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VMWARE CLOUD FOUNDATION: THE UNIFIED PLATFORM FOR PRIVATE AND PUBLIC CLOUD

vmware®

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Executive Summary

With the Software-Defined Data Center (SDDC), VMware laid out the vision for the architecture of the hybrid cloud. SDDC redefines the architecture and operational model of the data center, enabling IT to complete the transition to hybrid cloud and maximize its benefits. In an SDDC, compute, storage, and networking services are decoupled from underlying hardware infrastructure and abstracted into logical pools of resources that can be more flexibly provisioned and managed.

To accelerate the customer journey to SDDC, VMware has introduced VMware Cloud Foundation™, a new unified SDDC platform for the private and public cloud. Cloud Foundation brings together VMware's compute, storage, and network virtualization into a natively integrated stack that can be deployed on premises or run as a service from the public cloud.

Cloud Foundation enables organizations to achieve greater business agility and scalability to support the next generation of applications. While public cloud services can be a good fit for many applications, company-owned data centers continue to play a critical role especially for those mission-critical applications that require greater control and security. As a result, organizations are looking to shift to a more agile, service-oriented IT model that leverages both private and public clouds. Cloud Foundation allows CIOs to enable their business to achieve the operational and cost efficiency of web-scale cloud service providers.

A Single Architecture for Hybrid Cloud

Unlike legacy hardware-defined infrastructure, where services are tied to and dependent on physical devices, in an SDDC, infrastructure services are abstracted and decoupled from the underlying hardware. In this sense, the SDDC architecture can be not only hardware agnostic, but geography agnostic too, because the logically defined infrastructure resources can span across data centers, including those owned by the organization in question and those of a cloud service provider.

Picture an organization using the exact same SDDC architecture than its cloud service provider. Such design would allow said organization to shift to a more agile, service-oriented IT model that leverages both private and public cloud, ultimately implementing a true hybrid cloud.

The VMware SDDC architecture makes the hybrid cloud possible by defining a platform common to both private and public clouds. The foundational components of VMware's solution are VMware vSphere®, Virtual SAN™, and NSX®, which converge compute, storage and networking onto a single, integrated layer of software. This stack can be further enhanced through VMware's automated management platform, VMware vRealize® Suite, providing ongoing performance management, capacity optimization, real-time analytics, and cloud automation.

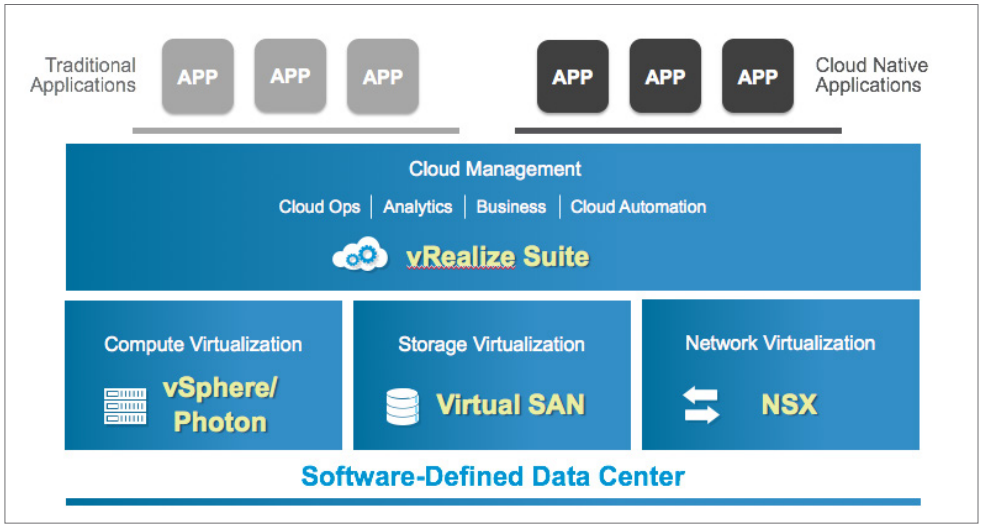

Figure 1. Software-Defined Data Center Architecture

VMware can bring this vision to reality, providing customers with the flexibility to run their private cloud on premises or to consume it as a service through public cloud partners, leveraging a common foundation that delivers a consistent operational model across private and public and can be managed using existing skill set and processes.

