPE Introduces a New Disaggregated HCI Architecture with HPE Nimble Storage dHCI

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IDC OPINION

As enterprises undergo digital transformation (DX), they are modernizing their information technology (IT) infrastructure to provide the performance, availability, scalability, and agility required to meet today's business demands. Software-defined infrastructure presents significant attractions to these customers by combining ease of management and commodity economics with extreme agility. Of all the software-defined storage platforms, hyperconverged infrastructure (HCI) has been the fastest-growing platform, providing an excellent fit for predictable workloads. For unpredictable workloads that require nonlinear scaling, however, enterprises continue to deploy disaggregated storage architectures like storage area network (SAN). While SANs can be more difficult to manage, the fact that they allow enterprises to scale compute and storage resources independently is a very attractive attribute for mixed workloads and larger-scale consolidation.

The simplified HCI management model is highly attractive to enterprises. To broaden the types of business-critical workloads that customers can place on HCI, vendors are starting to evolve their products to provide more options for scaling compute and storage resources independently. IDC sees this as a positive market development and is evolving its own definition of HCI to encompass these changes with the introduction of an additional type of HCI architecture that IDC refers to as "disaggregated." Products that fit the disaggregated HCI (dHCI) description retain the simplified management model of traditional HCI while providing the flexibility to scale compute and storage resources independently.

HPE recently introduced a new product, HPE Nimble Storage dHCI, that meets IDC's definition of disaggregated HCI. HPE Nimble Storage dHCI combines the unified and simplified management paradigm of HCI with the capabilities of true enterprise-class disaggregated storage. Unique integration points in this platform include built-in automation software for very simple cluster deployment and scaling and centralized management based on VMware vCenter. These features, combined with enterprise-class performance, availability, and storage management functionality, also differentiate this platform from other HCI and converged offerings in the market. Because this solution offers the best of both HCI and converged architectures, it will likely compete with both type of competitive offerings. There is no doubt that the platform will broaden the types of larger, more mission-critical workloads that HCI platforms can effectively support.

IN THIS WHITE PAPER

As the benefits of a hyperconverged infrastructure architecture become better known, many enterprises would like to use it for more types of workloads. A lack of flexibility in scaling compute and storage resources independently poses challenges to the broader use of HCI, however. At HPE Discover in June 2019, HPE addressed these concerns with its HPE Nimble Storage dHCI product. This white paper discusses the market requirements driving the need for a more flexible type of HCI offering and then turns to a brief review of HPE Nimble Storage dHCI and how it meets those requirements.

SITUATION OVERVIEW

As IT infrastructure has evolved over the years, the need for agility to support much more dynamic business models has become increasingly important. As enterprises undergo digital transformation and adopt much more data-centric business models, they are collecting, storing, and analyzing more data than ever before. Effectively accommodating high data growth has in fact been a key capability that enterprises look for as they move to more agile and modernized IT infrastructure. Another key requirement for digitally transforming enterprises is that they must continue to support legacy workloads while introducing next-generation applications (NGAs). Each of these workload types imposes very different requirements, and this is another factor that is driving the need for agility in the IT infrastructure. The rise of software-defined storage architectures has been driven in large part by the need for flexibility, not only to accommodate different types of workloads but also to enable easy scalability over a wide range.

Enterprises on the DX journey are clear about the issues holding them back. Budget constraints are a key concern. Reducing cost while continuing to meet business requirements is critical, and enterprises are deploying software-defined infrastructure to achieve this. Overburdening IT staff is another key consideration. With business growth, day-to-day IT operations grow as well, and enterprises are looking to the ease-of-use and self-managing capabilities of software-defined infrastructure as well as automation and orchestration tools and the public cloud to help manage the increased workload. They are also looking to newer technologies such as artificial intelligence and machine learning to inform better management as IT environments become increasingly complex in the new hybrid cloud world. New approaches that simplify day-to-day IT operations, making them more reliable and increasing the span of administrative control of those managing IT resources, are in demand, and this is another key reason enterprises look to modernize IT infrastructure.

