Dell EMC PowerStore: Technical Primer

Dell EMC PowerStoreOS 1.0

Abstract
This document provides an overview of Dell EMC™ PowerStore™ features for the Dell EMC PowerStoreOS 1.0 release.

May 2020
## Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>April 2020</td>
<td>Initial release: PowerStoreOS 1.0</td>
</tr>
<tr>
<td>May 2020</td>
<td>Minor updates</td>
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</tbody>
</table>

## Acknowledgments

Author: Robert Weilhammer

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### 1 PowerStore overview

Dell EMC™ PowerStore™ achieves new levels of operational simplicity and agility. It uses a container-based microservices architecture, advanced storage technologies, and integrated machine learning to unlock the power of your data. PowerStore is a versatile platform with a performance-centric design that delivers multidimensional scale, always-on data reduction, and support for next-generation media.

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

PowerStore provides customers with data-centric, intelligent, and adaptable infrastructure that supports both traditional and modern workloads. PowerStore makes this possible with:

- **Data-centric** design that optimizes system performance, scalability, and storage efficiency to support any workload without compromise.
- **Intelligent** automation through programmable infrastructure that simplifies management and optimizes system resources, while enabling proactive health analytics to easily monitor, analyze, and troubleshoot the environment.
- **Adaptable** architecture that enables speed and application mobility, offers flexible deployment models, and provides choice, predictability, and investment protection through flexible payment solutions and data-in-place upgrades.

![PowerStore key highlights](image.png)

**Figure 1** PowerStore key highlights

PowerStore is a game-changing new platform that unlocks the power of data, regardless of its structure or location, helping you adapt and transform your IT without disrupting today’s operations.
2 PowerStore platform

The PowerStore hardware platform is created with a focus on performance, reliability, and modular flexibility. Designed from the ground up to leverage next-generation innovations such as NVMe and Intel® Optane™ Storage Class Memory (SCM) to deliver higher IOPS at lower latencies for real-world workloads. This offers all the performance and expansion headroom that is needed to ensure long-term value through multiple solution life cycles.

PowerStore helps simplify and consolidate diverse infrastructures with high-performance multi-protocol network I/O options and single-architecture support for block, file, and VMware® vSphere® Virtual Volumes™ (vVols), transforming operations for both traditional and modern workloads.

Figure 2  PowerStore appliance

Each PowerStore appliance consists of two nodes. Each node includes dual-socket CPUs and an Intel chipset which is used to offload the inline data compression. Each hardware configuration in the PowerStore platform is available in either a PowerStore T model or PowerStore X model configuration. The base hardware, processors, memory, media support, and services such as deduplication and compression are identical between the two models.
The five available appliance models are shown in Table 1.

Table 1  PowerStore model comparison

<table>
<thead>
<tr>
<th></th>
<th>PowerStore 1000T/X</th>
<th>PowerStore 3000T/X</th>
<th>PowerStore 5000T/X</th>
<th>PowerStore 7000T/X</th>
<th>PowerStore 9000T/X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel CPU (per appliance)</td>
<td>4 x 8 core @ 1.8 GHz</td>
<td>4 x 12 core @ 2.1 GHz</td>
<td>4 x 16 core @ 2.1 GHz</td>
<td>4 x 20 core @ 2.4 GHz</td>
<td>4 x 28 core @ 2.1 GHz</td>
</tr>
<tr>
<td>Memory (per appliance)</td>
<td>384 GB</td>
<td>768 GB</td>
<td>1,152 GB</td>
<td>1,536 GB</td>
<td>2,560 GB</td>
</tr>
<tr>
<td>Maximum drives per appliance</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum raw capacity per appliance</td>
<td>898 TB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum cluster size</td>
<td>4 PowerStore T model appliances</td>
<td>1 PowerStore X model appliance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-port card</td>
<td>25/10/1 GbE optical/SFP+ and Twinax or 10/1 GbE BASE-T</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I/O modules</td>
<td>32/16/8 Gb or 16/8/4 Gb FC 25/10/1 GbE optical/SFP+ and Twinax (PowerStore T models only) 10/1 GbE BASE-T (PowerStore T models only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The base enclosure for all appliance models holds up to twenty-five 2.5-inch NVMe drives. Four slots are reserved for 8 GB NVMe write cache drives. Up to three additional expansion enclosures are available to serve capacity from twenty-five 2.5-inch SAS SSDs if using NVMe SSD drives in the base enclosure.

