ESG WHITE PAPER

Empowering Modern Application Transformation with Dell EMC VxRail

Providing Choice, Optimizing Infrastructure, and Simplifying Lifecycle Management

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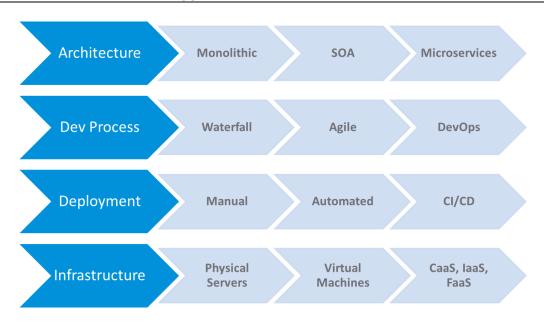## Application Architectures are Rapidly Evolving

Digital transformation initiatives across industries are accelerating. Based on ESG research, nearly three-quarters (72%) of respondents described their organization's digital transformation initiatives as mature (having implemented and optimized several initiatives) or in process (currently implementing and executing initiatives), up from 58% just a year ago. What's more, it's important to remember that digital transformation includes people, processes and technology, and organizations are rapidly deploying new technologies to help ensure alignment with new processes. It is also interesting to note that the most commonly reported goal of these digital transformation initiatives is to enable organizations to become more operationally efficient (56%) in order to overcome the inherent complexity in highly distributed IT environments.[1]

One example of deploying new technology is the effort to modernize application environments, a transformation that also incorporates people and processes. In the past, crafting a new monolithic architecture-based application might require years to build using a waterfall process, would typically reside on physical servers located in corporate data centers, and would only offer one major release and perhaps one or two minor releases per year. And the developers were typically segmented from the operations teams.

Today, growing numbers of organizations are evolving their application architectures (see Figure 1). These highly distributed modern application environments typically leverage microservices-based architectures, container and infrastructure-as-a-service (IaaS) platforms that can be hosted in either or both on-premises data centers or public clouds, and utilize DevOps methodologies, allowing companies to swiftly bring new applications and services to market. This has also driven closer alignment between application developers and operations, as well as given rise to new roles such as site reliability engineers or SREs.

Figure 1. The Evolution of Modern Applications

Architecture	Monolithic	SOA	Microservices
Dev Process	Waterfall	Agile	DevOps
Deployment	Manual	Automated	CI/CD
Infrastructure	Physical Servers	Virtual Machines	CaaS, IaaS, FaaS

Source: Enterprise Strategy Group

In fact, ESG research confirms the need to accelerate time to market, with a majority (86%) of organizations reporting that they are under pressure to deliver new products and services faster.[2]

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[1] Source: ESG Master Survey Results, *2021 Technology Spending Intentions Survey*, December 2020.
[2] Source: ESG Master Survey Results, *Trends in Modern Application Environments*, December 2019.

Moreover, there is a direct relationship between digital transformation maturity and the use of modern application architectures and methodologies. ESG research indicates that organizations with mature digital transformation initiatives are more than twice as likely (50% versus 22%) to prefer to use microservices architectures and more than four times as likely (66% versus 14%) to use DevOps extensively than those just beginning.[3] That said, it's important to bear in mind that many organizations are still in the starting stages of their digital transformations.

Furthermore, in an ESG study of organizations running or planning to run containerized workloads in production, only 22% of their overall workloads were currently running on containers; however, those organizations anticipated that the percentage of their workloads running on containers would climb to just over one third (34%) in 24 months.[4] As a result, organizations at varying stages of maturity will be running a mix of application architectures and infrastructure environments.

Modern Applications are Highly Distributed and Complex

While modern applications are often referred to as cloud-native, that doesn't mean "public cloud only." Organizations across industries are also looking to deploy modern applications on premises. In fact, ESG research highlights that 70% of organizations running container-based applications plan to run them in hybrid environments (defined as on-premises data centers and public cloud environments), and 88% percent believe it is important to have a modern application management solution that could be deployed across multiple public cloud environments[5] (for example, across multiple public clouds such as AWS, GCP, and Azure).

"While modern applications are often referred to as cloud-native, that doesn't mean "public cloud only."