Introducing VMware Cloud Foundation

VMware Cloud Foundation is VMware's new unified SDDC platform for the private and public cloud. Cloud Foundation brings together VMware's compute, storage, and network virtualization into a natively integrated stack that can be deployed on-premises or run as a service from the public cloud.

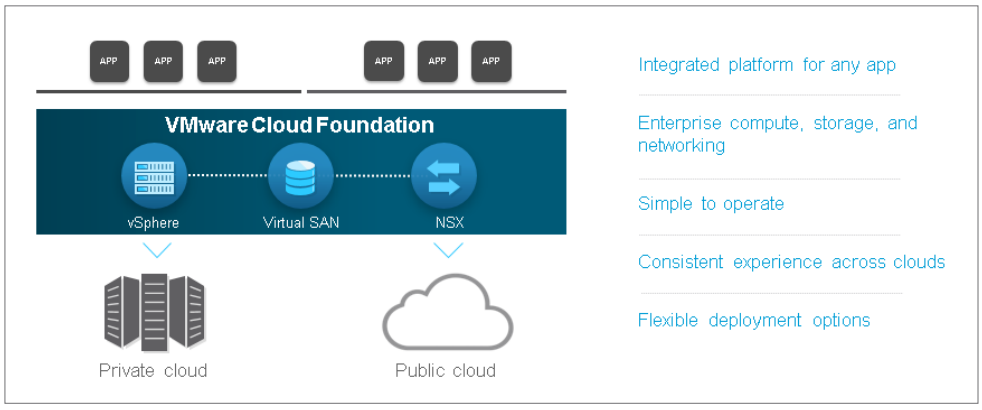

Figure 2. Overview of VMware Cloud Foundation

Cloud Foundation delivers enterprise-ready cloud infrastructure by combining VMware's highly scalable hyper-converged software, comprised of vSphere and Virtual SAN, with the network management efficiency of NSX. HCI is rapidly emerging as the ideal building block for SDDC thanks to its ability to deliver greater elasticity, simplicity and performance at a lower cost. However, unique to Cloud Foundation is the ability to converge not just compute and storage – as any other HCI solution in the market does — but also NSX's network virtualization directly from the hypervisor using modular x86 servers and standard top-of-rack switches.

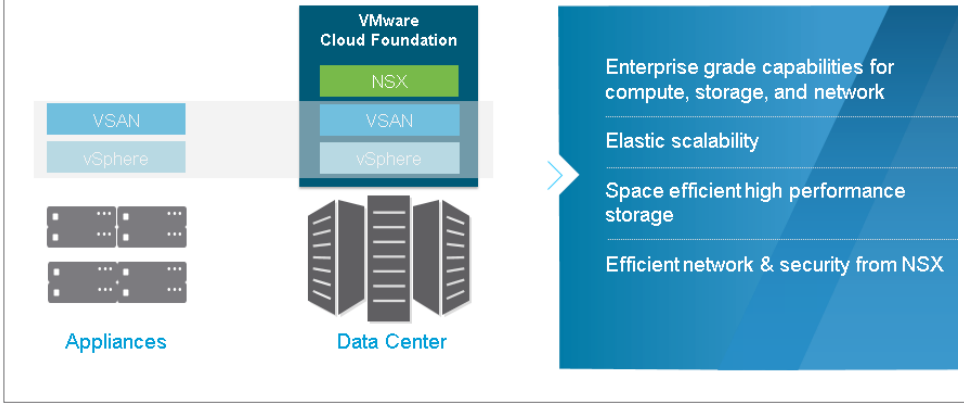

Figure 3. Native integration of hyper-converged software with network virtualization

To manage the logical infrastructure in the private cloud, Cloud Foundation augments the market-leading VMware virtualization and management components with a new component, VMware SDDC Manager™. SDDC Manager, serves as a single interface for managing the infrastructure. From this interface, the IT administrator can provision new private cloud resources, monitor changes to the logical infrastructure, and manage lifecycle and other operational activities.

