

Top 10

Reasons to Use Pure Storage
with VMware VVols

Reader ROI

Fulfilling the promise of VVols requires the services to be as good as—if not better—than other VM storage services, plus major product development in the array ecosystem it heavily relies on. IT Brand Pulse believes all the pieces are in place in 2019 for VVol solutions to take-off, which means it's also time for IT organizations to evaluate which array vendors offer the best foundation for VVols. This eBook is designed to give the reader a brief backgrounder on VVols before delivering 10 examples that demonstrate that Pure Storage is a leader in the development of useful VVol storage solutions.

VMware Created a Virtual World with VMFS

In 2001 VMware entered the data center market and single-handedly carved data centers into farms of virtual machines. Server utilization skyrocketed and by 2016, over 75% of workloads were running on VMs. Virtual servers became the core of data center architectures, driving thousands of networking and storage vendors to optimize their products for virtualized environments. VMware created a virtual world and they did it mostly on the back of VMFS, the Virtual Machine File System for block storage.

\$8.97B

VMware has grown to virtualizing 3/4 of enterprise workloads and generate almost \$9B of revenue in fiscal 2019

VMFS is a clustered file system elegantly designed to store groups of VM disk images in a datastore. Data services such as replication and QoS are applied, for better or worse, to all virtual disks in a single datastore. To tune storage or share data, virtual disks are mobile, but some processes are complex, time-consuming, and create stranded space. Plus, as VM-density increases, more and more server CPU resources are needed to process the server-based data services.

A decade later, the virtual world was ready for VM storage to move to the next level.

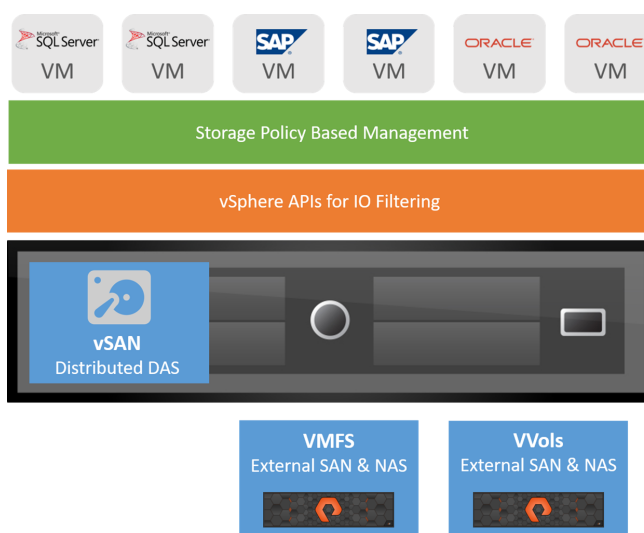
VVols Make it a VM-Centric Storage World

In 2015 the virtual world responded. VMware introduced VMware Virtual Volumes—a framework for VM-centric storage. Within this architecture, SAN and NAS storage policies can be configured at the granular level of a single VM building block, Storage Policy-Based Management brings control under one pane of glass, array-native volumes are highly mobile, and data services are offloaded to storage arrays which frees up server CPU.

Types of Storage Available to Virtual Machines

Today, vSphere and SPBM support vSAN direct-attached storage, as well as VVols and traditional VMFS external storage.

Rapid adoption of VVols on Pure Storage all-flash arrays is expected due to the advantages of the respective best-in-class products, and because of the tight integration of the two.



Anatomy of a VVol Architecture

The diagram below highlights the components of a VVol architecture and how they work together. A VASA provider advertises array capabilities and users combine them with desired settings into a Storage Policy. When a policy is assigned, a VVol datastore will inform the user if the array can satisfy that policy for any VM or virtual disk you are attempting to deploy or reconfigure. The volumes on the array are familiar block storage that is easily accessible and highly mobile.

