VMware Cloud Foundation: Extending Datacenter into Public Cloud

As companies strive to keep pace with evolving business needs and the rapid advancement of technology, they continue to shift away from a single cloud approach toward more flexible hybrid cloud environments.

A 2025 State of Cloud Report, conducted by Rackspace Technology found that over 90% plan to make significant changes in their cloud strategy over the next two years. Of those respondents, 48% said that a hybrid cloud for multi-environment deployment will be critical to their IT operations over the next 12-24 months. The results revealed 22% will accelerate hybrid cloud adoption, and 20% plan to invest in private cloud. Respondents indicated that these shifts are driven by a desire to prioritize flexibility, adaptability, and resilience amid demands for AI integrations that can improve operational efficiency and data analysis capabilities.

To future-proof their organizations, many are transitioning from a 'one-size-fits-all' model in favor of a more flexible and resilient multi-strategy approach. This pivotal moment for hybrid and multi-cloud models empowers organizations to choose services tailored to their unique technical requirements and workloads.

A driving force behind the desire for a multi-cloud model is the ease with which organizations can move data between different cloud environments, with 86% stating that they can transfer workloads seamlessly between the public and private cloud and 83% reporting that they can do so between multiple public cloud hyperscalers.[1]

Extending private cloud environment to the public cloud

This involves integrating an on-premises data center with a public cloud infrastructure. The business cases are driven by the desire to quickly expand the capacity of an existing data center, either on a temporary or permanent basis.

1. 2025 State of Cloud Report, Rackspace Technology, January 2025

Key Benefits

Reliable

Robust migration technology with 8+ year track record

Cost-effective

No application refactoring or re-architecting needed

Simple

Automated creation of optimized network interconnects and extensions

Fast

Bi-directional live application migration at scale

Flexible

Supported by leading hyperscalars and VMware Cloud Service Providers

Scenarios for extending data centers to the cloud include:

- **Infrastructure update** — Driven by the need to perform a refresh of the hardware or software in the existing production environment. Infrastructure updates are commonly driven by organizational changes which prompt "modernization" projects.
- **Hybrid applications** — Developing new applications that need to integrate with on-premises applications or access native cloud services
- **Capacity expansion** — Driven by the need to permanently expand the capacity of a production data center.
- **Seasonal bursting** — Driven by seasonal expansion. In this case, a secondary site is used to temporarily expand the capacity of a production data center in a transparent manner.
- **Test, development, lab, and training environments** — Deploying as-needed environments for ephemeral workloads such as test, development, lab, and training environments.

But extending environments across clouds is easier said than done. Organizations face many challenges while building and operating private cloud infrastructure.

Some of the key challenges are:

1. Enterprises are challenged with incompatible and non-interoperable stacks, cross-site networking and security issues, and the risk of business disruption.
2. Planning and scheduling migration waves (which workloads should be migrated and when). Architects spend a fair amount of time understanding application dependencies and correlation by conducting exhaustive interviews with application owners. A lot of time is spent in creating pre/post migration checklists and performing dry runs.
3. Network connectivity issues are common. Customers have to worry about the configuration and complexity of establishing VPN tunnels separately. Customers have to re-IP VMs, reconfigure network settings, or change application IP addresses.
4. Organizations may experience increased migration time due to high latency or lack of Direct Connect or MPLS circuits.
5. Large-scale modernization requires extensive code changes, making it resource-intensive; engineering teams often lack expertise in cloud-native frameworks, delaying adoption. Due to the complexity of rearchitecting, migration timelines are significantly longer, impacting application availability.

Overall, one of the primary challenges enterprises face is the absence of a standardized migration approach that accounts for business continuity, performance, security, and regulatory compliance.

"Considering that it generally takes about six months to migrate from on-premises to on-premises, this is truly an astonishing speed."

