

Dell EMC VxRail and Dell EMC PowerStore: Better Together

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White Paper

Abstract

This document describes the benefits of using Dell EMC VxRail and Dell EMC PowerStore together, and how they interoperate. It covers a range of use cases as well as how Dell EMC VxRail and Dell EMC PowerStore can be combined for maximum business flexibility, continuity, and scaling.

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Executive summary

Overview

This document describes the benefits of using Dell EMC VxRail and Dell EMC PowerStore together, and how they interoperate. This document covers various use cases with VxRail dynamic nodes, VxRail with vSAN, PowerStore T and PowerStore X models, and how they can be combined for maximum business flexibility, continuity, and scaling.

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Note: For links to other documentation for this topic, see the [Dell Technologies Info Hub](#).

Introduction

Business challenge

With the increasing complexity of the modern data center, administrators rely on solutions that add flexibility to quickly adapt to changing business needs. The ability to scale compute, networking, or storage helps take the guesswork out of sizing for solutions that grow with the business.

This white paper describes the strengths of combining Dell EMC VxRail with Dell EMC PowerStore to solve modern business challenges.

PowerStore overview

In this ever-evolving world of increasing complexity and scale, the need for an easy-to-use, intelligent storage system is clear. Organizations that use new applications and solutions require dependable storage, and often face the challenge of doing more with less. Dell EMC PowerStore addresses this challenge by packaging a powerful storage system into a cost- and space-efficient profile.

PowerStore achieves new levels of operational simplicity and agility. Built with a container-based microservices architecture, it uses advanced storage technologies and integrated machine learning (ML) to unlock the power of your data. A versatile platform with a performance-centric design, PowerStore delivers the following key benefits:

- Multidimensional scale
- Always-on data reduction
- Support for next-generation storage media

PowerStore brings the simplicity of public cloud to on-premises infrastructure, streamlining operations with an integrated ML engine and seamless automation. It offers predictive analytics to easily monitor, analyze, and troubleshoot the environment.

Further, PowerStore is highly adaptable, providing the flexibility to host specialized workloads directly on the appliance and modernize infrastructure without disruption. It also offers investment protection through flexible payment solutions and data-in-place upgrades.

The PowerStore platform is available in two different product model types: PowerStore T and PowerStore X.

PowerStore T models

PowerStore T models are unified storage arrays that can service block, file, and VMware vSphere Virtual Volumes (vVols) resources along with numerous data services and efficiencies. PowerStore T models are ideal for traditional and modern workloads, such as relational databases, electronic medical record applications, and content repositories.


PowerStore X models

PowerStore X model appliances allow for running applications directly on the appliance through the included AppsON capability. An on-board VMware ESXi hypervisor runs embedded applications alongside the PowerStore operating system, all in the form of virtual machines (VMs).

This feature is in addition to the traditional storage functionality of PowerStore X model appliances, which supports serving external block and vVol storage to servers with FC

and iSCSI. Its innovative design is perfect for storage-heavy applications, providing both additional compute and high-performance storage to an existing environment or any scenario where density, performance, and availability are primary factors.

The following outlines additional features of the PowerStore T and PowerStore X models:



PowerStore essentials

A versatile platform designed around an active-active container-based architecture with a performance-centric design for NVMe, PowerStore delivers multidimensional scale, and advanced data services such as always-on data reduction with a 4:1 guarantee.

PowerStore T models are bare-metal, unified storage arrays which can service block, file, and vVol resources along with numerous data services and efficiencies.

PowerStore X models, with the AppsON feature, enables running applications directly on the appliance via a native VMware ESXi layer running embedded on the appliance's two internal nodes, providing a 2U highly available consolidated compute and storage platform with PowerStore's advanced data services.

Figure 1. PowerStore T and PowerStore X details

Intelligent clusters

Beyond the power of a single PowerStore model appliance, up to four PowerStore T appliances can be grouped into an intelligent cluster. Each appliance can scale up to 2.8PB of effective capacity, and a cluster can scale out to over 11PB of effective capacity.

Intelligent clustering allows users to add compute power, capacity, or connectivity resources independently while enabling management of multiple appliances from a single control plane. Users can migrate resources seamlessly between appliances and intelligently load balance new applications based on storage metrics.

