

Desktop-as-a-Service for Service Provider 2000-Seat Virtual Desktop Infrastructure

Citrix XenDesktop/XenApp 7.5 built on Cisco UCS B200-M3 Blades with EMC VNX5600 and VMware vSphere 5.5 Last Updated: April 8, 2015



Building Architectures to Solve Business Problems





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Desktop-as-a-Service for Service Provider 2000-Seat Virtual Desktop Infrastructure

About this Document

This document provides a Reference Architecture for a 2000-Seat Virtual Desktop Infrastructure using Citrix XenDesktop 7.5 built on Cisco UCS B200-M3 blades with an EMC VNX5600 and the VMware vSphere ESXi 5.5 hypervisor platform.

Audience

This document is designed for use by the Desktop as a Service deployment and management technical team at the Cisco-Citrix-EMC Service Provider.

Business executives in the Service Provider organization can gain an overall understanding of the solutions components and the system architecture in the early sections of the Cisco Validated Design.

Overview

The landscape of desktop virtualization is changing constantly. New, high performance Cisco UCS Blade Servers and Cisco UCS unified fabric combined with the latest generation EMC VNX arrays result in a more compact, more powerful, more reliable and more efficient platform.

In addition, the advances in the Citrix XenDesktop 7.5 system, which now incorporates both traditional hosted virtual Windows 7 or Windows 8 desktops, hosted applications and hosted shared Server 2008 R2 or Server 2012 R2 server desktops (formerly delivered by Citrix XenApp,) provide unparalleled scale and management simplicity while extending the Citrix HDX FlexCast models to additional mobile devices

This document provides the architecture and design of a virtual desktop infrastructure for 2000 mixed use-case users. The infrastructure is 100% virtualized on VMware ESXi 5.5 with third-generation Cisco UCS B-Services B200 M3 blade servers booting via Fiber Channel from an EMC VNX5600 storage array. The virtual desktops are powered using Citrix Provisioning Server 7.1 and Citrix XenDesktop 7.5, with a mix of hosted shared desktops (90%) and pooled Server Virtual Desktops (ServerVDI) desktops

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(10%) to support the user population. Where applicable, the document provides best practice recommendations and sizing guidelines for customer deployments of Citrix DaaS Solution on the Cisco Unified Computing System.

Multi-Tenant DaaS Architecture

As mobile technologies have become pervasive, businesses are looking to take advantage of Bring

Your Own Device (BYOD) and anywhere computing workstyles. User mobility is a compelling force behind the increase in Desktop-as-a-Service (DaaS) initiatives that are creating new and growing opportunities for Cisco Powered[™] Cloud, Citrix[®] and EMC Service Provider Partners.

Employees that have ubiquitous access are more productive, responsive, and collaborative since they can work wherever and whenever it's convenient-at home, on the road, and in the office. Employees that have ubiquitous access are more productive, responsive, and collaborative since they can work wherever and whenever it's convenient-at home, on the road, and in the office.

To help providers rapidly deploy DaaS functionality and manage it at cloud scale, Cisco and Citrix engineers have validated this new reference architecture that is hosted on the Cisco Unified Data Center (UDC) architecture. On this scalable and cost-effective platform, the architecture delivers high user densities, outstanding End-User experience, proven Cisco network reliability and security, and easy deployment and manageability, while providing a rich mobile user experience.

Benefits Service Providers will gain by deploying this solution include:

- Simplified administration and management
- Intuitive infrastructure management and low total cost of ownership (TCO)
- Support for a variety of multi-tenancy isolation models
- Easy platform expansion
- Exceptional simplicity for provisioning and onboarding
- Optimized user experience.

Summary of Main Findings

The combination of technologies from Cisco Systems, Inc, Citrix Systems, Inc, VMware and EMC produced a highly efficient, robust and scalable 2000 seat mixed Desktop as a Service Infrastructure delivering outstanding end-user experience with the following concurrently running workloads:

- 200 Citrix XenDesktop 7.5 Server VDI Desktops using Windows Server 2012 R2
- 1800 Citrix XenDesktop 7.5 Hosted Shared Desktops.
- 10 Separate DaaS Tenants provisioned and running simultaneously.

The combined power of the Cisco Unified Computing System, Nexus switching and EMC storage hardware, VMware ESXi 5.5, Citrix XenDesktop 7.5, Citrix App Orchestrator 2.5, Citrix CloudPortal Services Manager and Cisco UCS Director produces a high-density per blade and per chassis mixed workload Virtual Desktop delivery system with the following:

• 14 Cisco UCS B200 M3 half-width blades with dual 10-core processors, 256GB of 1600 MHz memory that boot from SAN and house PVS write-cache were able to successfully run 2000 desktops spread across 10 different tenants ranging from a public shared model to private, isolated models.

- 2 Cisco UCS B200 M3 half-width blades with dual 10-core processors, 256GB of 1600 MHZ memory were able to handle all tenant infrastructure VMs (i.e. Active Directory, DNS, SQL, Citrix components)
- Pure Virtualization: We continue to present a validated design that is 100% virtualized on ESXi 5.5. All of the Windows Server 2012 R2 virtual desktops and supporting infrastructure components, including Active Directory, Profile Servers, Provisioning Servers, SQL Servers, and XenDesktop delivery controllers were hosted as virtual servers.
- We maintain our industry leadership with our new Cisco UCS Manager 2.2(2c) software that makes scaling simple, consistency guaranteed and maintenance simple. Combined with UCS Central, our Cisco UCS management scope extends to over 100,000 virtual desktops.
- Our 10G unified fabric story gets additional validation on second generation Cisco UCS 6200 Series Fabric Interconnects and second generation Nexus 5500 Series access switches as we run more challenging workload testing, maintaining unsurpassed user response times.
- EMC's VNX 5600 system provides storage consolidation and outstanding efficiency. Both block and NFS storage resources were provided by a single system.
- EMC's Fast Cache technology delivers predictable performance and continuous availability for end user computing environment ensuring a rich end user experience while enforcing compliance, data security, high- availability, and increasing IT productivity.
- EMC delivers simplified management to an End User Computing infrastructure through Unisphere for ease of configuration and management, plug-in technologies for simplified desktop provisioning, and integrations that deliver rich metrics for monitoring your VNX storage platform.
- Citrix HDX technology, extended in XenDesktop 7.5 software, provides excellent performance with host-rendered flash video and other demanding applications.
- Citrix XenDesktop 7.5 extends the flexibility of the solution design by adding hosted shared server desktops and Server VDI desktops.

Solution Component Benefits

Each of the components of the overall solution materially contributes to the value of functional design contained in this document.

Benefits of Cisco Unified Computing System

Cisco Unified Computing System[™] is the first converged data center platform that combines industry-standard, x86-architecture servers with networking and storage access into a single converged system. The system is entirely programmable using unified, model-based management to simplify and speed deployment of enterprise-class applications and services running in bare-metal, virtualized, and cloud computing environments.

Benefits of the Unified Computing System include:

Architectural flexibility

- · Cisco UCS B-Series blade servers for infrastructure and virtual workload hosting
- Cisco UCS 6200 Series second generation fabric interconnects provide unified blade, network and storage connectivity
- Cisco UCS 5108 Blade Chassis provide the perfect environment for multi-server type, multi-purpose workloads in a single containment

Infrastructure Simplicity

- · Converged, simplified architecture drives increased IT productivity
- Cisco UCS management results in flexible, agile, high performance, self-integrating information technology with faster ROI
- Fabric Extender technology reduces the number of system components to purchase, configure and maintain
- Standards-based, high bandwidth, low latency virtualization-aware unified fabric delivers high density, excellent virtual desktop user-experience

Business Agility

- Model-based management means faster deployment of new capacity for rapid and accurate scalability
- Scale up to 20 Chassis and up to 160 blades in a single UCS management domain
- Scale to multiple UCS Domains with Cisco UCS Central within and across data centers globally
- Leverage UCS Management Packs for VMware vCenter 5.5 for integrated management

Benefits of Cisco Nexus Physical Switching

The Cisco Nexus product family includes lines of physical unified port layer 2, 10 GB switches, fabric extenders, and virtual distributed switching technologies. In our study, we utilized Cisco Nexus 5548UP physical switches and Cisco Nexus 1000V distributed virtual switches to deliver amazing end user experience

Cisco Nexus 5548UP Unified Port Layer 2 Switches

The Cisco Nexus 5548UP Switch delivers innovative architectural flexibility, infrastructure simplicity, and business agility, with support for networking standards. For traditional, virtualized, unified, and high-performance computing (HPC) environments, it offers a long list of IT and business advantages, including:

Architectural Flexibility

- Unified ports that support traditional Ethernet, Fiber Channel (FC), and Fiber Channel over Ethernet (ISCSI)
- Synchronizes system clocks with accuracy of less than one microsecond, based on IEEE 1588
- Offers converged Fabric extensibility, based on emerging standard IEEE 802.1BR, with Fabric Extender (FEX) Technology portfolio, including the Nexus 1000V Virtual Distributed Switch

Infrastructure Simplicity

- Common high-density, high-performance, data-center-class, fixed-form-factor platform
- Consolidates LAN and storage
- Supports any transport over an Ethernet-based fabric, including Layer 2 and Layer 3 traffic
- Supports storage traffic, including iSCSI, NAS, FC, RoE, and IBoE
- Reduces management points with FEX Technology

Business Agility

- Meets diverse data center deployments on one platform
- · Provides rapid migration and transition for traditional and evolving technologies
- · Offers performance and scalability to meet growing business needs

Specifications At-a-Glance

- A 1 -rack-unit, 1/10 Gigabit Ethernet switch
- 32 fixed Unified Ports on base chassis and one expansion slot totaling 48 ports
- The slot can support any of the three modules: Unified Ports, 1/2/4/8 native Fiber Channel, and Ethernet or ISCSI
- Throughput of up to 960 Gbps.

Cisco Nexus 1000V Distributed Virtual Switch

Get highly secure, multitenant services by adding virtualization intelligence to your data center network with the Cisco Nexus 1000V Switch for VMware vSphere. This switch:

- · Extends the network edge to the hypervisor and virtual machines
- Is built to scale for cloud networks
- Forms the foundation of virtual network overlays for the Cisco Open Network Environment and Software Defined Networking (SDN)

Important differentiators for the Cisco Nexus 1000V for VMware vSphere include:

- Extensive virtual network services built on Cisco advanced service insertion and routing technology
- Support for vCloud Director and vSphere hypervisor
- · Feature and management consistency for easy integration with the physical infrastructure
- Exceptional policy and control features for comprehensive networking functionality
- Policy management and control by the networking team instead of the server virtualization team (separation of duties)

Use Virtual Networking Services

The Cisco Nexus 1000V Switch optimizes the use of Layer 4 - 7 virtual networking services in virtual machine and cloud environments through Cisco vPath architecture services.

