

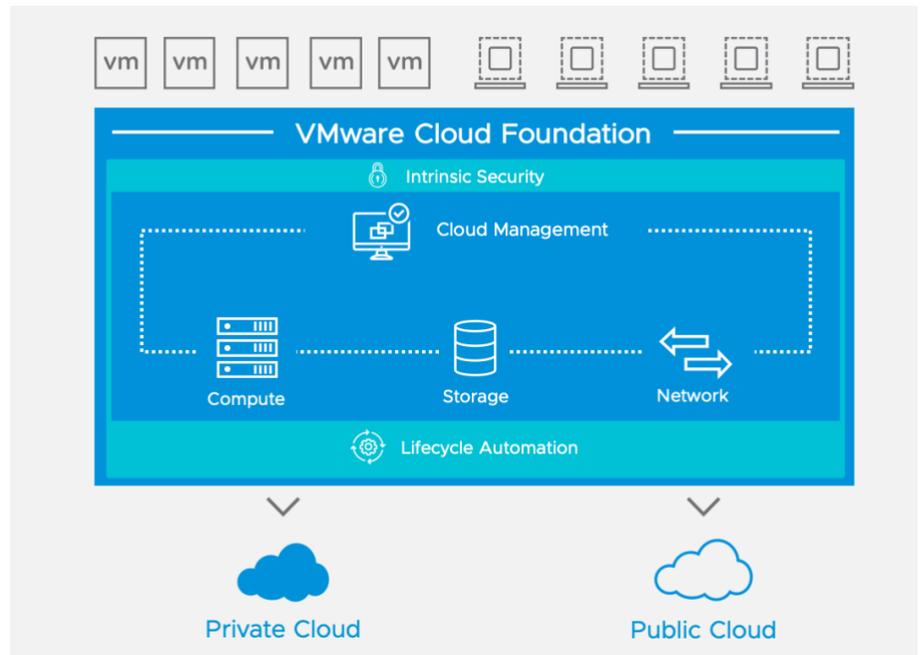
VMWARE ENTERPRISE PKS ON VMWARE CLOUD FOUNDATION

A Brief Introduction to VMware Cloud Foundation

At a Glance

VMware® Enterprise PKS enables enterprises to deploy and consume container services with production-grade Kubernetes orchestration. VMware vSAN as core of VMware HCI provides the storage platform for deploying VMware Enterprise PKS in a persistent environment.

Cloud Foundation is an integrated cloud infrastructure that combines compute, storage, networking, security, and cloud management services. Cloud Foundation provides an ideal platform on which to run enterprise workloads and containerized applications across both private and public environments. VMware Cloud Foundation makes it easy to deploy and run a hybrid cloud by delivering common infrastructure that is fully compatible, stretched and distributed along with a consistent cloud operational model for your on- and off-premises data centers and public cloud environments.



KEY BENEFITS FOR PKS WITH CLOUD FOUNDATION

- Consolidate hardware silos to reduce complexity
- Simplify infrastructure provisioning with automation
- Adopt self-driving operations to assure performance
- Enable lifecycle management of the entire SDDC stack
- Deliver agility via self-service and application automation
- Extend the boundaries of the datacenter with hybrid cloud

See [VMware Cloud Foundation](#) for detailed information.

Key Benefits of Cloud Foundation

- **Natively integrated software-defined stack** simplifying the path to a hybrid cloud delivered by a single solution.
- **Enterprise-grade functionality** thanks to VMware’s market-leading technologies.
- **Automated Infrastructure provisioning** with workload domains.
- **Storage elasticity and high-performance** building on VMware’s leading hyperconverged architecture (vSAN) with enterprise-class storage services.

