

White Paper

Hardware Matters for Hyperconverged Infrastructure

Dell EMC XC Series Proves the Point

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August 2017

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Executive Summary

A common misconception about hyperconverged infrastructure (HCI) is that because data services are software-defined, the hardware doesn't matter. It's easy to see why—the software driving HCI solutions such as the Dell EMC XC Series (in this case, Nutanix software) is exceptional. It efficiently manages data and communications across a cluster of nodes and storage tiers, keeping the cluster and virtual machines (VMs) up and running, delivering optimal performance and availability. Software-defined infrastructure is changing the way data services are delivered, making companies more efficient and agile, and reducing costs.

But the software—no matter how powerful—cannot do anything alone. It depends on a hardware foundation that impacts the efficacy of your infrastructure. Sure, you can save money by using commodity x86 hardware—but that will also define the manageability, reliability, performance, and support of your HCI deployment.

Hardware abstraction is a given with HCI, but what does that mean? It simply means data tasks are managed through software, and can therefore be done on different hardware platforms. It does *not* mean that hardware doesn't matter; on the contrary, the hardware and software are interdependent. To get the best results, the entire stack should be validated to handle the varying demands of different enterprise applications. While commodity hardware can get you some of the benefits of HCI, a high-quality hardware foundation can get you more.

Dell EMC intellectual property makes the difference in the XC Series. It uses PowerEdge hardware designed specifically for HCI, pre-integrated with Nutanix software, and with purpose-built configurations tailored to HCI workloads. Leveraging the vast experience and expertise of Dell EMC storage engineers, the XC Series delivers a high-quality foundation that works together holistically.

What Drives Customers to HCI?

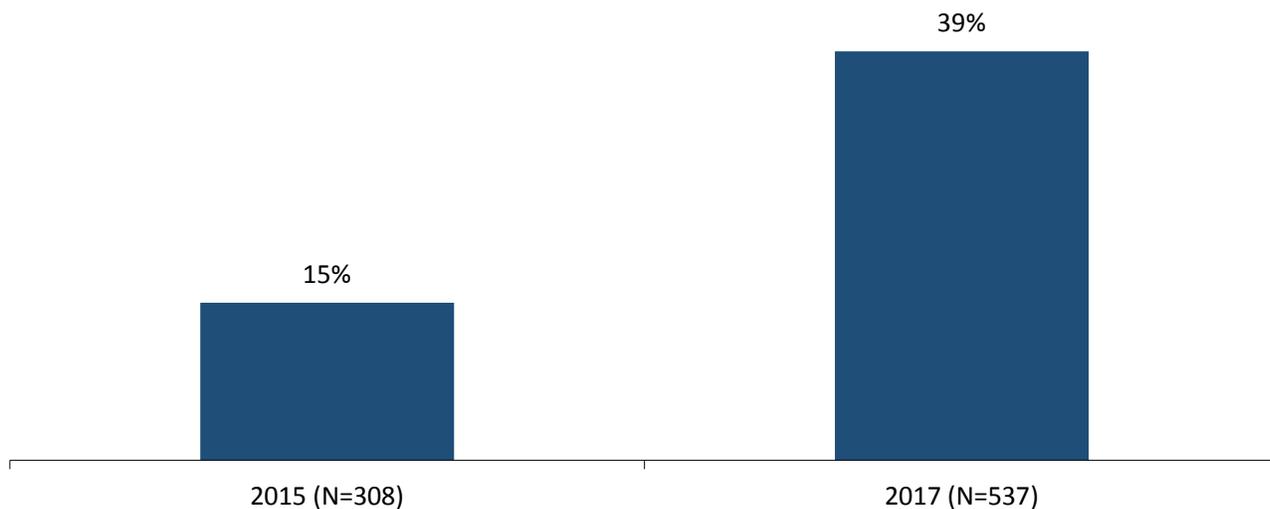
Organizations are attracted to HCI primarily for its simplicity—it is easy to deploy, providing a fast onramp for virtualization. With compute and storage resources in a single footprint, the central control reduces management effort and cost, as do software-defined data services. IT no longer has to manage LUNs and RAID groups on external storage connected via SAN; they may opt instead for the internal storage of HCI that can include enterprise-class storage features. HCI provides a common platform for multiple virtualized applications, instead of requiring a different server for each workload, and is easy to upgrade and to scale.

