

White paper FUJITSU Integrated System PRIMEFLEX for VMware Cloud Foundation

For enterprises demanding more service-oriented IT support, PRIMEFLEX for VMware Cloud Foundation delivers a turnkey next-generation software-defined data center architecture that's easy to deploy, operate and maintain.



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Introduction

Businesses today are putting enormous pressure on IT organizations to create environments in which flexibility and speed are paramount. At the same time, they expect IT to keep an eye on costs. Those data center operations still running traditional hardware-defined data center architectures find it increasingly difficult to live up to all these requirements. They are looking at new approaches that enable them to become more business-centric and thus better positioned to meet future business challenges. This white paper outlines how PRIMEFLEX for VMware Cloud Foundation helps IT organizations deliver more responsive IT support while reducing operational costs by introducing a turnkey software-defined data center infrastructure that's easy to deploy, operate and maintain.

Data center architecture in transition

While the virtualization of computing resources has greatly improved data center operations over the past decade, many organizations are now looking to extend virtualization to other IT resources. They focus especially on a strategy to establish the Software-Defined Data Center (SDDC), which provides the operational efficiency and agility necessary to cope with the ever-increasing demand for more responsive and cost-efficient IT support. An SDDC is based on a fully virtualized infrastructure, and it is centrally managed using extensive automation technology. For an in-depth discussion on strategic aspects of the transformation to SDDC, the architectural model, major benefits and possible limitations, please read this white paper: "[Software-Defined Data Center – infrastructure for enterprise digital transformation](#)".

Besides streamlining their existing on-premises data center infrastructure, many IT organizations are starting to build their IT sourcing strategy on a mix of options across cloud and non-cloud IT with the goal to achieve the best of both worlds: the control of on-premises deployments and the cost-effectiveness of cloud. Therefore, they are looking at solutions that enable them to integrate their on-premises private cloud environment with off-premises resources from the public cloud. VMware Cloud Foundation can be consumed as-a-service through a VMware cloud service provider partner like VMware Cloud on AWS – enabling a true hybrid cloud based on a common and compatible platform that stretches from on premises to off premises.

With the Fujitsu service offering for VMware Cloud on AWS, Fujitsu helps organizations on VMware enterprise environments to unlock the benefits of Amazon Web Services (AWS) alongside a mix of any other cloud platforms – without the need for large or costly transformation projects. This service, underpinned by our capabilities in enterprise Hybrid IT, enables

you to extend to the public cloud from your VMware estate with minimal risk, exploit AWS features to develop cloud-native apps and digital services and seamlessly migrate to and manage AWS within your hybrid environment. For more information on the Fujitsu service offering for VMware Cloud on AWS, please [click here](#). The remainder of this white paper focusses on the on-premises VMware Cloud Foundation deployment.

Challenges in making SDDC happen

Building an SDDC environment with a do-it-yourself approach can be a complex, time-consuming and error-prone process. There are several phases in the development of a software-defined data center infrastructure. Each has its own challenges. Customers must select the right set of server, storage, and networking hardware resources and ensure that the hardware is compliant with the SDDC software stack. Once the hardware is selected, ordered and received, customers must install and configure the hardware and software stacks. Then the IT department must patch and upgrade existing pools of resources – as well as add new pools of resources – to keep the infrastructure highly available and conforming to performance requirements. After all customers need to make sure all new infrastructure components are certified to not run into any support issues. Existing silos within IT make the quick deployment of resources especially challenging. All resources must satisfy performance specifications and comply with infrastructure security requirements. In addition, even after intensive preparation, best practices on new technology are not always understood. Thus configurations may not be optimal in terms of performance and availability for customer workloads. Finally, when operational issues do arise, a single point of contact to reduce the mean time to innocence is required. Given these challenges, enterprises often struggle to achieve the agility, economy of scale and efficiency of large-scale software-defined data center infrastructures.



PRIMEFLEX for VMware Cloud Foundation

In order to reduce risk, Fujitsu and VMware have been working together to provide a turnkey factory-integrated system, with all the hardware and software required for rapidly deploying a large-scale hyper-converged software-defined data center infrastructure, which enables IT organizations to run highly scalable general purpose server virtualization environments, virtual desktop infrastructures or Infrastructure as a Service deployments. Based on a high-performance Fujitsu/Extreme® hardware platform and market-leading VMware software technology, featuring software-defined compute, storage and networking in combination with integrated life-cycle management of all virtual resources, PRIMEFLEX for VMware Cloud Foundation is ideal for enterprises and service providers demanding fast time to production, reduced management complexity and lower TCO. Research from a user survey on data center infrastructure deployment options conducted in April 2017 shows that customers increasingly realize the value of integrated systems. When asked about their delivery model preferences, the survey revealed that overall 56% and even 76% of the best performing IT organizations¹ see the use of pre-integrated systems as an important part of their platform mix. Indeed, there are indications that the best performers are increasingly adopting a “self-build by exception” policy.

