FUTUREWEI Whitepaper

VMware Ecosystem and Partnership Survey

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INTRODUCTION

VMware is a leader in server virtualization and virtual infrastructure management and is leveraging those strengths to take a leading position in the ever-growing cloud infrastructure market. VMware plays at every level of the cloud market, including IaaS and management, VMware-hosted SaaS.

After years of focusing on transforming datacenter operations via its virtualization technology and more recently noticing enterprises increasingly moving workloads and data into the cloud, VMware put a laser focus on the hybrid cloud, leveraging its on-premises advantage and close partnership with parent company Dell Technologies to extend into the cloud.

Through its vRealize® management platform, the company offers various options for managing everything from traditional applications to containerized workloads.
It's NSX® technology forms the basis of its broad cloud networking products. Also, in 2019, VMware introduced Tanzu, a platform for developers to create modern apps and a way for the vendor to expand beyond virtual machines and into the world of Kubernetes and containers.

VMware's cloud platform can be found on the Amazon Web Services public cloud and AWS' Outposts on-premises appliances as well as a fully managed offer running on Dell EMC VxRail™ hyperconverged infrastructure (HCI). VMware Cloud Foundation is a single, integrated software-defined datacenter architecture includes a hybrid cloud platform built on HCI and managing both VMs and containers.

The company is now pulling together Tanzu and VMware Cloud Foundation™ together under a new multi cloud distributed platform called VMware Cloud that is aimed at enabling enterprises to accelerate their application and infrastructure modernization efforts in any cloud and the datacenter as well as at the edge. We expect to see more focus on providing easy to use and manage features for VMware Cloud platform. .

This survey is intended to explore VMware's partner ecosystem landscape and offer strategy vision for existing or new VMware partners that are seeking ways to improve or extend partnership with VMware.

1 VMWARE COMPANY OVERVIEW

VMware originally pioneered the development and application of virtualization technologies with x86 server-based computing, separating application software from the underlying hardware. IT driven innovation continues to disrupt markets and industries. VMware worked with customers facing digital transformation challenges in the areas of hybrid and multi-cloud, modern applications, networking, security, and digital workspaces. VMware aims to provide a flexible digital foundation to enable customers in their digital transformation.

VMware help customers manage their IT resources across private clouds and complex multi-cloud, multi-device environments by offering solutions across three categories: Software-Defined Data Center ("SDDC"), Hybrid and Multi-Cloud Computing and Digital Workspace—End-User Computing ("EUC"). This portfolio supports and addresses the key IT priorities of VMware's customers including accelerating their cloud migration, modernizing their applications, empowering digital workspaces, transforming networking and embracing intrinsic security.

2 CURRENT PRODUCTS AND SOLUTIONS

VMware’s core product is its hypervisors. The current solutions are focusing on so-called “Software-Defined Data Center”, Hybrid and multi-cloud computing, End-user solution and Solution for Kubernates, VMware Tanzu.

Software-Defined Data Center

VMware, like other players in the industry, recognized that infrastructure is increasingly virtualized and delivered as a service, enabling data center management to be entirely automated by software, from one unified platform. Traditional data centers are collections of technology silos where each application type has its own vertical stack consisting of a CPU and operating system, storage pool, networking, security, and management systems. Over time, costs to maintain data center infrastructure have increased as the data center environment has become more heterogeneous and complex, requiring greater resources to manage and maintain IT infrastructures. SDDC is VMware’s vision and answer to this change. SDDC is aimed to simplify data center operations and lowers costs. The goal is to modernize and transform the data center into an on-demand service that addresses application requirements by abstracting, pooling and automating the services that are required from the underlying hardware.

SDDC architecture consists of VMware's main product categories, which are available to be purchased separately or as part of VMware's Software-Defined Data Center Suites or Platform:

- Compute
- Cloud Management
- Networking
- Storage and Availability

Compute

VMware vSphere®, the flagship data center platform that utilizes VMware's hypervisor software, provides the fundamental compute layer for VMware environments. Users deploy the vSphere® hypervisor when they implement vSphere®, VMware Cloud Foundation™ or suite solutions that include vSphere®, such as VMware vCloud Suite®.