SPBM

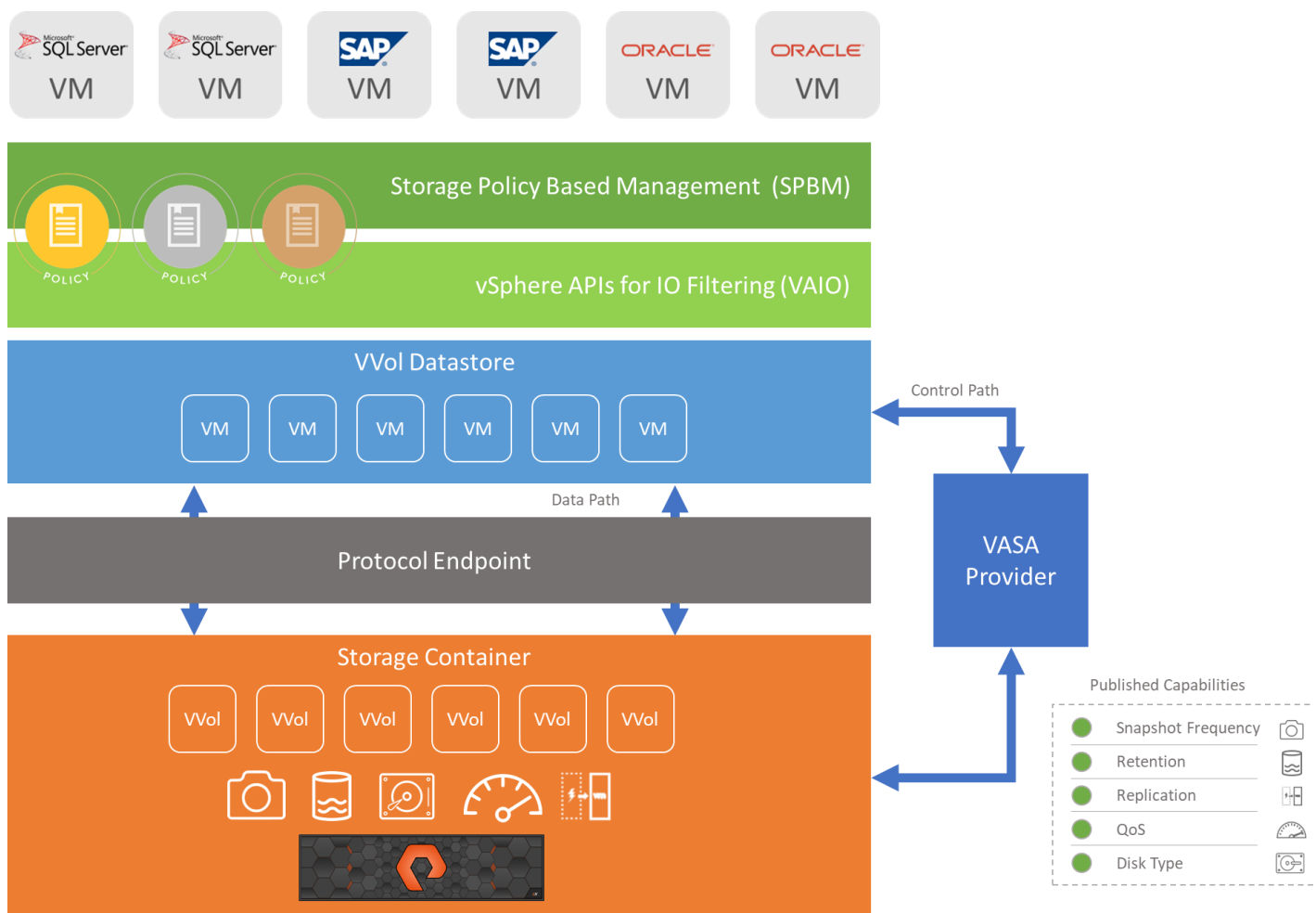
A unified control plane for policies that can be granular for an individual disk, single VM, or a group of VMs. A separate policy can be created for each service level (Platinum, Gold, Silver, Bronze) .

VVol

A VMware object type that corresponds to a VM disk, its snapshots and fast-clones. A VVol is a volume on the array that it looks like a VMware "virtual" disk to the OS.

VVol Datastore

Emulates a file system to represent VMs provisioned through it and manage VM space allocation. It can be viewed as a collection of references to VVols.



Protocol Endpoints

Provides the physical data path to the array.

VASA Provider

Provided by array vendor, it runs in an array controller and provides communications between array and vSphere to indicate what data services were configured for VVols.

Storage Containers

A capacity quota for VVols from a particular array. A storage container is represented as a VVol datastore within vSphere.

Top 10 Reasons to Use Pure Storage with VVols

We covered the basics of the VVols to make our case the technology is ready for primetime and will dominate the future of VM storage. Now let's go over the top 10 reasons to use Pure Storage with VMware VVols.

#1 Unlock the Potential of SPBM

Storage Policy-Based Management (SPBM) and VVols are at their best with all-flash array leader Pure Storage who offers a rich set of data services today, and who you can count on to be at the forefront of new services in the future.