Key features

Some of the key PowerStore value propositions are as follows:

- **Active/active architecture:** PowerStore uses both nodes to serve host input/output (I/O) and run data operations in an active-active manner. This design efficiently uses all available hardware resources and optimizes performance, cost, and density in data centers.
- **NVMe platform:** PowerStore is designed to use the latest storage and interface technologies to maximize application performance and eliminate bottlenecks. PowerStore can maximize performance with NVMe flash storage and supports Intel Optane storage class memory (SCM) which approaches the speed of DRAM.

PowerStore supports front-end NVMe connectivity with NVMe over Fibre Channel for a complete end-to-end NVMe solution.

- **AppsON:** Integration of the PowerStore container-based architecture with onboard VMware ESXi results in a new level of consolidation for enterprise storage. This consolidation provides the benefits of a local, on-array application environment and integrates with the VMware vSphere management environment and server resources. This ability allows users to bring applications closer to storage by running applications as VMs that run directly on PowerStore, benefiting from the core storage services that PowerStore provides.

AppsON enables agility for application deployments and allows seamless movement between the PowerStore appliances and VMware ESXi servers. Each PowerStore appliance is a 2U appliance with two active-active HA nodes, deployed as two ESXi hosts in a vSphere cluster, with shared storage, helping to reduce the server and networking footprint for space-efficient edge and remote deployments. At the same time, each appliance offers high availability for VMs running on the AppsON deployment.

Complemented by joint engineering work with VMware and Intel, AppsON uses intellectual property to bypass the hypervisor. This ability enables bare-metal NVMe performance with full support for plug-and-play functionality and PCIe fault containment.

The AppsON model also simultaneously acts as a regular external storage array, allowing users to both run VMs on the embedded hypervisor while also being able to serve storage to servers through FC/iSCSI/NVMeoF protecting existing infrastructure investments.

- **VMware integration:** PowerStore is designed to have deep integration with VMware vSphere including VAAI, VASA, event notifications, snapshot management, vVols, and VM discovery and monitoring in PowerStore Manager.
- **Unified offering:** PowerStore has a single architecture for block, file, and vVols. This architecture uses the latest technologies to provide flexible functionality without sacrificing the cost-effective nature of enterprise storage. PowerStore provides storage in multiple formats to applications, ranging from physical and virtual volumes to containers and traditional files. This ability provides maximum workload flexibility and enables IT to simplify and consolidate infrastructure.
- **A modern, simple interface:** PowerStore Manager, the PowerStore management interface, is built with data center administrators in mind. With browser native HTML5, PowerStore Manager can be used across various operating systems (OS) and web browsers without requiring an external management server or appliance.
- **Inline data reduction:** Data reduction technologies play a critical role in environments in which storage administrators are attempting to do more with less. PowerStore data reduction supports this effort by optimally reducing the amount of physical storage that is required to save a dataset, with PowerStore guaranteeing a 4:1 data reduction ratio. PowerStore data reduction provides space savings by using software data deduplication and compression through hardware assist. These storage services are always enabled, and intelligently controlled by the PowerStore OS.

- **Native data protection:** Data security and availability are critical concerns for many organizations, and PowerStore storage offers multiple solutions to address this need. Snapshots provide point-in-time copies of block, file, and VM data that can be used for backup and restoration purposes. Asynchronous replication offers an IP-based replication strategy within a system, or between two systems. Data at Rest Encryption (D@RE) ensures that user data on the system is protected from physical theft and can substitute drive disposal processes, such as shredding.

VxRail overview

Dell EMC VxRail delivers an agile infrastructure with full stack integrity and end-to-end lifecycle management to drive operational efficiency, reduce risks, and help free up teams to focus on the business. Adoption of VxRail systems that break down operational silos and enable continuous innovation through rapid provisioning and deployment of workloads results in significant cost savings and operational efficiencies.

VxRail systems enables IT organizations to drive business opportunities rather than simply supporting business operations. Built for and with VMware, to enhance VMware, VxRail is the first and only hyperconverged infrastructure (HCI) system jointly engineered with VMware to eliminate the operational complexity of deploying, provisioning, managing, monitoring, and updating of HCI.

VxRail is available in several node hardware configurations and deployment options. This document focuses on two of the deployment options: VxRail with vSAN, and VxRail dynamic nodes. Both deployments are built upon the VxRail HCI System Software, providing users with a common operating model for both deployment options to simplify daily data center operations. The following outlines basic VxRail features:

Note: This paper does not cover VxRail hardware configurations. More information can be found in the [VxRail Spec Sheet](#).



