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**ESG WHITE PAPER**

# **Dell Technologies: DevOps-ready Platforms**

Empowering Developers with a DevOps-ready IT Infrastructure

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## Executive Overview

IT operations are faced with unprecedented challenges from rapidly changing environments and the need to more efficiently manage increasing IT costs and complexity, diverse platforms, apps, and data residing on premises or in diverse clouds, disparate tools, and devices.

IT organizations also want flexibility to support their unique digital transformation journeys as well as simplify operations and the challenges supporting business use cases, which can include mixed workloads, tier-one applications, and edge locations. They want a single, end-to-end platform that supports diverse infrastructure requirements while also lowering maintenance costs. This platform, whether within a multi-cloud environment or a private cloud infrastructure, should be integrated with hyperscalers and container orchestration platforms.

The advantage of hyperconverged infrastructure (HCI) is that it integrates the entire stack of compute, virtualization, data storage, and networking into a single unified platform that reduces and simplifies administrative workloads. It radically simplifies infrastructure scalability by combining compute with storage in server clusters that can scale by adding nodes, providing flexibility and choice across all the layers. The ability to deploy containers—virtualized or containerized—into a single management interface reduces maintenance costs while also freeing IT staff to focus on value-added innovation.

DevOps-ready HCI solutions are increasingly essential to IT organizations that need to deploy cloud-native applications faster using a robust governance approach with fewer staff. These solutions empower developers with the tools and resources they need in order to focus more on innovation and revenue-generating activities and less on maintenance and support. At the same time, IT maintains control of IT data and costs, with the flexibility to run workloads where it makes the most sense, whether it is on premises or in the cloud.

## IT Insights and Challenges Impacting the Business Ecosystem

More enterprises are recognizing the business value inherent in a cloud and multi-cloud platform approach. In fact, recent research from ESG forecasts an increased willingness to invest in HCI technology that powers a more modern, DevOps-ready approach. Specifically, findings from the *2022 Technology Spending Intentions Survey* show increased adoption and spending on enabling technology investments that support HCI and DevOps-ready platforms for cloud-native initiatives.<sup>1</sup>

IT leaders are faced with the following challenges:

- Application environments are continuously changing and becoming increasingly more diverse.
- Managing all these applications effectively requires oversight to prevent the undermining of infrastructure planning and wasteful spending (i.e., shadow IT).
- Delivering applications across the continuous integration/continuous delivery (CI/CD) pipeline is key and requires a focus on agile processes, automation, and use of a DevOps methodology to build in collaboration and responsiveness.

DevOps organizations break down the barriers between operations and engineering and implement effective, high-quality, and rapid communications that allow for speed and innovation in application delivery. Agile development removes process barriers and enables developers to collaborate more closely with customers and stakeholders to accelerate delivery.