![PowerStore front view](image)

Figure 3  PowerStore front view

Each of the two nodes in an appliance comes with an integrated 4-port Ethernet network card. Customers can choose between a 4-port 10/1 GbE BASE-T or a 4-port 25/10/1 GbE optical/SFP+ and Twinax card. For increased connectivity, each node supports up to two additional I/O modules. These extra I/O modules must match across the nodes on an appliance.
PowerStore supports the following I/O modules:

- **PowerStore T models and PowerStore X models:**
  - 4-port 32/16/8 Gb Fibre Channel
  - 4-port 16/8/4 Gb Fibre Channel

- **PowerStore T models only:**
  - 4-port 10/1 GbE BASE-T Ethernet
  - 4-port 25/10/1 GbE optical/SFP+ and Twinax

![PowerStore back view](image)

**Figure 4** PowerStore back view

### 2.1 PowerStore T models

PowerStore T models provide organizations with all the benefits of a unified storage platform for block, file and vVol data, while enabling flexible growth with the intelligent scale-up and scale-out capability of appliance clusters. Also, automated management of resources across the cluster results in superior storage utilization and simplified administration. PowerStore enables application storage for VMware® Cloud Foundation™ (VCF) with both block and file protocols, supporting needs for portability across today’s hybrid cloud environments.

PowerStore T models can provide block storage and file services when deployed in unified mode. When no file services (NFS/SMB) are required, the system can be deployed in a block-optimized mode to use the maximum power of each appliance to serve block I/O. PowerStoreOS is installed on purpose-built hardware, which runs the containers that are providing these services.

![PowerStore T model architecture](image)

**Figure 5** PowerStore T model architecture
2.2 PowerStore X models

PowerStore X models natively support serving block and vVol resources to external hosts. Also, PowerStore X models feature a revolutionary new storage architecture that enables running virtualized workloads directly on the appliance through the new AppsON capability. PowerStore X models include an integrated VMware ESXi™ hypervisor, which allows it to provide multiple IT services simultaneously:

- Scalable storage capacity for applications running on external hosts throughout the enterprise
- High-performance VMware-based compute environment for hosting local applications (AppsON)

With VMware vSphere as the underlying foundation, administrators can move workloads seamlessly between these services. Standard vSphere tools, including VMware vSphere vMotion® and storage vMotion, enables easy workload mobility in and out of PowerStore X models to other VMware targets.

Benefits of the AppsON capability include a new level of agility for application deployments, with seamless movement between the PowerStore appliances and VMware ESXi servers. AppsON also provides the ability to shrink the stack by eliminating server and networking footprint for space-efficient edge and remote deployments. AppsON is ideal for data-intensive applications that require low latency or a storage-heavy imbalance of compute and storage.

The native VMware ESXi hypervisor can be used immediately after initial configuration is completed. The initial configuration includes registration and configuration into an existing VMware vCenter™. The initial deployment also configures two controller VMs for the PowerStore X model appliance. There is one controller VM on each node, which runs a virtualized version of PowerStoreOS. Both controller VMs reserve 50% of the available CPU and memory on their respective node, leaving the other 50% for user VMs.

For more information about the PowerStore platform and models, see the document *Dell EMC PowerStore: Introduction to the Platform* on Dell.com/StorageResources.
3 Management overview

3.1 PowerStore Manager

PowerStore Manager provides an easy and intuitive front end for operators and storage administrators to configure and manage the cluster and associated appliances. It is based on HTML5 and does not require additional software to be installed on the client.

![PowerStore Manager](image)

For more information about PowerStore Manager, see the document *Dell EMC PowerStore: PowerStore Manager Overview* on Dell.com/StorageResources.
3.2 PowerStore CLI

PowerStore CLI allows quick lookups and scripted configuration on Microsoft® Windows® or Linux® clients. After initial configuration is finished, almost all operations can be initiated on the installed stand-alone PowerStore CLI client. That includes configuration of host access, resources, networking, and monitoring for block, file, and vVols.