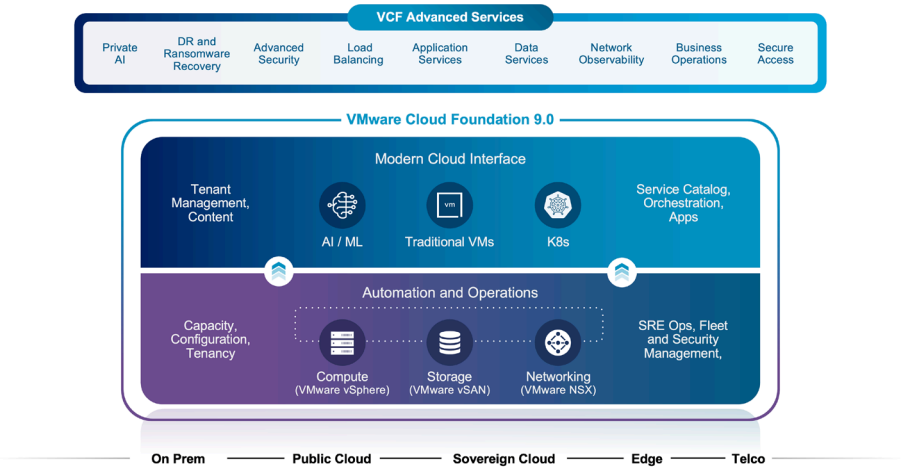
Mr. Tadashi Itakura
DX Promotion Office Manager,
Business Strategy Promotion Division
Human Resocia Co., Ltd.

The solution: The power of cloud extension

Extending VMware workloads to public cloud infrastructure using VMware Cloud Foundation (VCF) enables organizations to combine the familiarity of their on-premises environments with the scale, flexibility, and geographic reach of public cloud platforms. Leading public cloud providers like Amazon Web Services (AWS), Microsoft Azure, Google Cloud, and Oracle Cloud offer VCF-powered services, unlocking a hybrid cloud ecosystem tailored to business needs.

VMware Cloud Foundation

A quick glance



VCF is a comprehensive private-cloud platform that delivers virtual infrastructure with integrated, enterprise-class compute, networking, storage, management, and security.

VMware extends the trusted infrastructure and operations—proven in the data center for more than 20 years—to your choice of public cloud providers. This consistent environment is available globally, enabling seamless portability of workloads and a single set of operations, skills, tools and policies from the data center to the cloud to the edge.

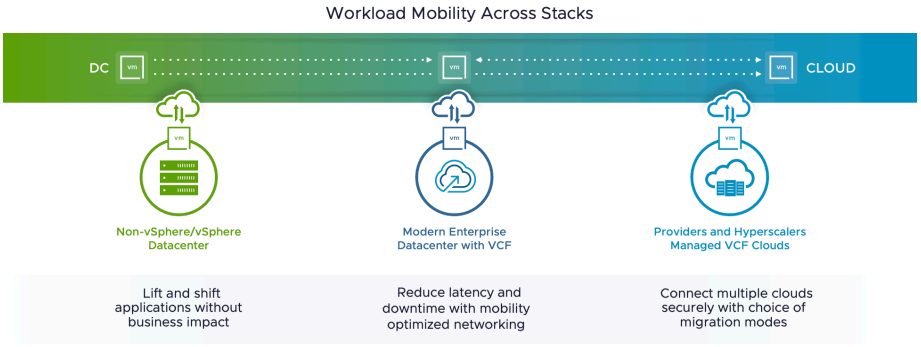
VMware supports the broadest range of applications, from virtualized apps to containerized apps and those built on cloud native principles using microservices and Kubernetes. And they all run on VMware's cloud infrastructure in the data center, cloud and edge.

VMware has strategic relationships with all major hyperscale clouds—AWS, Azure, Google Cloud, IBM Cloud, Oracle Cloud—and more than 120 other VMware Cloud Verified partners around the world. This gives customers the ultimate flexibility to deploy your applications wherever you choose, on the cloud provider that best fits their needs, and all on consistent VMware Cloud infrastructure and operations.

"We chose VMware technology so we could use our existing skills and wouldn't need to reconfigure servers. With hybrid cloud, we can consciously decide where to host applications to ensure the best performance and cost benefits."

Daniel Bolton
Head of Technical Services
Kingston University

A crucial capability in VCF that enables workload migration and mobility is VCF Operations HCX. It essentially acts as a bridge between different environments, offering a suite of tools and capabilities to simplify and streamline the process of moving workloads across hybrid and multi-cloud environments.



VCF Operations HCX

VCF Operations HCX simplifies application migration, workload rebalancing and business continuity across clouds. It enables high-performance, large-scale workload mobility across VMware vSphere® and non-vSphere cloud and on-premises environments to accelerate data center modernization and cloud transformation. VCF Operations HCX automates the creation of an optimized network interconnect and extension, and facilitates interoperability across KVM, Hyper-V, and vSphere versions. This delivers live and bulk migration capabilities without the need to redesign the application or re-architect networks.