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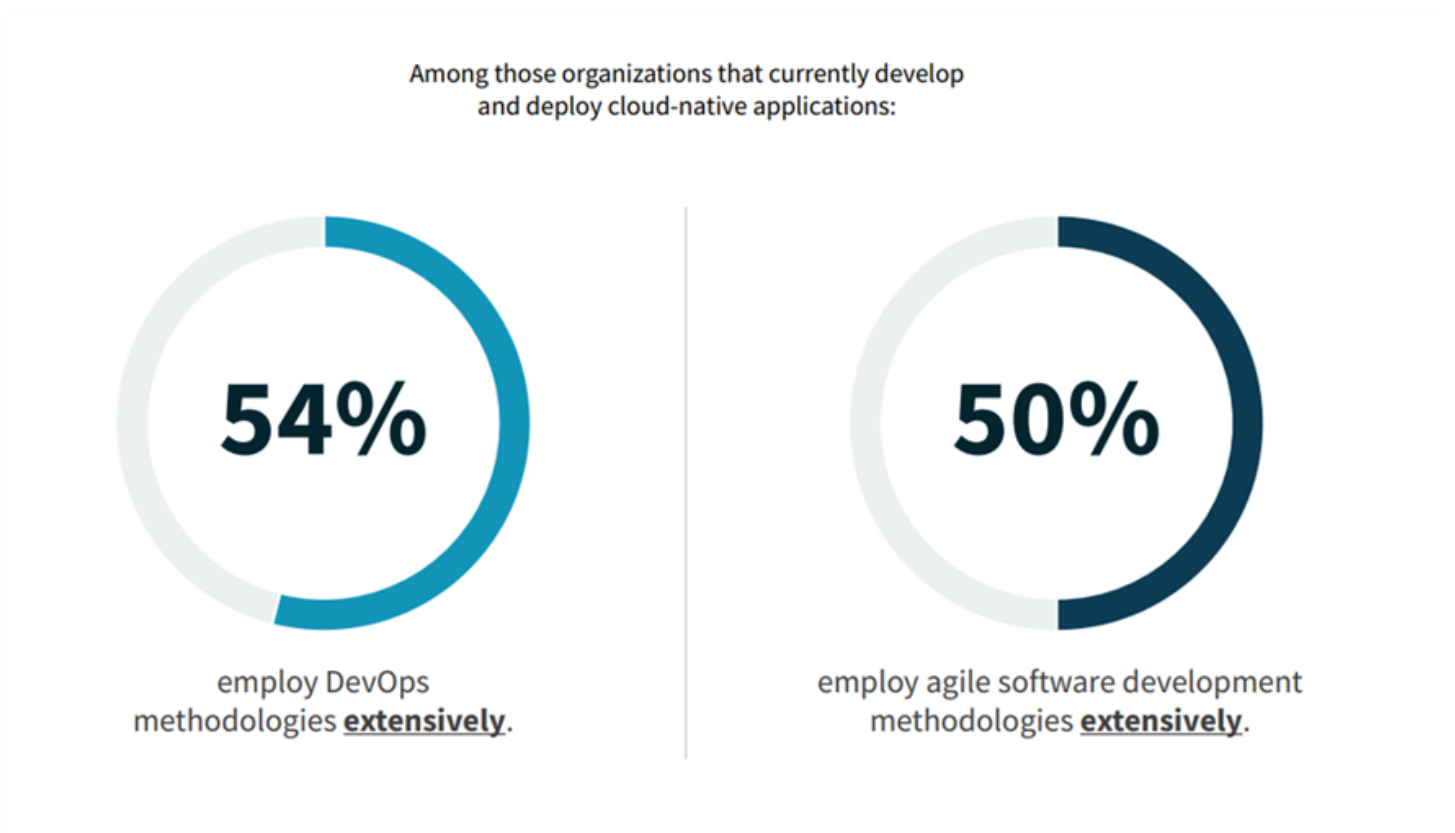
<sup>1</sup> Source: ESG Research Report, [2022 Technology Spending Intentions Survey](#), November 2021.

- **Challenge 1: Managing IT cost and operational data by simplifying and optimizing Kubernetes deployments and AppDev processes with DevOps-ready integrated platforms**

Figure 1 shows a strong correlation between those organizations that develop and deploy cloud-native apps and those that use newer app development methodologies like DevOps and agile.<sup>2</sup> A DevOps-ready platform increases the use of automation to simplify and optimize Kubernetes deployments. At the same time, a DevOps model enables infrastructure as code (IaC) and cross-functional collaboration within an agile development process for faster time to market. Fewer errors and less complexity accelerate overall development time and reduce related IT costs.

The use of Kubernetes—the open source container orchestration platform that automates many of the manual processes involved in deploying, managing, and scaling containerized applications—further reduces IT maintenance costs. The related time and cost savings can fuel innovation and growth.

**Figure 1. Strong Correlation between Cloud-native and Extensive Usage of Newer Application Development Methodologies and Processes**



Source: ESG, a division of TechTarget, Inc.

- **Challenge 2: Simplifying cloud operations by seamlessly adopting multi-cloud container orchestration platforms and eliminating DevOps silos**

<sup>2</sup> Source: ESG Research Report, [2022 Technology Spending Intentions Survey](#), November 2021.

Adoption of containers is growing across multi-cloud environments, including public, private, and hybrid clouds. Because containers require fewer system resources than traditional or virtual machine (VM) environments and applications running in containers can be easily deployed to multiple, different operating systems and hardware platforms, IT operations become simpler and more flexible and, overall, leaner and meaner.