![PowerStore CLI](image)

Figure 8  PowerStore CLI

3.3 PowerStore REST API

Like PowerStore CLI, the REST API implementation for PowerStore can be used for almost all operations which are required to run a PowerStore system. The implementation of REST API follows the popular and well-described rules to interact with systems. Since many operating systems provide clients with a method to interact with the API using HTTPS, it perfectly suits provisioning tools for automation.

The intuitive and simple to use SwaggerUI gives an overview and details on how to use the powerful API.

![PowerStore REST API](image)

Figure 9  PowerStore REST API
4 Features

4.1 Block storage
PowerStore provides block storage using IP (iSCSI) or Fibre Channel networks. Block storage is provisioned using volumes, which can also be optionally combined into write consistent volume groups.

4.2 File services
File services like SMB, NFS, FTP, and SFTP are available on PowerStore model T unified deployments. Like other PowerStore software components, file services are running in a container and are seamlessly integrated into the PowerStore management framework. NAS servers can be actively running on both nodes and automatically load-balanced with high availability.

Standard protocols like DNS, LDAP, Active Directory, and NIS are supported to enable integrating PowerStore file services into new or existing environments. The supported protocols include the following:

- NFS
  - NFSv3
  - NFSv4 - 4.1
  - Secure NFS (krb5/krb5i/krb5p)
- SMB
  - SMB1
  - SMB2
  - SMB3 - 3.1.1
- Multiprotocol
- FTP/SFTP
- Three-way NDMP for full and incremental backups

For more information about file capabilities, see the document *Dell EMC PowerStore: File Capabilities* on [Dell.com/StorageResources](http://Dell.com/StorageResources).

4.3 Virtualization integration
PowerStore features multiple integration points with VMware vSphere virtualization technology that is used in data centers today. Many of these powerful integration points are embedded in the system and are designed with the end-user experience in mind. They can be easily managed directly from the HTML5-based PowerStore Manager user interface. In addition to the integration points that are built into the system, off-array software and plugins are available to enable PowerStore to be used with existing tools and fit the specific requirements of each customer. Storage and virtualization administrators can leverage these features to create simple, modern, flexible, and affordable solutions.

Both PowerStore T models and PowerStore X models are designed to feature deep integration with VMware vSphere such as VAAI and VASA support, event notifications, snapshot management, storage containers for vVols, and virtual-machine discovery and monitoring in PowerStore Manager.
PowerStore X models provide flexibility and agility by enabling administrators to run applications directly on the storage system. Due to the presence of the embedded VMware ESXi hypervisor on the PowerStore X model nodes, additional virtualization features and automation for the configuration process are available on this model. While the vSphere hypervisor is embedded on each of the PowerStore X model nodes to allow running applications, it also can simultaneously be used as a standard external storage array. This use provides block volume access to servers over Fibre Channel or iSCSI protocols.

Figure 10  Virtualization integration

4.4 Data efficiencies

Data-reduction technologies play a critical role in environments to help reduce the amount of physical storage that is needed to save a dataset. By reducing the amount of storage required to store data, you not only reduce the number of drives that are required to store the data, but also reduce the physical footprint of the solution which helps reduce the total cost of ownership (TCO) of the storage system. In PowerStore, data efficiency techniques using pattern matching, deduplication, and compression help to reduce the amount of data physically stored within the system. These data efficiency methods are always on, and their data reduction achievements can be viewed within various resources of the system.

For more information about data efficiencies, see the document Dell EMC PowerStore: Data Efficiencies on Dell.com/StorageResources.