ESG research with midmarket and enterprise organizations supports the notion that efficiency and cost are key drivers of HCI. The percentage of respondents deploying HCI has more than doubled since 2015, from 15% to 39%,¹ with an additional 18% expressing imminent interest in the technology. Also, 44% view HCI as the best vehicle for them to become more “cloud-like,” to deliver IT as a service and reap the cost, efficiency, and agility benefits. When asked about their reasons for deploying it, ESG research respondents selected scalability, TCO, ease and speed of deployment, simplified systems and storage management, agility of VM provisioning, and reduce operational expenses, placing these in the top ten most popular responses.

¹ Source: ESG Research Report, *Hyperconverged Infrastructure Continues to Gain On-Premises Momentum*, to be published. All other research references and charts in this white paper have been taken from this report.

Figure 1. HCI Deployments are Increasing

Percentage of organizations currently using hyperconverged infrastructure technology solutions, 2015 vs. 2017. (Percent of respondents)



Source: Enterprise Strategy Group, 2017

What to Look for in HCI Solutions

Not all HCI solutions are alike. Below are some of the features you should be aware of when selecting an HCI solution.

- *Ease of deployment and management.* HCI is a node-based architecture, with nodes working together in a cluster. It should be fast and easy to deploy with minimal configuration—being a turnkey system is a key feature. Managing compute, storage, and networking from a central location saves time and money, and software-based upgrades are easy.
- *Scalability.* Scaling is as simple as adding nodes to the cluster; both hardware and software contribute to keeping management simple as you scale.
- *Lifecycle management.* How easy is it to upgrade hardware and software components? An integrated, purpose-built appliance is a holistic HCI solution that is easier to deploy, operate, and upgrade than hardware and software that are used together but remain distinct throughout the lifecycle.
- *Serviceability.* Component failures do happen. Drives fail, especially as you scale from dozens to thousands of drives. Because most HCI clusters support many applications, virtual desktops, and production workloads, it is essential that IT be able to troubleshoot and fix problems easily, without disruption.

- *Performance.* HCI storage is local, eliminating the delays that happen with external RAID storage. Performance must meet expectations for multiple simultaneous workloads and VMs. Be sure you get the performance you need.
- *Reliability.* You're running numerous applications and VMs, so always-on data services are essential.
- *TCO.* The biggest savings with HCI are in OpEx, because you don't need separate administrators for server, storage, networking, and virtualization. Any automation in your HCI solution will increase those savings. In addition, hardware that does the job efficiently, is easier to manage and service, fails less, and delivers the right performance for any workload will deliver a lower TCO.
- *Flexibility.* Workload requirements differ—some may need more compute, some may need more storage. Having capacity and performance configuration options in your HCI Nodes allows you to cost-effectively optimize your environment.
- *Density and power/cooling.* Some organizations need a small footprint due to space restrictions, and HCI is a great solution for that. The ability to pack as much performance and capacity as you need into a small footprint and ensure power efficiency can provide market advantage.

Realities of Hardware and Hyperconverged

A typical conversation about HCI goes something like this: “You can run a bunch of workloads on HCI. It's a complete infrastructure in a box—compute, storage, networking, virtualization—with software-defined everything! ‘Software-defined’ abstracts functionality from the underlying hardware, so you can use whatever hardware you want. This will save you money, make it easier to manage, and enable modular scaling.” The assumption is that you don't have to pay any attention to the hardware. Great! One less thing to think about.