Given this background, HCI arose as a new software-defined storage architecture that exhibited attractive attributes relative to monolithic network storage array designs. Because the systems were software defined, they were much more agile and could be configured to meet the requirements of a broad set of enterprise workloads. HCI's centralized, policy-based management made storage administration much simpler in mixed workload environments, not only through improved orchestration, automation, and self-management to meet defined performance and availability goals but also because it enabled management tasks to be performed much more intuitively at the application (i.e., virtual machine [VM]) level. This made it much easier for the IT generalists that were increasingly taking over storage administration tasks in many enterprises to quickly, safely, and reliably handle common workflows for provisioning, data mobility, scaling, data protection, and meeting service-level agreements (SLAs). HCI also enabled simple, nondisruptive expansion. As a result, administrators could just add another node-level building block, which included the compute, the storage, and the networking all under a single SKU, secure in the knowledge that everything they needed to support the expansion was included.

While HCI systems started with select workloads like virtual desktop infrastructure (VDI), they have since expanded to include a broader mix of workloads as enterprises became more comfortable with their capabilities.

As part of that expansion, enterprises were looking to migrate other applications, like more performance-sensitive business-critical workloads with larger data sets, onto HCI platforms as they retired older systems that were more expensive, less flexible, and harder to manage. Many of these other workloads had much more unpredictable scaling requirements: these were environments where the option to scale compute and storage resources independently drove improved resource utilization, reduced energy and floorspace consumption, and lower overall infrastructure and administrative costs for these larger workloads. With data – particularly enterprise data – anticipated to grow significantly over the next five years, IT managers need to field an agile IT infrastructure that is both reliable and highly scalable. The ability to match actual compute and storage resource purchase and deployment much more closely to actual workloads is an important requirement in these environments.

These other workloads also imposed other requirements that had in the past been better met by disaggregated storage solutions like SANs. Not only did many of them require very large storage capacities, but they also had stringent requirements for predictably low-latency storage performance at scale as well as very high availability. With DX, IT becomes a much more strategic resource than it has been at most enterprises, which increases availability requirements for IT infrastructure.

Most enterprises are highly virtualized, and VMware virtual infrastructure is most widely deployed among organizations running virtual workloads that have any kind of high-performance and/or high-availability requirements. When customers buy server, storage, and networking components separately, the level of VMware integration the chosen storage supports is often a key consideration. VMware offers a wide range of monitoring, orchestration, automation, and administration tools as well as APIs that provide options for customers to use them as a centralized control plane for their virtualized environments, despite the fact that the underlying infrastructure may be built from hardware (and public clouds) from a number of different vendors. As more enterprises deploy hybrid cloud environments, the ability to extend the control plane to monitor and manage both on-premises and off-premises (i.e., public cloud) infrastructure from a single pane of glass is becoming a more important consideration.

Based on this set of evolving requirements – easy scalability with centralized management that will accommodate hybrid cloud environments, software-defined flexibility (which includes the ability to scale compute and storage resources independently as necessary), and the need to streamline infrastructure costs in both acquisition and ongoing management – a new disaggregated HCI platform that melds the best of enterprise-class converged infrastructure with the best of HCI would be very attractive to a large portion of the enterprise storage market.