Cloud Management

Vmware Cloud management platform manages hybrid environments running a range of workloads from traditional to container. Cloud management solutions are available as both an on-premises platform or as a service under VMware's VMware Cloud Services offering, providing businesses with automated operation, programmable provisioning, and application monitoring. VMware Cloud Services optimize cloud usage and costs,

improve cloud security and compliance, monitor application and cloud infrastructure, and automate the deployment, management and migration of applications and data across vSphere®, non-vSphere, hybrid and multiple public clouds. VMware Cloud Services enable customers to run, manage, connect and better secure their applications across hybrid and multiple public clouds, including Amazon Web Services ("AWS"), Microsoft Azure ("Azure"), Google Cloud Platform ("Google Cloud") and IBM Cloud, as well as all devices in a common operating environment, regardless of whether the underlying infrastructure is VMware based.

Key products in the cloud management product portfolio include:
• vRealize® Operations—provides performance, capacity, and configuration management for virtual or physical infrastructure as well as transparency and control over the costs and quality of IT services.
• vRealize® Automation™—enables customers to rapidly deploy and provision cloud services.
• Wavefront™ by VMware—provides a SaaS-based metrics monitoring and analytics platform for modern cloud-native applications.
• CloudHealth by VMware—delivers a consistent cloud operations platform across AWS, Azure and Google Cloud, enabling customers to analyze and manage cloud costs, usage, security, and performance centrally for native public clouds.

Networking

VMware networking products and services enable customers to connect and operate their network consistently within and across the data center, the cloud and network edges. The offerings also provide networking capabilities to virtual machines, containers, and public cloud workloads.

Key products within networking solutions include:
• VMware NSX® ("NSX")—VMware's network virtualization solution, abstracts physical networks and greatly simplifies the provisioning and consumption of networking and security resources. NSX can be layered into any environment, integrates with many automation, security and container solutions and is an integral part of VMware's key offerings, including VMware Cloud Foundation, VMware Cloud on AWS and Pivotal Container Service.

• VMware SD-WAN by VeloCloud®—available as a service and as an on-premises software solution, enables simple, agile, and more secure branch connectivity. VMware's SD-WAN solution serves as a platform for deploying virtual network services that integrate with local edge compute to manage and control application traffic from users and Internet-connected devices.

• Network Insight—delivers intelligent operations and planning for software-defined networking and security across virtual, physical, and multi-cloud environments.

Storage and Availability

VMware provides various storage and availability products to offer cost-effective, holistic data storage and protection options to all applications running on the vSphere platform. These products can be installed and used for hyperconverged infrastructure as well as traditional infrastructure solutions designed to enable a broad range of hardware solutions. Key solutions include:

• VMware vSAN™ ("vSAN")—clusters server disks to create simple, shared storage designed for virtual machines in hyperconverged infrastructure.

• VxRail™—a hyperconverged infrastructure solution comprising a fully integrated and pre-configured Dell EMC Appliance powered by vSAN™ and vSphere® software.

Software-Defined Data Center Suites

SDDC products are available separately, and VMware's compute and management products may also be purchased as part of a broader offering. The VMware vRealize® Suite and VMware vCloud Suite® are packaged solutions for building and managing a complete cloud infrastructure optimized for use with the vSphere® platform:

• VMware vRealize Suite® —an enterprise-ready cloud management platform that enables customers to manage heterogeneous, multi-cloud environments.
• VMware vCloud Suite® —an integrated offering that bundles vSphere hypervisor together with vRealize ® Suite.