Cisco vPath 2.0 supports service chaining so you can use multiple virtual network services as part of a single traffic flow. For example, you can simply specify the network policy, and vPath 2.0 can direct traffic:

- Through the Cisco ASA1000V Cloud Firewall for tenant edge security
- Through the Cisco Virtual Security Gateway for Nexus 1000V Switch for a zoning firewall

In addition, Cisco vPath works on VXLAN to support movement between servers in different Layer 2 domains. Together, these features promote highly secure policy, application, and service delivery in the cloud.

Benefits of EMC VNX5600 Storage Arrays

The EMC VNX flash-optimized unified storage platform delivers innovation and enterprise capabilities for file, block, and object storage in a single, scalable, and easy-to-use solution. Ideal for mixed workloads in physical or virtual environments, VNX combines powerful and flexible hardware with advanced efficiency, management, and protection software to meet the demanding needs of today's virtualized application environments.

VNX storage includes the following components:

- Host adapter ports (for block)-Provide host connectivity through fabric into the array.
- Data Movers (for file)-Front-end appliances that provide file services to hosts (optional if providing CIFS/SMB or NFS services).
- Storage processors (SPs)-The compute component of the storage array. SPs handle all aspects of data moving into, out of, and between arrays.
- Disk drives-Disk spindles and solid state drives (SSDs) that contain the host/application data and their enclosures.

Note

The term Data Mover refers to a VNX hardware component, which has a CPU, memory, and input/output (I/O) ports. It enables the CIFS (SMB) and NFS protocols on the VNX array.

EMC Next-Generation VNX Series

Next-generation VNX includes many features and enhancements designed and built upon the first generation's success. These features and enhancements include:

- More capacity with multicore optimization with multicore cache, multicore RAID, and multicore FAST Cache (MCx[™])
- Greater efficiency with a flash-optimized hybrid array
- Better protection by increasing application availability with active/active
- Easier administration and deployment with the new Unisphere® Management Suite

VSPEX is built with next-generation VNX to deliver even greater efficiency, performance, and scale than ever before.

Flash-Optimized Hybrid Array

VNX is a flash-optimized hybrid array that provides automated tiering to deliver the best performance to your critical data, while intelligently moving less frequently accessed data to lower-cost disks.

In this hybrid approach, a small percentage of flash drives in the overall system can provide a high percentage of the overall IOPS. Flash-optimized VNX takes full advantage of the low latency of flash to deliver cost-saving optimization and high performance scalability. EMC Fully Automated Storage Tiering Suite (FAST Cache and FAST VP) tiers both block and file data across heterogeneous drives and boosts the most active data to the flash drives, ensuring that customers never have to make concessions for cost or performance.

Data generally is accessed most frequently at the time it is created; therefore, new data is first stored on flash drives to provide the best performance. As the data ages and becomes less active over time, FAST VP tiers the data from high-performance to high-capacity drives automatically, based on

customer-defined policies. This functionality has been enhanced with four times better granularity and with new FAST VP solid-state disks (SSDs) based on enterprise multilevel cell (eMLC) technology to lower the cost per gigabyte.

FAST Cache uses flash drives as an expanded cache layer for the array to dynamically absorb unpredicted spikes in system workloads. Frequently accessed data is copied to the FAST Cache in 64 KB increments. Subsequent reads and/or writes to the data chunk are serviced by FAST Cache. This enables immediate promotion of very active data to flash drives. This dramatically improves the response times for the active data and reduces data hot spots that can occur within the LUN.

All VSPEX use cases benefit from the increased efficiency provided by the FAST Suite. Furthermore, VNX provides out-of-band, block-based deduplication that can dramatically lower the costs of the flash tier.

VNX Intel MCx Code Path Optimization

The advent of flash technology has been a catalyst in making significant changes in the requirements of midrange storage systems. EMC redesigned the midrange storage platform to efficiently optimize multicore CPUs to provide the highest performing storage system at the lowest cost in the market.

MCx distributes all VNX data services across all cores (up to 32), as shown in Figure 1. The VNX series with MCx has dramatically improved the file performance for transactional applications like databases or virtual machines over network-attached storage (NAS).

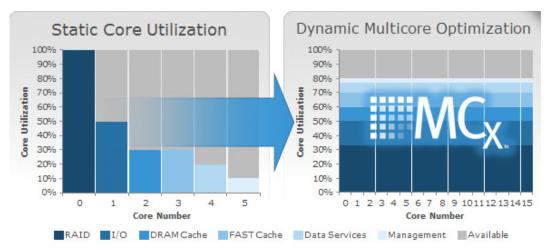


Figure 1 Next-Generation VNX with Multicore Optimization

Multicore Cache

The cache is the most valuable asset in the storage subsystem; its efficient use is the key to the overall efficiency of the platform in handling variable and changing workloads. The cache engine has been modularized to take advantage of all the cores available in the system.

Multicore RAID

Another important improvement to the MCx design is how it handles I/O to the permanent back-end storage—hard disk drives (HDDs) and SSDs. The modularization of the back-end data management processing, which enables MCx to seamlessly scale across all processors, greatly increases the performance of the VNX system.

Performance Enhancements

VNX storage, enabled with the MCx architecture, is optimized for FLASH 1st and provides unprecedented overall performance; it optimizes transaction performance (cost per IOPS), bandwidth performance (cost per GB/s) with low latency, and capacity efficiency (cost per GB).

VNX provides the following performance improvements:

- Up to four times more file transactions when compared with dual controller arrays
- Increased file performance for transactional applications (for example, Microsoft Exchange on VMware over NFS) by up to three times, with a 60 percent better response time
- Up to four times more Oracle and Microsoft SQL Server OLTP transactions
- Up to six times more virtual machines

Active/Active Array Storage Processors

The new VNX architecture provides active/active array storage processors, as shown in Figure 2, which eliminate application timeouts during path failover because both paths are actively serving I/O.



Figure 2 Active/Active Processors Increase Performance, Resiliency, and Efficiency

Load balancing is also improved, providing up to double the performance for applications. Active/active for block is ideal for applications that require the highest levels of availability and performance, but do not require tiering or efficiency services like compression, deduplication, or snapshot.



The active/active processors are available only for RAID LUNs, not for pool LUNs.

Benefits of VMware vSphere ESXi 5.5

VMware vSphere® 5.5 is the latest release of the flagship virtualization platform from VMware. VMware vSphere, known in many circles as "ESXi", for the name of the underlying hypervisor architecture, is a bare-metal hypervisor that installs directly on top of your physical server and partitions it into multiple virtual machines. Each virtual machine shares the same physical resources as the other virtual machines and they can all run at the same time. Unlike other hypervisors, all management functionality of vSphere is possible through remote management tools. There is no underlying operating system, reducing the install footprint to less than 150MB.

The following are some key features included with vSphere 5.5:

- Improved Security
- Extensive Logging and Auditing
- Enhanced vMotion
- New Virtual Hardware
- Active Directory Integration
- Centralized Management
- Stateless Firewall
- Centralized Management of Host Image and Configuration via Auto Deploy.

For more information on the vSphere ESXi hypervisor, go to:

http://www.vmware.com/products/esxi-and-esx/overview.html

Benefits of Citrix XenDesktop 7.5

Service Providers and other IT organizations are tasked with the challenge of provisioning Microsoft Windows apps and desktops while managing cost, centralizing control, and enforcing corporate security policy. Deploying Windows apps to users in any location, regardless of the device type and available network bandwidth, enables a mobile workforce that can improve productivity. With Citrix XenDesktopTM 7.5, IT can effectively control app and desktop provisioning while securing data assets and lowering capital and operating expenses.

In addition to providing a performance boost over the previous XenDesktop 7.1 version, the XenDesktop[™] 7.5 release offers these benefits:

- **Comprehensive virtual desktop delivery for any use case.** The XenDesktop 7.5 release incorporates the full power of XenApp, delivering full desktops or just applications to users. Administrators can deploy both XenApp published applications and desktops (to maximize IT control at low cost) or personalized VDI desktops (with simplified image management) from the same management console. Citrix XenDesktop 7.5 leverages common policies and cohesive tools to govern both infrastructure resources and user access.
- Simplified support and choice of BYO (Bring Your Own) devices. XenDesktop 7.5 brings thousands of corporate Microsoft Windows-based applications to mobile devices with a native-touch experience and optimized performance. HDX technologies create a "high definition" user experience, even for graphics-intensive design and engineering applications.
- Lower cost and complexity of application and desktop management. XenDesktop 7.5 helps IT organizations take advantage of agile and cost-effective cloud offerings, allowing the virtualized infrastructure to flex and meet seasonal demands or the need for sudden capacity changes. IT organizations can deploy XenDesktop application and desktop workloads to private or public clouds, including Amazon AWS, Citrix Cloud Platform, and (in the near future) Microsoft Azure.

• **Protection of sensitive information through centralization.** XenDesktop decreases the risk of corporate data loss, enabling access while securing intellectual property and centralizing applications since assets reside in the datacenter.

Benefits of Citrix App Orchestration 2.5

Citrix App Orchestration 2.5 allows CSPs to orchestrate and automate the delivery of applications and desktops in multi-tenant environments and across multiple products, sites, and datacenters. With App Orchestration, service providers can:

- Manage XenApp and XenDesktop across multiple locations, including multiple datacenters in multiple versions, sites or farms, Active Directory domains, and datacenters, from a single unified interface.
- Provide consistent configuration across global deployments spanning multiple delivery sites, eliminating configuration drift and issues.
- Define tenant
- and user affinity to deliver offerings to primary and backup locations, for optimum continuity and fault tolerance.
- Provision desktops and applications on any supported hypervisor, including VMware ESXi as in this CVD. App Orchestration can incorporate externally provisioned VMs (e.g., provisioning through Cisco UCS Director as in this architecture).