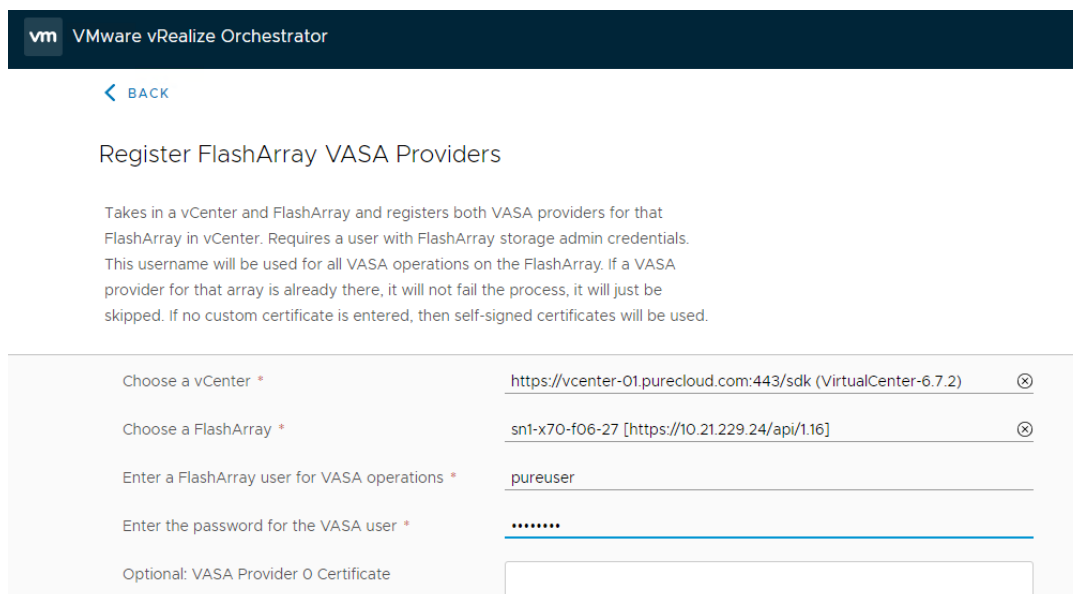
VMware has managed to streamline VM storage management into a single SPBM control plane for policies addressing a broad range of data services and storage solutions including Virtual Volumes, vSAN, and traditional VMFS.

Available Pure Storage array capabilities are now advertised in a highly visible single pane of glass. This makes it easy to configure VM storage policies by selecting the desired capabilities.

With SPBM, and VVols on Pure Storage, vSphere admins will overcome complexity and excess capacity, provision datastores at scale, and eliminate the need to provision datastores on a case-by-case basis.

In addition, SPBM APIs can be used by PowerCLI, VMware vRealize Suite, vSphere API, Open Stack and other applications to automate management of VVols on Pure all-flash arrays in a software-defined storage environment.

Registering FlashArray VASA Provider



A vSphere plugin is not required for FlashArray-based VVols, but using one simplifies administrative functions such as VASA provider registration.

For example, with the plug-in, you can easily select Pure Storage from the dropdown menu to display the FlashArray™ pane Objects tab. Simply right-click the array whose VASA providers are to be registered and select Register Storage Provider from the dropdown menu to launch the Register Storage Provider wizard.

#2 Eliminate Performance Overhead of Snapshots

VVols supports backup software that uses vSphere APIs for Data Protection (VADP), which enables backup products to do centralized, efficient, off-host LAN free backup of vSphere virtual machines. Because the snapshots are offloaded, the snapshot performance penalty is eliminated.

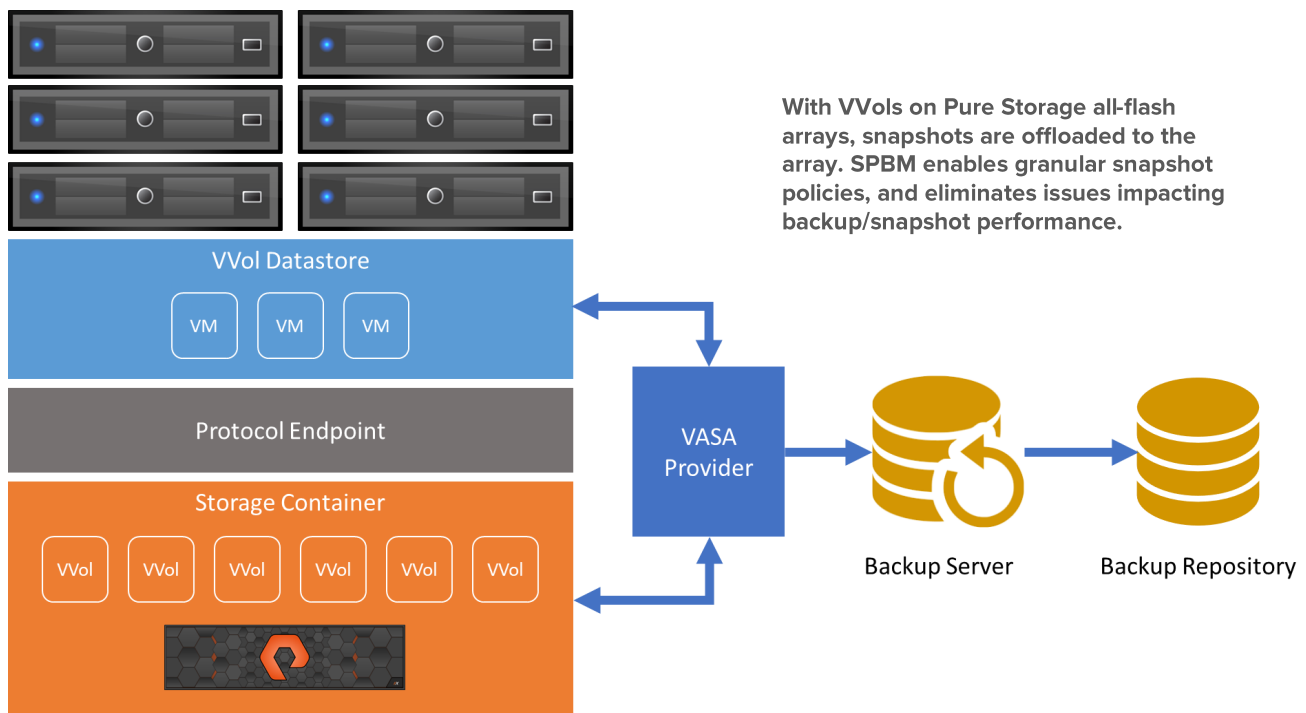
A backup product using VADP can backup vSphere virtual machines from a central backup server or virtual machine without requiring backup agents or requiring backup processing to be done inside each guest virtual machine on the ESXi host.