Private Cloud deployment options

Cloud Foundation provides maximum flexibility in choosing on-premises deployment options. Organizations can choose from fully integrated systems that combine software and hardware, offered by select OEM vendors such as VCE, to procuring the software stack directly from VMware in order to deploy on top of Ready Systems from qualified hardware vendors. Cloud Foundation is supported to run on qualified VSAN Ready Nodes from vendors, including Dell, HPE and QCT, with more hardware partners to come in order to provide maximum choice and flexibility. To learn more about supported qualified hardware, please visit the Cloud Foundation product page.

To pick the right configuration, customers begin by sizing their Cloud Foundation deployment. The sizing process translates into a bill of materials (BoM) consisting of both hardware and software components. With this BoM in hand, Cloud Foundation partners integrate these components and ship the integrated system, consisting of physical racks, servers, server subcomponents, power distribution units, switching infrastructure and the Cloud Foundation software, to customers.

Public Cloud deployment options

Organizations looking to leverage the agility and economies of scale of the public cloud are no longer limited to deploying an SDDC in their own private data centers. VMware has partnered with IBM Cloud and will do so with select VMware vCloud® Air™ Network (vCAN) partners in the near future to enable consumption of the full SDDC stack through a subscription model. These partners will deliver a common SDDC infrastructure in the public cloud powered by Cloud Foundation, one that natively integrates compute, storage, and network virtualization. Customers benefit from the ability to seamlessly extend their private cloud to these third-party public clouds, while service providers offer differentiation and added value through the specifics of their own service consumption model.

This means that companies will be able to run apps and workloads anywhere, with the same people, same processes, and same tools, which saves them time, training, people, and money.

To learn in-depth details about public cloud services powered by Cloud Foundation, please refer to the public documentation offered by each service provider.

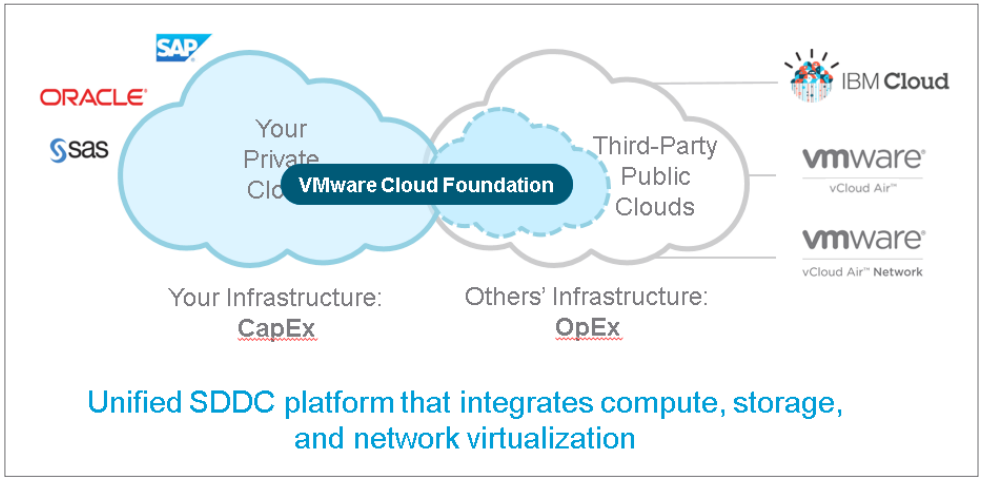

Figure 4. Cloud Foundation provides a common platform across private and public clouds

Components in the Software Stack

For the case of private cloud deployments, the Cloud Foundation stack includes VMware vSphere, Virtual SAN, NSX and VMware SDDC Manager. Customers that possess unused licenses of these software components (vSphere, VSAN or NSX) can bring them to the environment and acquire only the missing components to complete the licensing of the Cloud Foundation stack.