App Orchestration 2.5 provides the following features to simplify cloud-scale administration for service providers:

- Simplified management across datacenters. App Orchestration simplifies how Citrix technologies can be provisioned and deployed on virtual servers across datacenters. Given pools of XenDesktop Session Machines and Delivery Controllers, App Orchestration automatically manages capacities across multiple sites and datacenters, even managing multiple product versions and farms/sites in physically different domains.
- **Multi-tenant configuration.** Support for different types of isolation models (e.g., Session-based, Server-based, and Site-based) on a per-application or per-desktop basis. There are two areas in App Orchestration 2.5 in which you can specify isolation levels: delivery isolation and tenant StoreFront isolation.
- Simplified, secure network configuration with zero trust domains. New in App Orchestration 2.5, zero trust domains eliminate the Active Directory requirement for private tenant domains. Instead, a domain agent resides in the private tenant domain, and App Orchestration uses SSL client certificates to validate agent identity. This approach eliminates the need for various ports to be opened on the firewall, resulting in a simplified and hardened network configuration for dedicated environments.
- Quick application and desktop configuration. App Orchestration enables the harmonious configuration and integration of XenDesktop, XenApp, NetScaler, and Active Directory. This helps automate the installation of farms/sites, Session Machines and StoreFront server groups. Automatic discovery of application information (including name, icon, command line, working directory, etc.) from a XenDesktop HSD host can save valuable administrative time.
- App Orchestration web management console. App Orchestration supplies a web-based management console to control App Orchestration activities. You can use the console to monitor workflows for deployment actions, such as creating Delivery Sites or adding Session Machines.

- Easier patching of XenDesktop HSD hosts. When you create a new version of a XenDesktop HSD host, App Orchestration can automate the tasks of gradually draining users from the older version servers to the newer ones, without any downtime or manual intervention.
- **Tenant Management.** The administrator defines tenants into the system, their desired level of isolation, and assigns resources to them directly. The console allows the administrator to easily view which resources (applications, desktops, XenDesktop HSD hosts, sites, etc.) are allocated to which tenants.
- **CloudPortal Services Manager integration.** Using App Orchestration with CloudPortal Services Manager, CSPs can enable multi-tenant self-servicing of application and desktop offerings that are configured through App Orchestration. This capability empowers a degree of self-support, delegating control to the tenant administrator to manage user subscription offerings.

For CSPs unfamiliar with Citrix App Orchestration, see the App Orchestration documentation at the Citrix eDocs site:

http://support.citrix.com/proddocs/topic/app-orchestration/cao-app-orchestration-25-landing.html

Benefits of Citrix CloudPortal Services Manager

Citrix CloudPortal Services Manager (CPSM) is a self-service portal that helps providers manage the delivery of cloud services and customer offerings. It drives App Orchestration operation by associating desired states with tenants and allowing services to be provisioned to users.

CPSM provides out-of-the-box support for Desktop-as-a-Service and Windows applications (powered by Citrix XenApp and Citrix XenDesktop), as well as popular business applications and services like Microsoft Exchange, Office, SharePoint, Lync, web and data hosting, and virtualization service management. Customers and sub-customers (for example, such as a reseller's customers) that lack IT expertise can add or change services, view reports, manage users, and perform day-to-day administration tasks through the self-service interface.

The integration of Citrix CloudPortal Services Manager and App Orchestration allows providers to scale their subscriber base while using the existing support staff, helping to increase provider profit margins.

DaaS Architectural Overview

This reference architecture enables Citrix Service Providers to deliver Windows applications and desktops as Desktop-as-a-Service (DaaS) through an integrated set of Citrix and partner technologies:

- Citrix XenDesktop unifies the delivery of hosted applications and desktops (XenApp) with virtual desktops (XenDesktop) using a single architecture and management experience.
- Citrix App Orchestration allows CSPs to automate and manage, at a high scale, the delivery of DaaS offerings in a multi-tenant environment.
- CloudPortal Services Manager supplies a portal to manage service delivery and subscriber offerings. It supports delegated management roles that enable down-channel partners and tenant administrators to self-provision and monitor provisioning requests.

Key Architectural Modules

Figure 3 illustrates the architecture for the DaaS software solution can be divided into four logical modules: (1) Infrastructure-as-a-Service (IaaS), (2) Multi-Tenant Citrx Farms and Sites, (3) Dashboards and Management, and (4) Endpoints and Offices.

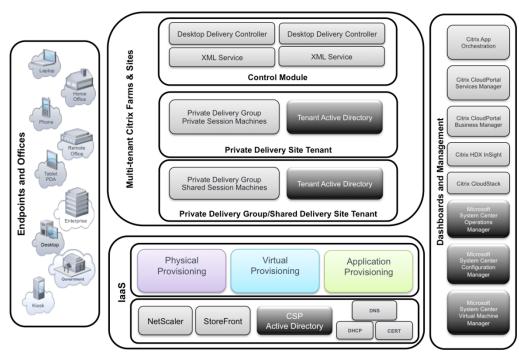


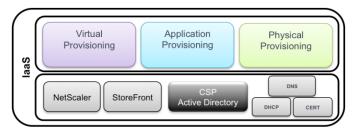
Figure 3 Four Architectural Modules of the Daas Logical Architecture

Infrastructure-as-a-Service (IaaS) Module

The foundation of the architecture is the Infrastructure-as-a-Service (IaaS) module, which is responsible for network, authentication, and provisioning functions (Figure 4). It has two sub-layers:

- Network infrastructure, including the implementation of Active Directory domains
- · Provisioning infrastructure, including virtual, application, and physical provisioning

Figure 4 Infrastructure-as-a-Service (IaaS) Module



The IaaS module controls the system-wide network configuration, forest-level Active Directory management, remote access, and all layers of provisioning.

Multi-Tenant Citrix Farms and Sites Module

The Multi-Tenant Citrix Farms and Sites module (Figure 5) is the core component of the service provider datacenter — this logical block controls application and desktop delivery within the multi-tenant architecture.



In the unified XenDesktop 7.5 release, a "site" rather than a "farm" is the main XenDesktop environment consisting of Delivery Controllers and a database used to deliver both XenApp and XenDesktop services.

Within a multi-tenant datacenter, applications and desktops are virtualized and subscriber partitions and Active Directory boundaries are defined, while centralized XenDesktop Delivery Controllers govern application and desktop delivery across tenants.

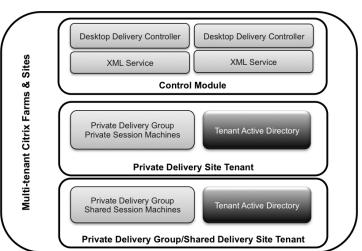
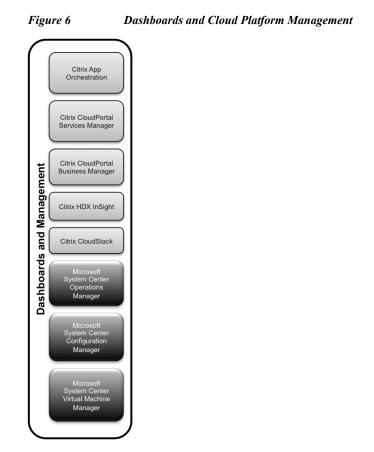


Figure 5 Multi-Tenant Citrix Farms and Sites

Dashboards and Cloud Platform Management Module

To successfully manage a service provider network, administrators need effective tools that are simple to use and scale efficiently as they add new tenants. Along with Cisco UCS Manager, Citrix App Orchestration and Citrix CloudPortal Services Manager enable a unified view across the entire infrastructure, across multiple datacenters, XenDesktop and XenApp sites, and servers. This end-to-end view gives providers the detailed information and wide spectrum of control necessary to provision applications and quickly and maintain service level agreements for subscribers. Additional tools such as HDX Insight and the Citrix Usage Collector also facilitate ease of management. The Citrix documentation http://www.citrix.com/edocs describes App Orchestration and CloudPortal Services Manager management capabilities in more detail.



Endpoints and Offices Module

When applications, desktops and data are delivered as a service, the user is the ultimate judge of the endpoint experience. Service providers must deliver a consistent experience across a range of network bandwidths and devices to build and expand the subscriber base. Citrix Receiver and HDX technologies are the strategic components that make this possible.

With Citrix Receiver, CSPs have complete control over security, performance, and user experience with no need to own or manage the physical device or its location. Users simply install Citrix Receiver on their own device to gain access to their desktop and all of their business, web, Software-as-a-Service (SaaS), and native mobile applications.

With the introduction of Citrix's next-generation seamless application capabilities, applications that must execute on the endpoint device can now be presented within a user's cloud-hosted desktop. This capability enables 100% application compatibility within the CSP solution while also providing a smooth transition over time for application migrations from legacy endpoints and datacenters into the CSP hosted datacenter.

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Figure 7

Endpoints and Offices Module

Key Concepts

The reference architecture uses the following key concepts to deliver DaaS in a multi-tenant environment.

Delivery Sites and Delivery Groups

App Orchestration uses Delivery Sites and Delivery Groups to isolate the provisioning of application and desktop services in this reference architecture:

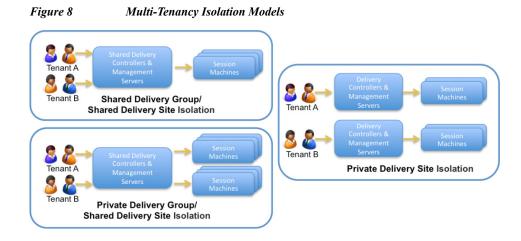
- Delivery Sites. A Delivery Site is the core environment that contains the XenDesktop Delivery Controllers and the SQL Database used to deploy XenApp and XenDesktop services. Delivery Sites provision desktops and applications to users through App Orchestration.
- Delivery Group. A Delivery Group is a container for one or more virtual machines used to deliver applications and desktops to a specific group of users. A Delivery Group is associated with a shared or private Delivery Site. A Delivery Group can be shared among tenants or dedicated to a specific tenant, according to the isolation level of the subscriptions it is hosting.

When you create App Orchestration offerings, you choose a means of isolation for tenants who subscribe to the app or desktop. The isolation level refers to whether the Delivery Controllers and Session Machines used for the offering are shared with other tenants or private to the subscribing tenant.

Multi-Tenancy Isolation Models

Multi-tenancy capabilities provide economies of scale on a single infrastructure while providing the required isolation and data protection. Providers can make trade-offs regarding price and features to meet individual tenant requirements.