UNIQUE CAPABILITIES

EASY MANAGEMENT AND OPERATION

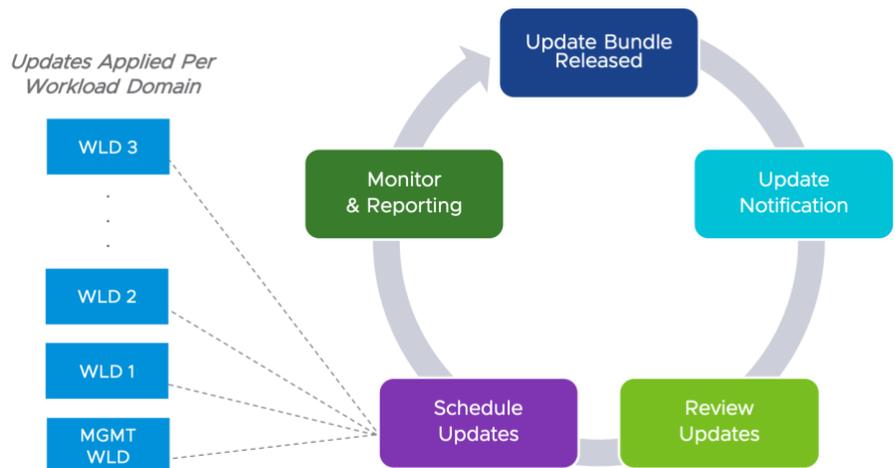
- Easily deploy Kubernetes clusters in HCI environments.
- Integrate Kubernetes storage classes with VMware Storage Policy Based Management.
- Easily scale-out vSAN and Kubernetes clusters.
- Protect infrastructure and workload VMs with VMware vSphere® High Availability and vSAN data services.

- **End to end security** by delivering micro-segmentation, distributed firewalls, and VPN (VMware NSX®), VM, hypervisor, and VMware vSphere vMotion® encryption, and data at rest, cluster, and storage encryption (vSAN).
- **IT automation** delivering automation of IT service provisioning and day two.

This paper focuses on the key advantages VMware Cloud Foundation can bring to your VMware Enterprise PKS deployment. [The reference architecture of VMware Enterprise PKS running on vSAN](#) details the advantages vSAN can bring to your PKS deployment.

Automated Lifecycle

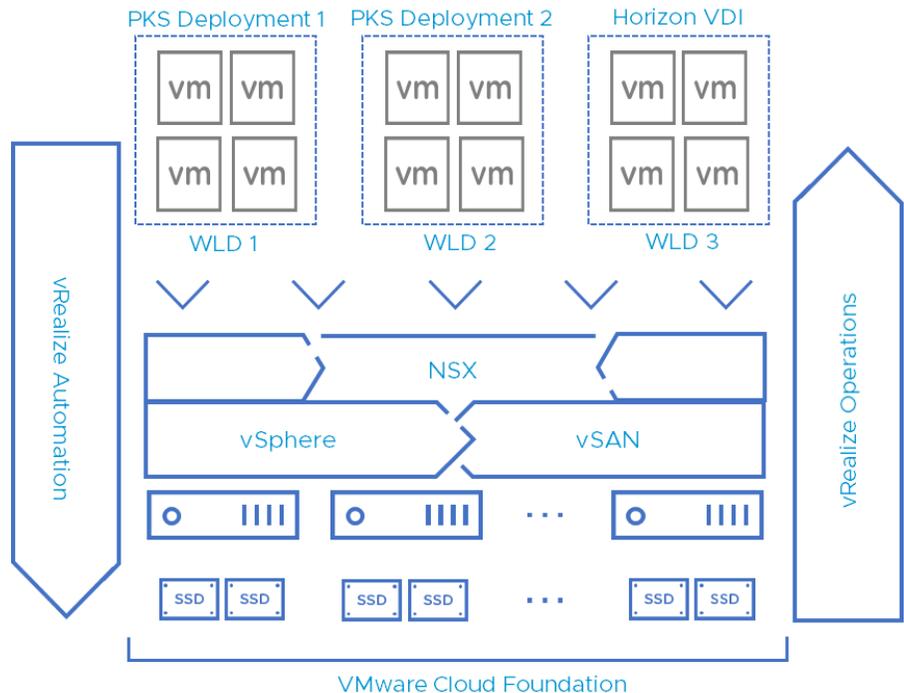
Cloud Foundation offers automated lifecycle management on a per-workload domain basis. Available updates for all components are tested for interoperability and then bundled with the necessary logic for proper installation order. The updated bundles are then scheduled for automatic installation on a per-workload domain basis. This allows the cloud administrator to target specific workloads or environments (development vs. production, for example) for independent updates of the rest environment.



VERIFIED SOLUTION ARCHITECTURE

- Fast deployment.
- Deep integration with Storage Policy Based Management (SPBM) in vSAN.
- Deep integration with NSX-T.
- Unified control plane.