Only, it's not true. The hardware *does* matter. You may not have to fiddle with it as much—that's one of the benefits of HCI—but it is important to realize that all hardware is not created equal. Hardware that is designed for HCI, built for the tasks that HCI does in one box—particularly storage tasks—will deliver more benefits than a commodity server.

And here's why. Commodity x86 servers are built for general purpose computing, not for storage tasks that put different stresses on the system. “Commodity” means there are options from various manufacturers, along with lower acquisition costs due to economies of scale from mass production. They can have an important place in the data center. But they were not designed for the levels of performance and reliability an HCI platform should deliver. If your workloads needed enterprise storage capabilities such as high performance and reliability before HCI, why should you give those up to get HCI? If you're consolidating workloads onto a single platform, make that platform a robust, purpose-built workhorse, not a generic work bench.

Hardware needs to be designed and configured with software nuances and limitations in mind, to sense what's going on in the system and hardware components. Getting it right can improve the reliability and manageability of the system. A hardware and software solution that is validated and hardened into a complete ecosystem can do that. Running multiple virtualized applications creates an “I/O blender” effect, with different I/O types all wanting resources at the same time. This can overwhelm a virtualized storage controller, causing performance degradation, unless the platform is built for that specific purpose. Also, HCI clusters depend on inter-node communication to handle resource pooling, data replication for protection, and other tasks. These require the software to consume resources; in case of hardware failure, fewer resources are available, resulting in not only application performance problems, but problems across the entire cluster. You will minimize disruption if your hardware is up to the task, your hardware vendor works in lock step with the software vendor, and together they offer expansive support.

Dell EMC XC Series HCI Proves the Point

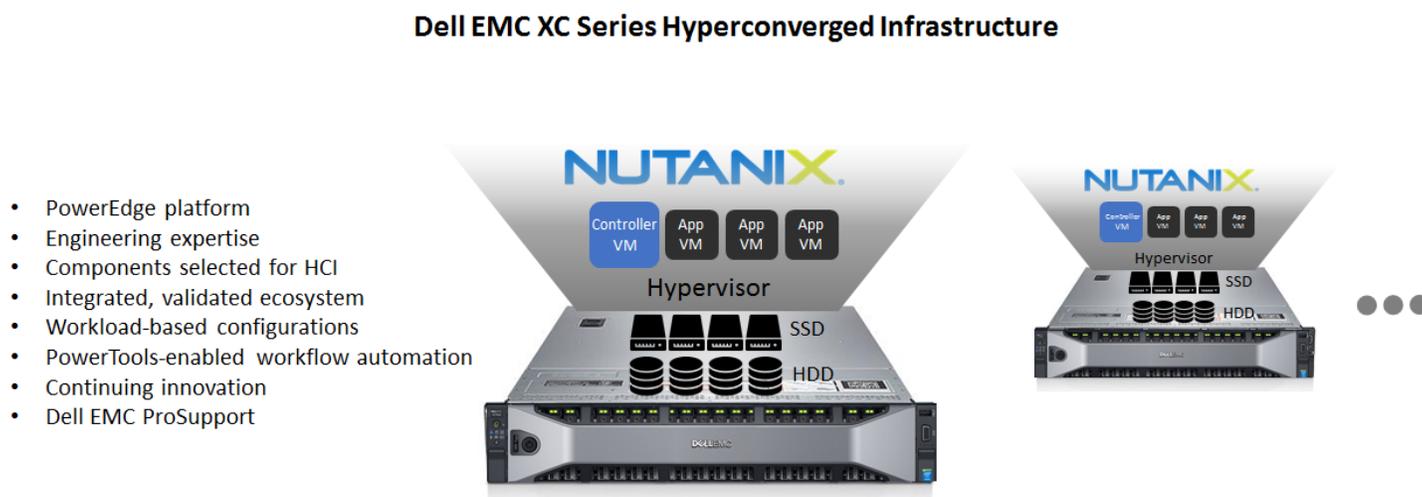
There are numerous HCI solutions on the market, some bundled with hardware, some software only. The Dell EMC XC Series is a purpose-built HCI appliance that proves why hardware matters. Dell EMC and Nutanix have shared their knowledge to create a fully integrated, hardware/software ecosystem designed for HCI workloads.