The three common multi-tenancy isolation models used in the market today — Shared Delivery Group/Shared Delivery Site, Private Delivery Group/Shared Delivery Site, and Private Delivery Group/Private Delivery Site — differ according to the type of isolation they employ (Figure 8). In a Shared Delivery Group/Shared Delivery Site, both the session machines and the delivery site are shared with other tenants. In a Private Delivery Group/Shared Delivery Site, session machines are private, but the delivery site is shared. In a Private Delivery Group/Private Delivery Site, both the session machines and the delivery site are private, and not available to other tenants. All three multi-tenant approaches can be delivered from the provider's datacenters.



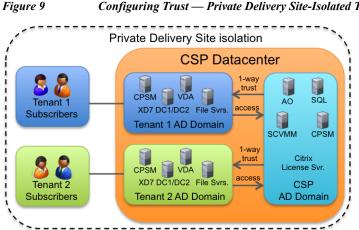
Tenant Domains

A domain contains machines hosting tenants' resources, users, or both. A domain can be either shared or private. A shared resource domain contains machines that that host resources for multiple tenants. In contrast, a private domain contains machines hosting resources for a single tenant.

Configuring Trust

In a previous version of the DaaS reference architecture (based on App Orchestration 2.1), one-way trust relationships were configured to permit access to CSP resources external to a Private Delivery Site tenant's Active Directory (AD) domain.

Figure 9 illustrates the CSP Management domain featured a 1-way, non-transitive trust with Private Delivery Site tenant domains to allow those tenants to access resources within the CSP domain.



Configuring Trust — Private Delivery Site-Isolated Tenants

To simplify DaaS configurations with isolated private domains, App Orchestration 2.5 includes a Zero Trust Agent that provides the ability to manage all shared components from a single management domain (without requiring Active Directory one-way trusts to a private tenant domain). The Zero Trust Agent establishes a secure SSL encrypted communication channel to the App Orchestration configuration server and authenticates using SSL certificates. This feature provides a simpler and more secure model to orchestrate resources across tenant domains using SSL-client authentication. For detailed information, go to Configuring SSL for App Orchestration 2.5" and "Deploying the Zero Trust Agent in App Orchestration 2.5.

Virtual Provisioning

Virtualization is a fundamental enabler of an efficient cloud datacenter. As a best practice, virtualizing workloads enables dynamic scale and simplifies management. VMware ESXi 5.5 was used as the hypervisor technology in this CVD. Cisco UCS Director was used to provision virtual machines for the infrastructure, HSD, and VDI services deployed in this architecture.

Application Provisioning

Application provisioning provides a key element to the dynamic assembly capabilities within the system. Dynamic assembly is the process by which separate elements are combined in real-time to present a user with their specific, familiar, and personalized environment of operating system, desktop, application, and personalization settings.

Application virtualization is one of the key enablers of dynamic assembly, separating applications from the underlying OS. This also allows lifecycle management of the application as a discreet object. A further advantage to this separation of OS and application is the ability to deliver and manage a single application image across CSP tenants, personalized for each tenant's SLA through the policies associated with that tenant's Delivery Group partition.

App Orchestration provides the means of allocating applications and desktops to subscribers based on Delivery Groups and Delivery Sites that map to specific Active Directory OUs.

Citrix StoreFront provides users an enterprise app store that aggregates offerings in one place. Each StoreFront user is able to subscribe to their favorite application and desktop resources, which can then follow the user automatically between devices. In this reference architecture, App Orchestration configures private or shared StoreFront catalogs that manage desktop and application offerings for subscribers.

Architecture

Hardware Deployed

The architecture deployed is highly modular. While each Service Provider's environment might vary in its exact configuration, once the reference architecture contained in this document is built, it can easily be scaled as requirements and demands change. This includes scaling both up (adding additional resources within a Cisco UCS Domain) and out (adding additional Cisco UCS Domains and EMC VNX Storage arrays).

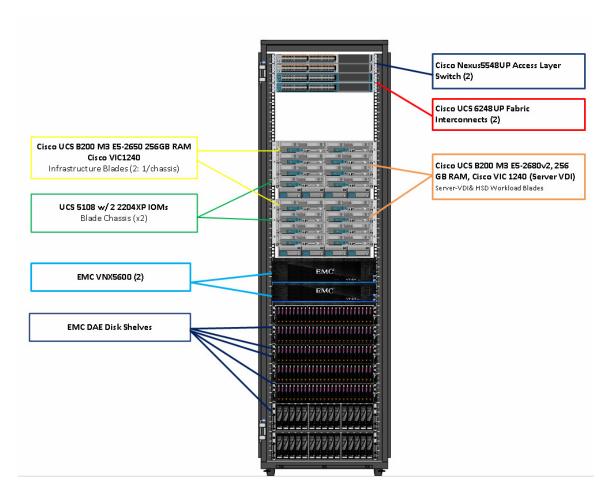
The 2000-user Citrix DaaS solution includes Cisco networking, Cisco UCS and EMC VNX storage, which fits into a single data center rack, including the access layer network switches.

This Cisco Validated Design details the deployment of the 2000-user configuration for a mixed XenDesktop workload featuring the following software:

- Citrix XenDesktop 7.5 Pooled Hosted Shared Desktops with PVS write cache on NFS storage
- · Citrix XenDesktop 7.5 Pooled Server-VDI Virtual Desktops with PVS write cache on NFS storage

- Citrix Provisioning Server 7.1
- Citrix User Profile Manager
- Citrix StoreFront 2.1
- Cisco Nexus 1000V Distributed Virtual Switch
- VMware vSphere ESXi 5.5 Hypervisor
- Microsoft Windows Server 2012 R2 virtual machine Operating Systems
- Microsoft SQL Server 2012 SP1

Figure 10 Workload Architecture



The workload contains the following hardware as shown in Figure 10:

- Two Cisco Nexus 5548UP Layer 2 Access Switches
- Two Cisco UCS 6248UP Series Fabric Interconnects
- Two Cisco UCS 5108 Blade Server Chassis with two 2204XP IO Modules per chassis
- Two Cisco UCS B200 M3 Blade servers with Intel E5-2650v2 processors, 256GB RAM, for Infrastructure of all DaaS components with N+1 server fault tolerance.
- Fourteen Cisco UCS B200 M3 Blade servers with Intel E5-2680v2 processors, 256 GB RAM, and VIC1240 mezzanine cards for the 2000 hosted shared and server VDI Windows Server 2012 server desktop workloads with N+1 server fault tolerance.
- EMC VNX5600 dual controller storage system, 10 disk shelves, 10GE ports for NFS andCIFS connectivity.
- (Not Shown) One Cisco UCS 5108 Blade Server Chassis with 3 Cisco UCS B200 M3 Blade servers with Intel E5-2650 processors, 128 GB RAM, and VIC1240 mezzanine cards for the Login VSI launcher infrastructure

Logical Architecture

The logical architecture of the validated is designed to support 2000 users within two chassis and fourteen blades, which provides physical redundancy for the chassis and blade servers for each workload.

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Figure 11 outlines the logical architecture of the test environment.

Figure 11 Logical Architecture Overview

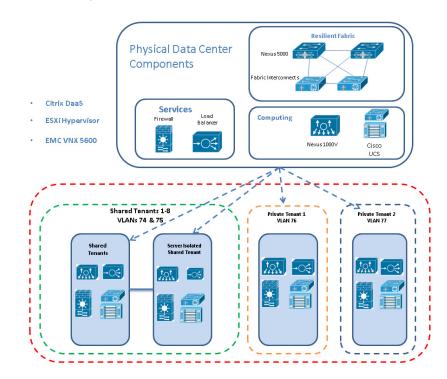


Table 1 outlines all the servers in the configurations

Table 1Infrastructure Architecture

Server Name	Location	Purpose
CH1-BL1	Physical – Chassis 1	Windows 2012 Datacenter VMs ESXi 5.5 host
		(Infrastructure Guests)
CH1-BL2,3,4	Physical – Chassis 1	XenDesktop 7.5 RDS ESXi 5.5 Hosts
CH1-BL5,6,7,8	Physical – Chassis 1	XenDesktop 7.5 HVD ESXi 5.5 Host
CH2-BL1	Physical – Chassis 2	Windows 2012 Datacenter VMs ESXi 5.5 host
		(Infrastructure Guests)
CH2-BL2,3,4	Physical – Chassis 2	XenDesktop 7.5 RDS ESXi 5.5 Hosts
CH2-BL5,6,7,8	Physical – Chassis 2	XenDesktop 7.5 HVD ESXi 5.5 Hosts
Daas-DC01	Virtual – CH1-BL1	Active Directory Domain Controller
DaaS-XDC01	Virtual – CH1-BL1	XenDesktop 7.5 controller
PVS1	Virtual – CH1-BL1	Provisioning Services 7.1 streaming server
VCENTER	Virtual – CH1-BL1	vCenter 5.5 Server
DaaS-SF01	Virtual – CH1-BL1	StoreFront Services server
SQL01	Virtual - CH1-BL1	SQL Server (clustered)
Daas-n1kv	Virtual – CH1-BL1	Nexus 1000-V VSM HA node

Desktop-as-a-Service for Service Provider 2000-Seat Virtual Desktop Infrastructure

CTXLIC	Virtual – CH1-BL1	XenDesktop 7.5 License server
N1KV-VSM-1	Virtual – CH1-BL1	Nexus 1000-V VSM HA primary node
DaaS-DC02	Virtual – CH2-BL1	Active Directory Domain Controller
DaaS-XDC02	Virtual – CH2-BL1	XenDesktop 7.5 controller
PVS2	Virtual – CH2-BL1	Provisioning Services 7.1 streaming server
DaaS-SF2	Virtual – CH2-BL1	StoreFront Services server
SQL02	Virtual – CH2-BL1	SQL Server (clustered)
N1KV-VSM-1	Virtual – CH2-BL1	Nexus 1000-V VSM HA backup node

Software Revisions

This section includes the software versions of the primary products installed in the environment.

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Vendor	Product	Version
Cisco	UCS Component Firmware	2.2(2c)
Cisco	UCS Manager	2.2(2c)
Cisco	Nexus 1000V for VSphere	4.2(1)SV2(2.2)
Citrix	XenDesktop	7.5.0.4033
Citrix	Provisioning Services	7.1.0.4022
Citrix	StoreFront Services	2.1.0.17
Citrix	Netscaler Appliance	10.1 Build 128.8
Citrix	App Orchestrator	2.5
Citrix	Cloud Portal Services Manager	11.1
Citrix	Netscaler	10.1 Build 128.8
VMware	vCenter	5.5.0 Build 1476327
VMware	vSphere ESXi 5.5	5.5.0 Build 1746018
EMC	VAAI Plugin	1.0-11
EMC	Power Path for VMware	5.9 SP1 Build 011
EMC	VNX Block Operating System	05.33.000.5.051
EMC	VNX File Operating System	8.1.2-51

Table 2	Software Revision
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Configuration Guidelines

The 2000 User Citrix DaaS Solution Provider design described in this document provides details for configuring a fully redundant, highly-available configuration. Configuration guidelines are provided that refer to which redundant component is being configured with each step, whether that be A or B. For example Nexus A and Nexus B identify the pair of Cisco Nexus switches that are configured. The Cisco UCS Fabric Interconnects are configured similarly.