The HPE Nimble Storage dHCI

The HPE Nimble Storage dHCI is a new disaggregated HCI platform that leverages HPE ProLiant servers and HPE Nimble Storage arrays with intelligent automation software that simplifies deployment, management, upgrade, and support for an integrated IT infrastructure solution. The system features a VMware vCenter-based control plane that provides virtual machine-centric data services and resource management across all IT infrastructure resources, and the control plane is well integrated with HPE InfoSight, HPE's cloud-based predictive analytics platform. HPE InfoSight underpins HPE's Intelligent Data Platform and performs extensive monitoring and analytics of HPE Nimble Storage dHCI, leveraging artificial intelligence and machine learning (AI/ML) to self-manage the environment to meet and exceed SLAs, predictively identify and diagnose problems,

pinpoint "noisy neighbor" VMs, gain visibility into underutilized resources to be repurposed, and make recommendations that optimize performance and drive higher efficiency without operator intervention. It also offers assistance in many other areas, including pre-upgrade validation, performance and capacity planning, system resource optimization, and best practice dissemination.

Specifically developed to run VMware vSphere, HPE Nimble Storage dHCI has added key, out-of-the-box vCenter integration that provides granular and intuitive application (i.e., VM)-level management. As software-defined infrastructure, all IT resources are abstracted and managed through vCenter. Auto-discovery makes it simple and easy to add new resources to the cluster (or reconfigure them). Policy-based automation enables VM-centric snapshots, clones, and data protection and recovery, which can be easily extended with replication for disaster recovery options (including HPE Cloud Volumes and enterprise-class block storage in the public cloud). Additional integration points between vSphere tools and HPE InfoSight were added for the HPE Nimble Storage dHCI platform, which make this particular product faster and easier to deploy, better instrumented, and easier to manage and troubleshoot.

Customers will notice the value to the extensive vSphere integration almost immediately. The system takes only 15 minutes to deploy from "rack to apps" (once cabled), auto-discovery software takes the manual effort out of finding and connecting resources, and the QoS feature makes assigning SLA priorities simple and easy. VMware software components like the ESXi (formerly ESX) hypervisor are pre-installed at the factory prior to shipment, while the vCenter plug-in is built into the Nimble Storage operating system. Centralized management through vCenter makes deployment and configuration quick and intuitive. All in all, customers will notice 96% time savings to deploy a 4-node configuration with HPE Nimble Storage dHCI (relative to traditional SAN architectures).

The system also includes industry-leading VMware Virtual Volumes (VVols) integration. While the system offers both VMFS and VVols support, the use of VVols enables more intuitive application-level management; makes better use of available compute, storage, and network resources; simplifies and/or automates common administrative tasks like space reclamation and storage provisioning; and enables storage array data services to be applied to individual VMs. The VMware plug-in lets administrators manage the entire solution stack (servers, storage, applications) from vCenter and uniquely actually runs directly on the Nimble Storage arrays (rather than in separate VMs as it does in less efficient, more complex designs), giving this configuration easier deployment and more efficient server resource utilization than other storage solutions. VVols brings real value in terms of storage management and cost savings, and HPE Nimble Storage's VVols implementation has more adoption than any other vendor in the industry, comprising almost 38% of VMware's entire VVols installed base. This is a strong testament to the functionality of HPE Nimble Storage's VVols integration and growth that we see increasing only with HPE Nimble Storage dHCI.

The system design, vCenter integration, and InfoSight support make the system actually easier to manage than competitive off-the-shelf HCI configurations, and the fact that HPE uses Nimble Storage arrays for the storage layer brings considerable benefits that are not included with traditional HCI platforms. Available in both all-flash and hybrid configuration options, the integrated Nimble Storage arrays can deliver latencies as low as 200 microseconds. Unlike most HCI systems, the HPE Nimble Storage dHCI platform offers a full complement of mature, proven data services, including thin provisioning, triple-parity RAID, inline data reduction, snapshots (zero copy and application consistent), encryption (and secure data shredding), replication, and a growth path to NVMe technology (and related higher-performance architectures like HPE Memory-Driven Flash based on Intel Optane) in the future. Based around this type of enterprise-class storage, HPE Nimble Storage dHCI can meet "six-nines" ("99.9999%") data availability requirements. The built-in data reduction

(compression, deduplication, zero-pattern elimination) in the Nimble Storage arrays delivers high data reduction ratios to make the most out of available storage capacity. And best of all, the use of Nimble Storage technology in the platform gives customers the flexibility to upgrade server and storage resources independently as needed.