Automation of Workload Domains



AGILITY PERSONIFIED

ADAPT TO CHANGING NEEDS

- Adopt and integrate the very latest hardware technologies like 3D XPoint NVMe devices into a cluster.
- Adopt the very latest and well proven software including VMware vCenter®, vSphere, vSAN and NSX-T.
- Scale up or out incrementally, as needed by an organization.
- Maintain full independence of storage from demands of other clusters. Just as with compute and memory, vSAN storage is a cluster resource that remains independent from other clusters.

The workload domain is the unit of consumption in the private cloud. VMware Cloud Foundation abstracts the individual building blocks of the Software-Defined Data Center—compute, storage, networking, and cloud management—through the workload domain construct. WLDs aggregate the physical servers created on the composable infrastructure into logical pools of capacity on top of which the SDDC building blocks of compute, network and storage virtualization are deployed. VCF allows to deploy a PKS cluster in one workload domain and more PKS clusters in other workload domains.

Why VMware Enterprise PKS on Cloud Foundation?

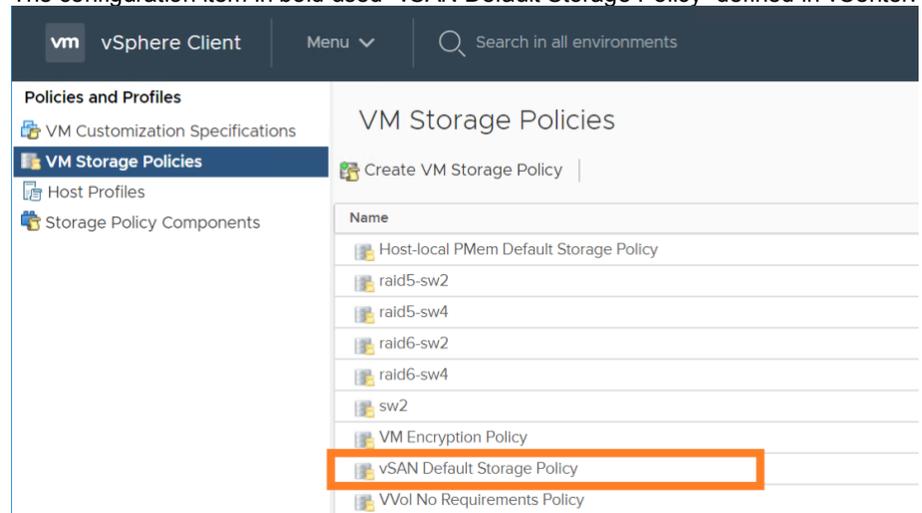
VMware Enterprise PKS is a purpose-built container solution to operationalize Kubernetes for enterprises moving to hybrid and multi-cloud deployments as well as service providers. It significantly simplifies the deployment and management of Kubernetes clusters with Day 1 and Day 2 operations support.

VMware vSAN is a core product in the Cloud Foundation stack. vSAN's SPBM offers users flexibility to define policies on demand in VMware vCenter and delivers ease of management of storage for containers. Data services such as snapshots, cloning, encryption, deduplication and compression are available at a container volume level of granularity. Deep integration between PKS and vSAN means developers can consume storage as code by abstracting the complexity of the underlying storage infrastructure. With Project Hatchway and vSAN services, cloud-native applications take advantage of operational benefits of hyperconverged storage and compute as well as seamless application failover and rapid recovery.

As an example of storage class definition used by Kubernetes deployed by PKS, the storage class yml file is:

```
kind: StorageClass
apiVersion: storage.k8s.io/v1
metadata:
  name: default-vsan-sc
  provisioner: kubernetes.io/vsphere-volume
  parameters:
    diskformat: thin
storagePolicyName: "vSAN Default Storage Policy"
datastore: vsanDatastore
```

The configuration item in bold used “vSAN Default Storage Policy” defined in vCenter:



VMware NSX-T™ is another core product in the Cloud Foundation stack. With the help of VMware NSX-T, there is no need for end users to know the underlying network architecture. Networking can be easily managed with Kubernetes clusters—deployment, upgrade, and scaling out. NSX-T can automatically create load balancers, routers, switches to be used by PKS. NSX-T provides end-to-end security by firewalls, namespace isolation and so on.

The following figure shows one of the automatically created router in NSX-T used by PKS.