Software-Defined Data Center Platform—On Premises

VMware Cloud Foundation™ is a unified platform that combines compute, storage, and networking technologies with cloud management into an integrated stack that delivers enterprise-ready cloud infrastructure for private and public clouds. The offering includes lifecycle management capabilities to span the full stack.

SDDC products can also be delivered through VMware vCloud® NFV, a fully integrated, modular, multi-tenant network functions virtualization ("NFV") platform which is targeted at operators, allowing them to provide virtualized network services and drive NFV deployments with an architecture that will support 5G and Edge services in the future.

Hybrid and Multi-Cloud Computing

VMware's multi-cloud offering aims for consistent infrastructure and operations across the data center, public cloud, and edge environments. VMware's cloud solution is primary delivered through VMware Cloud Foundation, the VMware vRealize® cloud management platform and a new set of VMware Cloud Services that they are developing.

VMware Cloud Provider Program Services

VMware currently enable their customers to utilize vSphere-based multi-cloud computing capacity through VMware's VMware Cloud Provider Program (“VCPP”) offerings. VCPP partners, a key component of VMware's strategic priority to support multi cloud, constitute a global ecosystem of over 4,500 cloud providers in more than 120 countries who provide VMware-based cloud services. VMware's VCPP offering is directed at hosting and cloud computing providers, giving organizations the flexibility to choose between running applications in virtual machines on their own private clouds inside their data center or on public clouds hosted and managed by a VMware cloud provider.

Software-Defined Data Center Platform—Multi Cloud

VMware Cloud Foundation™ can be used for on-premises private clouds and can be extended to multi-cloud environments using VMware Cloud on AWS or VCPP offerings. VMware Cloud on AWS is an on-demand service that enables customers to run applications across vSphere-based cloud environments and provides access to a broad range of AWS services. This hybrid offering, a strategic alliance with AWS, integrates vSphere®, vSAN™ and NSX® along with VMware vCenter® management and is optimized to run on dedicated, elastic, bare-metal AWS infrastructure.

VMware Cloud Foundation™ is also offered as a service platform through a select number of VMware's VCPP partners.

VMware Cloud Services

VMware Cloud Services are SaaS offerings that optimize cloud usage and costs, improve cloud security and compliance, monitor application, and cloud infrastructure, and automate the deployment, management and migration of applications and data across vSphere and non-vSphere environments and hybrid and multiple public clouds. VMware Cloud Services enable VMware's customers to run, manage, connect, and better secure their applications across hybrid and multiple public clouds, including AWS, Azure, Google Cloud and IBM Cloud, as well as all devices in a common operating environment, regardless of whether the underlying infrastructure is VMware-based.

Digital Workspace—End-User Computing Solution

VMware also offers an EUC solution which consists of VMware Workspace ONE®, their digital workspace platform that securely delivers and manages any application on any device by integrating access control, application management and multi-platform endpoint management. Workspace ONE® includes Unified Endpoint Management and VMware Horizon® application and desktop virtualization, tied together with a common access control layer:

• Unified Endpoint Management—a platform built to manage and help secure endpoints across all major operating systems from a single management console, enabling customers to more effectively manage, secure and benefit from “bring your own device” programs.

• VMware Horizon®—a virtual platform that provides a streamlined approach to delivering, protecting, and managing virtual desktops and applications from one digital workspace, while containing costs and allowing end users to work anytime, anywhere and across any device.

VMware Tanzu

Tanzu is VMware’s solution for Kubernetes controlled container-based applications, which includes products and services that allow companies to build, run and manage a Kubernetes environment from a single control point. It includes:

- Spring Runtime - Cloud Native application development framework
- Tanzu Application Catalog, Tanzu Build Services - For assembling and containerizing container-based applications.
- Tanzu Application Services - For secured and automated delivery of software
- Tanzu Kubernetes Grid (and vSphere 7 with Kubernetes) - For running and operating Kubernetes across all clouds
- Tanzu Mission Control - Centralized provisioning and policy driven management for all clusters.
- Tanzu Observability by Wavefront™ - Observability tool to visualize and alert on metrics, histograms, and traces.