SDDC Manager is a new innovative system management automation component specifically developed by VMware for Cloud Foundation. SDDC Manager complements the existing suite of VMware management software, namely VMware vCenter Server® and vRealize Suite, to provide simplified operational experience at the system level allowing customers to manage a highly distributed architecture as a single logical system.

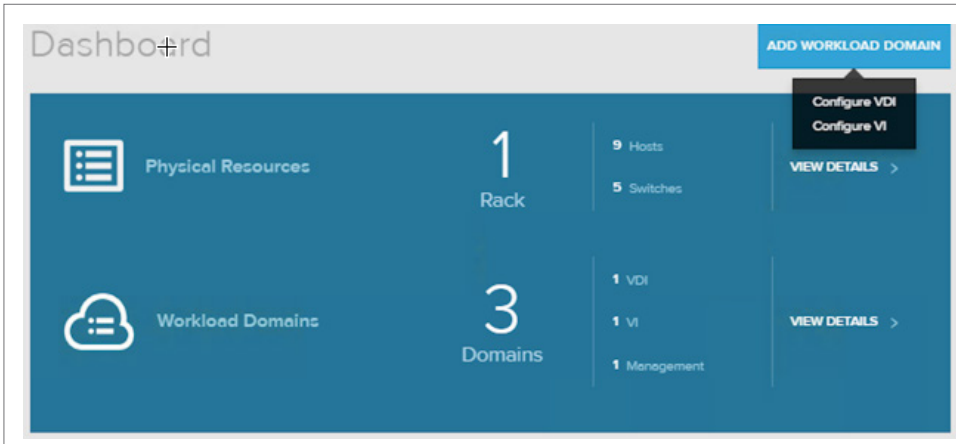

Figure 5. SDDC Manager Dashboard

Cloud Foundation integrates with the VMware stack, including VMware's virtual desktop solution, Horizon and cloud management platform, vRealize Suite. When these additional components are deployed on top of Cloud Foundation, the SDDC Manager can extend its lifecycle automation to the Horizon Suite, vRealize Operations Manager and vRealize Log Insight, with more software components of the management suite to be integrated soon.