XC Series Overview

First, the XC Series is built on Dell's flagship PowerEdge platform, an x86 machine that has been a stalwart in data center computing throughout 14 generations (the XC Series will include the PowerEdge 14G in late 2017). It is equipped with high performance Intel Xeon processors, high performance flash, and high-speed Ethernet. Delivered in 1U or 2U appliances, the XC Series supports virtualized environments that leverage Microsoft Hyper-V, VMware ESXi, and Nutanix AHV hypervisors.

XC Series appliances are fast and easy to deploy, with node-based linear scalability that ensures predictable performance as you expand and pay-as-you-grow expansion. Compute and storage resources are seamlessly intertwined with software-defined data services. Data, metadata, and operations are distributed across the cluster, delivering high availability and data protection; however, data is not randomly distributed. Frequently used data resides on the same node as the VM for optimal performance. Features include replication, capacity-saving deduplication and compression, and "1-click" upgrades and node additions. The Nutanix Acropolis operating system runs in a controller VM on each node to combine SSD, HDD, and SED capacity into pools. Nutanix Prism provides GUI-based, centralized cluster management, with REST APIs enabling third-party cloud management integration.

Figure 2. Dell EMC XC Series Hyperconverged Infrastructure



Source: Enterprise Strategy Group, 2017

XC Series Differentiators

What makes the XC Series different? First, it is a fully integrated, pre-tested, hardware/software ecosystem. The hypervisor and Nutanix software are installed before shipping, saving IT administrators time and cost. The components and versions

are already compatible, built into a validated stack—so there are no surprises that delay deployment, speeding time to value.

The ability to choose the hypervisor enables the XC Series to support a variety of use cases. Even more important, the XC Series offers flexible configurations designed for optimal support of workloads ranging from virtual desktop infrastructure to enterprise business applications. Dell EMC offers seven configuration options designed using workload-based sizing tools to define the CPU, memory, hybrid or all-flash drives, and networking, validated end-to-end. These configurations help optimize resources and cost; for example, Exchange and SharePoint applications are often better served by 3.5” high-capacity drives, while VDI and server virtualization often benefit from higher compute density and need less storage capacity. The ability to match your workloads with specific components makes the XC Series a tailored HCI solution instead of a generic one.

Solution-aware Support

Dell EMC provides full 24/7 support including access to hardware, software, hypervisor, and operating system experts, with assistance from Nutanix or other third-party vendors as needed; the global support organization covers 165 countries and 55 languages.

In addition, the Dell EMC XC Series provides SupportAssist, a proactive and predictive support technology that works in combination with Nutanix Pulse. A component failure will trigger numerous processes: automatic alerts to the customer and Dell EMC; creation of a support case; secure transfer of system state details to Dell EMC; and contact to the customer with a resolution. For customers with ProSupport Plus, Dell EMC can analyze trends, predict certain failures, and proactively resolve them before the failure occurs. This solution-aware support service is managed by a dedicated technical account manager and ensures that problems are reported and resolved quickly, enabling organizations to maintain high availability for the workloads running on HCI clusters.

PowerEdge Platform, Engineering Expertise

Dell EMC’s expertise and experience building software-defined appliances sets the XC Series apart from competitors’ solutions. The multigenerational PowerEdge platform is an industry standard for data centers. It was designed and configured by a team of storage engineers with hundreds of years of combined storage experience, a team that has developed numerous software-defined storage appliances. This is a vastly different approach from grabbing commodity hardware off the shelf and installing HCI software on it. Why? Because these engineers understand that a storage failure in HCI can be more disruptive than in a compute server. Understanding the functions that the appliance must reliably execute enabled these engineers to design-in the required reliability and performance.