Networking and Multi-tenancy

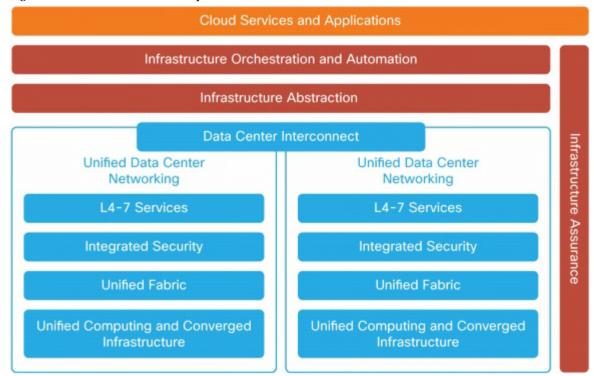
Cisco VMDC Architecture for Scalable, Secure and Resilient Infrastructure

The Cisco VMDC is a tested and validated reference architecture for the Cisco Unified Data Center. It provides a set of guidelines and best practices for the creation and deployment of a scalable, secure, and resilient infrastructure in the data center. The Cisco VMDC architecture demonstrates how to bring

together the latest Cisco routing and switching technologies, network services, data center and cloud security, automation, and integrated solutions with those of Cisco's ecosystem of partners to develop a trusted approach to data center transformation. Specific benefits include:

- Demonstrated solutions to critical technology-related problems in evolving IT infrastructure: Provides support for cloud computing, applications, desktop virtualization, consolidation and virtualization, and business continuance
- Reduced time to deployment: Provides best-practice recommendations based on a fully tested and validated architecture, helping enable technology adoption and rapid deployment
- Reduced risk: Enables enterprises and service providers to deploy new architectures and technologies with confidence
- Increased flexibility: Enables rapid, on-demand, workload deployment in a multitenant environment using a comprehensive automation framework with portal-based resource provisioning and management capabilities
- Improved operating efficiency: Integrates automation with a multitenant pool of computing, networking, and storage resources to improve asset use, reduce operation overhead, and mitigate operation configuration errors

The Cisco VMDC architecture, consisting of the Cisco Unified Data Center and Cisco Data Center Interconnect (DCI) together with other architectural components such as infrastructure abstraction, orchestration and automation, assurance, and integrated services and applications, as shown in Figure 12, provide comprehensive guidelines for deployment of cloud infrastructure and services at multiple levels.





Cisco VMDC Architecture

This section describes the primary components of the Cisco VMDC architecture:

- Modular building blocks
- Resilient network fabric
- Multilayer end-to-end security
- · Intelligent network-based services
- Efficient data center interconnection for business continuity
- Comprehensive cloud service management
- Integrated applications and services

Modular Building Blocks: Integrated Systems, Points of Delivery (PoDs), and Data Centers

The Cisco VMDC architecture builds on existing integrated system components such as VSPEX (using the Cisco UCS platform and EMC storage) and Vblock [™] Infrastructure Packages (using the Cisco UCS platform and EMC storage, integrated through the Virtual Computing Environment (VCE) coalition). In both cases, VMware software is used for virtualization; however, other hypervisors such as Microsoft Hyper-V, Red Hat KVM, and Citrix XenServer can also be used in designing basic integrated system building blocks. The Cisco VMDC architecture supports all variations.

Another modular building block of the Cisco VMDC architecture is the point of delivery (PoD), as shown in Figure 13, which contains standardized computing, storage, and networking components, as predefined integrated FlexPod or Vblock systems, and customized computing and storage systems, as needed by the deployment. The PoD concept and architecture is not limited to Cisco UCS and can be modified and extended to include other computing and storage stacks.

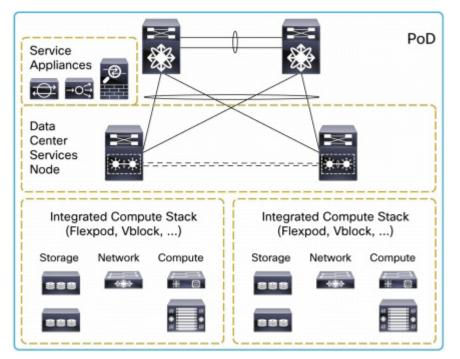


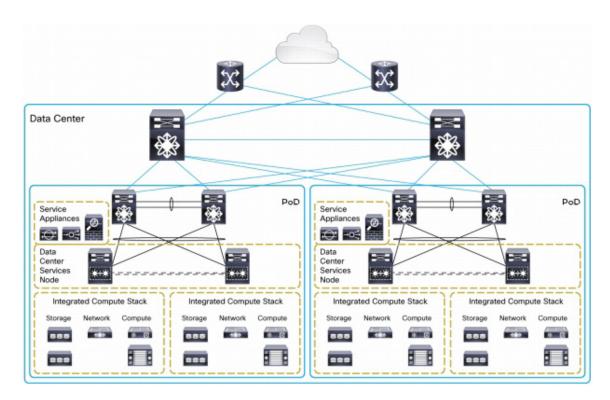
Figure 13 Point of Delivery

PoDs can contain localized network-based services such as firewalls and load balancers. PoDs can be created to house different application or service loads. Each PoD can be mapped to a class of applications, such as IT applications (print and file services, for example) or dedicated application servers (for SAP, for example). For orchestration and automation, a PoD represents a shared resource pool in a common administrative domain and can be autodiscovered by the operation software and configured for the specific defined service profile. Factors that go into PoD sizing and definition include:

- Storage capacity: Balance of computing needs to storage I/O operations per second (IOPS)
- Computing capacity: VMware vSphere cluster sizing and VMware vCenter domain management considerations
- Layer 2 scale considerations: MAC address and Address Resolution Protocol (ARP) capacity and VLAN scaling budgets
- Service insertion requirements: Scale and performance of network-based services such as load balancing and firewalling; a PoD may have its own dedicated set of load balancing and firewall service engines
- Application requirements: Requirements of specific applications; for example, some PoDs can be dedicated to VDI, and others can be dedicated to media applications
- Management requirements: Some PoDs can be dedicated to specific functions such as management

Multiple PoDs can be connected together to make up a data center, as shown in Figure 14. To design the optimal network for PoD connectivity, organizations need to consider the data center scale, network resiliency and tolerance to failure, security through traffic separation and protection, consumer and operator access control, and traffic characteristics and requirements of the applications and services that are hosted in the PoDs. The Cisco VMDC architecture provides all necessary details for these design considerations in a modular fashion, hence enabling creation of data centers that can grow and expand with ease.

Figure 14 Connecting Multiple PoDs



In addition to the basic connectivity within a data center, which may span multiple buildings in a campus or metropolitan network, the Cisco VMDC architecture specifies optimal connectivity between multiple sites that can be separated by farther distances. These specifications are part of the Cisco DCI module of Cisco VMDC. Use of resilient, secure, and efficient DCI methods enables application mobility at scale and the capacity to provide disaster recovery and business continuance.

Because the Cisco VMDC architecture is well documented, we did not include deployment steps for this flexible, modular system in this paper.

For more information on Cisco's VMDC architecture, go to:

http://www.cisco.com/c/en/us/solutions/collateral/enterprise/data-center-designs-cloud-computing/white_paper_c11-714729.html

VLAN

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The VLAN configuration recommended for the environment includes a total of eight VLANs as outlined in the Table 3.

Table 3	VLAN Configurati	on		
	VLAN	VLAN	Use	
	Name	ID		
	Default	1	Default VLAN	
	MGMT-	70	Out of Band Management Network	
	OB			

MGMT-I B	71	In Band Management Network
Storage Traffic	72	IP Storage VLAN for NFS and CIFS
vMotion	73	vMotion
Shared	74	VLAN for client machines in shared tenants
Tenant		
Clients		
Server	75	VLAN for clients in hardware isolated
Isolated		environment.
Clients		
Private	76	VLAN for all of Private Tenant 1 (Infrastructure
Tenant 1		and Clients)
Private	77	VLAN for all of Private Tenant 1 (Infrastructure
Tenant 2		and Clients)
PXE for	79	Native VLAN
UCS-D		

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VMware Clusters

We utilized four VMware Clusters in one data center to support the solution and testing environment:

- SP DaaS Service Provider DaaS
- XenDesktop RDS Clusters (Windows Server 2012 R2 hosted shared desktops)
- XenDesktop Server Virtual Desktop Cluster (Windows Server 2012 R2 ServerVDI)
- Infrastructure Cluster (vCenter, Active Directory, DNS, DHCP, SQL Clusters, XenDesktop Controllers, Provisioning Servers, and Nexus 1000V Virtual Switch Manager appliances, etc.)

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Figure 15 vCenter Data Centers and Clusters Deployed

Infrastructure Components

This section describes the infrastructure components used in the solution outlined in this study.

Cisco Unified Computing System (UCS)

Cisco UCS is a set of pre-integrated data center components that comprises blade servers, adapters, fabric interconnects, and extenders that are integrated under a common embedded management system. This approach results in far fewer system components and much better manageability, operational efficiencies, and flexibility than comparable data center platforms.

Cisco Unified Computing System Components

Cisco UCS components are shown in Figure 16.

