



Technical FAQ

VMware Virtual Volumes on SolidFire

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Abstract

This FAQ covers the details of SolidFire's Virtual Volumes (VVols) implementation. It is intended for NetApp employees and partners.

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Overview

VMware Virtual Volumes (VVols) represent a new management and integration framework delivering a new operational model for virtual machine storage. It uses VMware APIs for storage awareness (VASA) and enables more direct, VM-level storage object creation and management using Storage Policy-Based Management (SPBM) and vSphere datastore tags.

What are Virtual Volumes?

VMware Virtual Volumes represent an integration and management framework delivering a new operational model for external storage. It is comprised of a control plane using Storage Policy-Based Management, and a data plane using VASA APIs for external storage and vSphere APIs for IO Filtering for in-hypervisor software data services.

What are the primary benefits of VVols on SolidFire?

There are many benefits to using VVols on SolidFire storage:

- Per disk/VM quality of service (QoS) guarantee
- Increased storage efficiencies
- Reduces LUN limit restrictions
- Policy based programmatic control over VM storage
- Storage provisioning is greatly simplified and focused through vCenter
- Storage containers scale seamlessly with cluster resources

What are the requirements for running Virtual Volumes on SolidFire?

- VMware vSphere 6.0 or later
- SolidFire Element OS 9 (Fluorine) or later
- iSCSI connectivity to SolidFire for ESXi hosts

How is Virtual Volumes support enabled on SolidFire?

VVol support is enabled under the cluster settings tab in the SolidFire management GUI. Once VVol support has been enabled, it cannot be disabled. The VVol feature should not be enabled for clusters that do not support compatible VMware environments.

Can Virtual Volumes and VMFS be used together?

Yes, SolidFire fully supports concurrent use of VVols and VMFS storage.

What are the licensing requirements for VVols?

VVol support (and all other SolidFire features) are included with the SolidFire cluster. No additional license is required. There are no additional licensing requirements for vSphere.

How many Virtual Volumes does SolidFire support?

Solidfire has tested to and supports 8,000 VVols per SolidFire cluster.

What are the types of VVols?

There are five different types of VVols currently defined:

- Config – VM Home, Configuration files, logs

- Data – Equivalent to a VMDK
- Memory – Contains VM memory image when a snapshot is taken with the “Snapshot the virtual machine’s memory” option enabled
- SWAP – Virtual machine memory swap
- Other – vSphere solution specific object

Are multiple vCenter instances supported?

The SolidFire VASA provider can only be registered to a single vCenter due to limitations with how SSL is handled by vCenter. Therefore, a single vCenter can have multiple SolidFire clusters, but a SolidFire cluster cannot be shared between two vCenters at this time.

Virtual Volume Management

The management paradigm for VVols rotates around a combination of SPBM policies, the VASA provider and vSphere tags.

What is SPBM?

Storage based policy management (SPBM) is a policy based framework for provisioning storage for VMs. SPBM allows the creation of storage policies with specific QoS values for entire VMs or individual virtual disks (VMDKs). When a SPBM policy is applied to a VM or VMDK that policy will automatically guide the creation or modification of storage objects to meet the policy requirements. VMware details the usage of SPBM in the vSphere Storage Policy Based Management Overview on blogs.vmware.com

What is a VASA provider?

The VASA provider is a highly available service that runs internally to the SolidFire cluster as part of the cluster master service. It is responsible for managing VM storage requests from vCenter and ESXi including creating, modifying and deleting VVols and their attributes as dictated by SPBM policies that have been applied to those VMs. The VASA provider is also used by ESXi to gain access to the VVols. The VASA provider must be running and accessible to power on VMs and do other VM operations.

What are vSphere tags?

vSphere tags are attributes that can be attached to vCenter inventory objects for the purposes of filtering.

What role do vSphere tags play with VVols?

Although not required, vSphere tags can be used to flag storage resources that are most appropriate for a given VM. For example, a VM template can be tagged “Finance” so that during deployment it will only show VVol datastores also tagged “Finance” as compatible. This can greatly aid in developing automated storage provisioning workflows for user self service portals or to ensure the correct storage resources are used for specific VM types.

Virtual Volumes Datapath and Datastore Representation

VVols makes significant changes to how storage is represented and addressed in comparison to VMFS to enable greater scale, performance and simplicity.

How many storage containers does SolidFire support?

For SolidFire, storage containers are a purely logical construct tied to tenant accounts. The number of storage containers, and thus, VVol datastores, is not limited.

What is a virtual volumes storage container?

A storage container is a datastore representation created on a SolidFire cluster. Storage containers are created and tied to accounts on SolidFire. A storage container created on SolidFire storage will appear as a vSphere datastore in vCenter and ESX. Storage Containers, themselves, do not allocate any space on SolidFire. They are simply used to logically associate Virtual Volumes.

Can multiple storage containers belong to one account?

Yes. Storage Containers can be created and associated with an existing account, or a new account can automatically be created when a storage container is created. Storage containers can belong to accounts that have non-VVols volumes, as well.

What is the capacity of a storage container?

A storage container has the capacity of the entire SolidFire cluster. As the size of the cluster changes, the size of the entire storage container changes. This may initially cause confusion when looking at a storage container datastores on the vSphere client, because all datastores will appear to have the full capacity of the SolidFire cluster

What are some of the datapath problems solved by Virtual Volumes?

- Increased the number of targets an ESXi host could see from 256 to 64,000 using protocol endpoints (PE) and subsidiary LUNs
- Increased performance of snapshots
- SolidFire QoS applied per VMDK instead of per datastore
- Larger scale datastores

What is a protocol endpoint?

A protocol endpoint (PE) is the access point used by a host to address storage on a SolidFire cluster. SolidFire automatically creates one protocol endpoint per storage node in the cluster, so a six node SolidFire array will have six PEs that will be mapped to each ESXi host. PEs are dynamically managed by SolidFire and will be created, moved or destroyed as needed without any intervention.

PEs are the target for multipathing and act as an I/O proxy for subsidiary (or sub) LUNs. Each PE consumes an available SCSI address, just like a standard iSCSI target. Protocol Endpoints appear as a single block (512 byte) storage device in the vSphere client, but this storage device is not available to be formatted or used as storage.

What is a subsidiary LUN?

Sub LUNs map to VVols and are used as a way to address SCSI commands to a particular VVol. Sub LUNs do not show up as storage devices in the vCenter inventory.

Does SolidFire support snapshots with VVols?

Yes, snapshots of VVol backed VMs are fully offloaded to SolidFire. Snapshots offloaded to SolidFire will perform better than VMware native “redo log” based snapshots.

Does SolidFire support VAAI with VVols?

Yes, VAAI is fully supported. sVMotion operations from VMFS -> VVol datastores and VVol <-> VVol datastores will be fully offloaded. Due to limitations in the VMware datamover sVMotions from VVol -> VMFS will offload WRITESAME, but not XCOPY commands.

Virtual Volumes Interoperability

For a list of VVol interoperable VMware products, see the VMware Virtual Volumes (VVols) interoperability with other vSphere products and features (2112039) knowledge base article available on kb.vmware.com.

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