3 PARTNERSHIP AND ECOSYSTEM

VMware has engaged a broad group of hardware, software, and cloud computing service vendors to cooperatively advance virtualization technology through joint marketing, product interoperability, collaboration, and co-development.

Currently VMware claims to have more than 1,200 technology partners and over 4,000 active service provider partners. Partners are classified as follows:

Global Partners and other Independent Hardware Vendors (IHVs): Industry-leading independent hardware and system vendors including Cisco, Dell, Fujitsu, HPE, IBM, Lenovo, NetApp and NEC for product integration, then sell and support joint solutions. VMware also works closely with AMD, Intel and other IHVs to provide input on product development to enable them to deliver hardware advancements that benefit VMware’s virtualization product. VMware coordinates with other leading storage and

networking vendors to ensure joint interoperability and enable VMware's software to access their differentiated functionality.

Independent Software Vendors ("ISVs"): VMware partners with leading systems management, infrastructure software and application software vendors-including healthcare, telecom, finance, and retail market leaders-to deliver value-added products that integrate with VMware products.

Global System Integrators and Service Providers: VMware have established partnerships with over 4,000 active service providers including accenture, capgemini, Fujitsu, IBM, KPN, Macquarie, Navisite, Nifty, NTT, OVH, and UOL Diveo to enable them to host and deliver enterprise-class hybrid clouds as a way for enterprises to extend their data centers to external clouds, while preserving security, compliance, and quality of service.

Cloud Providers: VMware partners with public cloud service providers including AWS, Microsoft Azure, Google Cloud, Alibaba Cloud, Oracle Cloud, IBM Cloud to allow customers to build, run, manage software anywhere whether on-prem or in the cloud.

VMware's Technology Alliance Partner (TAP) program facilitates joint solution creation and coordinated go-to-market activities with partners. According to VMware, over 4,500 of the most widely used applications from ISVs support the vSphere platform. These applications include business solutions for enterprise resource planning, human resource management, electronic medical records management, financial processing, and middleware, such as application servers and databases.

Hyperconverged Infrastructure (HCI) Partnership

VMware partner with wide variety of hardware and software vendors to certify and integrate HCI software products with partner's hardware products.

Hyperconverged Infrastructure Partners are categorized into three groups based on the types of the infrastructures:

1. VMware Cloud Foundation™ /Private cloud:
    a. vSAN™ ready Node/Integrated systems: VMware have certified various server and integrated HCI systems including Dell PowerEdge, HPE Proliant Gen 10, Lenovo ThinkAgile VX, Fujitsu Primeflex, Hitachi Unified Compute Platform.

    b. Composable System: HPE Synergy. Dell EMC PowerEdge MX

c. Jointed Integrated/Engineered systems: VCF on Dell EMC VxRail™

2. vRealize®

   VMware worked with storage vendor partners to provide TrueVisibility Suite Management pack for NetApp, Dell EMC, Cohesity, HPE, IBM Pure Storage

3. vSphere®
   VMware continue to evolve flagship product by working closely with strategy partners and adding support for modern container applications.

   1. Partnership with Nvidia
      1. nVIDIA + vmWARE AI ready platform: VMware vSphere® with Tanzu
      2. vSphere certified with Nvidia AI Enterprise suite utilizing Nvidia GPU and DPUs (Nvidia certified system)
      3. VMware Horizon accelerated by Nvidia virtual GPU

   2. vSphere® with Tanzu
      1. Since vSphere 7, Tanzu (VMware's Kubernetes offering) has been fully integrated into vSphere, expanding vSphere ecosystem to include Tanzu ecosystem partners.

   3. SAP – VMware and SAP have been worked with each other since 2007, SAP HANA® on vSphere® fully supported. Reference architecture from Lenovo, HPE, Dell EMC see detail on website.