VADP leverages the snapshot capabilities of VMware vSphere to enable backup of a Pure all-flash array without requiring downtime for virtual machines. As a result, backups can be performed non-disruptively at any time without requiring extended backup windows and the downtime to applications and users associated with backup windows.

VVols on Pure Storage all-flash arrays are offloaded to the array and accelerate performance because of the way “consolidate” and “revert” operations are implemented. For starters, the base VMDK is always the base VMDK. It is always the write target. Instead of writing to the redo log, the snapshots are now read-only reference files that do not exist within a chain. Because of this, when the snap is reverted or deleted, there’s nothing to ingest back into the base VMDK, because it already has everything. This change alone has significantly enhanced the performance and usability of VMware snapshots.

Furthermore, because VVols are just array volumes, you can also use native array snapshotting policies to protect virtual machines or virtual disks through granular SPBM policies.

Backup & Restore of VVols on Pure Storage All-Flash Arrays



#3 Share Data Between Physical and Virtual Servers

Sharing data between physical and virtual servers is often required due to software licensing which creates environments that are part virtual and part physical. In addition, vendors sometimes require customers to troubleshoot VM issues by re-creating issues on physical hardware.

Unfortunately, sharing data between physical and virtual servers is complex. Admins often use RDMs, but that means losing the benefits of cloning, Storage vMotion, ease of provisioning, and built-in snapshots.

Fortunately, using VVols to share copies of data between physical and virtual servers is much improved with VVols on Pure all-flash arrays.

Pure makes it easy to copy and share data between virtual and physical with the benefits of VVols and without the penalty of RDMs. Because each VVol is a plain volume on a Pure all-flash array, you can copy it on the array and make it available to any physical server. It's that simple.

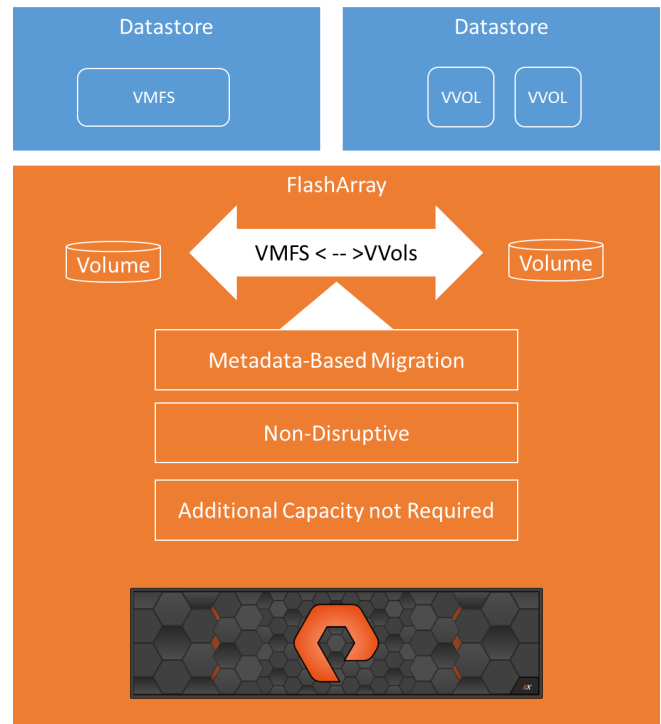
#4 Share Data Between Production and Dev/Test

Pure Storage improves the efficiency of Dev/Test operations by making it simple to share VVols between physical and virtual, and to clone VVols.