VxRail essentials

Fully integrated, preconfigured, and tested hyperconverged infrastructure appliance simplifies lifecycle management and extends VMware environments.

VxRail HCI System Software integrates with existing VMware ecosystem management solutions for streamlined deployment and management in VMware environments.

Start small, with as few as two nodes. Single node scaling, storage capacity expansion, and vSphere license independence enable growth that meets business demands.

Backup distributed applications or workloads with integrated data protection options, including RecoverPoint for VMs.

Figure 2. VxRail details

VxRail with vSAN

HCI platforms deliver compute, software-defined storage, in this case with vSAN and networking infrastructure services in a cluster of PowerEdge servers. Collapsing the core components of the traditional data center—compute and storage—into a server. Because HCI is software-defined—which means the infrastructure operations are logically separated from the physical hardware—the integration between components is much tighter. HCI manages everything as a single system through a common toolset.

VxRail systems are optimized for VMware vSAN software, which is fully integrated in the kernel of vSphere and provides full-featured, cost-effective, software-defined storage. vSAN implements an efficient architecture, built directly into hypervisor. This distinguishes vSAN from solutions that typically install a virtual storage appliance (VSA) that runs as a guest VM on each host.

Embedding vSAN into the ESXi kernel layer has advantages in performance and memory requirements. It has little impact on CPU utilization (less than 10 percent) and self-balances based on workload and resource availability. It presents storage as a familiar data store construct and works seamlessly with other vSphere features such as VMware vSphere vMotion and Storage Policy Based Management to provide the flexibility to easily configure the appropriate level of service for each VM.

vSphere is a well-established virtualization platform, a familiar usable entity in most data centers. Dell EMC leverages vSphere for ESXi-based virtualization and VM networking in multiple product offerings, and supports a common set of VMware and Dell EMC services. This overlap enables a VxRail implementation to integrate smoothly into VMware-centric data centers and to operate in concert with Dell EMC converged, hyperconverged, and traditional storage offerings.

NSX for SDN can optionally be added to the VxRail solution. VMware NSX Data Center transforms the network in a similar way in how vSphere and vSAN transform compute and storage respectively. It provides much more flexibility, agility, and security to overcome limitations of the physical network architecture.

VxRail dynamic nodes

For applications that benefit from asymmetric scaling of processing power and storage capacity, VxRail dynamic nodes provide the ability to attach Dell EMC external storage resources for use as primary storage. VxRail dynamic nodes decouple compute and storage scaling. As processing demand grows, customers can add dynamic nodes to the cluster. As storage capacity demand grows, customers can also provision more storage from external storage resources to dynamic nodes.

VxRail dynamic nodes are VxRail systems that are compute-only nodes used to form a vSphere cluster. Dynamic node clusters rely on external storage resources for its primary storage. External storage resource types can be remote datastores from vSAN clusters using VMware vSAN HCI Mesh or datastores from storage on Dell EMC storage arrays such as PowerStore T, PowerMax, Unity XT, and PowerFlex.

Dynamic node clusters further extend the workload types that VxRail can address. Customers can now deploy VxRail for workloads that may require enterprise storage-level data protection and resiliency and benefit from independent scaling of compute and storage for better cost economics. Customers can also continue to store the workloads on an enterprise array while benefitting from the VxRail simplified lifecycle management. For applications that may be compute- or storage-intensive, VMware vSAN HCI Mesh allows customers to use a mix of compute clusters and vSAN clusters to result in better resource

utilization and optimized license costs. When VxRail is used to form vSphere clusters and vSAN clusters, customers can benefit from a common operating model with VxRail HCI System Software.

VxRail dynamic nodes are compute-only nodes running ESXi. There is no internal storage, meaning a vSAN license is not required. VxRail HCI System Software is responsible for the lifecycle management of the node. Lifecycle management of the storage array is separate. VxRail dynamic nodes are available in multiple VxRail series including the E660F, P670F, and V670F VxRail models. All configuration options that come with these models are available except for cache and capacity drives.

VxRail HCI System Software

VxRail HCI System Software is the foundation for the value differentiating the capabilities of VxRail. From an infrastructure stack perspective, the management software runs on top of the VMware software and the PowerEdge server to allow VxRail to act as a singular unified system.

