VMware vSphere
Virtual Volumes (vVols)

Integration and management framework that virtualizes SAN/NAS arrays

AT A GLANCE

vVols simplifies operations through policy-driven automation that enables more agile storage consumption for VMs and dynamic adjustments in
real time when needed. It simplifies the delivery of storage service levels to individual applications by providing granular control of hardware resources and native array-based data services that may be instantiated at the VM level.

KEY BENEFITS

• Simplifies Storage Operations

• Simplifies Delivery of Service Levels

• Improves Resource Utilization

Software-Defined Storage (SDS)

VMware's vision and strategy are to drive transformation through the hypervisor, bringing to storage the same operational efficiency that server virtualization brought to compute. As the abstraction between applications and available resources, the hypervisor can balance all IT resources—compute, memory, storage and networking—needed by an application. With server virtualization as the de facto platform to run enterprise applications, VMware is uniquely positioned to deliver Software-Defined Storage (SDS) leveraging the pervasiveness of this software tier.
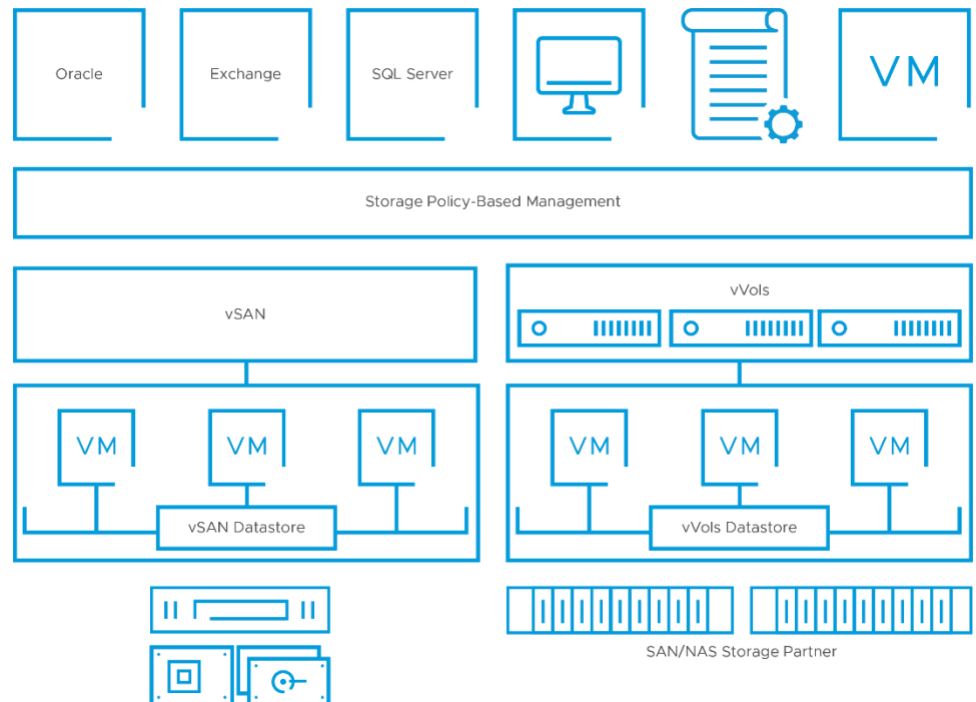

FIGURE 1: Software-Defined Storage

What is vVols?

vVols is a SAN/NAS management and integration framework that exposes virtual disks as native storage objects and enables array-based operations at the virtual disk level. vVols transform the data plane of SAN/NAS devices by aligning storage consumptions and operations with the VM. In other words, vVols make SAN/NAS devices VM-aware and unlocks the ability to leverage array-based data services with a VM-centric approach at the granularity of a single virtual disk.

vVols allows customers to leverage the unique capabilities of their current storage investments and transition without disruption to a simpler and more efficient operational model optimized for virtual environments that work across all storage types.

FIGURE 2: vVols partner ecosystem

Key Elements

FLEXIBLE CONSUMPTION AT THE LOGICAL LEVEL

vVols virtualize SAN and NAS devices by abstracting physical hardware resources into logical pools of capacity (called Virtual Datastore) that can be flexibly consumed and configured to span a portion of or several storage arrays. The Virtual Datastore defines capacity boundaries, access logic, and exposes a set of data services accessible to VMs provisioned in the pool.
Virtual Datastores are purely logical constructs that may be configured on the fly, when needed, without disruption and do not require file system formatting.

PRECISE CONTROL AT THE VM LEVEL

vVols define a new virtual disk container (vVol) that is independent of the underlying physical storage representation (LUN, file system, object, etc.). In other terms, with vVols the virtual disk becomes the primary unit of data management at the array level. This turns the Virtual Datastore into a VM-centric pool of capacity. It becomes possible to execute storage operations with VM granularity and to provision native array-based data services to individual VMs. This allows admins to provide the right storage service levels to each VM.

