Legacy Data Centers Slow You Down...

Scalability  Agility  Efficiency

Security
Cloud Operating Model – Deliver what the Business Cares About

A Universal Workload Platform – Built for Today and The Future

- Virtual Desktops
- Mission Critical Apps
- Container Apps
- Machine Learning
- Data Analytics/Hadoop
- IoT

- IaaS
- CaaS
- PaaS
- DaaS

VMware Cloud Foundation

- vSphere
- vSAN
- NSX
- vRealize
- SDDC Manager

Data Center
Edge
Service Provider
Public Cloud

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VMware Cloud Foundation
Consistent infrastructure and operations to speed innovation

Standardized Architecture

Full Stack Approach

Consistency & Security

Tested and Validated

Apps/Services/Infrastructure Automation

Simplified Experience

Built-in Security

VMware Cloud Foundation

Management

Compute

Storage

Networking

Public Cloud

Data Center

Edge
### VMware Cloud Foundation

**Fully Integrated Infrastructure for the Hybrid Cloud**

<table>
<thead>
<tr>
<th>SIMPLE</th>
<th>Deploy &amp; Manage Infrastructure/Apps</th>
<th>With the Ease of Cloud Operating Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSISTENT</td>
<td>Infrastructure and Operations</td>
<td>Across Hybrid Clouds</td>
</tr>
<tr>
<td>SECURE</td>
<td>Intrinsic and Intelligent Security</td>
<td>For Apps and Infrastructure</td>
</tr>
<tr>
<td>CONSUMABLE</td>
<td>Enterprise Developer Experience</td>
<td>Accelerates Apps and Containers</td>
</tr>
</tbody>
</table>
VMware Cloud Foundation is the Ideal Hybrid Cloud Platform

- Built on standardized & validated architectures
- Integrated software-defined cloud platform
- Simplest to deploy and operate
- Built-in intrinsic security
- Supports traditional and new workloads
- Simplest path to hybrid cloud

VMware Cloud Foundation

Automation & Operations

Compute  Storage  Network

Intrinsic Security & Lifecycle Automation
VMware Cloud Foundation 4 with Tanzu

App-focused Management | Dev & IT Ops Collaboration

VMware Cloud Foundation

VMware Cloud Foundation Services

KUBERNETES & RESTful APIs

Tanzu Runtime Services

Hybrid Infrastructure Services

Tanzu Kubernetes Grid Service

vSphere Pod Service

Network Service

Registry Service

Storage Service

Intrinsic Security & Lifecycle Automation

vSphere

NSX-T

vSAN

vRealize

vCenter Server

Data Center

Edge

Service Provider

Public Cloud

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Intrinsic Security Built into Every Layer of the Infrastructure

**Network**
- Micro-segmentation
- VPN
- Secure end user
- Multi-Cloud Security

**Storage**
- Data at rest encryption
- Cluster-level key management
- Hardware agnostic (no self-encrypting drives)

**Compute**
- VM-level encryption
- Encrypted vMotion
- Multi-factor authentication
- TPM / vTPM 2.0 + VBS

**Management**
- Governance
- Compliance
- Container registry services
- vSphere Trust Authority
Workload Domain Overview

• Purpose Built SDDC Environment
  – Dedicated vSAN Ready Nodes
  – Dedicated vCenter / NSX Manager
  – Create, expand, and delete independently

• Automated provisioning
  – Management Domain provisioned at initial Bring Up
  – Virtual Infrastructure (VI) WLD provisioned on-demand
  – Horizon – automated deployment to an existing VI WLD
  – Enterprise PKS - automated deployment to an existing VI WLD

• Up to 15 Workload domains can be created

• Configure multiple vSphere Clusters per Workload Domain
Management Domain

Special purpose domain
- Created during Bring-up

One per VCF instance
- Minimum 4 hosts
- Built using vSAN and NSX-T

Runs infrastructure components
- SDDC Manager, vCenter Server(s), NSX-T Manager(s), Optional: vRealize Operations, vRealize Log Insight, vRealize Automation
- Can be used for AD, Backup, 3rd party tools, etc

vCenter & NSX Manager instances for all WLDs run in Management Domain
VMware Cloud Foundation: VI Workload Domains
On-demand, policy managed infrastructure for workloads

External Interfaces
Can be specific to certain Workload Domains (WLD)

Software Flexibility
Products, Versions, 3rd party software

Application Mapped Infrastructure
Capacity, Performance, Security/Compliance, HW requirements

Hardware Choice
Vendors, Configuration

Mapping to specific HW infrastructure capabilities

HETEROGENEOUS HARDWARE RESOURCE POOL
e.g. GPUs, Large Storage/Memory, Higher Performance Storage

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Cloud Foundation Deployment Options

Single site, Stretched and Multi-site Deployments

1. VCF Single Site Deployment
   - Single site deployment of one or more workload domains. Each workload domain can be multi-clustered.
   - Diagram:
     - Site
     - vCenter
     - vCenter

2. VCF Stretched Deployment
   - Stretched vSAN workload domain(s) between 2 sites. Each cluster has option to be stretched.
   - Diagram:
     - Site Boundary
     - vCenter