Continuously Validated States: VxRail runs on pre-tested and validated software and firmware for the entire VxRail stack, including the VMware software and PowerEdge server components. VxRail lifecycle management capabilities ensure that VxRail clusters run in that known good state throughout its entire lifecycle as the cluster goes through continuous changes to take advantage of the latest VMware software innovation, security fixes, or bug fixes. Continuously Validated States is the term that encapsulates the configuration stability delivered by VxRail clusters.

Electronic Compatibility Matrix: With different software and hardware components in the stack, VxRail team is continuously testing and validating against the entire stack so any desired state the user determines from the VMware compatibility matrix has been validated as a Continuously Validated State. In addition, VxRail refers to this matrix to ensure the cluster configuration stays in compliance. These benefits drastically reduce the testing effort and resources a customer need to invest while also giving the customer the peace of mind to predictably and securely evolve their VxRail clusters without impacting application workloads.

Ecosystem connectors: To build an extensive Electronic Compatibility Matrix, VxRail has to communicate with ecosystem members in the stack, including vSphere, vSAN, vCenter, and the PowerEdge server and multiple hardware components within. The connectors allow VxRail to know the software and firmware versions running in each component and lifecycle manage those components. The automation and orchestration capabilities allow VxRail to be managed as a singular unified system.

VxRail Manager: The primary management user interface for VxRail is the vCenter plug in called VxRail Manager. It provides a fully integrated vCenter experience. VxRail users can perform any VxRail activity through this interface, including:

- Initial cluster configuration
- Monitoring hardware components
- Performing graceful cluster shutdown
- Expanding the cluster by adding nodes
- Updating VxRail HCI System Software

VxRail dynamic nodes and PowerStore T

Introduction

Traditionally virtualized environments have been built on a three-tier architecture consisting of x86 servers, a redundant storage fabric, and an enterprise grade shared storage platform, like a Dell EMC PowerStore T, for example. IT, the applications they deliver, and the environment they run on, are critical to business operations today.

These separate tiers can have their own refresh cycles, be it driven by advancements in product technology, budget cycles, or outgrowing part of the original environment. Regardless the cause, the architecture provides an opportunity for to revisit and improve upon the existing environment in multiple way. Servers have a shorter refresh cycle; typically three years versus five years for storage arrays.

Leveraging existing storage investments

In cases where there are existing storage investments in the data center but the compute is reaching a refresh cycle, VxRail dynamic nodes can be introduced along with the benefits of VxRail HCI System Software, the VxRail management software.

VxRail HCI System Software is a strategic advantage for VxRail and further reduces operational complexity. It is the software running atop the vSphere stack and encapsulates much of the key VxRail differentiation over other x86 servers running vSphere in the market.

VxRail HCI System Software provides automation and orchestration for deployment to daily, system-based operational tasks, which reduces the overall IT OpEx required to manage the stack. No build-it-yourself hypervisor solution provides this level of lifecycle management, automation, and operational simplicity.

With VxRail HCI System Software, updates—BIOS, firmware, drivers or ESXi—are simple and automated with a single click. Customers can go from one known good state to the next, inclusive of all the managed software and hardware component firmware. They no longer have to verify hardware compatibility lists, run test and development scenarios, or sequence and trial updates. The heavy lifting of sustaining and lifecycle management is already done for them, helping VxRail create IT certainty.

Lifecycle management for predictable outcomes

The following features help ensure predictable outcomes for customers.

- Automated, Intelligent Lifecycle Management (LCM) functionality automatically updates clusters with pre-validated, pre-tested software and firmware components, ensuring the HCI stack is in a Continuously Validated State.
- The Electronic Compatibility Matrix is a compliance asset providing validation that all possible configuration and update path permutations are sound, enabling customers to choose the Continuously Validated State of their choice to optimize each cluster for its respective workloads.
- Ecosystem connectors tightly integrate with infrastructure components including vSAN, PowerEdge server components, and networking, enabling automation and orchestration services across the entire stack for simple cluster software and firmware updates.

Scaling storage and compute independently

The ability to scale everything independently has the following primary advantages when both solutions are combined.

Scaling storage capacity for low compute workloads

In the case where a business application may have very low compute requirements but high storage capacity requirements, PowerStore T appliances can scale both vertically and horizontally to meet the demand.