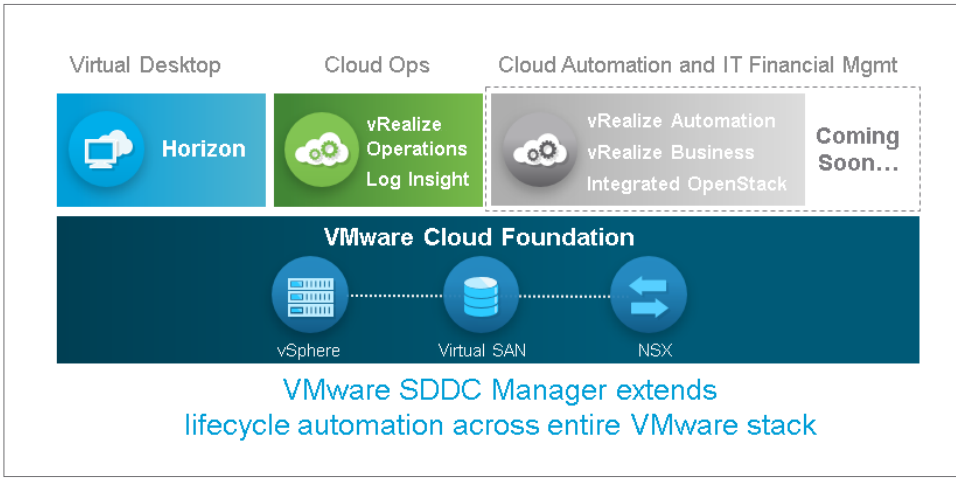

Figure 6. Integration with the VMware stack

Key Features and Benefits

In addition to the core features and capabilities provided by the individual components of the software stack, Cloud Foundation adds several unique capabilities. While many of the following capabilities will apply to a public cloud implementation, each service providers will provide differentiation through management interfaces, support and other traits of their service, so the upcoming descriptions are focused on the features and benefits of a private cloud implementation.

Natively Integrated Software-Defined Stack

Cloud Foundation delivers a natively integrated software-defined data center stack starting with the core infrastructure virtualization, vSphere, Virtual SAN and NSX, in addition to the SDDC Manager for lifecycle management automation. Customers can flexibly upgrade individual components in the stack to higher editions and optionally deploy VMware vRealize Suite and VMware Horizon.

Day 0 to Day 2 Automated Operations

Cloud Foundation automates Day 0 to Day 2 operations of the entire VMware software stack. Once the rack is installed and power and networking are provided to the rack, the SDDC Manager leverages its knowledge of the hardware bill of materials and user-provided environmental information (e.g. DNS, IP address pool, etc.) to initialize the rack. Time savings will vary by customer, but upfront setup time is estimated to be reduced from several weeks to as little as two hours due to the automation of certain previously manual functions related to provisioning workloads, including automated provisioning of networks, allocation of resources based on service needs, and provisioning of end points. When the process completes, the customer has a virtual infrastructure ready to start deploying vSphere clusters and provisioning workloads.

Simplified Resource Provisioning

Extensive coordination is required in today's legacy environment across server, storage and networking silos to construct private clouds that are highly available and meet performance requirements. However, with Cloud Foundation, a cloud administrator simply needs to create and manage pools of resources.

To achieve this, Cloud Foundation introduces a new abstraction, Workload Domains, for creating logical pools across compute, storage, and networking. Workload domains are a policy-driven approach for capacity deployment, where each workload domain provides the needed capacity with specified policies for performance, availability, and security. For example, a cloud administrator can create one workload domain for a dev/test workload that has balanced performance and low availability requirements, while creating a separate workload domain for a production workload requiring high availability and high performance.

SDDC Manager automatically implements a deployment workflow to translate the workload domain specifications into the underlying pool of resources. Workload domains relieve a cloud administrator from having to research and implement best practices needed to achieve the operational goals.

Automated Lifecycle Management

Data center upgrades and patch management are typically manual, repetitive tasks that are prone to configuration and implementation errors. The reason for this is that validation testing of software and hardware firmware to ensure interoperability among components when one component is patched or upgraded requires extensive quality assurance testing in staging environments. Often strapped for time, IT must sometimes make the difficult decision to deploy new patches before they are fully vetted or defer new patches, which slows down the roll-out of new feature or security and bug fixes. Both situations increase risk for the private cloud environment.

The SDDC Manager automates upgrade and patch management for both the logical and physical infrastructure, thereby freeing resources to focus on business critical initiatives, while improving reliability and consistency. VMware tests all components of the Cloud Foundation private cloud together before shipping new patches to the customer.

Cloud Foundation's lifecycle management can be applied to the entire infrastructure or to specific workload domains one at a time and is designed to be non-disruptive to tenant virtual machines (VM). By utilizing live VM migration, SDDC Manager can patch servers, switches and the Cloud Foundation software to improve infrastructure security and reliability, while maintaining tenant uptime.