   4. 2VSphere® Bitfusion (support AI and ML based workload by virtualizing GPU), vSphere 7 with Bitfusion on Dell EMC PowerEdge Servers

Partnership with Dell

VMware has been partnering with parent company Dell exclusively on HCI and other key solutions.

Dell EMC VxRail™ is the jointly engineered hyperconverged infrastructure from Dell EMC and VMware. Powered by VMware vSAN™ and managed through the VMware vCenter® interface, VxRail™ is also the first hyperconverged system fully integrated with VMware Cloud Foundation SDDC Manager delivering one, complete, automated platform.

VxRail™ is also the reference platform for VMware Tanzu with full stack solution options from a flexible reference architecture to a fully automated turnkey solution, so businesses can adopt Kubernetes their way.

Tanzu Architecture for VxRail™ (TA4V) for customers who need a CaaS/PaaS platform

vSphere with Tanzu on VxRail™ for customers who are looking for network flexibility and have minimal scaling requirements, or SDN expertise to manage Kubernetes at scale.

VCF with Tanzu on VxRail™ (Dell Tech Cloud Platform) for customers who are looking for a highly automated, turnkey on-premises cloud platform for Kubernetes at scale.

Tanzu Partnership

Tanzu is VMware's complete solution for Kubernetes. Due to the size of Tanzu portfolio and targeted developer community, Tanzu even has its own ecosystem. VMware is working with the following types of partners for their Tanzu ecosystem:

1. Cloud partners: AWS Service, Azure and GCP Broker for Tanzu - Allow developers to add public cloud service to their applications.

2. Technology Partners
    1. Solution hub: MongoDB, Spring Cloud services, RabbitMQ, Elastic, Black Duck etc.

    2. Greenplum marketplace:
        1. Data Protection: Integrated solution Dell EMC PowerProtect Appliances

        2. Hardware and Storage Partner:
            1. Dell, Hedvig, Minio, Portworx
            2. Dell Greenplum Reference architecture - on premises solution including VMware Tanzu Greenplum certified by VMware.

4 FINAL THOUGHTS

VMware has certainly geared the upcoming focus of VMware vSphere® on containers and VMware Tanzu is the aggregate of this effort. VMware Tanzu is the suite or portfolio of products and solutions that allow its customers to build, run, and manage Kubernetes controlled container-based applications. It's clear that for VMware, recent acquisitions are various container focused companies. VMware has certainly made waves in the

industry with VMware Tanzu that allows VMware vSphere® to be the all-in-one solution for running both virtual machines and containers.

VMware has the upper hand here when compared to competitors in having the single pane of glass management solution and platform to seamlessly run your “applications” from a single solution that allows visibility, management, and security of the entire solution.

There were criticisms of VMware and their seeming lack of interest in containers and lack of solutions to get into the container race, but after VMworld 2019, those thoughts and ideas have certainly been squashed as VMware has emerged as a leader in hybrid cloud along with containerized workloads and the ability to easily manage containerized solutions driven by Kubernetes in the enterprise, public cloud, private cloud, and other environments.

MultiCloud/Hybrid Cloud

VMware is being seen pulling together Tanzu, it’s Kubernetes solution, and VMware Cloud Foundation™ together under a new multicloud distributed platform called VMware Cloud that is aimed at enabling enterprises to accelerate their application and infrastructure modernization efforts in any cloud and the datacenter as well as at the edge. VMware Cloud, introduced recently, also includes features enabling organizations to manage their VMware Cloud infrastructure wherever it’s deployed and to buy VMware infrastructure and services via a subscription model to make it easier to pay for and manage.

VMware’s cloud strategy, like as-a-service programs from many other companies continues by both on-premises datacenter technology providers and major cloud providers to play both sides of the hybrid cloud court. With initiatives like AWS’ Outposts and EKS Anywhere, Microsoft Azure’s Stack and Arc and Google Cloud’s Anthos, the cloud providers are offering enterprises ways to run their respective cloud services on premises.