Some of key capabilities of VCF Operations HCX that empower organizations with seamless workload mobility and migration are:

Infrastructure Hybridity — VCF Operations HCX creates a secure, high performance and highly reliable interconnect fabric between disparate vSphere environments, enabling loose coupling of multiple sites. It supports multi-site, multi-version interoperability between legacy vSphere (vSphere 6.5+) and modern VCF on the other side. VCF Operations HCX can migrate workloads between different chipset versions and across different CPU families (e.g. AMD to Intel).

Network Extension — Layer 2 VPN technology used to extend a network from a source site to a destination site. By utilizing the routing and security policies of the source site, network extension can accelerate the migration process by allowing virtual machines (VMs) to be migrated without re-IPing or complex VM conversions. Tight integration with NSX allows VCF Operations HCX network extension with Mobility-optimized Networking to utilize local egress for VMs after they are migrated and eliminate the network tromboning effect.

Migration Types — VCF Operations HCX supports several migration types for moving virtual machines (VMs) between vSphere environments, both within and across data centers and clouds. These include Cold Migration, vMotion (live migration), Bulk Migration, HCX-assisted vMotion, and Replication-assisted vMotion. Additionally, VCF Operations HCX offers OS-assisted Migration for migrating VMs from non-vSphere environments to vSphere. Here's a breakdown of the key migration types:

Migration Type	Migration Downtime	Scale
1. Bulk Migration	Minimal downtime	VM shutdown (source site)/ VM power-on (destination site), Parallel migrations, largest scale
2. Replication-assisted vMotion (RAV)	None	Parallel migrations, larger scale
3. HCX-assisted vMotion (HAV)	None	Concurrent operations, medium scale
4. HCX vMotion	None	Serial migrations, small scale
5. Cold Migration	Long downtime	VM copy with Network File Copy (NFC) protocol, small scale
6. OS-assisted Migration (OSAM)	Conversion downtime	Hyper-V and KVM workload migrations

Scheduled Migration: In a scheduled switchover (vs. immediate migration), once the full synchronization has completed, VCF Operations HCX will wait for the scheduled switchover window. Once it approaches the scheduled window, it will run final synchronization, then the VM on the source will be powered off and renamed and the VM on the destination will be powered on. Scheduled migrations allow for better planning and execution of migrations during maintenance windows, minimizing downtime and disruptions.

Migration Planning: In conjunction with VCF Operations for Networks, migration planning involves defining how workloads will be moved between different environments (on-premises, public cloud, or other cloud providers) using VCF Operations HCX. This process includes identifying the source and destination locations, creating migration plans (including migration waves and mobility groups), and configuring necessary networking and compute profiles.

Security and Compliance: VCF Operations HCX offers a secure pipeline for migrating, extending and protecting VMs across sites. It uses IPsec with Suite B AES-256 encryption which protects sensitive migration data. It can replicate and migrate security tags when moving VMs between vSphere environments which ensures security policies associated with a VM are maintained during the migration process.

Key Stats

Faster and lower cost to migrate vs. native cloud

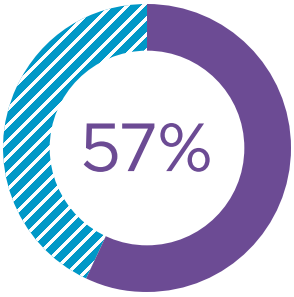
Reduce migration time **from years to months**

Advance to more **energy- and carbon-efficient** data centers

Place workloads **cost-optimally** across different environments

1 million+

VMs migrated to private and VMware clouds



Save 57% by eliminating costly rework and refactoring[2]

VCF Operations HCX can facilitate the movement of applications to data centers or cloud regions that meet specific data residency requirements. VCF Operations HCX simplifies the process of migrating applications, which can help organizations avoid delays and ensure that they meet compliance deadlines.

Benefits and Use-cases

The hybrid cloud capabilities of VCF offer transformative benefits for enterprises, including:

On-Demand Scalability

VCF enables rapid deployment of infrastructure in public cloud environments, allowing businesses to scale resources as needed. This agility is crucial for responding to fluctuating demands, ensuring that IT environments can grow or shrink dynamically.

Seamless Data Center Extension

Organizations can overcome physical data center limitations by extending their infrastructure to the public cloud. This approach allows customers to extend their on-premises infrastructure to public clouds and provides seamless access to native cloud services in the fastest way possible.