4.5 Clustering

Every PowerStore appliance is deployed into a PowerStore cluster. There is a minimum of one PowerStore appliance and a maximum of four PowerStore appliances that can be configured into the cluster. Multi-appliance clustering is only supported on PowerStore T models. When a multi-appliance cluster is deployed, this task can be performed during the initial configuration process or appliances can be added to an existing cluster. PowerStore clusters can be scaled down by removing appliances from an existing cluster.
Clustering PowerStore appliances can provide many benefits:

- Easy scale out to increase CPU, memory, storage capacity, and front-end connectivity
- Independent scaling of storage and compute resources
- Centralized management for multi-appliance cluster
- Automated orchestration for host connectivity
- Increased resiliency and fault tolerance

Users can scale-out appliances with different model numbers to create a four-appliance cluster. In addition to the scale-out benefit, each appliance can scale-up with different numbers of expansion enclosures, be a different model, and have different media types. This flexible scale-out and scale-up deployment give customers the ability to grow their clusters with no dependence on the model number, drive count, or even drive type.

For more information about clustering, see the document *Dell EMC PowerStore: Clustering and High Availability* on [Dell.com/StorageResources](http://Dell.com/StorageResources).

### 4.6 Resource balancer

In the modern data center, administrators must be quick and agile to support mission-critical applications. PowerStore offers an intelligent analytical engine that is built into PowerStoreOS. This engine offers many benefits such as helping administrators make decisions that are based on initial placement of data. It also assists with volume migrations or storage expansion that are based on analytics and capacity forecasting.
When storage administrators are creating storage resources, the resource balancer can provide many benefits. For example, when a multi-appliance cluster is deployed, the resource balancer intelligently and automatically places newly created volumes on different appliances in the cluster. This placement is based on which appliance has the most unused capacity. If choosing to override the decision of automatic placement, there is an option to manually select which appliance to place the volume.

![Volume migration diagram](image)

For more information about resource balancer, see the document *Dell EMC PowerStore: Clustering and High Availability* on [Dell.com/StorageResources](https://www.dell.com/storageresources).

### 4.7 Policy-based protection services

To simplify data protection, a policy-based protection mechanism is implemented on PowerStore. Each protection policy allows up to four snapshot rules and up to one replication rule. Once a protection policy is configured, it can be easily attached to one or multiple storage resources.

#### 4.7.1 Snapshots and thin clones

As data becomes increasingly important to organizations of all types, these organizations continually strive to find the safest and most effective ways to protect their data. While many methods of data protection exist, one of the simplest and most effective is snapshots, which allows recovery of data by rolling back to an older point-in-time or copying select data from the snapshot. Snapshots continue to be an essential data-protection mechanism used across a wide variety of industries and use cases. Snapshots preserve the most-important, mission-critical production data, sometimes together with other data-protection technologies.

PowerStore provides a simple but powerful approach to local data protection using snapshots. PowerStore uses the same snapshot technology across all the resources within the system, including volumes, volume groups, file systems, virtual machines, and thin clones. Snapshots use thin, redirect-on-write technology ensuring pool space is used optimally and reduces the management burden by never requiring administrators
Features

to designate protection space. Snapshots can be created manually through PowerStore Manager, PowerStore CLI, or REST API, or automatically, using protection policies. Protection policies can be created and assigned to quickly create local and remote protection on supported resources.

A thin clone is a read/write copy of a volume, volume group, or file system and uses the same underlying pointer-based technology that snapshots use to provide a method for creating multiple copies of storage resources. Thin clones support many data services, which engineers and developers can leverage in their environments. When users create a thin clone, it acts as a regular resource and is listed with the other resources of the system. Like snapshots, users can create, manage, and destroy thin clones through PowerStore Manager, PowerStore CLI, and REST API.

Figure 13  PowerStore snapshots

For more information about snapshots and thin clones, see the document *Dell EMC PowerStore: Snapshots and Thin Clones* on Dell.com/StorageResources.

4.7.2 Native asynchronous replication

To protect against outages which can interrupt data availability, it is crucial to have a redundant copy of data. Asynchronous replication can be used to protect against a storage system outage by creating a copy of data to a remote system. Replication is a software feature which synchronizes data to another cluster within the same site or in a different location. Replicating data helps to provide data redundancy, and safeguards against storage system failures at the main production site. Having a remote disaster recovery (DR) site protects against system and site-wide outages and provides a remote location to resume production and minimize downtime due to a disaster.