Sharing copies of data between physical servers and virtual servers (or another hypervisor) is common in dev/test scenarios. As we described above, Pure Storage makes it easy to copy volumes on the array and share them between production and Dev/Test.

Another common Dev/Test operation is backing up a production database and restoring it into a Dev/Test environment. The operation can take hours and can use precious temporary space.

With VVols on Pure all-flash arrays, backing up a production 10TB database volume on the array, and restoring a Dev/Test volume can be done in just a few seconds! Take the dev database offline, clone a production VVol volume containing a database, re-present it (or refresh it) to the dev server, and bring the dev database back online. It's just metadata at that point, and the array completes the task almost immediately. Pure provides sample PowerShell for this operation on their [GitHub page](#).



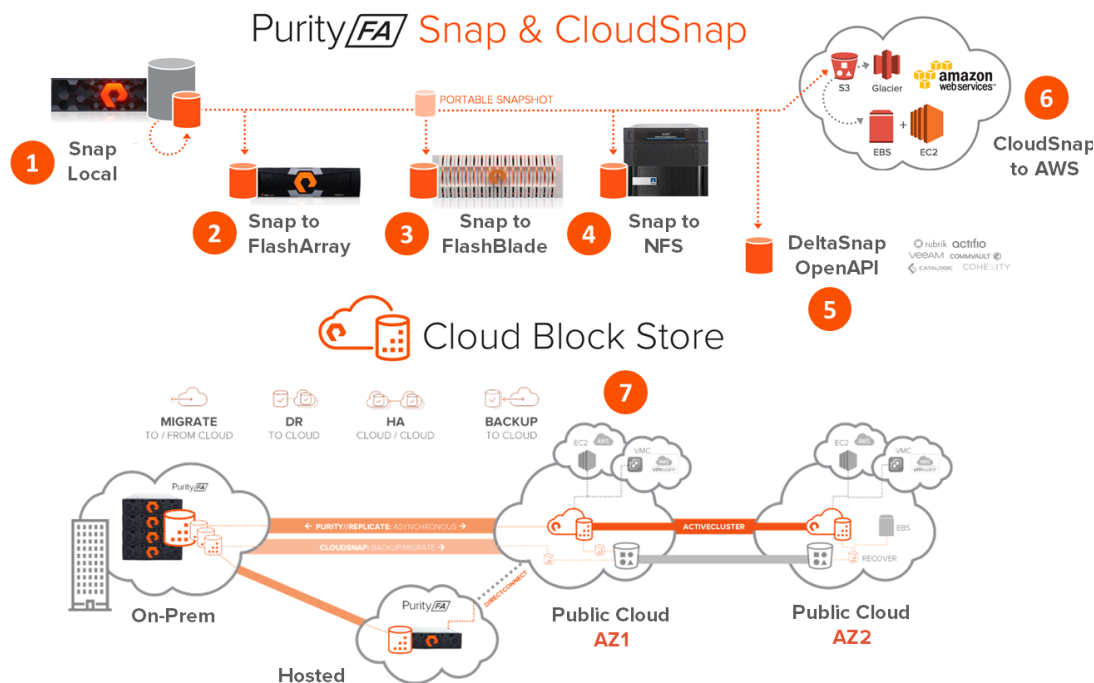
VMFS and VVol data becomes plain volumes on the FlashArray which can be cloned and shared instantly.

#5 Hybrid Cloud Data Mobility

The new normal is IT organizations operating hybrid clouds consisting of infrastructure on-premises in a private cloud, along with Infrastructure-as-a-Service in the public cloud. One of the many consequences of this trend is the need to efficiently move data across platforms inside the data center and across clouds.

Pure Storage Purity Protect Snapshots (Snaps) are instantaneous, space-efficient, and have no effect on FlashArray performance. Pure uses all-flash arrays, VVols, and snaps to achieve effortless portability of data inside the data center and to multiple clouds.