The focus on cloud-native services, including cloud-native applications, along with Kubernetes adoption, is also accelerating. A cloud-native approach helps modernize legacy systems and monolithic applications for increased innovation and faster time to value. These cloud-native apps include low-code and no-code applications, which can further accelerate deployment.

According to an ESG research survey about containers:<sup>3</sup>

- 29% of respondents state that their organizations use between 250 and 499 total business applications (container- and not container-based).
- 71% of respondents state that their container-based applications are or will be deployed in a hybrid method (i.e., a combination of public cloud platforms and private data centers).
- 39% of organizations state that they have run production workloads on container technology for the last 12 to 23 months.

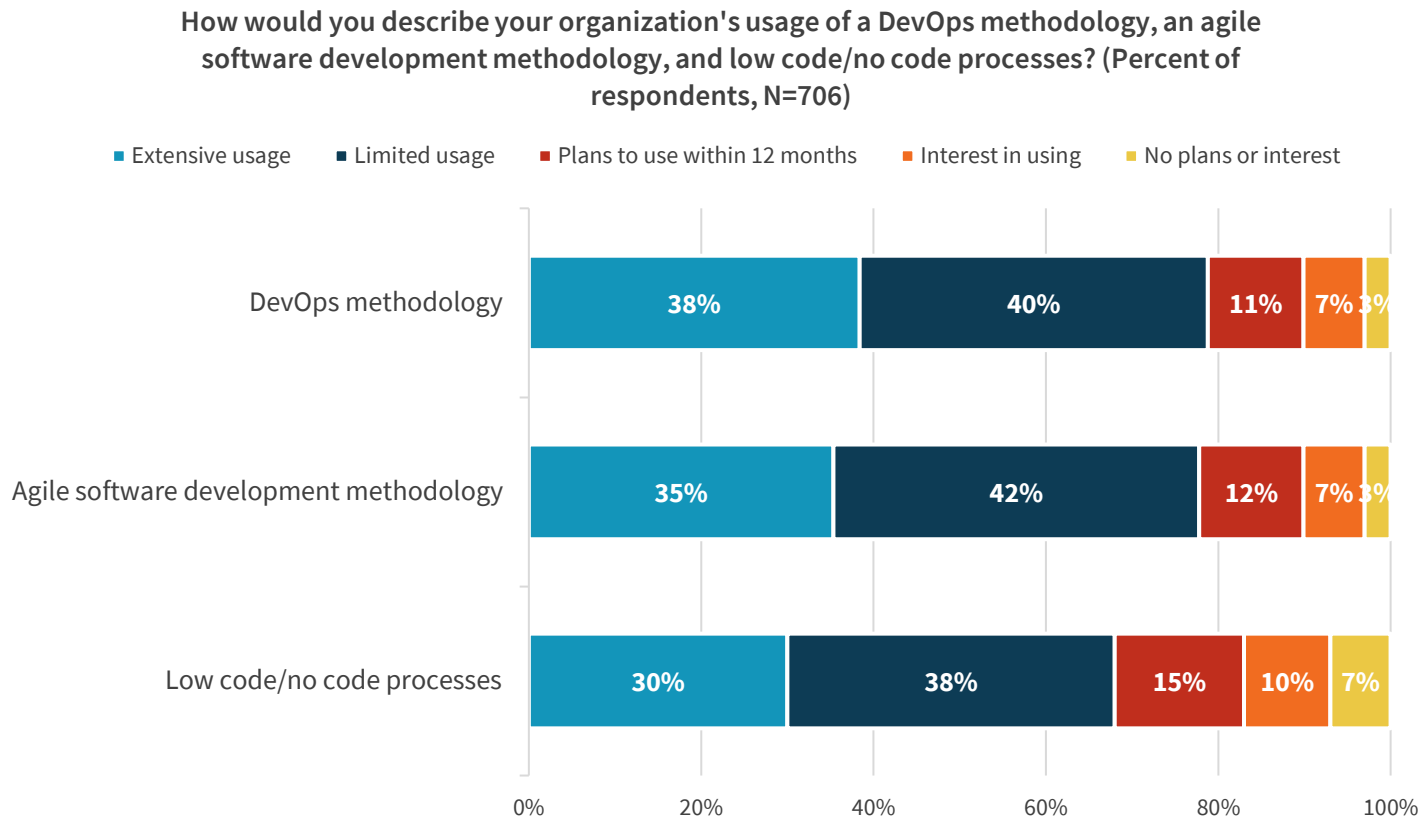
This data is important to note as the adoption of containers continues to grow within organizations. This also has a direct relationship to rapid deployment of applications with an agile approach. Adoption of or plans to adopt DevOps and agile development are on the rise, and both are important to optimize DevOps-ready environments. 78% of respondents reported that their organizations use a DevOps methodology in either a limited or extensive way and an additional 18% are either interested in using a DevOps methodology or have plans to use it within the next 12 months (see Figure 2).<sup>4</sup>