Most enterprises are moving in the hybrid cloud direction (if they're not already there), and HPE provides excellent hybrid cloud integration. Earlier this year, HPE announced a partnership with Google around the Google Cloud Anthos hybrid cloud platform. Google Cloud Anthos is a software product, meant to be deployed in on-premises infrastructure, that solves the problem of containerizing legacy applications. Built around cloud standards like Kubernetes and Istio, Anthos includes migration tools that automate the process of migrating legacy virtualized workloads, as well as converting workloads from VMware vSphere, Amazon EC2, and Microsoft Azure virtual machines to Google Kubernetes Engine (GKE) containers. By deploying Google Cloud Anthos on HPE Nimble Storage dHCI, enterprises enjoy high performance, six-nines availability, and true enterprise-class functionality, and this is all delivered with unified hybrid cloud management that provides a consistent control plane for all workloads regardless of where they reside.

The HPE Nimble Storage dHCI hybrid cloud integration doesn't stop there, however. Tools like snapshots and replication offer efficient application workload mobility to and from cloud and noncloud locations. HPE Cloud Volumes provide an enterprise-class storage service for Google Cloud Platform as well as other public clouds. And HPE GreenLake offers simple as-a-service delivery on a pay-per-use basis for HPE offerings, including the HPE Validated Designs for Google Cloud Anthos.

HPE has been offering the Timeless Ownership Experience on its storage solutions for several years and covers the HPE Nimble Storage dHCI platform with it as well. The Timeless Program drives meaningful value for end users in a number of ways:

- **Cost savings:** Bundled software specific to the HPE Nimble Storage arrays such as dHCI Automation Software, all enterprise-class data services, and HPE InfoSight is offered at no additional charge with an active support contract.
- **Guaranteed high availability:** HPE guarantees six-nines data availability on even minimally configured HPE Nimble Storage dHCI systems.
- **Data reduction guarantee:** The HPE Store More Guarantee is unique in the industry. It guarantees that HPE Nimble Storage arrays will store more data per raw terabyte than any competitive all-flash array (AFA) for any given workload. If HPE is not able to meet the storage efficiency of an all-flash array competitor, then HPE will provide the incremental storage for free.
- **Future proofing:** HPE provides an option for free storage controller upgrades and a nondisruptive growth path to NVMe technology. HPE does not require a forklift upgrade to expand system performance and/or capacity.

All in all, the characteristics of HPE Nimble Storage dHCI seem well suited to customer requirements to host more business-critical workloads on newer, much more agile IT infrastructure that is much easier to manage than traditional systems.

CHALLENGES/OPPORTUNITIES

While HPE Nimble Storage dHCI may appear to the untrained eye to be just a packaging exercise, it is clearly more than that: HPE has done development to make additional features available in this platform that are not available in other competitive products. On the management software side, new features were added that allow customers to install these systems themselves in 15 minutes and manage the entire vSphere-based solution with a seamless administrative experience. New integration points between HPE InfoSight and VMware vCenter provide more comprehensive monitoring, optimization, and troubleshooting capabilities relative to traditional HCI platforms. Getting customers to understand just what this solution is and how it is different from traditional HCI solutions will be part of the challenge. The simple description that HPE is using in its marketing efforts – the simplicity of hyperconverged infrastructure with the flexibility of converged infrastructure – should be sufficiently compelling to make prospective customers take the time to understand the differentiating benefits HPE Nimble Storage dHCI brings to the table.