3. VCF Multi-instance Management
   - Multiple VCF instances connected via a Federation for aggregated visibility and ease of management.
   - Diagram:
     - Site Boundary
Data Center Automation
Automated Day 0 to Day N Operations of your Hybrid Cloud Infrastructure

Day 0
- Rapid Deployment & Scale to Best Practice
- Policy-based Flexibility

Day 2
- SSL Certificate Replacement
- Password Update & Rotation

Day N
- Create/Expand/Delete Workload Domain(s)
- SDDC Patching, Upgrades and LCM
- Deploy Container Architectures (PKS/Tanzu)
- Public API Support

SDDC Manager
Lifecycle Management - Ease of Upgrades and Patching

A new way to manage data center infrastructure, not individual components

Updates applied per Cluster

- WLD 3
  - Cluster 1
  - Cluster Y
- WLD 2
  - Cluster 1
  - Cluster X
- WLD 1
  - Cluster
- MGMT WLD
  - Cluster

Updates over Time

- Update Bundle Released
- Monitor & Reporting
- Schedule Updates
- Update Notification
- Review Updates
- SDDC Manager LCM

SDDC Components

- ESXi
- PSC
- vCenter
- vSAN
- NSX
- vRealize
Lifecycle Management
VMware Cloud Foundation

Connects using your My VMware Credentials

Determines applicable bundles based upon your software versions

Download additional Install Bundle like vRealize Suite Lifecycle Manager

Step 1: Authenticate to the VMware depot
Step 2: Download applicable bundles
Step 3: Install the bundle, or Schedule for Install

1 Authenticate
2 Download Bundle
3 Install Bundle

VMware depot

SDDC Manager

Single-Click Updates
Schedule Updates

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Offline Lifecycle Management

VMware Cloud Foundation

Used when SDDC Manager does not have access to the VMware depot

Manually download update bundles and transfer them to SDDC manager

Command line tool, shipped with SDDC Manager
(/home/vmware/vcf/lcm/lcm-tools)

Step 1: Generate marker file on SDDC Manager
Step 2: Copy tool and marker file to computer with internet access
Step 3: Execute tool to download applicable update bundles
Step 4: Transfer bundle(s) to SDDC Manager repository
Initial Support for vSphere Lifecycle Manager
On Supported Hardware in a vLCM Workload Domain

Uses **desired-state model** for all lifecycle operations
- Monitors compliance “drift”
- Remediates back to desired state

Built to **manage hosts** at cluster level
- Hypervisor
- Drivers
- Firmware

Modular framework supports **vendor firmware plugins**
- Dell
- HPE

Managed by SDDC Manager

**vSphere Lifecycle Manager (vLCM)**

- **Base image**
  - ESXi/vSAN
- **Vendor Addon**
  - Drivers
- **Firmware & Drivers Addon**
  - BIOS
  - I/O Controllers
  - Storage devices
  - NICs
  - BMC

**Vendor plugins**

- **Desired Image**

**Apply Image across cluster**

**Remediate drift**

**Uses desired-state model for all lifecycle operations**
- Monitors compliance “drift”
- Remediates back to desired state

**Built to manage hosts at cluster level**
- Hypervisor
- Drivers
- Firmware

**Modular framework supports vendor firmware plugins**
- Dell
- HPE
## VMware Cloud Foundation Capability Evolution

<table>
<thead>
<tr>
<th></th>
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<td>3.7.x</td>
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<td>Automated Horizon Deployment</td>
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<td>Full API Coverage</td>
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<td>Automated Enterprise PKS Deployment</td>
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<td>Multi Instance Management</td>
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<td>Cluster Level Upgrades</td>
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<td>Multi-pNIC Support</td>
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<td></td>
<td>New in 3.9.1</td>
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</tbody>
</table>

\(^*\)Multi-pNIC available as API only
VCF 4 Supports a Portfolio of Storage Solutions

Supports a broad range of storage options

VMware Cloud
Foundation

File
Block

Storage Policy Based Management
(Adjustable)

Tag based initial placement
(fixed)

vSAN

vVolS

VMFS

NFS

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VMware Cloud Foundation Storage

Flexible Storage Options

Principle Storage – vSAN is required to Create the Management Domain

Management Domain

vSAN

IP or FC Network

Switches

Principle Storage Options – Used to Create the Workload Domain

Workload Domain

vSAN

Workload Domain

NFS

Workload Domain

FC

Supplemental Storage – Used to add capacity the Domains

vVols

iSCSI

NFS

FC
## Flexible Consumption Model

Choice of Hardware and Clouds for Cloud Foundation-enabled Hybrid Deployments

<table>
<thead>
<tr>
<th>Private Cloud</th>
<th>Public Cloud</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>vSAN ReadyNodes &amp; Integrated Systems</strong></td>
<td>VMware Cloud on AWS Outpost, powered by AWS Hardware (Coming Soon)</td>
</tr>
<tr>
<td><strong>Composable Systems</strong></td>
<td>VMware Cloud on Dell EMC, powered by DellEMC VxRail</td>
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<tr>
<td><strong>Co-Engineered Systems</strong></td>
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<td><strong>VMware Cloud on Dell EMC</strong></td>
<td></td>
</tr>
<tr>
<td><strong>VMware Cloud on Outpost</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Public Cloud Providers
- VMware Managed
  - Azure VMware Solution by CloudSimple
  - Azure VMware Solution by Virtustream
- Partner Managed
  - Microsoft Azure
  - Google Cloud
  - VMware Cloud on AWS Outpost