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<sup>3</sup> Source: ESG Survey Results, [Data Protection Considerations for Containers](#), December 2020.

<sup>4</sup> Source: ESG Research Report, [2022 Technology Spending Intentions Survey](#), November 2021.

**Figure 2. Broad Usage of DevOps and Agile Software Methodologies**



Source: ESG, a division of TechTarget, Inc.

- **Challenge 3: Accelerating innovation by empowering developers to become an innovation engine for the organization**

In a fast-changing technology environment, innovation in IT is essential to driving business growth. The rapid, automated, and scalable provisioning available in HCI compute and storage resources provides the foundation for a flexible, extensible infrastructure with dynamic resource allocation across the enterprise. In this environment, the managing and provisioning of infrastructure is automated through code instead of manual processes, which in turn can free DevOps teams to become innovation powerhouses.

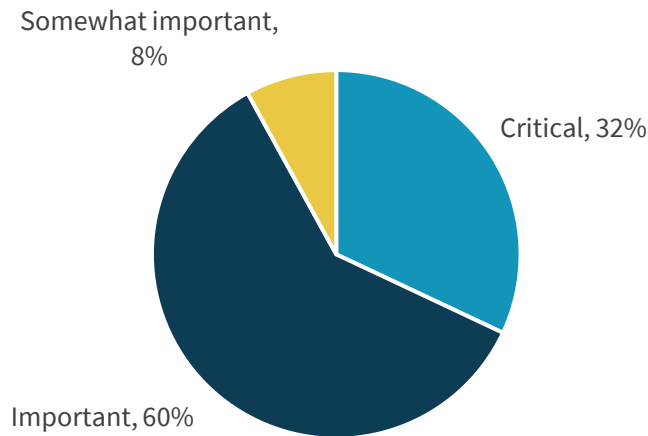
A recent ESG research survey shows that 92% of respondents said that scalability of compute and storage resources independently of each other is either critical or important (see Figure 3).<sup>5</sup> This data indicates that the adoption of independent scaling of resources is important to organizational project growth.

IT organizations with the ability to seamlessly scale their compute and storage resources independently and automatically can provide developers the resources they need when they need them so developers can be a true innovation engine for their business. This modern infrastructure enables IT to be seamlessly incorporated into the agile methodology processes and CI/CD pipelines that DevOps teams are using.

<sup>5</sup> ESG Survey Results, [Hyperconverged Infrastructure 2.0](#), October 2021.

**Figure 3. Scaling HCI Compute and Storage Resources**

How important is the ability of HCI nodes to scale compute and storage resources independently of each other (instead of just adding new HCI nodes and having one or the other underutilized)? (Percent of respondents, N=348)