Consequently, this mindset creates the need for a modern application environment and Infrastructure to support these highly dynamic and distributed application environments—both on premises and in multiple public clouds. Thus, it should come as no surprise that organizations have consistently selected hyperconverged infrastructure (HCI) in an effort to modernize their on-premises data center environments.

In fact, ESG research indicates that HCI has been one of the top three most commonly cited areas chosen by organizations in which to make significant investments to modernize their on-premises data centers for the last three years.[6] And why not? HCI is built by tightly integrating hardware with a virtualization layer that creates a consistent SDDC infrastructure, which can be replicated across multiple locations (on premises/public clouds/edge), in a way that regularly enables automation, workload placement agility, and management consistency across those locations.

Today, organizations are facing a myriad of challenges requiring innovative solutions to accelerate the adoption and growth of a modern application environment. This would include an increasing level of complexity. According to ESG research, 75% of organizations believe IT complexity has increased over the past two years (up from 64% last year).[7] Therefore, these solutions must be easy to use and provide a viable means to help overcome the complexity of these highly distributed application environments. To drive simplicity and operational efficiency, the solutions should include software, management, and infrastructure to support these complex environments—and the combination of VMware Tanzu and Dell EMC VxRail offers an ideal starting point.

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[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Source: ESG Master Survey Results, *2021 Technology Spending Intentions Survey*, December 2020.
[7] Ibid.

VMware Tanzu

VMware Tanzu is a portfolio of products that enables organizations to simplify Kubernetes adoption and build, run, and manage modern applications from a single control point. VMware Tanzu editions, introduced in 2020, package products and capabilities of the Tanzu portfolio into clearly defined solutions targeted at specific enterprise challenges. With a ubiquitous Kubernetes distribution across the portfolio, customers can run any app across multiple clouds, including vSphere, public cloud, and edge. The Tanzu editions are packaged to bring Dev and Ops together in a shared effort to continuously deliver a better path from software to production.

VMware Tanzu Basic Edition simplifies operation of Kubernetes on-premises, putting cloud-native constructs at the VI admin's fingertips as part of vSphere 7, enabling the running of VMs and containers side by side. VMware Tanzu Standard Edition adds to these capabilities by simplifying operation of Kubernetes for multi-cloud, centralizing management and governance for many clusters and teams across on-premises, public clouds, and edge.

Dell EMC VxRail

Dell EMC VxRail offers the ability to span from core, to edge, to cloud, accommodating traditional, as well as modern, application environments. Suitable for mission-critical applications (e.g., SAP HANA, VDI, AI/ML, etc.), Dell EMC VxRail is the only HCI system that is jointly engineered with VMware. Dell Technologies has been working closely with VMware to offer tightly integrated solutions to accommodate organizations across industries. This close working relationship has resulted in several offerings that can assist organizations in accelerating modern application transformation adoption within these increasingly distributed and complex IT environments.

Dell Technologies Offers Multiple Solutions

Organizations are at varying levels of maturity when it comes to modern application and Kubernetes adoption. Subsequently, they require different solutions based on work performed to date, size of environment, and future plans. As a result, Dell Technologies offers several solutions that incorporate VMware Tanzu and VxRail to enable customers to consume Kubernetes modern application platforms that align with their unique environment and business needs. These solutions include:

vSphere with Tanzu on VxRail

vSphere with Tanzu on VxRail offers organizations the ability to leverage Kubernetes via vSphere in order to quickly deploy Tanzu services for test, development, and runtime. Based on the standard upstream open-source Kubernetes distribution, vSphere with Tanzu on VxRail embeds the native Kubernetes control plane directly into vSphere and features the Kubernetes Cluster API as a service layer that performs underlying IaaS infrastructure resource provisioning, lifecycle management, and entire Tanzu Kubernetes Grid cluster deployments.

The solution enables both modern application developer and IT infrastructure teams to rapidly modernize using developer-ready, native Kubernetes integrated, and a network-flexible infrastructure in a turnkey solution that is natively integrated into vSphere and can be managed using native VMware management tooling such as vCenter Server and Kubernetes API's. Organizations can leverage the vSphere Distributed Switch environment (vDS) by default to get started quickly; however, the solution provides the option for more experienced Kubernetes users to implement the software-defined networking (SDN) solution of their choice to provide advanced networking functionality.