→ For the user survey, [click here](#).



The key outcomes customers can gain when introducing PRIMEFLEX for VMware Cloud Foundation include²:

- 15x faster time to production through time savings on planning and deployment efforts with factory-integrated delivery and automated initial start-up
- New levels of agility and productivity with 20x faster application provisioning through streamlined delivery of application services via blueprints (templates)
- Significant CAPEX and OPEX savings with 30-40% reduction in TCO over a traditional three-tier alternative thanks to a smaller hardware footprint (i.e., no external storage necessary) and the streamlined operation environment

1) IT organizations scoring best on a performance scorecard based on the following criteria: meeting service level expectations, response to new or changing needs, management of costs and overheads, control of IT related risks

2) Based on internal VMware analysis and testing

VMware Cloud Foundation software stack

VMware Cloud Foundation™ delivers an enterprise-ready cloud infrastructure by combining VMware’s highly scalable hyper-converged software, comprised of vSphere® and vSAN™, with the network management efficiency of NSX®. Hyper-converged infrastructures are rapidly emerging as the ideal building block for SDDC thanks to its ability to deliver greater elasticity, simplicity and performance at a lower cost.

For the logical infrastructure, the familiar VMware virtualization and management components are augmented by the VMware SDDC Manager, which serves as the centralized management interface in Cloud Foundation used to automate the lifecycle of all software components, from bring-up, to configuration, to infrastructure provisioning to upgrades/patches. Private cloud customers can now expect to consume their resources in a manner consistent with the public cloud. SDDC Manager provides a REST-based application interface (Cloud Foundation API) to integrate with the existing data center management and monitoring tools.

VMware Cloud Foundation also includes cloud management capabilities from the VMware vRealize Suite and VMware vRealize Network Insight.

- **vRealize Log Insight** providing real-time log management and log analysis
- **vRealize Operations** providing self-driving operations from applications to infrastructure, using AI / machine learning (ML) based performance and capacity optimization
- **vRealize Automation** providing automated delivery of personalized infrastructure, applications and custom IT services.
- **vRealize Business** providing automated costing, usage metering, and service pricing of cloud infrastructure.
- **vRealize Network Insight** providing highly-available and secure network infrastructure across multi-cloud environments. It accelerates micro-segmentation planning and deployment, enables visibility across virtual and physical networks, and provides operational views to manage and scale VMware NSX® deployments.

For VDI use cases, IT organizations may integrate the VMware Horizon® suite on top of the VMware Cloud Foundation software stack.

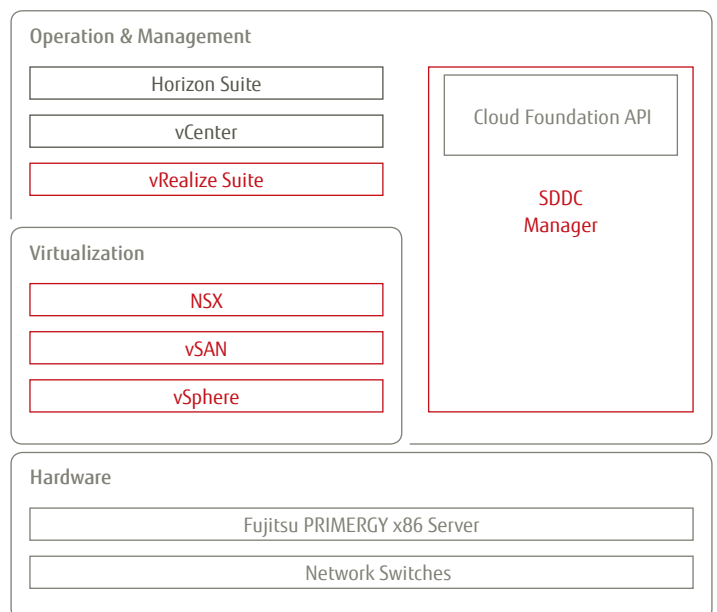
Packaging and licensing

The basic edition of VMware Cloud Foundation includes compute (vSphere Enterprise+), storage (vSAN Advanced), networking (NSX Advanced), and lifecycle automation (SDDC Manager). Higher end editions (Standard, Advanced and Enterprise) also include cloud management (vRealize Suite and vRealize Network Insight) in increasing levels of functionality. SDDC Manager can automatically deploy vRealize Automation, vRealize Operations and vRealize Log Insight as part of the Cloud Foundation standardized architecture. Customers must purchase a Cloud Foundation package that includes cloud management, or purchase vRealize Suite separately to license this functionality. For further information, please see the detailed [feature list](#).