The diagram below reflects a Pure Storage demonstrating 7 options for their hybrid cloud data mobility:



1. **Local**—Through a non-disruptive, VAAI-offloaded Storage vMotion, a VMFS VM is converted into a VVol-based VM. Then FlashArray replicates VVols to another remote FlashArray.
2. **To Database**—Database VVol data volume is replicated to another site. Once replicated, the data volume is presented to a Microsoft Hyper-V host and to a Hyper-V virtual machine to perform additional data manipulation.
3. **To EC2**—the same data volume is connected to an EC2 instance over Direct Connect using iSCSI connectivity from the Pure Storage FlashArray.
4. **To NFS**—A Snap to NFS is used to create a backup of the database data volume. After making a backup, the snapshot is restored into an EC2 instance.
5. **To Cloud**—A CloudSnap is used to take the database data volume and rehydrate into a cloud native format (EBS) that can be connected to EC2.
6. **To Other Clouds**—An open REST API (which can be used by customers and third party data management software) is used to move snapshots from FlashArray to other clouds.
7. **Cloud Block Store**—100% software running in AWS, and with the same APIs as FlashArray. Features ActiveCluster to mirror data across availability zones.

#6 Virtualize Laggard DBs

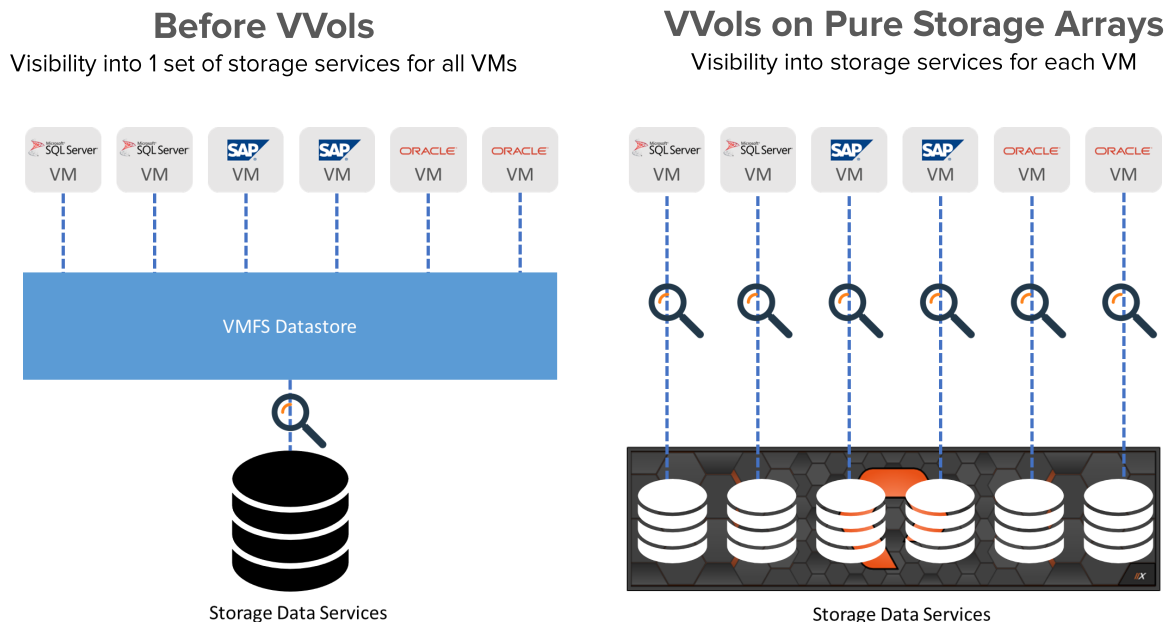
For database server admins required to use physical servers, or who those still evaluating virtualization, virtual volumes can support storage for physical servers and virtual servers simultaneously. The VVols are just plain volumes on the array. Admins are not locked in to compute or virtualization platforms and can easily migrate databases back and forth from virtual servers to physical servers.

#7 Simplified DR Workflows

VVols with Pure Storage FlashArrays simplify DR workflows with automation that scales to multiple targets. Basic disaster recovery is set-up by storage admins creating Replication Groups combined with VI admins creating VM storage policies. Examples of workflow automation are: a) Replication Discovery – where the relationships between multiple fault domains are discovered; b) Synch Replication – where data between source and replica are synched; c) DR and Planned Migration – where on-demand sync is initiated at the recovery site; and d) Protection after a DR Event – where admins set-up protection in the reverse direction after a recovery on a peer site.

#8 Deeper Insights into VM Storage

Before VVols, the lack of direct VM-to-storage mapping prevented granular data services and VM-to-storage Visibility. This blind spot made it difficult to troubleshoot performance, forecast growth, and contributed to compliance drift from SLAs. VVols running on Pure Storage arrays are mapped to individual VMs allowing Pure to reveal insights into storage services for each VM.