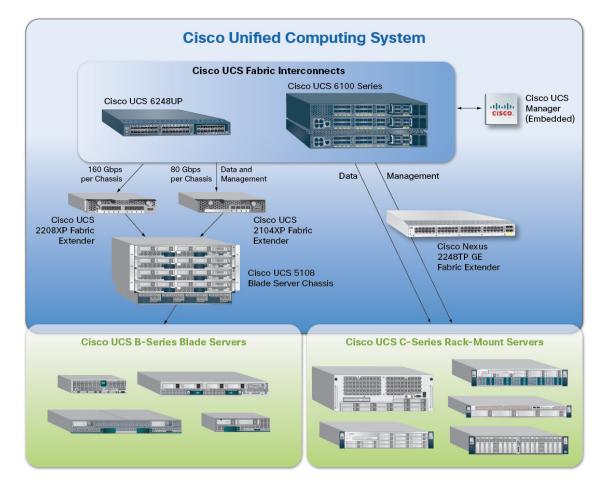


Figure 16 Cisco Unified Computing System Components

The Cisco UCS is designed from the ground up to be programmable and self integrating. A server's entire hardware stack, ranging from server firmware and settings to network profiles, is configured through model-based management. With Cisco virtual interface cards, even the number and type of I/O interfaces is programmed dynamically, making every server ready to power any workload at any time.

With model-based management, administrators manipulate a model of a desired system configuration, associate a model's service profile with hardware resources and the system configures itself to match the model. This automation speeds provisioning and workload migration with accurate and rapid scalability. The result is increased IT staff productivity, improved compliance, and reduced risk of failures due to inconsistent configurations.

Cisco Fabric Extender technology reduces the number of system components to purchase, configure, manage, and maintain by condensing three network layers into one. It eliminates both blade server and hypervisor-based switches by connecting fabric interconnect ports directly to individual blade servers and virtual machines. Virtual networks are now managed exactly as physical networks are, but with massive scalability. This represents a radical simplification over traditional systems, reducing capital and operating costs while increasing business agility, simplifying and speeding deployment, and improving performance.

Fabric Interconnect

Cisco UCS Fabric Interconnects create a unified network fabric throughout the Cisco UCS. They provide uniform access to both networks and storage, eliminating the barriers to deploying a fully virtualized environment based on a flexible, programmable pool of resources.

Cisco Fabric Interconnects comprise a family of line-rate, low-latency, lossless 10-GE, Cisco Data Center Ethernet, and FCoE interconnect switches. Based on the same switching technology as the Cisco Nexus 5000 Series, Cisco UCS 6000 Series Fabric Interconnects provide the additional features and management capabilities that make them the central nervous system of Cisco UCS.

The Cisco UCS Manager software runs inside the Cisco UCS Fabric Interconnects. The Cisco UCS 6000 Series Fabric Interconnects expand the UCS networking portfolio and offer higher capacity, higher port density, and lower power consumption. These interconnects provide the management and communication backbone for theCisco UCS B-Series Blades and Cisco UCS Blade Server Chassis.

All chassis and all blades that are attached to the Fabric Interconnects are part of a single, highly available management domain. By supporting unified fabric, the Cisco UCS 6200 Series provides the flexibility to support LAN and SAN connectivity for all blades within its domain right at configuration time. Typically deployed in redundant pairs, the Cisco UCS Fabric Interconnect provides uniform access to both networks and storage, facilitating a fully virtualized environment.

The Cisco UCS Fabric Interconnect family is currently comprised of the Cisco 6100 Series and Cisco 6200 Series of Fabric Interconnects.

Cisco UCS 6248UP 48-Port Fabric Interconnect

The Cisco UCS 6248UP 48-Port Fabric Interconnect is a 1 RU, 10-GE, Cisco Data Center Ethernet, FCoE interconnect providing more than 1Tbps throughput with low latency. It has 32 fixed ports of Fibre Channel, 10-GE, Cisco Data Center Ethernet, and FCoE SFP+ ports.

One expansion module slot can be up to sixteen additional ports of Fibre Channel, 10-GE, Cisco Data Center Ethernet, and FCoE SFP+.

Cisco UCS 6248UP 48-Port Fabric Interconnects were used in this study.

Cisco UCS 2200 Series IO Module

The Cisco UCS 2100/2200 Series FEX multiplexes and forwards all traffic from blade servers in a chassis to a parent Cisco UCS Fabric Interconnect over from 10-Gbps unified fabric links. All traffic, even traffic between blades on the same chassis, or VMs on the same blade, is forwarded to the parent interconnect, where network profiles are managed efficiently and effectively by the Fabric Interconnect. At the core of the Cisco UCS Fabric Extender are ASIC processors developed by Cisco that multiplex all traffic.

Up to two fabric extenders can be placed in a blade chassis.

Cisco UCS 2104 has eight 10GBASE-KR connections to the blade chassis mid-plane, with one connection per fabric extender for each of the chassis' eight half slots. This gives each half-slot blade server access to each of two 10-Gbps unified fabric-based networks via SFP+ sockets for both throughput and redundancy. It has 4 ports connecting up the fabric interconnect.

Cisco UCS 2208 has thirty-two 10GBASE-KR connections to the blade chassis midplane, with one connection per fabric extender for each of the chassis' eight half slots. This gives each half-slot blade server access to each of two 4x10-Gbps unified fabric-based networks via SFP+ sockets for both throughput and redundancy. It has 8 ports connecting up the fabric interconnect.

Cisco UCS 2208 fabric extenders were utilized in this study.

Cisco UCS Chassis

The Cisco UCS 5108 Series Blade Server Chassis is a 6 RU blade chassis that will accept up to eight half-width Cisco UCS B-Series Blade Servers or up to four full-width Cisco UCS B-Series Blade Servers, or a combination of the two. The Cisco UCS 5108 Series Blade Server Chassis can accept four redundant power supplies with automatic load-sharing and failover and two Cisco UCS (either 2100 or 2200 series) Fabric Extenders. The chassis is managed by Cisco UCS Chassis Management Controllers, which are mounted in the Cisco UCS Fabric Extenders and work in conjunction with the Cisco UCS Manager to control the chassis and its components.

A single Cisco UCS managed domain can theoretically scale to up to 40 individual chassis and 320 blade servers. At this time Cisco supports up to 20 individual chassis and 160 blade servers.

Basing the I/O infrastructure on a 10-Gbps unified network fabric allows the Cisco UCS to have a streamlined chassis with a simple yet comprehensive set of I/O options. The result is a chassis that has only five basic components:

- The physical chassis with passive midplane and active environmental monitoring circuitry
- Four power supply bays with power entry in the rear, and hot-swappable power supply units accessible from the front panel
- Eight hot-swappable fan trays, each with two fans
- Two fabric extender slots accessible from the back panel
- Eight blade server slots accessible from the front panel

Cisco UCS B200 M3 Blade Server

Cisco UCS B200 M3 is a third generation half-slot, two-socket Blade Server. The Cisco UCS B200 M3 harnesses the power of the latest Intel[®] Xeon[®] processor E5-2600 v2 product family, with up to 768 GB of RAM (using 32GB DIMMs), two optional SAS/SATA/SSD disk drives, and up to dual 4x 10 Gigabit Ethernet throughput, utilizing our VIC 1240 LAN on motherboard (LOM) design. The Cisco UCS B200 M3 further extends the capabilities of Cisco UCS by delivering new levels of manageability, performance, energy efficiency, reliability, security, and I/O bandwidth for enterprise-class virtualization and other mainstream data center workloads.

In addition, customers who initially purchased Cisco UCS B200M3 blade servers with Intel E5-2600 series processors, can field upgrade their blades to the second generation E5-2600 processors, providing increased processor capacity and providing investment protection

Figure 17 Cisco UCS B200 M3 Server



Cisco UCS VIC1240 Converged Network Adapter

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A Cisco[®] innovation, the Cisco UCS Virtual Interface Card (VIC) 1240 (Figure 1) is a 4-port 10 Gigabit Ethernet, Fibre Channel over Ethernet (FCoE)-capable modular LAN on motherboard (mLOM) designed exclusively for the M3 generation of Cisco UCS B-Series Blade Servers. When used in combination with an optional Port Expander, the Cisco UCS VIC 1240 capabilities can be expanded to eight ports of 10 Gigabit Ethernet.

The Cisco UCS VIC 1240 enables a policy-based, stateless, agile server infrastructure that can present up to 256 PCIe standards-compliant interfaces to the host that can be dynamically configured as either network interface cards (NICs) or host bus adapters (HBAs). In addition, the Cisco UCS VIC 1240 supports Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) technology, which extends the Cisco UCS fabric interconnect ports to virtual machines, simplifying server virtualization deployment.



Figure 18 Cisco UCS VIC 1240 Converged Network Adapter

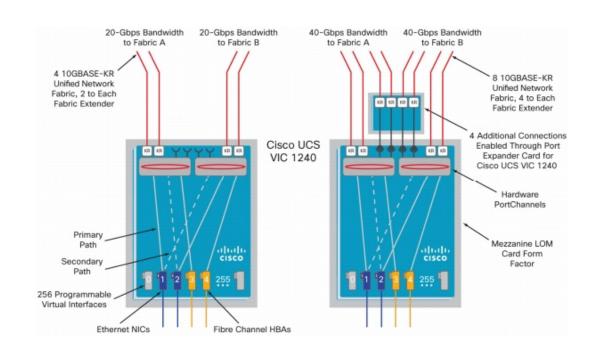


Figure 19 The Cisco UCS VIC1240 Virtual Interface Cards Are Deployed in the Cicso UCS B-Series B200 M3 Blade Servers

Cisco UCS Director

Cisco UCS Director improves consistency, efficiency, and speed within your organization. It accomplishes this by replacing time-consuming, manual provisioning and de-provisioning of data center resources with automated workflows. Cisco UCS Director reduces delivery time from weeks to minutes.

Superior IaaS Management Capabilities

Unified infrastructure provisioning and management delivers superior infrastructure as a service (IaaS) management capabilities with the following benefits:

- Out-of-box task library that spans Cisco and third-party hardware solutions to build your infrastructure in minutes
- Reduction of data center complexity by replacing manual provisioning and de-provisioning tasks with workflows that span computing, network, storage, and virtualization functions
- Lowering of capital expenses with real-time monitoring, dynamic load balancing, and optimum resource usage

Multi-Hypervisor Solution

With support for VMware, Microsoft Hyper-V, and Red Hat KVM hypervisors, Cisco UCS Director's task library supports creation, manipulation, and editing of virtual machines, hosts, and virtual networks. Broad OS guest support facilitates cloning of Windows and Linux virtual machines, and also monitors host and virtual machine memory and resource use. It offers:

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- Support for NetApp Virtual Storage Console on Clustered Data ONTAP to deliver fast and efficient cloning of virtual machines with low storage use
- Support for Microsoft System Center Virtual Machine Manager networking models and Hyper-V infrastructure management
- Support for Cisco Nexus 1000V and Citrix network devices within Microsoft System Center Private Cloud

Multivendor Solution

Because your data center comprises diverse technologies, Cisco UCS Director delivers heterogeneous infrastructure management. The benefits include:

- Support for Hewlett Packard Onboard Administrator to install bare-metal blades and manage them using Cisco UCS Director's task library
- Extensive enhancements for VMware, VCE, and EMC solution components
- Integration of third-party solutions into the Cisco UCS Director management platform with a publicly available software development kit

EMC Storage Architecture Design

The EMC VNXTM family is optimized for virtual applications delivering industry-leading innovation and enterprise capabilities for file, block, and object storage in a scalable, easy-to-use solution. This next-generation storage platform combines powerful and flexible hardware with advanced efficiency, management, and protection software to meet the demanding needs of today's enterprises.