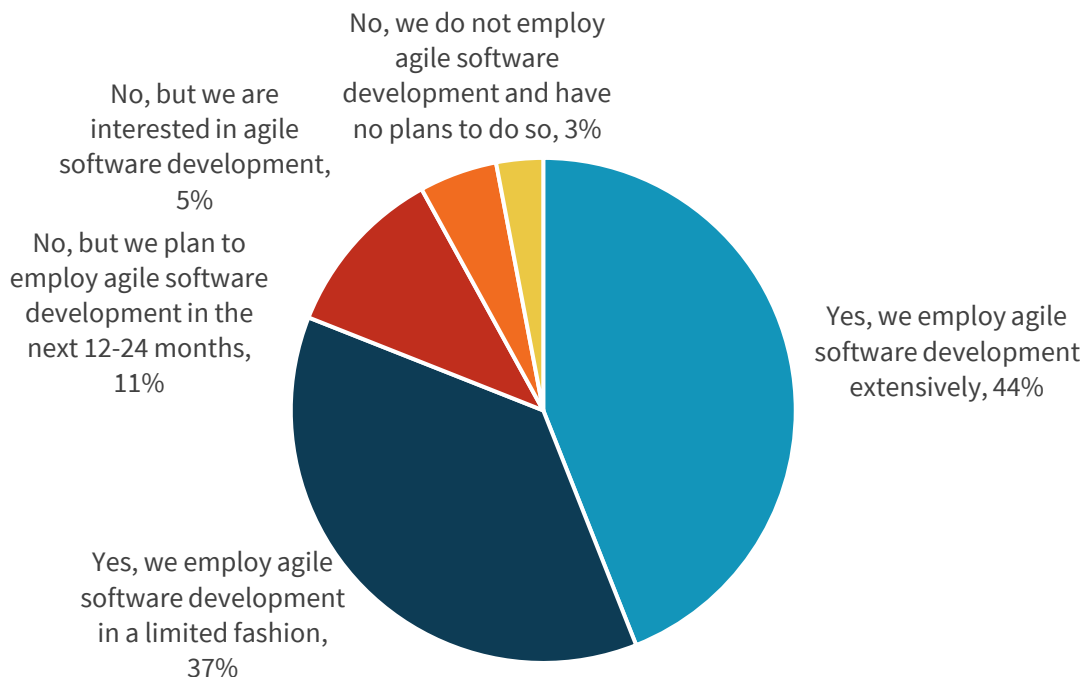


Source: ESG, a division of TechTarget, Inc.

According to ESG research, organizations are catching on to the potential benefits of agile development, with 81% of respondents stating that they extensively or somewhat employ it, as shown in Figures 4 and 5.<sup>6</sup> This amplifies the need to incorporate agile development processes into the overall organization CI/CD pipeline process.

**Figure 4. Deployment of Software Methodologies**

Does your organization employ an agile software development methodology? (Percent of respondents, N=348)

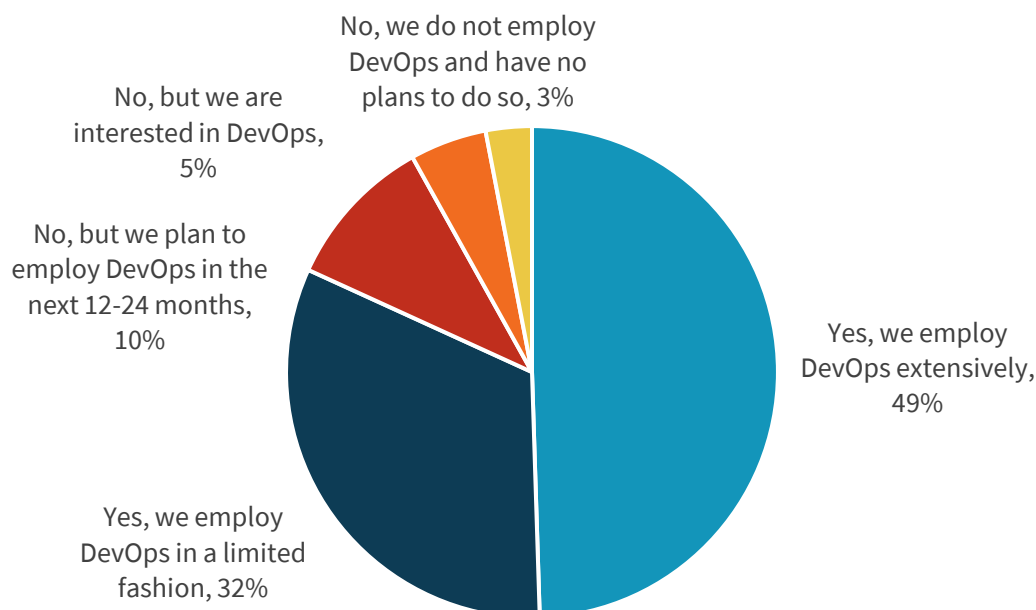


Source: ESG, a division of TechTarget, Inc.