Depending on capacity and performance requirements, PowerStore requires a minimum of six drives and can then scale in single drive increments vertically, including the additional of up to three additional expansion enclosures if needed. If more horsepower is needed beyond a single appliance, up to three additional PowerStore appliances can be added to the PowerStore cluster.

Horizontal PowerStore scaling by adding more appliances

The benefit of adding multiple appliances to a PowerStore cluster is that it allows mixing and matching of models with different capacities to meet different needs.

For example, the cluster could have a PowerStore 1000 filled with high-capacity drives for testing and development workloads, while the same cluster could also have a PowerStore 5000, 9000, or both for mission critical applications needing extra performance.

Combining multiple arrays of different sizes means that the management and configuration of storage in the cluster is done through a single, simplified web interface, and treated as a single cluster entity.

The PowerStore built-in cluster service uses AI for initial placement and then makes re-balancing recommendations post initial placement as needed. For example, if a development application needs to be promoted to production, the underlying storage can seamlessly be migrated from the PowerStore 1000 in the cluster to the 9000 with a few simple clicks and no interruption to the workload.

Scale compute for CPU intensive workloads

If applications require additional compute, additional VxRail dynamic nodes can be added to scale to meet any new compute requirements needs. The VxRail HCI System Software node addition process ensures that up to six new nodes can be added at a time, up to the vSphere cluster limit. The node addition process also ensures the new nodes are not only running the same version of vSphere, but the same BIOS, firmware and drivers, as well configured with the same host settings as the existing nodes in the cluster. This capability provides a consistent deployment and cluster expansion experience.

Dell EMC VxRail dynamic nodes provide additional, flexible storage options when it comes to scaling and addressing expanded workloads. Many workloads have different, sometimes extreme requirements of compute and storage. Dynamic nodes expand VxRail deployment configurations and addressable use cases allowing users to scale asymmetrically.

VxRail with vSAN and PowerStore T

Introduction

Traditionally, on-premises private cloud virtualization environments have existed in one of two architectures: Three tier, with x86 servers, a storage fabric, and Dell EMC SAN or

NAS storage, or HCI like VxRail, where the hypervisor incorporates a software defined storage capability.

These two architectures have typically been targeted at different use cases and markets. However, a transformation has occurred where customer demand has these two architectures increasingly used side-by-side, and use cases no longer provide a clear benefit of one architecture over the other.

Dynamic nodes provide the increased flexibility of choice to meet specific application requirements as needed based for compute or storage capacity and features, including the following:

- In an existing VxRail environment where the need for storage capacity has outpaced growth in compute, adding the additional VxRail nodes to meet this storage need will incur a premium of unneeded compute. Adding external storage in the form of Dell EMC PowerStore T meets this demand for increased storage while increasing the choice of storage data services offered.
- For out-of-sync servers and storage refresh cycles, server refresh cycles tend to be needed around every three years, while higher costing of storage infrastructure is refreshed less often, typically around every five years. This results in an existing vSphere environment with Dell EMC SAN or NAS where the servers are due for replacement. As is often the case, the demands of the business change over time, as does the available technology. By adding VxRail with vSAN nodes, customer gain VxRail Lifecycle Management while increasing the choice of storage data services offered with vSAN storage.
- In modern data centers, there exists a range of applications with a vast range of storage needs, which no single architecture or solution can meet. Business demands continue to press for efficiencies and breaking down siloed infrastructure. By combining VxRail with vSAN nodes and Dell EMC PowerStore T in a single environment, customers can effectively meet more of the business requirements demanded of them.

Building a solution with VxRail dynamic nodes and PowerStore provides world-class performance, flexibility, support, and services.

PowerStore T benefits

For traditional on-premises private cloud virtualization environments that have existed in three tier architectures, many of the native storage array benefits can be extended to VxRail, as outlined here.

Ability to utilize storage array features

Many organizations have been integrating array-based features into their application hierarchy for years. These provide valuable services for business continuity, cost savings, and application availability.

Replication

One key aspect of continuity for business-critical applications is making sure that application data is not only protected, but moved off-site to isolate against disasters effecting a geographical area.

Array-based replication is a mature technology that can take most any data stored on a block or file volume and transport it to another array in another data center at a safe

distance away. The primary benefit to the application is that under most circumstances, the replication takes place seamlessly underneath the covers with very little interaction required.