As VMware vCenter is not included in VMware Cloud Foundation, customers are required to bring their own vCenter Server licenses to a VMware Cloud Foundation environment. The requirement is one vCenter Server license per SDDC Manager instance, regardless of the number of workload domains in the environment.

Although part of the platform deployed by Cloud Foundation, Horizon is sold and licensed separately.

PRIMEFLEX for VMware Cloud Foundation is sold on a per CPU licensing metric with a perpetual license model. For Horizon-only environments, a Cloud Foundation with Horizon package is also available, and it is licensed per concurrent user (CCU) metric. Customers who possess unused licenses for individual components (vSphere, vSAN, NSX or vRealize Suite) can use them to complete the licensing of the Cloud Foundation environment and just purchase the missing components. VMware SDDC Manager is only available through VMware Cloud Foundation. In situations where customers bring their own licenses of vSphere, vSAN and NSX, a VMware SDDC Manager license can be purchased as an upgrade.



Compute and storage infrastructure

The foundation of PRIMEFLEX for VMware Cloud Foundation is based on a hyper-converged infrastructure (vSAN Ready Nodes), which means that compute and storage for VMs are delivered from the same x86 server platform running the hypervisor. To meet varying customer requirements, Fujitsu offers a range of certified vSAN Ready Nodes (hybrid and all-flash) ensuring quick, repeatable deployments while eliminating risk of misconfiguration. All Fujitsu vSAN Ready Nodes are based on FUJITSU Server PRIMERGY dual-socket rack servers providing maximum performance when running virtual workloads, which is proven by a long track record of outstanding VMware VMmark results. As of the writing of this white paper, Fujitsu x86 servers are leading in 70% of all VMmark 2.x benchmark categories and continue to lead in VMmark 3.

Virtual compute

The market-leading VMware vSphere Enterprise Plus software serves as the virtualization layer enabling VMware vMotion®, Distributed Resource Scheduler®, High Availability and Network IO Controller and many more features. While SDDC Manager builds and manages the virtualization environment, administrators continue to have full administrative access to the ESXi™ hypervisor and vCenter.

Virtual storage

VMware vSAN is a distributed layer of software that runs natively as a part of the ESXi hypervisor. vSAN aggregates local or direct-attached capacity devices of a host cluster and creates a single storage pool shared across all hosts in the vSAN cluster. While supporting VMware features that require shared storage, such as HA, vMotion, and DRS, vSAN simplifies storage configuration and virtual machine provisioning activities when compared to external storage options. Based on simplified availability and performance policies, the SDDC Manager provisions and configures VMware vSAN. For additional flexibility, Ethernet-based external storage may be connected through the data center network – just visible to ESX hosts, but not managed by SDDC Manager.



Network infrastructure

Physical network design

From a physical network point of view, PRIMEFLEX for VMware Cloud Foundation includes a prescriptive network design within and across racks. The design requires a leaf-spine topology involving Top of Rack (ToR) and inter-rack switches. This network architecture offers a number of benefits in the modern data center, such as scale-out networking design, lower latency between hosts and reduction in congestion points compared to three-tier architectures. Isolation from the existing corporate network provides a well-defined single point of attachment to the existing corporate network to carry north-bound traffic and enforce security and access control policies.

Each rack contains two Extreme Networks® ExtremeSwitching™ VDX 6740 ToR switches, which control intra-rack network connectivity and traffic to the existing data center network. With scale out across multiple racks, east-west traffic is fully self-contained. Connectivity between racks is provided by using two Extreme Networks® ExtremeSwitching™ VDX 6940-36Q inter-rack switches. If a management network is required an optional Extreme Networks® ExtremeSwitching™ VDX 6740T-1G may be integrated in each rack.



Virtual network

VMware NSX is a software networking and security virtualization platform that delivers the operational model of a virtual machine for the network. Virtual networks reproduce the Layer2 - Layer7 network model in software, allowing complex multi-tier network topologies to be created and provisioned programmatically in seconds. NSX also provides a new model for network security. Security profiles are distributed to and enforced by virtual ports and move with virtual machines. NSX includes a library of logical networking services – logical switches, logical routers, logical firewalls, logical load balancers, logical VPN and distributed security. SDDC Manager deploys and configures these logical networking services. For example, in VDI deployments, SDDC Manager enables micro-segmentation to secure each virtual desktop from unauthorized access or the spreading of network-based worms. Virtual networks are programmatically provisioned and managed independent of networking hardware. This decoupling from hardware introduces agility, speed and operational efficiency that can transform data center operations.