EMC VNX5600 used in this solution provides comprehensive storage architecture for hosting all virtual desktop components listed below on a unified storage platform.

- ESXi OS is stored on an FC LUN from which each vSphere host is booted. The boot from SAN design allows UCS service profiles to be portable from one blade to another when the blades do not use local disks.
- PVS vDisk is hosted on a VNX CIFS share to provide central management of vDisk by eliminating duplicated copies of the same vDisk image.
- PVS write cache and infrastructure VMs hosted on VNX NFS datastores simplifies VM storage provisioning.
- User profiles defined by Citrix User Profile Management (UPM) and user home directories both reside on VNX CIFS shares that can leverage VNX deduplication, compression, and data protection.

Enhancements in XenDesktop 7.5

Citrix XenDesktop 7.5 includes significant enhancements to help customers deliver Windows apps and desktops as mobile services while addressing management complexity and associated costs. Enhancements in this release include:

• Unified product architecture for XenApp and XenDesktop—the FlexCast Management Architecture (FMA). This release supplies a single set of administrative interfaces to deliver both hosted-shared applications (RDS) and complete virtual desktops (VDI). Unlike earlier releases that separately provisioned Citrix XenApp and XenDesktop farms, the XenDesktop 7.5 release allows administrators to deploy a single infrastructure and use a consistent set of tools to manage mixed application and desktop workloads.

- Support for extending deployments to the cloud. This release provides the ability for hybrid cloud provisioning from Amazon Web Services (AWS) or any Cloud Platform-powered public or private cloud. Cloud deployments are configured, managed, and monitored through the same administrative consoles as deployments on traditional on-premises infrastructure.
- Enhanced HDX technologies. Since mobile technologies and devices are increasingly prevalent, Citrix has engineered new and improved HDX technologies to improve the user experience for hosted Windows apps and desktops.
- A new version of StoreFront. The StoreFront 2.5 release provides a single, simple, and consistent aggregation point for all user services. Administrators can publish apps, desktops, and data services to StoreFront, from which users can search and subscribe to services.
- Remote power control for physical PCs. Remote PC access supports "Wake on LAN" that adds the ability to power on physical PCs remotely. This allows users to keep PCs powered off when not in use to conserve energy and reduce costs.
- Full AppDNA support. AppDNA provides automated analysis of applications for Windows platforms and suitability for application virtualization through App-V, XenApp, or XenDesktop. Full AppDNA functionality is available in some editions.
- Additional virtualization resource support. As in this Cisco Validated Design, administrators can configure connections to VMware vSphere 5.5 hypervisors.

FlexCast Management Architecture (FMA) Technology

In Citrix XenDesktop 7.5, FlexCast Management Architecture (FMA) technology is responsible for delivering and managing hosted-shared RDS apps and complete VDI desktops. By using Citrix Receiver with XenDesktop 7.5, users have access to a device-native experience on a variety of endpoints, including Windows, Mac, Linux, iOS, Android, ChromeOS, and Blackberry devices.

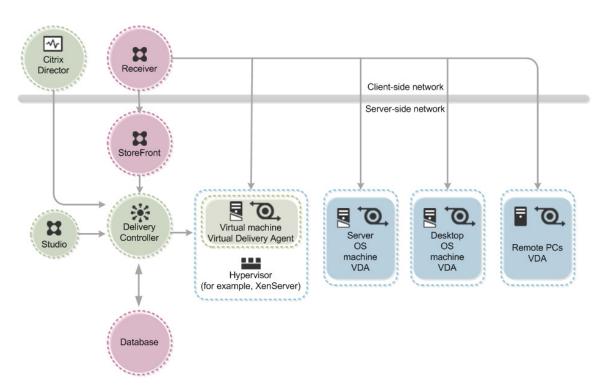


Figure 20 Key components in a typical deployment using FlexCast technology

The diagram above shows the key components in a typical XenDesktop deployment:

- Director Director is a web-based tool that enables IT support and help desk teams to monitor an environment, troubleshoot issues before they become system-critical, and perform support tasks for end users.
- Receiver Installed on user devices, Citrix Receiver provides users with quick, secure, self-service access to documents, applications, and desktops. Receiver provides on-demand access to Windows, Web, and Software as a Service (SaaS) applications.
- StoreFront StoreFront authenticates users to sites hosting resources and manages stores of desktops and applications that users can access.
- Studio Studio is the management console to set up the environment, create workloads to host applications and desktops, and assign applications and desktops to users.
- License server —At least one license server is needed to store and manage license files.
- Delivery Controller Installed on servers in the data center, the Delivery Controller consists of services that communicate with the hypervisor to distribute applications and desktops, authenticate and manage user access, and broker connections between users and their virtual desktops and applications. The Controller manages the desktop state, starting and stopping them based on demand and administrative configuration. Each XenDesktop site has one or more Delivery Controllers.
- Hypervisor —Hypervisor technology is used to provide an enterprise-class virtual machine infrastructure that is the foundation for delivering virtual applications and desktops. Citrix XenDesktop is hypervisor-agnostic and can be deployed with Citrix XenServer, Microsoft Hyper-V, or VMware vSphere. For this CVD, the hypervisor used was VMware ESXi 5.5.
- Virtual Delivery Agent (VDA) Installed on server or workstation operating systems, the VDA enables connections for desktops and apps. For Remote PC Access, install the VDA on the office PC.

- Machine Creation Services (MCS) A collection of services that work together to create virtual servers and desktops from a master image on demand, optimizing storage utilization and providing a pristine virtual machine to users every time they log on. Machine Creation Services is fully integrated and administrated in Citrix Studio.
- Windows Server OS machines These are VMs or physical machines based on Windows Server
 operating system used for delivering applications or hosted shared desktops to users.
- Desktop OS machines These are VMs or physical machines based on Windows Desktop operating system used for delivering personalized desktops to users, or applications from desktop operating systems.
- Remote PC Access User devices that are included on a whitelist, enabling users to access resources on their office PCs remotely, from any device running Citrix Receiver.

In addition, Citrix Provisioning Services (PVS) technology is responsible for streaming a shared virtual disk (vDisk) image to the configured Server OS or Desktop OS machines. This streaming capability allows VMs to be provisioned and re-provisioned in real-time from a single image, eliminating the need to patch individual systems and conserving storage. All patching is done in one place and then streamed at boot-up. PVS supports image management for both RDS and VDI-based machines, including support for image snapshots and rollbacks.

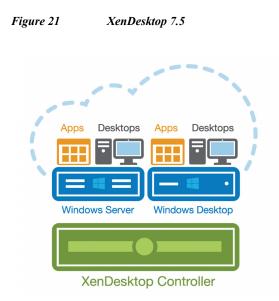
High-Definition User Experience (HDX) Technology

High-Definition User Experience (HDX) technology in this release is optimized to improve the user experience for hosted Windows apps on mobile devices. Specific enhancements include:

- HDX Mobile[™] technology, designed to cope with the variability and packet loss inherent in today's mobile networks. HDX technology supports deep compression and redirection, taking advantage of advanced codec acceleration and an industry-leading H.264-based compression algorithm. The technology enables dramatic improvements in frame rates while requiring significantly less bandwidth. Real-time multimedia transcoding improves the delivery of Windows Media content (even in extreme network conditions). HDX technology offers a rich multimedia experience and optimized performance for voice and video collaborations.
- HDX Touch technology enables mobile navigation capabilities similar to native apps, without rewrites or porting of existing Windows applications. Optimizations support native menu controls, multi-touch gestures, and intelligent sensing of text-entry fields, providing a native application look and feel.
- HDX 3D Pro uses advanced server-side GPU resources for compression and rendering of the latest OpenGL and DirectX professional graphics apps. GPU support includes both dedicated user and shared user workloads. In this release, HDX 3D Pro has been upgraded to support Windows 8.

HSD and VDI Services

IT departments strive to deliver application services to a broad range of enterprise users that have varying performance, personalization, and mobility requirements. Citrix XenDesktop 7.5 allows IT to configure and deliver any type of virtual desktop or app, hosted or local, and optimize delivery to meet individual user requirements, while simplifying operations, securing data, and reducing costs.



As depicted above, the XenDesktop 7.5 release allows administrators to create a single infrastructure that supports multiple modes of service delivery, including:

- Application Virtualization and Hosting (via XenApp). Applications are installed on or streamed to Windows servers in the data center and remotely displayed to users' desktops and devices.
- Hosted Shared Desktops (RDS). Multiple user sessions share a single, locked-down Windows Server environment running in the datacenter and accessing a core set of apps. This model of service delivery is ideal for task workers using low intensity applications, and enables more desktops per host compared to VDI.
- Pooled VDI Desktops. This approach leverages a single desktop OS image to create multiple thinly provisioned or streamed desktops. Optionally, desktops can be configured with a Personal vDisk to maintain user application, profile and data differences that are not part of the base image. This approach replaces the need for dedicated desktops, and is generally deployed to address the desktop needs of knowledge workers that run more intensive application workloads.
- VM Hosted Apps (16 bit, 32 bit, or 64 bit Windows apps). Applications are hosted on virtual desktops running Windows 7, XP, or Vista and then remotely displayed to users' physical or virtual desktops and devices.

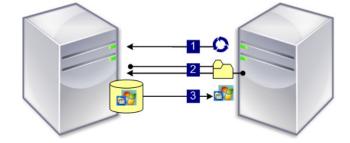
This CVD focuses on delivering a mixed workload consisting of hosted shared desktops (HSD based on RDS) and hosted virtual desktops (VDI).

Citrix Provisioning Services

Citrix XenDesktop 7.5 can be deployed with or without Citrix Provisioning Services (PVS). The advantage of using Citrix PVS is that it allows virtual machines to be provisioned and re-provisioned in real-time from a single shared-disk image. In this way administrators can completely eliminate the need to manage and patch individual systems and reduce the number of disk images that they manage, even as the number of machines continues to grow, simultaneously providing the efficiencies of a centralized management with the benefits of distributed processing.