In cases where it does make sense for the application to coordinate with the application to flush I/Os to disk before snapshots, built-in features or third-party software can coordinate the operations to create application consistent snapshots, providing the best probability of a successful recovery.

Data reduction

PowerStore has many different data reduction techniques that help to save on storage capacity usage. The PowerStore in-line data reduction engine works to process data through the deduplication and compression logic before being saved to the drives, guaranteeing a 4:1 data reduction ratio. In coordination with thin snapshots and thin provisioning, in many cases, efficiencies exceeding 4:1 is not uncommon. This provides applications performant storage at a cost-effective price.

VxRail with vSAN benefits

Traditionally on-premises private cloud virtualization environments have existed in one of two architectures: Three tier, with PowerEdge servers, a storage fabric, and Dell EMC SAN, or NAS storage, or HCI like VxRail.

Within VxRail HCI System Software, SaaS multi-cluster management provides global visualization, simplified health monitoring, and multi-cluster management via a cloud-based web portal. These features build upon the LCM services to increase operational efficiency, especially for customers with a large footprint of VxRail clusters and managing at scale has been challenging. Some key VxRail with vSAN benefits are outlined here.

Another type of storage in their vSphere environment

Flexibility is key to efficient data center operations, including the ability to provide not just an additional storage offering to business applications and the application owners, but a storage offering with a rich data services set.

VxRail clusters with vSAN can be configured with hybrid, all-flash or all-NVMe storage options, offer mirroring, erasure coding, deduplication, compression, encryption, and replication. vSphere clusters are well-equipped with the combined storage offerings of VxRail with vSAN and PowerStore T.

By having the ability to match application and workload requirements more closely with storage offerings, business can run smoothly and more efficiently. Further, application and workload requirements can and do change over the life of the application. It's important to have the ability to easily and non-disruptively migrate an application to different storage offerings as the application moves from test and development to staging and production to legacy as these migrations occur.

VxRail Lifecycle Management

The fast-paced digital world means organizations that want to stay competitive require ongoing infrastructure updates and patches to ensure they are getting the most from their technology investments. Staying current with the latest software updates, updates, and patches ensures the infrastructure is secure and optimized for performance while providing users with the latest features and functionality to better serve business needs.

VxRail LCM is built on Ecosystem Connectors to integrate vSAN cluster software and PowerEdge server hardware so that the ESXi host can be managed as a single system. This system integration enables automation and orchestration necessary to deliver non-disruptive, streamlined HCI stack updates. Where VxRail LCM delivers differentiated value is in the ability to deliver a pre-validated set of software and firmware that ensures compatibility and compliance of the HCI stack configuration while maintaining the performance and availability required of the virtualized workloads running on the clusters.

The ability to test, validate, and produce a VxRail software bundle to support every vSphere release, any-to-any version update path, and the millions of VxRail configurations is known as Continuously Validated States. These Continuously Validated States are recorded on the Electronic Compatibility Matrix. The VxRail team delivers a \$60 million equipment investment with more than 100 team members dedicated to testing and quality to make this possible.

PowerStore X and VxRail with vSAN

Introduction

PowerStore X and VxRail have clear benefits when they work together. PowerStore X is unique in the storage world with its AppsON capability. This enables VMs to be run directly on the PowerStore appliance itself.

Note: For more information on this capability, please read [PowerStore: Introduction to the Platform](#). While PowerStore X is also capable of providing storage to external hosts via FC, iSCSI, or FC-NVMe, these capabilities are covered in the [PowerStore T section](#).

In this configuration, PowerStore X and VxRail are not connected to each other and are not providing resources to the same vSphere cluster. Rather, both platforms exist as separate vSphere clusters in either the same vCenter, or separate vCenter instances, and there is a need for workload mobility between the two clusters. As both platforms are, from the point of view of VMware vSphere two vSphere clusters, we can leverage the capabilities of VMware vMotion to provide the desired workload mobility and migrate from one to the other.

vMotion capabilities

VMware vMotion is a foundational feature of vSphere that enables the live or hot migration of running VMs from one physical server to another without interruption of downtime. VMware has extended the capabilities of vMotion since its groundbreaking release, increasing performance, extending the distance, and adding additional capabilities from there.