<sup>6</sup> Ibid.

**Figure 5. Automation of DevOps CI/CD for Code and Infrastructure**

**Does your organization employ a DevOps methodology to automate the continuous integration and continuous delivery (CI/CD) of code and application infrastructure?  
(Percent of respondents, N=348)**



*Source: ESG, a division of TechTarget, Inc.*

### **Dell Technologies’ Approach: Simplified DevOps-ready Hyperconverged Systems**

The IT challenges described earlier can be addressed by leveraging a modernized approach to the continuous integration/continuous delivery (CI/CD) pipeline. Dell Technologies offers an integrated approach that aligns to the business needs.

The Dell Technologies HCI portfolio allows for flexibility based on current infrastructure, operational models, and desired IT outcomes. With support for every major hyperscaler and container orchestration platform that runs on IaaS (regardless of underlying infrastructure), Dell Technologies lets IT organizations easily manage and maintain the infrastructure. This flexibility gives DevOps teams the ability to deploy, test, expand, or reduce resources on demand in a cloud-native environment—helping organizations extract the most value from a hyperconverged infrastructure and simplify lifecycle management. Natively enabled IaC supports GitOps practices with automated tracking of code changes and CI/CD that speed innovation and enhance the DevOps CI/CD pipeline.

The Dell Technologies hyperconverged infrastructure portfolio includes Dell VxRail, Integrated System for Azure Stack HCI, and PowerFlex—all providing choice based on business need. Dell Technologies PowerStore has certified and validated reference architectures to deliver DevOps-ready solutions that are fully tested and ready to deploy in any environment.

#### **Dell VxRail**

Dell VxRail hyperconverged infrastructure, a jointly engineered hyperconverged infrastructure system with VMware, is a fast and easy way to extend a VMware environment. Dell VxRail integrated systems are designed for VMware to enhance organizations’ ability to streamline operations and predictably evolve. VxRail provides existing VMware customers a familiar, consistent, and simplified operating experience—with all the expected benefits integrated into the VMware



ecosystem. VxRail is the first hyperconverged system fully integrated with VMware Cloud Foundation SDDC Manager. Deep integration between VxRail HCI System Software and VMware Cloud Foundation SDDC Manager drives end-to-end, full stack automation from Day 0 to Day 2, delivering a complete, automated, turnkey hybrid cloud platform natively equipped with NSX-T software-defined networking that enables DevOps teams to streamline operations and provisioning. Its Kubernetes Container Network Interface/NSX Container Plug-in (CNI/NCP) simplifies the deployment and extensibility of existing IT tools and processes into DevOps processes. In fact, VxRail is the only fully integrated, pre-configured, and tested HCI system optimized for VMware vSAN and is the standard for transforming VMware environments.

Users can access vSphere Cloud Native Storage (CNS) and vSAN/vSphere Container Storage Interface (CSI) drivers and can integrate with vVol capabilities, connecting clusters to external storage (including persistent volumes for internal, external, and distributed drives and plug-ins for Kubernetes). VxRail dynamic nodes are compute-only nodes that support HCI mesh or external storage systems (such as PowerStore, PowerMax, and Unity XT) and can provide additional flexibility in scaling storage capacity as well as enterprise-level data services required for modern applications deployed to the DevOps-ready platform.

### VxRail is the first:

- Hyperconverged system fully integrated with VMware Cloud Foundation SDDC Manager.
- To deliver a complete, automated turnkey hybrid cloud platform equipped with software-defined networking.
- Hyperconverged system with Kubernetes CNI/NCP streamlining, deployment, and extensibility of existing IT tools and processes into DevOps processes.

VxRail DevOps-ready platforms are always validated and certified by container orchestration partners and are deployable as a vSphere HCI cluster or cloud platform stack running container apps, which provides flexibility for container platforms like VMware Tanzu, Red Hat OpenShift, Amazon EKS Anywhere, Google Anthos, SUSE Rancher, or any Kubernetes distribution qualified to run on VMware vSphere. These deployments can also run on a VxRail cluster at the same time.