There may also be a challenge with HPE's use of the term *HCI* in the product name. There is no doubt that the HCI market is evolving, and to meet customer demand to make certain modifications to the offerings to better support more performance- and availability-sensitive workloads at higher capacities, the HCI market will likely expand to include more architectural diversity. Other HCI vendors are trying to make changes to their traditional HCI platforms to enable an ability to scale compute and storage resources more independently, but those that stay too much within the existing definition of HCI will not be able to meet the same performance and availability requirements that the HPE Nimble Storage dHCI product can. HPE will be competing against both traditional HCI and traditional SAN arrays with this product since its capabilities really straddle both markets. Hybrid products like this can generate some confusion in the market, so HPE will need to be clear and concise in its marketing efforts around the benefits it provides and how this product is different from competing solutions.

The opportunities for this type of a product are promising. Given that an inability to scale compute and storage resources independently is probably the biggest reason that drives customers *not* to purchase traditional HCI for more unpredictable, business-critical workloads despite the manageability advantages, this product addresses that with a solution that extends both storage performance and availability. Strong hybrid cloud integration capabilities are a critical part of this offering and will tempt customers looking to modernize their IT infrastructure, regardless of whether they are running a hybrid cloud environment already or will plan to move to it in the future.

Interestingly, HPE will be providing an upgrade path to HPE Nimble Storage dHCI for existing ProLiant server customers (in addition to selling it as a complete HCI system). This gives those customers that have been happy with HPE's server technology to enjoy the same relationship with the vendor for enterprise storage solutions. There is a huge installed base of ProLiant systems, and this provides a very attractive option to modernize storage infrastructure for those customers.

CONCLUSION

It's hard to argue with the manageability and scalability advantages of traditional HCI platforms, and this is clearly one of the reasons that the HCI market is one of the fastest-growing enterprise storage markets. IDC predicts that HCI market revenue will grow at a CAGR of 25.2% to crest \$11.4 billion in 2022. As HCI has matured, enterprises have been looking to use it to host a broader set of workloads, but there are still workloads whose performance, availability, and/or capacity demands encourage the use of disaggregated storage architectures that allow IT managers to scale compute and storage resources independently. This capability in particular makes disaggregated storage solutions better for workloads whose growth is very dynamic and unpredictable.

HPE has responded with a new disaggregated HCI architecture product that offers the management simplicity of HCI with the flexibility of disaggregated storage architectures. The HPE Nimble Storage dHCI product uses HPE ProLiant servers and HPE Nimble Storage arrays and provides integrated, single-pane-of-glass management through VMware vCenter, thereby providing customers the ease of use of HCI with all the performance, availability, and scalability advantages of enterprise-class storage. Because the storage is in a sense "disaggregated," customers enjoy the flexibility of scaling compute and storage resources completely independently. The use of Nimble Storage technology brings strong enterprise-class storage capabilities to the table: storage latencies as low as 200 microseconds, six-nines of data availability (guaranteed), capacity scalability into the multipetabyte range, a full complement of proven enterprise-class data services, strong hybrid cloud integration that spans all the major public cloud platforms, and AI/ML-infused monitoring, optimization, and troubleshooting with the industry's leading cloud-based predictive analytics platform HPE InfoSight.

With the HPE Nimble Storage dHCI announcement, HPE is extending its HCI portfolio to support a broader set of application types, including both predictable and unpredictable workloads. HPE SimpliVity is an intelligent HCI optimized for edge, remote office/branch office, VDI, and general-purpose workloads. As a leader in the HCI market, HPE SimpliVity provides a simple management and life-cycle experience with single-click upgrades, high data efficiency, and unique built-in backup, data protection, and data mobility. As HPE SimpliVity aggregates compute and storage in a scale-out architecture, it is ideal for workloads with predictable growth patterns. HPE Nimble Storage dHCI, on the other hand, offers the attractive, simplified HCI management experience with the flexibility to scale compute and storage resources independently that is needed for business-critical workloads that require more unpredictable resource scaling. This allows HPE to bring the simplified HCI management experience to a much broader set of workloads, providing a compelling alternative for many workloads in the past that would have been forced to go with a traditional SAN architecture.

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