Hybrid Cloud Optimization

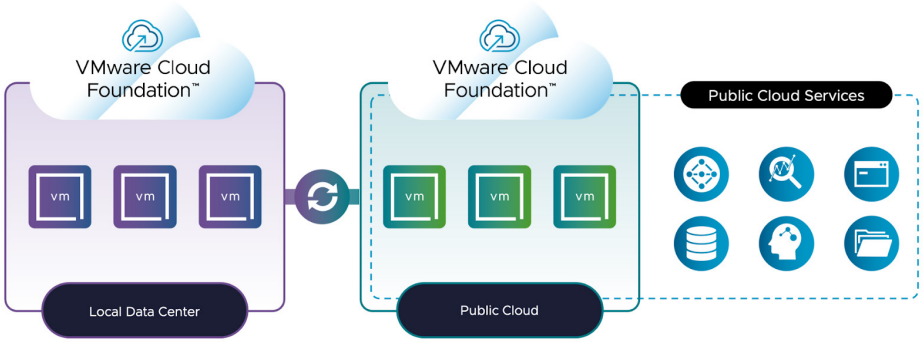
Enable optimal workload placement, balancing performance, cost, and compliance requirements. VCF gives organizations greater control over their cloud infrastructure and the flexibility to choose the right resources for their needs.

Cloud Bursting for Seasonal Demand

Dynamically scale resources during peak periods to handle increased demand efficiently. VCF in a hybrid cloud model helps organizations address unpredictable or temporary spikes in workload demand by leveraging the elasticity of the public cloud.

2. IDC White Paper, sponsored by VMware, The Business Value of Hybrid Cloud with VMware, 2020

How VCF and VCF Operations HCX address the challenges of moving your applications to wherever you need to run them:



Interoperability and Compatibility: VCF Operations HCX works across various vSphere versions and different cloud environments, including VMware Cloud on AWS, other VMware-based clouds, and public clouds like AWS, Azure, and GCP. It maintains compatibility between different vSphere versions, ensuring seamless migrations between disparate versions.

Reduced Operational Expenses: With the Network Extension capability, you can extend a VM's network to a remote site, eliminating the need to re-IP or modify configurations, such as, Mac address, DNS, etc. and retaining existing network policies.

Seamless integration into existing infrastructure: VCF Operations HCX's deep integration with vSphere, vSAN, NSX, as well as with VCF Operations and VCF Automation enables ease of hybrid cloud operations and single, logical management of on-premises and public cloud resources.

Performance Optimization: VCF Operations HCX includes features to optimize performance during migrations, ensuring minimal impact on ongoing operations. It can also optimize and manage network traffic for efficient data transfer during migrations.

Security and Compliance: VCF Operations HCX provides encryption capabilities for data in motion during migrations, ensuring security. It helps maintain compliance during migrations by applying security and compliance policies consistently. The security tag migration capability helps maintain security policies and configurations during the migration, ensuring that migrated virtual machines have the same level of security on the new site as they did on the old site.

Migration Planning and Testing: VCF provides tools for the assessment and planning of migrations to ensure smooth and successful transitions. Allows for testing migrations before executing them in a production environment, reducing risks.

Subscription Portability: With the VCF subscription offering, customers can deploy and utilize their VCF licenses across a range of compatible environments whether that's in their own data center, a hosting provider, a cloud service provider or a public cloud hyperscaler.

Resources to Learn More

- VMware Cloud Foundation — Website
- VCF Operations HCX — Website
- Business Value White Paper — VMC on AWS
- Cross-Cloud Mobility Hands-on Lab
- Read up on the latest blogs
- Follow us on X
- Follow us on LinkedIn
- Watch latest videos on YouTube

How to get started?

Discover how VMware Cloud Foundation can help facilitate seamless workload mobility and migration across different cloud environments, such as between on-premises data centers and various cloud platforms. Whether you're looking to migrate or rebalance workloads, or enable hybrid network connectivity, VCF provides the flexibility and power you need.

Take advantage of our Private Cloud Modernization Program where Broadcom will help you in your IT infrastructure transformation journey, regardless of where you are in your cloud journey. Please contact your Broadcom representative to learn more, and start your journey toward a robust and future-proof private and hybrid cloud infrastructure.

Summary

In essence, VCF enables organizations to seamlessly extend their on-premises vSphere environments into hybrid and multi-cloud architectures without requiring application redesign or network re-architecture. This is achieved through VCF Operations HCX which is a workload migration and mobility solution that facilitates the movement of applications and workloads across different VCF environments, including on-premises, private clouds, and public clouds. Capabilities such as unrestricted mobility, secure large-scale migrations, and hybrid networking, make it an ideal choice for VCF customers looking to simplify workload migration and business continuity.

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Item No: VCF Extending Datacenter Public Cloud Solution Brief 051425 5/25