## Dell PowerFlex

Dell PowerFlex software-defined infrastructure is built to reduce operational and infrastructure complexity. PowerFlex empowers organizations to move faster by delivering flexibility, elasticity, and simplicity with extraordinary, predictable performance for mission-critical workloads while also providing resiliency at scale. The PowerFlex family provides a foundation that combines compute and high-performance storage resources in a managed, unified fabric.

Built with a software-first architecture, PowerFlex aggregates resources across a broad set of nodes, unlocking massive input, output, and throughput performance while minimizing latency. The self-balancing architecture eliminates any hotspots and ensures consistency and simplicity over time. Users can non-disruptively scale system capacity and simultaneously scale performance linearly from a minimum of four nodes to thousands of nodes. With its self-healing architecture, PowerFlex can handle outages, upgrades, and maintenance without downtime, resulting in 99.9999 percent availability.

PowerFlex DevOps-ready platforms have been validated with a broad set of container management and hyperscaler platforms, including Amazon EKS, Azure Arc, Google Cloud Anthos, Red Hat OpenShift, VMware Tanzu, and SUSE Rancher/RKE. With PowerFlex, organizations can deploy containers on bare-metal or virtualized nodes, offering complete freedom to develop their DevOps strategy. Organizations can even deploy multiple container management platforms in a single deployment on a common infrastructure, offering extreme flexibility to architect and evolve DevOps and production container environments as needs dictate. PowerFlex utilizes the Container Storage Interface, a component of Dell's Container Storage Module, to deliver enterprise storage features to Kubernetes users.

## Dell Integrated System for Microsoft Azure Stack HCI

Intelligently designed with operational efficiency, full stack lifecycle management, and native Azure integration through Azure Arc, Dell Azure Stack HCI is an engineering-validated, all-in-one hyperconverged infrastructure solution. Azure Stack HCI delivers powerful infrastructure-level automation via Dell OpenManage Integration with Microsoft Windows Admin Center (OMIMSWAC), PowerShell, and Microsoft Azure Arc-enabled infrastructure. Software developers benefit the most by modernizing applications on the fully managed container ecosystem: Azure Kubernetes Service on Azure Stack HCI (AKS on Azure Stack HCI). All of this is backed by a collaborative support model between Microsoft and Dell Technologies to provide end-to-end enterprise-level deployment and support expertise.

The lifecycle management automation and orchestration inherent in the system produces a highly agile hybrid cloud architecture that minimizes maintenance and support costs. OMIMSWAC extensions and snap-ins deliver automated cluster creation, cluster expansion preparation, and full stack cluster-aware updating. Dell Technologies extensively validates quarterly releases of BIOS, firmware, and drivers for the integrated system—ensuring predictability and reliability.

Dell Azure Stack HCI provides an ideal DevOps-ready platform for enterprises aligned with Microsoft Azure and cloud-management tools and framework.

## PowerStore

PowerStore is a container-based, active-active, scale-up and scale-out NVMe enterprise storage array with industry leading data services, such as data reduction and integrated machine learning to unlock the power of your data. PowerStore is designed with deep integration with VMware vSphere, with the PowerStore X model with AppsON including an embedded ESXi hypervisor that allows users to run their applications directly on the PowerStore appliance. PowerStore can utilize Container Storage Modules and its CSI drivers to deliver enterprise storage features to Kubernetes users. Dell Powerstore X with AppsON takes a new approach to virtualization and storage, allowing users to now run applications on storage, without the need for external servers. Although not an HCI solution, PowerStore with AppsON has been certified and validated with Tanzu and Amazon EKS Anywhere. This option enables maximum deployment flexibility.

## The Bigger Truth

The only constant in technology is rapid change—and it continues at a fast and furious pace. IT organizations that fully embrace DevOps practices work smarter and faster, with consistent delivery of higher quality, revenue-generating applications to stakeholders. By fostering innovation and standardizing deployments through automation and cross-functional collaboration, Dell's DevOps-ready HCI solutions improve the CI/CD pipeline while reducing complexity—changing the game for IT teams.

In this dynamic landscape, IT and business demands are also rapidly evolving. Increased adoption of HCI deployments enable rapid change management with new ITSM models, including empowering the citizen developer. Organizations are taking advantage of this and other benefits, such as flexibility in staffing and ease of use inherent in HCI deployments that Dell Technologies is providing in the marketplace.

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