Leveraging the automation and scalability of the VxRail HCI infrastructure platform, vSphere with Tanzu on VxRail is capable of running both traditional (monolithic or SOA on virtual machines) and cloud-native applications. VxRail is jointly engineered with VMware to provide a seamless user experience right out of the box, including the ability to perform

automated, cluster-aware full stack lifecycle management (LCM) non-disruptive upgrades that are fully tested and continuously validated to ensure a transition from one known good state to the next. It also automates cluster management to quickly expand infrastructure resources for developers based on demand. This fully integrated, configured, and tested solution includes all the hardware and software required to deploy vSAN, vCenter Server, and vSphere with Tanzu.

VMware Cloud Foundation (VCF) with Tanzu on VxRail

VxRail is the only jointly engineered HCI system that includes deep integration with VMware Cloud Foundation, i.e., it provides a comprehensive, turnkey approach to deploying Kubernetes in an integrated, automated, hybrid, secure multi-cloud environment (including edge locations) at scale. This tight integration results in operational efficiencies for both traditional and cloud-native applications on day one—and as the environment scales. This is achieved by fully integrating the Kubernetes control plane into vSphere to enable common developer and infrastructure operations. Cloud Foundation on VxRail also includes tight integration with NSX-T for SDN and intrinsic security, along with automated, non-disruptive, full hardware and software upgrades and patches.

VMware Cloud Foundation with Tanzu on VxRail is based on the open source-aligned Kubernetes distribution, which features the Kubernetes Cluster API for CaaS platform deployment and for performing underlying IaaS infrastructure resource provisioning, lifecycle management, and Tanzu Kubernetes Grid cluster deployments. The full stack of hardware and software is fully tested and validated as an HCI solution with Life Cycle Management delivered through the integration of VxRail Manager and SDDC Manager. The solution Includes VMware Cloud Foundation (with built-in and fully integrated VMware NSX-T data center and vRealize Suite) on VxRail and vSphere with Tanzu and has a single point of support.

Tanzu Architecture for VxRail

Purpose-built, validated, and tested reference architecture for VxRail, Tanzu Architecture for VxRail provides organizations with an on-premises, cloud-native and VM platform to run workloads (i.e., container-as-a-service, CaaS) or to develop and deploy them (i.e., platform-as-a-service, PaaS) within data centers or at edge locations, leveraging Tanzu Kubernetes Grid Integrated Edition (TKGI) (formerly known as VMware Enterprise PKS) and VMware Tanzu Application Service.

The VMware Tanzu Application Service platform that can be used in the Tanzu Architecture for VxRail is based on the Cloud Foundry Platform and leverages a BOSH architecture layer to perform underlying IaaS infrastructure resource provisioning, lifecycle management, and CaaS/PaaS platform translation operations.

Leveraging VxRail (which includes VxRail HCI System Software, vSphere, and vSAN) and VMware NSX-T for SDN, the solution effectively creates a PaaS or CaaS to accelerate the development and deployment of modern application environments on a proven, enterprise-grade modern HCI infrastructure. The solutions have decoupled the CaaS/PaaS control plane from underlying vSphere infrastructure to allow independent application developer and infrastructure operations (via Ops Mgr/PKS CLI). These solutions include the appropriate documentation and tools to enable standardized and proven designs and deployments.

Choosing the Best Dell Technologies Solution for Your Environment

The combination of these Dell Technologies offerings provides organizations flexibility when deploying modern application infrastructure platforms. More importantly, these solutions leverage Kubernetes for both on-premises, public cloud, and edge locations, creating a seamless hybrid cloud environment. This also creates operational efficiencies as the solution provides consistent operations and management across a distributed environment.

Dell Technologies offers three hyperconverged infrastructure options for consuming this technology, so how do you determine which solution is the most appropriate for your organization? The use cases below will help clarify the best option for your organization.