Logical Router	ID	Type	Connected Tier-0 Roul	High Availability Mode	Transport Zones	Edge Cluster
lb-pks-2466d79-36f4-440b-9442-620d8f7b74-cluster-router	8c80_88f1	Tier-1	l0-router	Active-Standby	TZ-Overlay	edge-clusterf
lb-pks-25345e19-5953-4af9-b475-a06f7257336e-cluster-router	e329_495a	Tier-1	l0-router	Active-Standby	TZ-Overlay	edge-clusterf
lb-pks-3849b46-8933-4054-498f-888d5930260c-cluster-router	1ea5_0f71	Tier-1	l0-router	Active-Standby	TZ-Overlay	edge-clusterf
lb-pks-3a952ee-e30c-4132-89bc-4304448a819-cluster-router	bcfd_fa82	Tier-1	l0-router	Active-Standby	TZ-Overlay	edge-clusterf
lb-pks-7d8305a-8840-4a3a-9509-3042771a3e-cluster-router	845c_457a	Tier-1	l0-router	Active-Standby	TZ-Overlay	edge-clusterf
lb-pks-459f9cb-648c-4283-a449-04a262a480cc-cluster-router	a43a_1c00	Tier-1	l0-router	Active-Standby	TZ-Overlay	edge-clusterf
pks-2466d79-36f4-440b-9442-620d8f7b74-cluster-router	9849_1834	Tier-1	l0-router		TZ-Overlay	
pks-2466d79-36f4-440b-9442-620d8f7b74-default	6390_8867	Tier-1			TZ-Overlay	
pks-2466d79-36f4-440b-9442-620d8f7b74-kube-public	4097_684b	Tier-1			TZ-Overlay	
pks-2466d79-36f4-440b-9442-620d8f7b74-kube-system	b45c_c935	Tier-1			TZ-Overlay	
pks-2466d79-36f4-440b-9442-620d8f7b74-pks-system	e1a4_6596	Tier-1			TZ-Overlay	
pks-25345e19-5953-4af9-b475-a06f7257336e-cluster-router	15d9_8d9f	Tier-1	l0-router		TZ-Overlay	
pks-25345e19-5953-4af9-b475-a06f7257336e-default	70dc_4252	Tier-1	l0-router		TZ-Overlay	
pks-25345e19-5953-4af9-b475-a06f7257336e-kube-public	8407_270a	Tier-1	l0-router		TZ-Overlay	
pks-25345e19-5953-4af9-b475-a06f7257336e-kube-system	f60b_f1a5	Tier-1	l0-router		TZ-Overlay	
pks-25345e19-5953-4af9-b475-a06f7257336e-pks-system	f603_c968	Tier-1	l0-router		TZ-Overlay	
pks-2466d79-36f4-440b-9442-620d8f7b74-cluster-router	f598_8240	Tier-1	l0-router		TZ-Overlay	
pks-3849b46-8933-4054-498f-888d5930260c-cluster-router	7a0d_c028	Tier-1	l0-router		TZ-Overlay	
pks-3849b46-8933-4054-498f-888d5930260c-cluster-router	0566_ba08	Tier-1	l0-router		TZ-Overlay	
pks-3849b46-8933-4054-498f-888d5930260c-kube-public	1a98_b951	Tier-1	l0-router		TZ-Overlay	

VMware Cloud Foundation includes vRealize cloud management components that allow customers to manage hybrid environments running anything from traditional to container workloads with a unified platform. vRealize speeds up the delivery of IT services through automation and pre-defined policies, providing high levels of agility and flexibility for developers and lines of business while maintaining governance and control. To provide enhanced management and monitoring capabilities for VMware PKS environments with NSX-T connectivity, the [vRealize Operations Management Pack for Container Monitoring with PKS 1.3 support](#) is available for free download. There are also [vRealize Operations Management Packs & vRealize Log Insight Content Packs for NSX-T](#) (a key enabler of Kubernetes on vSphere).

Summary

With the close integration of PKS, NSX-T, and vSAN based on Cloud Foundation, you can easily provision networks for containers in Kubernetes clusters, manage ephemeral and persistent storage as well as benefit from vSAN's availability and data service features. In addition, you can protect virtual machines against physical server failure by using vSphere HA and VMware vSphere Fault Tolerance. The combination of these technologies makes PKS a complete solution, which is perfect for Kubernetes administrators and developers.