This engineering expertise results in other important features. Without going into too much technical detail, here are a few examples:

- Understanding the need for rapid deployment and recovery, they built in installation and bare metal recovery tools loaded with software and firmware that enable deployment, system restore to factory state, or system restore to a stack version, all in approximately 30 minutes or less.
- The Integrated Dell Remote Access Controller (iDRAC) provides out-of-band management for improved productivity. It enables automation of provisioning, deployment, servicing, user customization, and updating, as well as remote monitoring and control for troubleshooting and maintenance. In addition, SupportAssist proactively supports iDRAC by monitoring, alerting, and automatically creating a support case, reducing downtime and speeding time to resolution.

- As part of the pre-integration, BIOS and management settings are optimized for the software stack, and firmware versions are validated with it.
- When selecting the PowerEdge components for this appliance, Dell EMC followed specific performance and reliability criteria focused on HCI vs. general purpose computing needs. For example, when selecting SSDs for general purpose computing, average performance is important, but for HCI, the key is consistent performance. Because workloads are spread across multiple drives and nodes, the slowest drive will dictate workload performance; therefore, consistent performance is more important than average overall performance. Similarly, Dell EMC runs the drives cooler in HCI, more like traditional external arrays than internal server disk, for improved reliability.

Dell EMC PowerTools: Making the XC Series Simpler

PowerTools is not a product, but a set of additional capabilities built from Dell EMC software and IP that automate appliance workflows. It abstracts host management tools while maintaining a consistent interface across server generations and hypervisors. With software-defined storage, it is important that the software understand what's going on in the hardware, and PowerTools enables that, keeping the stack optimized and validated and the ecosystem running smoothly. The combination of PowerTools and the PowerEdge design and configurations sets the XC Series apart from other Nutanix software-based offerings, and Dell EMC has worked with network partners as well to deliver rich diagnostics using these capabilities.

PowerTools Workflow Automation



Fast Deployment



Fast Recovery



Extended Management & Diagnostics



Stack Management



Cluster Workflow Automation

The workflows that it automates are essential to some of the ease-of-use benefits in the XC Series, even those that appear to come from Nutanix. The Dell EMC XC Series can load software and configure much of the appliance in the factory, before shipping, enabling deployment in about 30 minutes; in addition, scripts automate the actual on-site deployment process. These controls can also be run at the customer site to recover a certain software version. PowerTools works with the Nutanix Life Cycle Management Utility to enable 1-click firmware upgrades for the XC Series. The ability to consistently monitor hardware across server generations is available because the XC Series makes API calls directly to the hardware or iDRAC. For compliance, PowerTools enables locking of the

firmware, operating system, running applications, and VMs to validated levels (through Dell EMC OpenManage Essentials and Nutanix Prism) and will provide alerts when any component no longer meets the validated parameters. In essence, PowerTools provides customers the ability to deploy HCI faster, spend less time managing it, and restore functionality quickly.

The Bigger Truth

When it comes to HCI, the concept of “hardware abstraction” seems to have morphed into “hardware irrelevance.” That thinking is erroneous. The hardware in your HCI solution will define the ease, speed, and reliability of deployment, the ease of management, how you identify and resolve problems, and your levels of performance and reliability. It will also define your TCO, based on both capital and operational expenses, from the time you install through the lifecycle of your deployment.

The foundation of your hyperconverged infrastructure—the hardware—really does matter. Management is easier with software-defined data services that are abstracted from the hardware—but that doesn’t mean any server will create the same foundation as a purpose-built appliance like the XC series. In fact, some organizations want to use servers they already have and just download HCI software, only to find that their leftover hardware cannot support HCI for their workloads.

Dell EMC and Nutanix work closely together on the XC Series to deliver what customers need: simplicity, automation, reliability, flexibility, and performance for mission-critical virtualized applications and workloads. These are all greatly enhanced by the design and configuration expertise built by highly experienced Dell EMC engineers.

Hardware Abstraction? Yes, but it matters what you abstract *from*. With the Dell EMC XC Series, it’s more like Hardware Advantage.

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