EFFICIENT OPERATIONS THROUGH AUTOMATION

Storage Policy-Based Management (SPBM) allows capturing storage service level requirements, such as capacity, performance, or availability, in the form of logical templates (policies) to which VMs are associated. SPBM automates VM placement by identifying available datastores that meet policy requirements and coupled with vVols; it dynamically instantiates necessary data services. Through policy enforcement, SPBM also automates service-level monitoring and compliance throughout the lifecycle of the VM.
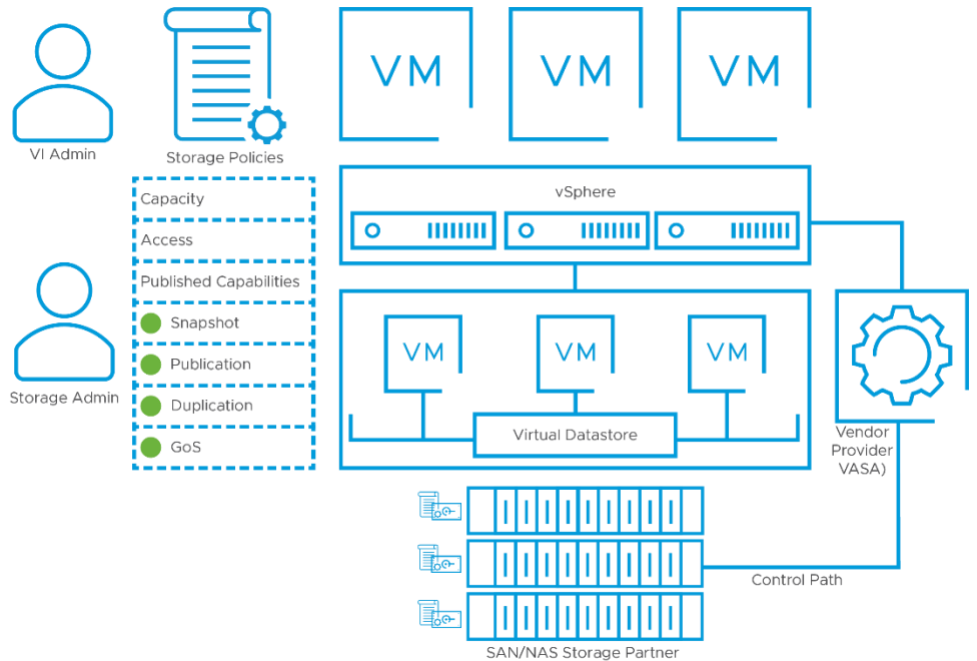
FIGURE 3: vVols architecture

Benefits

SIMPLIFIED STORAGE OPERATIONS

For both the VI Admin and Storage Admin, vVols greatly simplifies management over the existing operational model. vVols allow the separation of provisioning and consumption of storage for VMs.

In the VMware HCI model with vVols, the Storage Admin sets up an entity called the Virtual Datastore. The capacity and data services published by the Storage Admin in the Virtual Datastore are similar to menu items that the VI Admin can consume on demand. The Storage Admin retains control of the storage resources, as the VI Admin can only consume published capabilities. However, the Storage Admin no longer needs to determine which data services should be assigned to an application. Thus, the Storage Admin is responsible for up-front setup, allowing the VI Admin to be self-sufficient afterward.

With vVols, the VI Admin gains control and becomes responsible for defining the various storage classes of service for applications. However, the classes of service are no longer physical pre-allocations, but

logical entities controlled and automated entirely by software and interpreted through the mechanism of policies. By associating one or many VMs to the right policy, the provisioning and instantiation of storage service levels are automated for that VM or set of VMs.

Automated policy enforcement also becomes the mechanism to simplify the monitoring process and to ensure compliance of storage service levels throughout the lifecycle of the application.

Policy-driven automation enables agile storage consumption for VMs, which ultimately delivers faster provisioning for applications with different requirements, resulting in simplified change management.

SIMPLIFIED DELIVERY OF STORAGE SERVICE LEVELS

With vVols, it is easier to deliver and enable the right storage service levels according to the specific requirements of individual applications. With granular control over storage resources and native array-based data services at the VM level, administrators can create specific policy combinations and precisely deliver storage service levels on a case-by-case basis.. Additionally, policy-driven automation ensures desired service levels are met, and enables dynamic adjustments in real time, when needed, making it possible to adapt to ever-changing application and business requirements quickly.

IMPROVED RESOURCE UTILIZATION

Precisely mapping application requirements with storage resources when they are needed fundamentally eliminates over-provisioning issues. By virtualizing the storage infrastructure, vVols enable more flexible, VM-centric consumption of storage capacity and data services. Through automation, it enables dynamic adjustments in real time. This is in contrast with the legacy operational model, in which resources had to be pre-allocated and were hard to change, contributing to inefficient upfront investments in capacity and misuse of data services that create inefficient use of infrastructure resources over time.

Learn more at *https://www.vmware.com/products/vsphere/virtual-volumes.html*