Asynchronous replication is primarily used to replicate data over long distances but can be used to replicate to systems within the same location as well. The asynchronous replication for PowerStore is designed to have a minimal impact on host I/O latency. Host writes are acknowledged once they are saved to the local storage resource and no additional writes are needed for change tracking. Because write operations are not immediately replicated to a destination resource, all writes are tracked on the source. This data will be replicated during the next synchronization.
Asynchronous replication uses the concept of a recovery point objective (RPO). RPO is the acceptable amount of data, which is measured in units of time, which may be lost due to an outage. This delta of time also affects the amount of data which must be replicated during the next synchronization, and the amount of potential data loss if a disaster scenario were to occur. PowerStore asynchronous replication features can easily be configured using PowerStore Manager, PowerStore CLI, or REST API.

For more information about asynchronous replication, see the document Dell EMC PowerStore: Replication Technologies on Dell.com/StorageResources.

4.8 Import

PowerStore provides a native import capability for block storage. This capability is integrated in the system and requires the collaboration of a host plug-in. The integrated combination of the native functionality and the host plug-in allows automating many of the otherwise manual procedures that are required when migrating. For example, the mapping of the hosts, creation of the storage resources, and validation checks are automatically completed by the system. The native import capability can be used when migrating data from Dell EMC Unity™, VNX2™, SC Series, and PS Series storage to PowerStore.
For more information about the import feature, see the document Dell EMC PowerStore: Migration Technologies on Dell.com/StorageResources.

4.9 Data at Rest Encryption

Data at Rest Encryption (D@RE) is automatically enabled on all PowerStore systems, except when shipped to locations where encryption is prohibited. With D@RE enabled, PowerStore encrypts all user data that is written using 256-bit Advanced Encryption Standard (AES256). PowerStore uses an internal key manager to manage the self-encrypting drives (SEDs).

Encryption is designed to protect user data during physical security breaches. Encryption enables compliance with the National Institute of Standards and Technology (NIST) Special Publication 800-111 and other specifications.

4.10 SupportAssist

PowerStore includes SupportAssist, which enables Dell Technologies to remotely collect data and logs from the PowerStore system data over a secure connection. This enables Dell Technologies support personnel the ability to provide a world-class support experience.

SupportAssist can be enabled using the direct connect or gateway connect options. Direct connect leverages the integrated SupportAssist functionality on each system to connect to Dell Technologies. Gateway connect uses a centralized SupportAssist gateway server. This enables multiple systems to send data to the gateway server, which then sends the data to Dell Technologies.

SupportAssist can also be configured to allow or restrict remote access. Allowing remote access enables Dell Technologies support personnel to remotely connect to the system for troubleshooting purposes. These options can be changed at any time.
5 Ecosystem integration

5.1 CloudIQ

CloudIQ is a no cost cloud-native application that leverages machine learning to proactively monitor and measure the overall health of storage systems through intelligent, comprehensive, and predictive analytics. CloudIQ is designed to deliver these capabilities to customers:

- Centralized monitoring of storage systems and switches
- Proactive health scores to help users identify potential risks in the environment
- Predictive analytics enabling capacity trending, capacity predictions, and performance troubleshooting

These features are presented in a consolidated, user-friendly interface through any HTML5 browser or through the CloudIQ mobile application.

As a Software-as-a-Service solution, CloudIQ delivers frequent, dynamic, non-disruptive content updates for the user. CloudIQ is built in a secure multi-tenant platform to ensure that each customer tenant is properly isolated and secure from other customers.

![Figure 16 CloudIQ](image-url)
5.2 **AppSync**

Dell EMC AppSync™ simplifies, orchestrates, and automates the process of generating and consuming application consistent copies of production data. The deep application integration of AppSync coupled with abstraction of underlying Dell EMC storage and replication technologies empowers application owners to satisfy copy demands for data repurposing, operational recovery, and disaster recovery, all from a single user interface.

![AppSync](image)

**Figure 17** AppSync

5.3 **VMware vRealize Orchestrator**

VMware vRealize® Orchestrator™ (vRO) is an IT process automation tool that enables automated management and operational tasks across both VMware and third-party applications. With vRO, IT admins can create automation routines for elaborate workflows using a simple drag-and-drop approach. The workflows can span different pieces of infrastructure and scale to a large task volume.