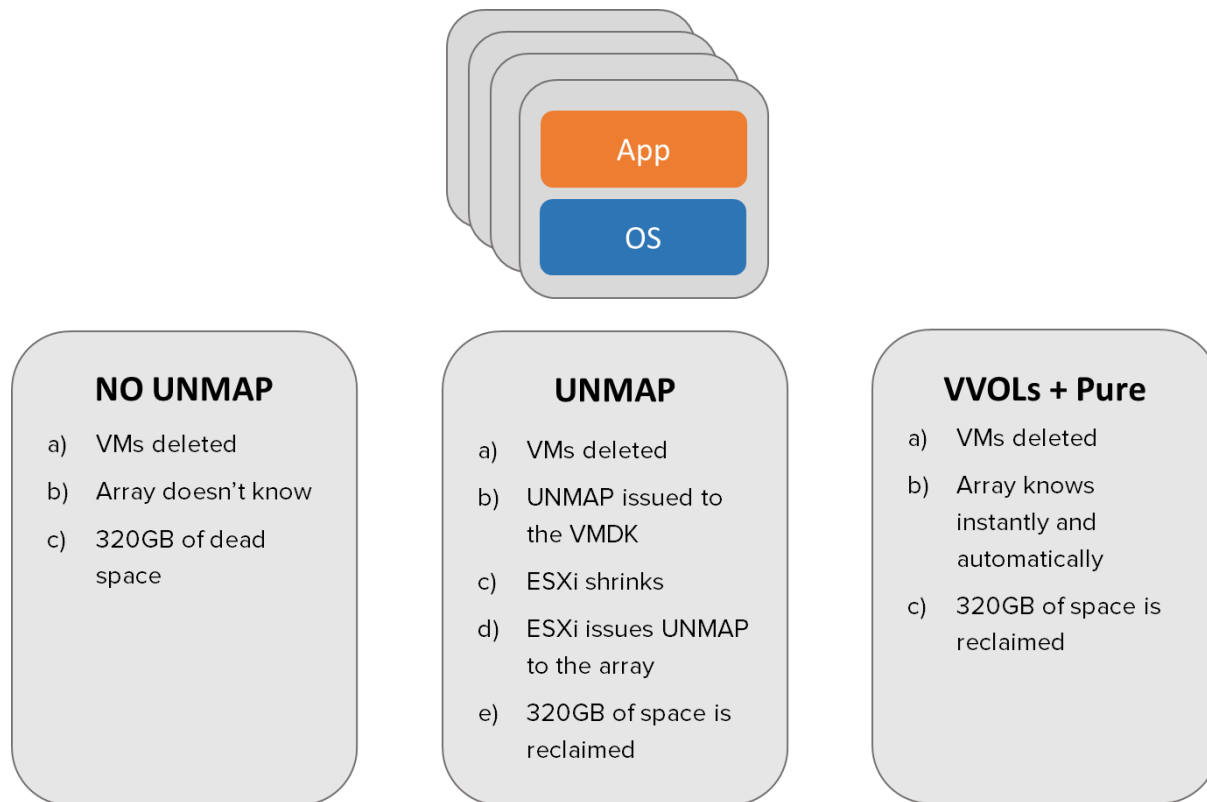
#9 Reclaim Storage

Another useful benefit of VVols, and Pure all-flash arrays used together is the ability to reclaim storage.

One way to reclaim storage is to eliminate dead space. In the past with a VMDK, when a file is removed, a variety of VMware requirements need to be satisfied before: a) the guest can issue UNMAP to the VMDK, b) ESXi will shrink, c) ESXi will issue UNMAP to the array, and d) the space is finally reclaimed. With a VVol on a Pure all-flash array, when the volume is deleted on the array, the array instantly and automatically knows the space is available. This means if you delete a file in a VM, the OS can directly issue reclamation to the VVol because it is a direct volume from the array.

It's also worthwhile to point out that if you deleted a VM on a VMFS, or deleted a VMDK, the array wouldn't know because it didn't control VMFS. With VVols on Pure Storage, when you delete a VM or disk, the array knows about it directly and reclaims the space.

VMs Deleted That Occupied 320GB of AFA Space



All-Flash Array dead space is automatically reclaimed when VMs are deleted with VVOLS and Pure.