### Customer Managed
- VMware Cloud on AWS

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Workload Domains & Deployment Overview
VMware Cloud Foundation Deployment Types

Start small and Grow

VCF Consolidated Architecture
- Compute workloads co-reside in management workload domain
- Shared vSphere cluster with resource pools

VCF Standard Architecture
- Management domain is dedicated to running infrastructure workloads
- Compute workloads run in VI domain(s) and are managed by separate vCenter servers

Start with what you need, easily scale non disruptively
Standard Architecture

Infrastructure runs on a dedicated Management Workload Domain. Workload VMs run in dedicated VI and/or VDI workload domains.

Targets medium to large deployments

- Requires a minimum of 7 servers (recommend 8)
- Management domain dedicated to infrastructure
- Dedicated VI domain(s) for user workloads
  - Each WLD can consist of multiple clusters
- Up to 15 WLD including Management Domain
  - vCenter instances run in linked-mode
  - Each WLD can consist of multiple clusters
Consolidated Architecture

Infrastructure and Workload VMs run together on the Management Domain inside separate resource pools.

Workload Resource Pool
- VMs

Management Resource Pool
- Optional: vRealize Suite Lifecycle Manager
- vRealize Log Insight
- vRealize Operations
- vRealize Automation
- NSX Edge Cluster
- vCenter
- NSX Managers

Consolidated vSwitch
- ESXi01
- ESXi02
- ESXi32
- vSAN

vSphere Cluster + vSAN

Consolidated Architecture

Targets smaller deployments
- Minimum of 4 servers

Infrastructure and compute VMs run together on shared management domain

Resource Pools used to segregate / isolate workload types

Supports multiple clusters and scale to documented Cloud Foundation maximums

All nodes within a Consolidated Architecture deployment must be vSAN ready nodes
Choice of Deployment Model
NSX Architecture Options

- Management domain has Private NSX Managers and Edge cluster
- Management: Optionally deploy NSX Edge Cluster at Day X
Choice of Deployment Model

NSX Architecture Options

• Management domain has Private NSX Managers and Edge cluster

• Management: Optionally deploy NSX Edge Cluster at Day X

• Workload Domains
  Create New or Re-use NSX Managers
Choice of Deployment Model
NSX Architecture Options

- Management domain has Private NSX Managers and Edge cluster
- Management: Optionally deploy NSX Edge Cluster at Day X
- Workload Domains Create New or Re-use NSX Managers
Choice of Deployment Model
NSX Architecture Options

- Management domain has Private NSX Managers and Edge cluster
- Management: Optionally deploy NSX Edge Cluster at Day X
- Workload Domains Create New or Re-use NSX Managers
- Edge Deployment Choice
Physical Hardware Overview – Notional Design

Top-of-Rack Switches

Management Switch (Optional)

Virtual Infrastructure WLD #2

Available Capacity

Virtual Infrastructure WLD #1

Management Workload Domain

Expandable as needed, up to vSphere Configuration Maximums

Inter-rack or Spine Switches

Rack fully populated with vSAN ReadyNodes

Minimum Of 4 ReadyNodes

Expand

Expand

Expand
Enabling the Hybrid Cloud with VCF
VMware Cloud Foundation Hybrid Cloud Platform
Operational Consistency Across Private and Public Clouds

Customer Managed
Customer Infrastructure
Private Cloud

VMware Managed
VMware Cloud

Partner Managed
VMware Cloud Provider Program
Edge Solutions

Management
Compute
Storage
Networking
Building a Hybrid Cloud with VMware Cloud on AWS
Public cloud service sold, delivered and supported by VMware

Operational Consistency Across the Hybrid Cloud
Building a Hybrid Cloud with VMware Cloud Partners

Public cloud services offered by our strategic partners

Operational Consistency Across the Hybrid Cloud
Conclusion
VMware Cloud Foundation
The Ubiquitous Hybrid Cloud Platform

DELIvers

Developer Ready Infrastructure
Automated infrastructure and developer-ready APIs

Universal Platform
Single platform for VMs and Containers

Lowest TCO
28% cheaper than 3-tier infrastructure

Foundation for Hybrid
Extend to the same software stack in public clouds

Source: Taneja Group: When Comparing Cloud Alternatives, For the Best TCO Leverage VMware Cloud Foundation, April 2019
Ideal Hybrid Cloud Solution Combines the Best of Both Worlds

Diverse Clouds  •  Same People  •  Same Process  •  Same Tools

- Secure/Compliant
- Lower Costs
- Scalable & Agile
- Support Traditional & New Apps
- Common Operational Model
- Self-driving Operations
- Easy to Use & Automated

PUBLIC CLOUD

PRIVATE CLOUD

EDGE CLOUD
Thank You