The vRO plug-in for PowerStore brings an extensive range of storage functionality in the form of programmable blocks that can be dropped into a workflow’s process map. Functionality includes:

- Storage provisioning
- Scheduled and on-demand snapshots
- Access to various storage objects specific to the array
- VMware integrated storage operations

The various tasks in the above categories form the basic building blocks that can be combined with compute and networking tasks to form an end-to-end operation that is easy to read, maintain, and extend.
Ecosystem integration

5.4 Virtual Storage Integrator

The Dell EMC Virtual Storage Integrator (VSI) for VMware vSphere Client is a plug-in for VMware vCenter®. It enables administrators to view, provision, monitor, and manage datastores on Dell EMC storage systems from the vCenter. VSI supports Dell EMC Unity, VMAX™, PowerMax™, and XtremIO™ and PowerStore storage systems.

This solution is designed for VMware administrators who want to manage storage through the vSphere client interface. This software enables VMware administrators to provision and manage storage on Dell EMC storage systems without the direct involvement of the storage administrator.
The Ansible® plug-in for PowerStore helps customers improve the efficiency, flexibility, and agility with which they run their data center. Dell EMC has enabled Ansible interactions with PowerStore by developing modules that expose the storage functionality to the Ansible engine. IT operations users simply need to specify the storage management actions to be performed in a simple key-value pair format in a YAML file.

The YAML file defines the desired state or configuration of the infrastructure. The PowerStore Ansible plug-in verifies if the wanted state is reached and runs the actions only if the wanted state is not reached. This intelligent management avoids inadvertent execution of actions, eliminating the resulting drift in infrastructure configuration. This approach makes it easy to maintain consistent, scalable operations over the entire IT infrastructure stack.
5.6 CSI driver
Container Storage Interface (CSI) is a specification that is designed as a standard method of exposing storage to container orchestrators, such as Kubernetes. CSI provides the ability for storage vendors to expose storage to containerized workloads using a driver. Dell Technologies provides a CSI driver that enables provisioning PowerStore volumes to Kubernetes for persistent storage.

5.7 PowerPath
Dell EMC PowerPath™ is a family of software products that ensures consistent application availability and performance across I/O paths on physical and virtual platforms. It provides automated path management and tools that enable you to satisfy aggressive service-level agreements without investing in additional infrastructure. PowerPath includes PowerPath Migration Enabler for non-disruptive data migrations and PowerPath Viewer for monitoring and troubleshooting I/O paths.

Use Dell EMC PowerPath/VE™ to provide predictable application performance, higher reliability, and more resilience in your growing virtual data center. You can deploy PowerPath/VE with PowerPath for better and easier data path management across your virtual, physical, and cloud environments.

5.8 RecoverPoint for Virtual Machines
RecoverPoint™ for Virtual Machines (RP4VMs) is hypervisor-based, software-only data replication that integrates with VMware vCenter. RP4VMs provides continuous data protection (CDP) for operational recovery and disaster recovery. It enables you to manage your VM protection simply and efficiently.

Virtualization admins and enterprise application owners can set and manage their VM data protection through a plug-in to VMware vCenter. Automated provisioning and DR orchestration make it easier to meet your
recovery point objectives (RPOs) and recovery time objectives (RTOs). With RP4VMs, you can enable quick recovery of VMware virtual machines to any point in time.

5.9 **VPLEX**

Dell EMC VPLEX™ provides an architecture for enterprise-class data mobility and continuous availability by using intelligent cache to provide distributed data protection. VPLEX addresses two distinct use cases:

- **Data mobility**: The ability to move application and data across different storage installations, within the same data center, across a campus, or within a geographical region.
- **Continuous availability**: The ability to create a continuously available storage infrastructure across the same varied geographies with unmatched resiliency.

VPLEX enables the connectivity to heterogeneous storage arrays providing seamless data mobility and the ability to manage storage provisioned from multiple heterogeneous arrays from a single interface within a data center. Data mobility and mirroring are supported across different array types and vendors, including PowerStore.
Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

Storage technical documents and videos provide expertise that helps to ensure customer success on Dell EMC storage platforms.

The PowerStore Info Hub provides detailed documentation on how to install, configure, and manage Dell EMC PowerStore systems.