

Kubernetes on VMware vSAN™

With Cloud Native Storage in VMware vSphere® and vSAN through the Container Storage Interface (CSI) Driver

BENEFITS OF RUNNING KUBERNETES ON VMWARE vSAN WITH CLOUD NATIVE STORAGE

- Dynamic and automated provisioning of persistent volumes
- Consistent data management between VM- and container-based workloads
- Developer self-service APIs to boost productivity
- Rapid application deployment with full stack agility
- Full stack networking and intrinsic security at every layer of the stack for VM- and container-based services
- Cloud operating model extending across private and hybrid cloud

Kubernetes on VMware vSAN with Cloud Native Storage through the Container Storage Interface (CSI) Driver on vSAN

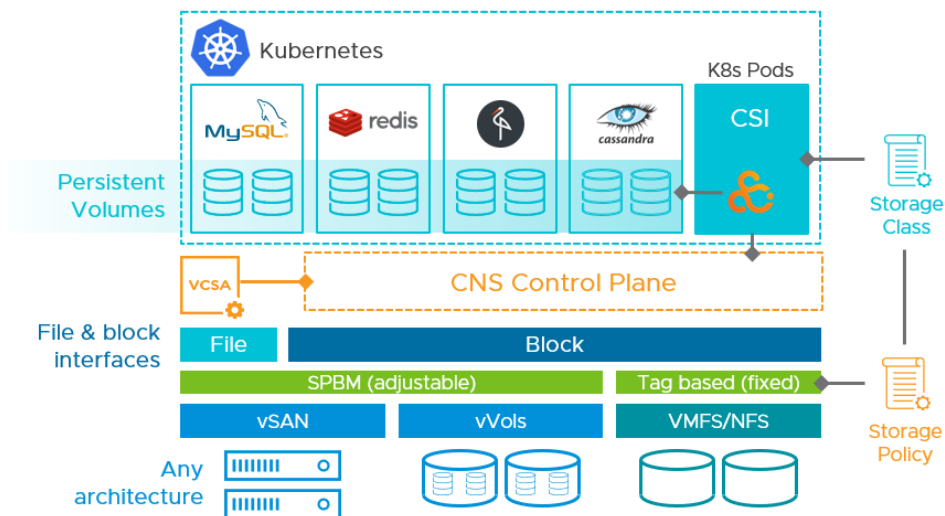
Nowadays, what’s driving growth of cloud native applications is the shift towards agile processes for faster innovation using containers and microservices.

Kubernetes is an open source platform that has established itself as the de facto standard for orchestrating and managing containers. Enterprises are increasingly looking for platform solutions that can combine traditional enterprise software workloads that are often VM-based with next-generation cloud native workloads that are often container-based and managed by Kubernetes.

The integration between Kubernetes and Cloud Native Storage through the CSI driver on vSAN enables developers to provision persistent storage for Kubernetes on vSphere on-demand in an automated fashion. It also allows IT administrators to manage container volumes through the Cloud Native Storage UI within VMware vCenter® as if they were VM volumes. Developers and IT administrators can now have a consistent view of container volumes and troubleshoot at the same level.

Solution Architecture

Kubernetes clusters deployed with vSphere can leverage Cloud Native Storage through the CSI driver on vSAN, a core element of VMware Cloud Foundation™ to provision and manage stateful modern applications.



Hyperconverged Infrastructure for Cloud-Native Applications

VMware Hyperconverged Infrastructure (HCI), powered by vSAN, is the market leader in low cost and high performance next-generation HCI solutions. vSAN delivers TCO reduction benefits over traditional 3-tiered architecture by eliminating infrastructure silos. vSAN also allows customers to achieve infrastructure agility and scalability by converging traditional compute and storage silos onto industry-standard servers, dramatically simplifying operations. vSAN is a bundled component in VMware Cloud Foundation.

¹ This solution was validated against VMware Cloud Foundation 3.9.1 and it applies to VMware Cloud Foundation 3.9.1 and above.

Cloud Native Storage through the CSI Driver on vSAN

Cloud Native Storage through the CSI driver on vSAN is natively integrated into vCenter. It is a solution that provides comprehensive data management for both stateless and stateful applications. When you use cloud native storage, you can create containerized stateful applications capable of surviving container restarts and outages. Stateful containers leverage storage exposed by vSphere that can be provisioned using Kubernetes primitives such as persistent volume, persistent volume claim, and storage class for dynamic provisioning.

The CSI driver on vSAN is an interface that exposes vSphere storage to containerized workloads managed by Kubernetes as well as other container orchestrators. It enables vSAN and other types of vSphere storage to support stateful applications.

Key Benefits of Cloud Native Storage through the CSI Driver on vSAN

Cloud Native Storage through the CSI driver on vSAN allows cloud native applications to persist data on all supported vSphere storage backends with the following benefits:

- Unified management for today's and tomorrow's applications: tight integration with Kubernetes through the use of a CSI driver for vSphere storage such as vSAN. Persistent volumes used by these applications can be easily managed by a vSphere administrator, just as easily as managing a virtual machine's virtual disks. The tight integration with Kubernetes brings operational consistency that increases the productivity and efficiency of both developers and IT administrators:
 - Consistent definition of storage policies through the integration between Kubernetes StorageClass primitive (what developers use to dynamically provision persistent volumes for their applications) and vSAN Storage Policy-Based Management policies (what vSphere administrators use to define storage policies and assign to StorageClasses)
 - Consistent labeling of container volumes, allowing admins and developers to talk in the same language and to have consistent visibility into container volumes
 - Consistent method of troubleshooting between virtual machines and container volumes.
- Dynamic and automatic provisioning of persistent volumes: developers can use Kubernetes APIs that they are familiar with to provision storage resources.
- Standardizing on the deployment of storage for Kubernetes while providing the flexibility of using various Kubernetes distributions, with the consistent processes and tools in the cloud environment.

VMware NSX-T Data Center™ Container Plug-in

VMware NSX® is the network virtualization and security platform that enables the virtual cloud network, which connects and protects applications new and existing, across data centers and clouds.

NSX-T Container Plug-in (NCP) provides integration between NSX-T and container orchestrators such as Kubernetes, as well as integration between NSX-T and container-based PaaS (platform as a service) products.

With NSX-T Container Plug-in, the application deployment on container platforms leads to creation of networks, routers, firewalls and load balancers with a consistent application platform user experience.

Takeaway

Deploying Kubernetes at scale is made simple through the integration between open source Kubernetes and VMware SDDC technologies, which delivers consistent VM and container management and allows developers and IT administrators to collaborate on building and running modern applications.

Cloud Native Storage in vSphere and vSAN, built on the CSI standard for container storage such as vSAN, enables automatic and dynamic provisioning of persistent volumes for stateful applications, as well as operational consistency between VM and container volume management.

NSX-T delivers micro-segmentation and granular security to individual VMs and pods, enabling a fundamentally more secure data center.

When using VMware Cloud Foundation as a unified SDDC platform, it further simplifies and accelerates the deployment of Kubernetes by automating the deployment of underlying virtual infrastructure. For more details, stay tuned for the complete solution reference architecture.

Resources

- Learn about building, running, and managing cloud native applications on [The Cloud Native Apps Blog](#).
- Check out the one-stop VMware Hyperconverged Infrastructure documentation on [StorageHub](#).
- Learn more about VMware Cloud Foundation on [the website](#).
- Check out Cloud Foundation [Blog](#), [Twitter](#), and [YouTube](#) for the latest updates on Cloud Foundation.



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