Jumpstart Your Kubernetes Journey

For organizations looking to start their journey with modern, cloud-native applications or become familiar with VMware Tanzu, vSphere with Tanzu on VxRail offers the fastest route to creating a viable working environment and accelerating Kubernetes adoption within an organization. This environment enables organizations to add containers and Kubernetes to their existing operations. VI admins can leverage familiar tools to provision and control containers (i.e., apply policies) alongside VMs in a way that leverages an organization's existing investment in tools, training, and people. This is important as organizations may not have acquired or developed Kubernetes skills yet, and it provides an opportunity to pool resources across traditional and modern applications while also protecting investments.

Given the ephemeral nature of these modern applications and container environments and the interconnections between them, software-defined networking (SDN) solutions are required. vSphere with Tanzu on VxRail supports SDN and provides organizations the flexibility to incorporate the software-defined networking solution of their choice and integrate it in the way that aligns to their business requirements. As a result, the responsibility to test and deploy the network components to ensure optimal capabilities from the platform would rest with existing resources within the organization.

Create a Full-stack, Hybrid Modern Application Environment at Scale

For those organizations that look to embrace a highly scalable, turnkey hybrid and multi-cloud environment, VMware Cloud Foundation (VCF) with Tanzu on VxRail is the right choice. For hybrid cloud infrastructure, organizations can standardize on VxRail—which can support both traditional and modern application environments, while enabling organizations to transition at their own pace. VCF with Tanzu on VxRail includes fully integrated software-defined networking and intrinsic security, with VMware NSX-T and vRealize built in as part of the platform.

This provides the ability to create templates and blueprint services that can be self-service provisioned with the appropriate budget guardrails in place. This solution delivers simplified full stack management and operations with the joint integration of Dell EMC VxRail HCI System Software and VMware Cloud Foundation's SDDC Manager. Organizations can quickly deploy and manage VxRail HCI clusters from common VMware tools, leveraging fully integrated, automated lifecycle management for the entire solution stack.

Build Out a Flexible and Powerful Application Development Platform On-premises

The Tanzu Architecture for VxRail provides organizations with the documented reference architecture guidance to build a complete solution. This option is ideal for advanced Kubernetes users that need to deploy a trusted and proven cloud-native architecture in an on-premises HCI solution to deliver PaaS, CaaS, or both. By leveraging VxRail, organizations can automate the underlying infrastructure management and enjoy greater operational efficiencies.

Organizations have the option to configure or tune the environment to best suit their needs. That includes the flexibility to leverage optional infrastructure storage platforms for object storage with Dell EMC ECS, which is already pre-validated as a part of the architecture.

Accelerate Adoption Leveraging Professional Services

The transformation to modern application environments requires new processes and skills to be developed along with the technology solutions cited above. It is imperative for organizations to be able to leverage the collective experience of the technology vendors to help them avoid common pitfalls that could hamper the adoption of modern application

environments. Dell Technologies offers deployment and installation services to accelerate the time to value and provides training to ensure existing resources can rapidly gain the appropriate levels of container and Kubernetes skills and verify that the deployed technology is optimized to best fit the needs of the business.

Given that organizations are progressing at different rates as they modernize their applications and infrastructure, it is important to choose strategic partners to assist with every stage of the journey. Dell Technologies has jointly developed these solutions to enable organizations to select the best fit for their organizations. This also includes the ability to provide expertise to quickly overcome any obstacles and remediate any issues. A critical component of these services is the ability to rely on 24x7 global support.

The Bigger Truth

Organizations continue to evolve and transform to adopt modern application architectures, and a key piece of this transformation is modernizing the underlying infrastructure that supports these applications. Consequently, these environments are becoming highly distributed and complex, requiring vendors to deliver solutions that can drive operational efficiency and empower organizations to accelerate the transformation to hybrid clouds that support modern cloud-native applications.

Dell Technologies has jointly engineered solutions with VMware to assist organizations to deploy turnkey, validated, and automated solutions for modern application environments. The VxRail HCI system software drives operational efficiency through its automated LCM and full integration with VCF to enable full stack automated LCM operations for agile infrastructure operations that align well to new agile cloud-native application development requirements. All the solutions discussed in this document are centered on the VxRail HCI solution and enable Dell Technologies to deliver multiple options to accelerate the adoption of modern applications. With three tested and proven options to choose from, organizations can select the one that best fits their unique needs.

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