Management

While SDDC Manager serves as the centralized management interface for the logical infrastructure, Fujitsu Software Infrastructure Manager (ISM) provides organizations with an integrated view and control over the entire hardware infrastructure across servers, storage and network devices.

- Compared to siloed management software solutions, ISM delivers:
- 23 times faster trouble shooting with centralized monitoring of all devices
 - 90% cost and time reduction with unified management of firmware updates
 - 50% reduction in power consumption using the group power capping function

→ For more information on Fujitsu Infrastructure Manager, [click here](#).

Backup

A data copy within the same virtualized environments doesn't protect the data against disaster, system failure, data corruption or deletion. Therefore, it is mandatory to store business-critical production data on a separate backup solution. FUJITSU Storage ETERNUS CS200c with integrated Commvault software is ideally suited to protect data of virtual environments (traditional, converged or hyper-converged). ETERNUS CS200c is an all-in-one backup solution including the right-sized Fujitsu hardware, Commvault software and the necessary licenses for the various capacity requirements. The industry-leading Commvault software is perfectly aligned with powerful Fujitsu technology in order to deliver the right performance for the selected capacity range. The out-of-the-box solution is suited for the backup and archive data of business applications and virtualized environments, and especially for all-in-one hyper-converged infrastructures like PRIMEFLEX for VMware Cloud Foundation.

- **Fast and easy setup – ready to go**
The pre-loaded, pre-configured and customizable solution is ready to go, right out of the box. ETERNUS CS200c enables the hassle-free setup of a comprehensive backup and archiving environment in less than 30 minutes from power-up to backup (depending on the customer environment). The appliance reduces the implementation time by up to 60% versus do-it-yourself implementations.
- **Automated VM backup and recovery**
ETERNUS CS200c provides comprehensive functionality for physical and virtual environments including backup, archiving, deduplication, disaster recovery, replication, snapshot, tape and cloud support. Integrated Commvault software leverages deep integration into the virtual infrastructure to deliver advanced data management capabilities and automate the protection of VMs. The solution protects all of your VMs quickly and unifies the data protection of physical and virtual environments. Policy-based auto-protection of virtual machines ensures that no VM will be at risk. The recovery of mission-critical applications is fast and simple.

- **Rich life cycle management capabilities for VMs**
Administrators can define storage policies to include or exclude VMs for data protection, shut down VMs, relocate VMs to secondary storage or to automatically archive stale VMs. In addition, you can optimize recovery and retention of files, virtual machines, and virtualized applications. The software provides user-friendly self-service access to the data of virtual machines making the data management much simpler. The user can create, manage and recover VMs across the entire life cycle.
- **Powerful scalability and flexibility**
The ETERNUS CS200c backup solution offers a broad range of scale-and performance-optimized models to meet the needs of small to large enterprise data centers. The appliance supports plug and play scalability without having to reconfigure your environment. You can add storage capacity (disk, tape, or in the cloud), advanced software capabilities or combine multiple appliances depending on your growing needs. The ETERNUS CS200c features native support of more than 30 cloud platforms (i. e. Microsoft Azure, Amazon, OpenStack and VMware clouds). This simple, cost-effective expandability enables future data growth and delivers investment protection.

→ For more information on ETERNUS CS200c, [click here](#).



Key features and capabilities

Natively Integrated Software-Defined Stack

PRIMEFLEX for VMware Cloud Foundation is an engineered integration into a single solution of the entire software-defined stack with guaranteed interoperability, freeing organizations from dealing with complex interoperability matrixes.

High scalability

Based on a scale-out, hyper-converged architecture, a PRIMEFLEX for VMware Cloud Foundation implementation can start as small as eight 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 eight full racks per SDDC Manager instance. This enables IT organizations to better align CAPEX spend with business needs.

Enterprise-Grade Services

PRIMEFLEX for VMware Cloud Foundation is based on market-leading VMware technologies: VMware vSphere (compute), VMware vSAN (storage), VMware NSX® (networking and security), and vRealize® Suite (cloud management), delivering enterprise ready services for both traditional and containerized apps.

Storage Elasticity and High Performance

PRIMEFLEX for VMware Cloud Foundation is built on VMware's leading hyper-converged architecture (VMware vSAN™) with all flash performance and enterprise-class storage services including deduplication, compression and erasure coding, delivering elastic storage and drastically simplifying storage management.