Integrated Management of Physical and Virtual Infrastructure

SDDC Manager understands the physical and logical topology of the SDDC and the underlying components' relation to each other, and efficiently monitors the infrastructure to detect potential risks, degradations and failures. SDDC Manager provides stateful alert management to prevent notification spam on problem detection. Each notification includes a clear description of the problem and provides remediation actions needed to restore service. Degradations or failures are aggregated and correlated to workload domains to enable a clear view of the impact of any issue to the business services being deployed within a domain. Therefore, the SDDC Manager can greatly reduce the mean time to resolution across organizational and technology silos.

Scalability and Performance

Cloud Foundation delivers a private cloud instance that can be easily deployed within an existing corporate network. Based on a scale-out, hyper-converged architecture, a Cloud Foundation implementation can start as small as 8 nodes, and can scale out to multiple racks. Additional capacity and performance can easily be added linearly in increments as small as one server node at a time within a single rack, scaling out to 8 full racks per SDDC Manager instance. This enables IT organizations to better align CapEx spend with business needs. Cloud Foundation automatically discovers any new capacity and adds it into the larger pool of available capacity for use.

Main Use Cases

Virtual Infrastructure

With Cloud Foundation, customers have a turnkey solution to run their virtualized vSphere infrastructure. Cloud administrators have the ability to expand and contract the underlying infrastructure to meet their changing business needs. With a cloud that is based on the market leading virtualization platform, lines of business have the flexibility to deploy a wide variety of operating systems and application stacks within the tenant VMs. Virtual infrastructure admins can integrate with and monitor the underlying infrastructure using a common monitoring toolset that aggregates and correlates across physical and virtual infrastructure. In addition, customers have the flexibility to integrate their vSphere compatible tools directly with vCenter Server.

IT Automating IT

vRealize Suite can be optionally added to the Cloud Foundation software stack. vRealize Operations Management and vRealize Log Insight provide performance management, capacity optimization, and real-time log analytics, using predictive analytics leveraging both structured and unstructured data, for proactive issue avoidance and faster problem resolution

With VMware vRealize Automation™, IT becomes a business enabler. IT is able to accelerate the delivery and ongoing management of personalized, business-relevant infrastructure, application and custom services, while improving overall IT efficiency. Policy-based governance and logical application modeling assures that infrastructure services are delivered at the right size and service level for the task and that needs to be performed. Full lifecycle management assures resources are maintained at peak operating efficiency.

Virtual Desktop

Virtual Desktop Infrastructure (VDI) infrastructure deployment is a non-trivial task requiring sizing and configuration of connections servers, authentication servers, databases, networking, and security. VMware Horizon can be optionally added to Cloud Foundation, making VDI deployments faster and more secure. Private cloud administrators focus on specifying the policies and needs of the VDI infrastructure instead of dealing with the details of deploying the VDI infrastructure. Cloud Foundation takes as input the logical capacity, service level agreements, and policy needs of target virtual desktops and automates provisioning of fully installed and configured Horizon VDI. Customers experience a highly simplified integration of Active Directory (AD) and associated databases. Cloud Foundation also automates the configuration and installation of VMware NSX-based networking and micro-segmentation security for virtual desktops.

FOR MORE INFORMATION

For more information on VMware Cloud Foundation, please visit the product page at http://www.vmware.com/products/cloud-foundation

For the latest technical insights and tips from VMware Cloud Foundation experts, please visit the blog at https://blogs.vmware.com/virtualblocks/

Conclusion

VMware Cloud Foundation makes it possible for organizations to benefit from the full power of VMware's market leading software-defined data center stack with an enhanced operational efficiency across private and public clouds. As a result, Cloud Foundation dramatically shortens the path to a complete hybrid cloud, increasing admin productivity. In particular, customers who deploy Cloud Foundation can achieve the following when compared to legacy hardware defined data centers:

- Faster time to market by automating complex processes around system design, testing, bring-up, and configuration
- Increase administrator productivity by automating Day 2 operations such as patching, updates, and monitoring
- Reduce overall TCO of private cloud deployments
- Eliminate hardware costs when consuming as a service on the public cloud
- Deploy workloads with portability between private and public clouds

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