VMware is looking for ways to extend the reach of its software portfolios into the public cloud realm and make it easier for enterprises to develop modern applications and run and move their workloads and data more easily between the datacenter, cloud and edge.

What to do as a storage vendor to leverage VMware cloud and container strategy? Given VMware’s large enterprise customer reach and product solution portfolio, VMware will remain as leader in Hybrid cloud at least in the next few years, maintaining strong partnership with VMware will be beneficial, if not critical for storage vendors. Besides, the recent announcement of parent company Dell offloading its owned VMware shares may open up more partnership opportunities for Dell EMC competitors.

Based on VMware’s current hybrid cloud and container strategy, the following solutions may help to accelerate customers’ hybrid cloud deployments and optimize customers' VMware investments:

-vSphere® Virtual Volumes™ as principal storage for VMware Cloud Foundation™

VMware vVols is a new technology that delegates some storage-specific operations to the storage-hardware side. In this case, vendors of storage array systems must implement support of vStorage API for Array Integration (VAAI) for their storage devices. Using VAAI considerably offloads storage-related tasks from ESXi servers to the storage arrays hardware and increases performance.

VMware vSphere 6.0 and later uses Storage Policy-Based Management (SPBM) to define application or VM-specific storage requirements. Policy-based management saves time for vSphere administrators in large virtual environments because admins don’t have to search manually for a suitable storage target for a VM among available storage arrays with free space. VMware vVol storage policies are managed on a level of a VM virtual disk.

Enable vSphere Virtual Volumes as Principal storage for VMware Cloud Foundation™. Customers can then utilize storage and vSphere® Virtual Volumes™ natively within VMware Cloud Foundation™. Full Flash array can deliver the performance, availability, and economics required for a VMware Cloud Foundation™ hybrid cloud in a single architecture, with the simplicity of integrated application to infrastructure management.

-Support for vSphere® Virtual Volumes™ storage with Site Recovery Manager™.

Modern data protection is a critical component for any VMware deployment including those leveraging vSphere® Virtual Volumes™ on storage arrays. For VMware infrastructure, VMware Site Recovery Manager™ provides an enterprise solution for automated disaster recovery. Integrated vSphere® Virtual Volumes™ with SRM will allow enterprises to consume vSphere® Virtual Volumes™ on storage array while protecting their mission critical applications from disaster.

-VMware Tanzu and container integration.

Support for the Cloud Native Storage and vSphere® Virtual Volumes™ programs would provide persistent storage that enables true hybrid cloud mobility for containers running on VMware. Cloud Native Storage and vSphere® Virtual Volumes™ enable workloads in Kubernetes environments to utilize all flash based and CSI-compliant persistent storage, bringing all-flash performance and data services to containerized applications in addition to VMware vSphere® environments.

-NVMe-oF with vSphere®

With modern data fabric support on vSphere® 7, VMware and storage vendors can provide native end-to-end support for NVMe over Fabrics (NVME-oF). NVMe is a revolution in the storage world, providing lower latency and higher throughput than legacy SCSI devices. This capability unleashes the raw performance of the All-Flash storage array and maximizes performance density in the data center. Mutual customers can enjoy a modern data experience that maximizes the performance and consolidation of critical applications, VMs, and containers.

-Participating in Tanzu Ecosystem

Participating in the Tanzu ecosystem is becoming increasingly important since Tanzu is viewed as a vital part of the VMware product and solution strategy. Tanzu has its own partner ecosystem with various types of partners ranging from cloud providers, storage vendors to third-party software developers.
Joining the Tanzu ecosystem, being able to integrate well with Tanzu products and solutions from VMware as well as other partners in the Tanzu ecosystem will surely benefit VMware's storage partners in the long run.

5. REFERENCES

1. VMware 10K report 2020
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3. vSAN Ready Notes
4. VMware Products
5. VMware Tanzu Marketplace