Self-Driving Operations

PRIMEFLEX for VMware Cloud Foundation enables self-driving operations (vRealize Operations™, vRealize Log Insight™) from applications to infrastructure to help organizations plan, manage and scale their SDDC efficiently. Users can perform application-aware monitoring and troubleshooting along with automated proactive workloads management, balancing and remediation.

Self-Service Automation

PRIMEFLEX for VMware Cloud Foundation delivers automation of IT service provisioning and day 2 operational capabilities across a hybrid cloud (VMware vRealize Automation™). Customers can model a complete infrastructure stack in the form of blueprints (templates) that bind compute, storage, networking and security resources. The blueprints embed both automation and policy, and when executed will automatically orchestrate the provisioning and lifecycle of all the components in the blueprint, and enforce access and security.

Built-in Intrinsic Security

PRIMEFLEX for VMware Cloud Foundation delivers end-to-end security for all applications by delivering network-level micro-segmentation, distributed firewalls and VPN, compute-level encryption for VM, hypervisor and vMotion® and storage-agnostic data at rest encryption.

Automated Lifecycle Management

PRIMEFLEX for VMware Cloud Foundation delivers simple management of your environment with built-in automation of day 0 to day 2 operations of the software platform.

- Rapid deployment – PRIMEFLEX for VMware Cloud Foundation automates the bring-up process of the entire software platform, including deployment of infrastructure VMs, creation of the management cluster, configuration of storage, cluster creation and provisioning.
- Simplified patching and upgrades – PRIMEFLEX for VMware Cloud Foundation enables a simplified patching/upgrading process of the software platform (including VMware vCenter Server®). Cloud admins have the flexibility to choose the timing and scope of the updates.
- Infrastructure cluster provisioning - Enables on-demand provisioning of isolated infrastructure clusters to enable workload separation.

Main use cases

Cloud Infrastructure

With PRIMEFLEX for VMware Cloud Foundation, customers have a solution to run a fully virtualized 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.

IT Automation

By integrating cloud management services, customers can automate the infrastructure and application delivery with self-service capabilities and day 2 operational capabilities across private and public cloud. PRIMEFLEX for VMware Cloud Foundation provides performance management, capacity optimization, and real-time log analytics and IT automation 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.

Virtual Desktop

PRIMEFLEX for VMware Cloud Foundation for VMware Horizon® delivers a complete solution for VDI deployments at scale. It simplifies the planning and design of a VDI environment.

Hybrid Cloud

PRIMEFLEX for VMware Cloud Foundation gives customers the flexibility to run the same platform on premises and as a service through a public cloud provider. Organizations can build a true hybrid cloud with common infrastructure and consistent operational model, connecting on- and off-premises data centers to make them compatible, stretched and distributed.

Conclusion

PRIMEFLEX for VMware Cloud Foundation enables customers to transition with confidence to a new IT infrastructure based on a Software-Defined Data Center architecture that's more responsive while delivering increased operational efficiency, productivity and reduced TCO. By choosing Fujitsu for your Software-Defined Data Center project, you will profit from Fujitsu's strategic partnership with VMware and a track record of over a decade in deploying large VMware infrastructure projects.

With Fujitsu you get:

- The most powerful VMware virtualization platform based on Fujitsu x86-servers, which have been leading 70% of all VMmark 2.x benchmark categories and continue to lead in VMmark 3
- A trusted platform that is engineered, manufactured, managed, supported and sustained as ONE product
- Turnkey factory-integrated delivery that significantly mitigates deployment risk
- First-class support with a single point of contact for support covering the complete hardware and software stack
- The experience of a global technology and service provider that has a 30+ years track record in deploying and operating large data center infrastructures running over 100 data centers worldwide

PRIMEFLEX for VMware Cloud Foundation is part of the FUJITSU Integrated System PRIMEFLEX® portfolio, a family of pre-defined, pre-integrated and pre-tested combinations of data center components from Fujitsu and its leading technology partners. Based on proven reference architectures and factory-integrated ready-to-run deployment options, PRIMEFLEX helps customers introduce new IT services or modernize existing IT infrastructures quickly without spending valuable staff resources on tedious procurement, integration of servers, storage, network connectivity and software, as well as testing and deployment tasks. PRIMEFLEX is supported by flexible service options throughout all phases of a system's life cycle and covers a broad range of virtualization, cloud, big data, high-performance analytics and SAP use cases. For information about FUJITSU Integrated System PRIMEFLEX, please see: www.fujitsu.com/primeflex



Published by
Fujitsu Technology Solutions GmbH
Mies-van-der-Rohe-Strasse 8
D-80807 Munich

2019-02-13 WW EN

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