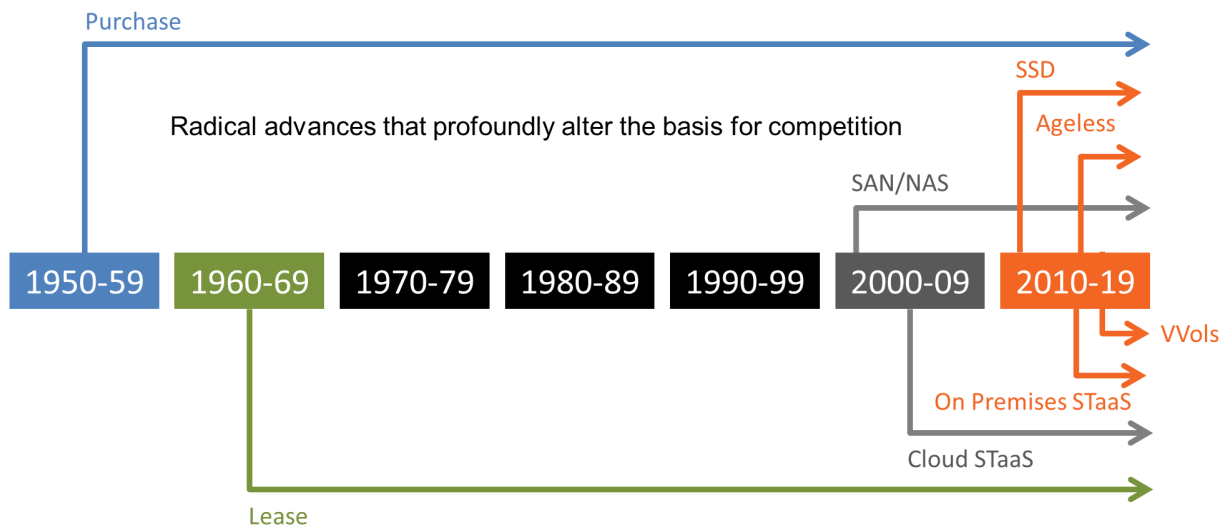
#10 It's Pure

There are innovative new features that we read about every day, and there is discontinuous innovation that offers such compelling benefits that new data center standards and operating models are quickly developed to help the trend succeed.

IT organizations create competitive advantage at these technology inflection points by partnering with vendors that can bring about a sea-change in how IT does business, and where new supply chains and new efficiencies can bloom quickly and create enormous economic value.

All-flash, Ageless (Evergreen), STaaS and VVol VM-centric storage are technologies that fit the definition of discontinuous innovation in the current decade. Pure Storage has been at the forefront of all four.

Pure Storage is at the Forefront of Discontinuous Storage Innovation



Discontinuous innovation was few and far between until this decade when all-flash, ageless, on-premises storage-as-a-service, and VVols brought about a sea change in storage technology and how it's delivered. Pure Storage played a leading role in changing the data center operating models caused by each new innovation.

The Pure Storage FlashArray delivers software-defined all-flash reliability, superior end-to-end performance, and enterprise-class data services.

The Purity Operating Environment software enables every FlashArray to provide the highest levels of reliability, completely non-disruptive operations, and support that's above and beyond.

For customers who need the full benefit of VVol VM-centric storage, Pure Storage should be on the short list of solutions to consider.

The Bottom Line

What's not to like about VVol VM-centric storage? VVols save IT organizations a lot of time because: a) they don't need multiple datastores with different capabilities, b) svmotions are replaced with policy changes. VVols can be provisioned faster because the compatible datastores are easy to identify when choosing policies, c) cloning is handled at the array level, and d) debugging is faster because if a VM is having a problem, VASA provides better communications resulting in array metrics showing the status of individual VVols.

With VVols and Pure Storage, disparate data services are stitched together into one easy to use fabric; the services run in Pure Storage arrays to give back server CPU and make data easily mobile; and now that VMs are mapped to their own storage, admins have the data needed to predict the future and act now.

The bottom line is IT organizations with virtualized environments should be at some phase of evaluating and deploying VVols on Pure Storage. The return on investment is easy to see.

Related Links

[Virtual Volume and the FlashArray Quick Start Guide](#)

[Pure Storage Video: Virtual Volumes: Introduction](#)

[Pure Storage Video: Virtual Volume Architecture](#)

[Presentation—vSphere VVols Made Easy with Pure Storage](#)

[Pure Storage Video: Pure Storage with Virtual Volumes on SQL Server](#)

[Pure Storage Blog: Introducing VMware VVols on Pure Storage FlashArray](#)

[Pure Storage: Web Guide: Virtual Volumes Quick Start Guide](#)

[Pure Storage: Web Guide: Implementing vSphere Virtual Volumes with FlashArray](#)

[VMware Product Web Page: Virtual Volumes](#)

[VMware VVol Getting Started Guide](#)

[VMware Blog—Virtual Volumes on Pure Storage FlashArray](#)

[VMware Blog: Using SPBM Policies to Manage Your Virtual Volumes \(VVols\)](#)

The Author



Frank Berry is founder and senior analyst for IT Brand Pulse, a trusted source of data and analysis about IT infrastructure, including servers, storage and networking. As former vice president of product marketing and corporate marketing for QLogic, and vice president of worldwide marketing for the automation division of Quantum, Mr. Berry has over 30 years experience in the development and marketing of IT infrastructure. If you have any questions or comments about this report, contact frank.berry@itbrandpulse.com.