With the release of vSphere 5.1 in 2012, VMware added the ability to performance vMotion without shared storage. This enables the migration of VMs from one vSphere cluster to another vSphere cluster, as long as they are within the same vCenter. This capability is also known as cross-cluster migration.

In 2015 with the release of vSphere 6.0 VMware added the ability to migrate VMs between vCenter Server instances. This capability is known as cross vCenter migration. Leveraging the capability of vMotion, workloads can move between PowerStore X and VxRail, from vVol to vSAN storage, regardless of vCenter configuration.

vMotion requirements

vMotion requirements impact workload mobility between PowerStore X and VxRail with vSAN in the ways outlined here.

Processors must come from the same vendor class

vMotion requires that the processors of the source and target host be of the same vendor. Source and target hosts must either both AMD or both Intel.

As PowerStore X is equipped with Intel processors, this means that it is not possible to vMotion to or from a VxRail cluster consisting of nodes with AMD processors like the E665, P675, or future AMD powered VxRail nodes. In this situation, only a cold migration, with the VM powered off, not suspended, can be performed.

If the desire for workload mobility requires that the VM be moved without disruption or interruption, and the PowerStore X uses Intel processors, so too must the VxRail cluster.

Processors must have the same CPU feature set or EVC baseline

Modern processors have evolved to include complex instruction sets that improve speed and performance of the applications using them. Each new processor generation brings with it additional instructions sets. Near the end of the vMotion process a VM is briefly paused from running on the processor in the source host, and then quickly resumed on the processor in the destination host. Therefore, the source and destination host processors must be able to provide the same instruction set. This requires that the destination host processor must be of the same generation or a later generation as the source host processor. But as vMotion can and will occur in either direction, the source and destination host processors must be or appear to be of the same generation.

As previously mentioned, vMotion is a mature VMware feature. VMware has taken into consideration that customers purchase hardware over time, and will end up with a mix of processor generations or server hardware.

vSphere has a feature called Enhanced vMotion Capability (EVC) mode. This setting is used to mask from the VM processor instruction sets, giving the OS and applications the appearance that VM is running on an older processor. This enables the VM to be vMotioned between processors of different generation in advance. EVC can be set at the cluster level or on individual VMs.

EVC settings for VxRail with HCI and PowerStore X

The vSphere cluster created by PowerStore X does not have EVC set, and setting EVC requires entering maintenance mode on the PowerStore X vSphere cluster. However, VxRail does enable EVC at the cluster level, setting it to Haswell, providing customer with the option of adding any VxRail nodes with earlier generations of Intel processors to a VxRail cluster, or to raise the EVC setting to a level meeting their requirements.

The cluster-wide EVC setting can be enabled or lowered, but only if all VMs are powered off, meaning it cannot be enabled on the PowerStore X vSphere cluster. However, the EVC setting can be raised at any time, so to enable workload mobility between the PowerStore X vSphere cluster and the VxRail with HCI vSphere cluster, the EVC setting on the VxRail with HCI cluster needs to be raised from the VxRail default of Haswell to reflect the processors in the PowerStore X.

This setting will enable all VMs to be vMotioned to and from both vSphere clusters. Alternatively, if VxRail cluster EVC baseline has already been raised to a level above the

processors in the PowerStore X, to enable VMs on the VxRail with HCI vSphere cluster to take advantage of features in the later processors, then per VM, EVC must be used.

Per VM, EVC is similar to the cluster-wide EVC setting, but applies only to that individual VM. It would need to be enabled and set to reflect the processors in the PowerStore X, on any VM that workload mobility between the clusters is desired. To enable or change per VM EVC, the VM must be powered off.

vMotion and its derivatives are a mature vSphere feature set, and their requirements have been documented in VMware material, including the following VMware sources:

- [Migration with vMotion in Environments Without Shared Storage](#)
- [Migration Between vCenter Server Systems](#)
- [VMware EVC and CPU Compatibility FAQ](#)

Note: This VMware material is recommended reading as this section does not cover all vMotion requirements.

References

Dell Technologies documentation

The following Dell Technologies documentation provides other information related to this document. Access to these documents depends on your login credentials. If you do not have access to a document, contact your Dell Technologies representative.

- [Dell Technologies Info Hub](#)
- [Dell EMC PowerStore resources](#)
- [Dell EMC VxRail resources](#)
- [VMware resources](#)