The Provisioning Services solution's infrastructure is based on software-streaming technology. After installing and configuring Provisioning Services components, a single shared disk image (vDisk) is created from a device's hard drive by taking a snapshot of the OS and application image, and then storing that image as a vDisk file on the network. A device that is used during the vDisk creation process is the Master target device. Devices or virtual machines that use the created vDisks are called target devices.

When a target device is turned on, it is set to boot from the network and to communicate with a Provisioning Server. Unlike thin-client technology, processing takes place on the target device (Step 1).



The target device downloads the boot file from a Provisioning Server (Step 2) and boots. Based on the boot configuration settings, the appropriate vDisk is mounted on the Provisioning Server (Step 3). The vDisk software is then streamed to the target device as needed, appearing as a regular hard drive to the system.

Instead of immediately pulling all the vDisk contents down to the target device (as with traditional imaging solutions), the data is brought across the network in real-time as needed. This approach allows a target device to get a completely new operating system and set of software in the time it takes to reboot. This approach dramatically decreases the amount of network bandwidth required and making it possible to support a larger number of target devices on a network without impacting performance

Citrix PVS can create desktops as Pooled or Private:

- Pooled Desktop: A pooled virtual desktop uses Citrix PVS to stream a standard desktop image to multiple desktop instances upon boot.
- Private Desktop: A private desktop is a single desktop assigned to one distinct user.

The alternative to Citrix Provisioning Services for pooled desktop deployments is Citrix Machine Creation Services (MCS), which is integrated with the XenDesktop Studio console.

Locating the PVS Write Cache

When considering a PVS deployment, there are some design decisions that need to be made regarding the write cache for the target devices that leverage provisioning services. The write cache is a cache of all data that the target device has written. If data is written to the PVS vDisk in a caching mode, the data is not written back to the base vDisk. Instead it is written to a write cache file in one of the following locations:

- Cache on device hard drive. Write cache exists as a file in NTFS format, located on the target-device's hard drive. This option frees up the Provisioning Server since it does not have to process write requests and does not have the finite limitation of RAM.
- Cache on device hard drive persisted. (Experimental Phase) This is the same as "Cache on device hard drive", except that the cache persists. At this time, this method is an experimental feature only, and is only supported for NT6.1 or later (Windows 7 and Windows 2008 R2 and later). This method also requires a different bootstrap.
- Cache in device RAM. Write cache can exist as a temporary file in the target device's RAM. This provides the fastest method of disk access since memory access is always faster than disk access.

- Cache in device RAM with overflow on hard disk. This method uses VHDX differencing format and is only available for Windows 7 and Server 2008 R2 and later. When RAM is zero, the target device write cache is only written to the local disk. When RAM is not zero, the target device write cache is written to RAM first. When RAM is full, the least recently used block of data is written to the local differencing disk to accommodate newer data on RAM. The amount of RAM specified is the non-paged kernel memory that the target device will consume.
- Cache on a server. Write cache can exist as a temporary file on a Provisioning Server. In this configuration, all writes are handled by the Provisioning Server, which can increase disk I/O and network traffic. For additional security, the Provisioning Server can be configured to encrypt write cache files. Since the write-cache file persists on the hard drive between reboots, encrypted data provides data protection in the event a hard drive is stolen.
- Cache on server persisted. This cache option allows for the saved changes between reboots. Using
 this option, a rebooted target device is able to retrieve changes made from previous sessions that
 differ from the read only vDisk image. If a vDisk is set to this method of caching, each target device
 that accesses the vDisk automatically has a device-specific, writable disk file created. Any changes
 made to the vDisk image are written to that file, which is not automatically deleted upon shutdown.

In this CVD, PVS 7.1 was used to manage Pooled Desktops with cache on device storage for each virtual machine. This design enables good scalability to many thousands of desktops. Provisioning Server 7.1 was used for Active Directory machine account creation and management as well as for streaming the shared disk to the hypervisor hosts.

Citrix App Orchestration

Citrix App Orchestration allows CSPs to orchestrate and automate the delivery of applications and desktops in multi-tenant environments and across multiple products, sites, and datacenters. With App Orchestration, hosted service providers can:

- Manage XenApp and XenDesktop across multiple locations, including multiple datacenters in multiple versions, sites or farms, Active Directory domains, and datacenters
- Provide consistent configuration across global deployments spanning multiple delivery sites, eliminating configuration drift and issues
- Define tenant and user affinity to deliver offerings to primary and backup locations, for optimum continuity and fault tolerance
- Provision desktops and applications on any supported hypervisor. App Orchestration can incorporate externally provisioned VMs (e.g., provisioning via PVS as in this reference architecture).

App Orchestration 2.5 works with XenDesktop 7.5 to automate deployment of machine catalogs, Delivery Sites, and Delivery Groups for delivering applications and desktops (known as "offerings") to users. Offerings are containers that help CSPs define a set of apps, desktops, and resources. They are designed so that tenant users can select them as needed from an application storefront.

App Orchestration provides a configuration system that enables a multi-tenant data model with flexible isolation concepts at its core (permitting separate isolation models for each service). It also features a simple user interface and automated workflows that control XenDesktop, Active Directory, and other components.

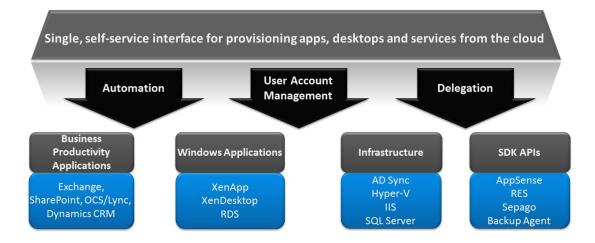
For detailed information about planning, installing, and configuring Citrix App Orchestration, see the App Orchestration documentation

http://support.citrix.com/proddocs/topic/app-orchestration/cao-app-orchestration-25-landing.html

Citrix CloudPortal Services Manager

Citrix CloudPortal Services Manager (CPSM) is a self-service portal that helps providers manage the delivery of cloud services and customer offerings. It drives App Orchestration operation by associating desired states with tenants and allowing services to be provisioned to users. CPSM provides out-of-the-box support for Desktop-as-a-Service and Windows applications (powered by Citrix XenApp and Citrix XenDesktop), as well as popular business applications and services like Microsoft Exchange, Office, SharePoint, Lync, web and data hosting, and virtualization service management. Customers and sub-customers (i.e., such as a reseller's customers) that lack IT expertise can add or change services, view reports, manage users, and perform day-to-day administration tasks through the self-service interface.

Figure 22 Citrix CloudPortal Services Manager Provisioning Capabilities



CloudPortal Services Manager provides the following features to simplify and streamline application service provisioning within the CSP reference architecture:

- Secure delegation of administrative tasks. Day-to-day administrative tasks, such as creating users, resetting passwords, and provisioning applications and services, are delegated to the customer (or sub-customer in reseller situations) for streamlined management, reduced support costs, and improved quality of service and response time.
- Simplified user interface. The easy-to-use self-service web portal interface enables helpdesk staff and customers to manage their application and service offerings without requiring intense training or expensive skillsets.
- **Consolidated management of multiple customer environments.** Multiple customers in a multi-tenant infrastructure can be managed from a single web-based interface, simplifying administration and enabling faster response times.
- Wizard-driven interface for adding new customers and users. Adding new users and customers is easy and simple required information fields are displayed in a familiar, web-based form. The User Copy feature allows an existing user's profile and services to be replicated to a new user for even faster user creation. Multiple users can also be imported from a simple Microsoft Excel spreadsheet, allowing customers to get started quickly and efficiently.
- **Customer resource and limit configuration.** Establishing limit configurations prevents customers from overprovisioning services.

• **Reporting.** By tracking and monitoring the environment, CPSM supports the creation of customized reports for usage and billing.

Solution Architecture

Citrix DaaS Design Fundamentals

DaaS solutions can provide the "anytime, anywhere, any device" access to Windows desktops and applications that workers need for optimal efficiency. For subscribers, the Cisco and Citrix architecture brings a native user experience across a range of endpoints—smartphones, tablets, laptops, PCs, and Macs—even on low-bandwidth mobile networks. From the provider's perspective, implementing the Cisco and Citrix architecture on Cisco UDC platforms enables cost-effective services at cloud-scale across multiple tenants, infrastructure resources, and datacenters.

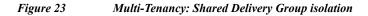
For customers with stringent security requirements, providers can deploy services using dedicated rather than shared resources. Sharing resources (and using session isolation) enables a lower cost model for tenants with less rigorous security needs.

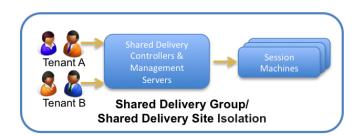
Isolation Models

Three common multi-tenancy isolation models are used in the market today — Shared Delivery Group/Shared Delivery Site, Private Delivery Group/Shared Delivery Site, and Private Delivery Group/Private Delivery Site. The models differ according to the type of isolation they employ.

Shared Delivery Group/Shared Delivery Site Isolation Model

With the Shared Delivery Group/Shared Delivery Site isolation model, tenants share a single site infrastructure and session host, but each tenant's applications and desktops run within an isolated session on the same virtual machine. This approach is not recommended from a best practice or security perspective, but it is a common model in use for smaller providers today, particularly for those CSPs offering basic, standard desktop services where cost — not security — is the most significant business concern. This CVD does not demonstrate the deployment of this type of isolation model.





Key characteristics of this model include:

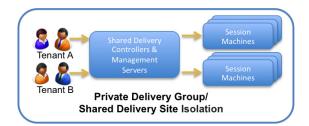
• Users from multiple tenants have isolated sessions on a shared virtual machine (called a Session Machine). This requires appropriate lockdown of Session Machines to minimize the possibility of a user on one tenant negatively affecting users of another tenant. However, there is still a chance that a user can compromise a server (thus affecting another tenant's users).

- User performance guarantees can be established by using the CPU Utilization Management feature.
- A separate web interface site can provide custom branding for each tenant. In addition, Microsoft Windows and Citrix policies in Active Directory can provide a highly customized experience to users (for example, wallpaper, theme, Citrix HDX settings, and so on).
- This method of multi-tenancy is extremely cost-effective because a CSP can spread infrastructure costs across multiple tenants.

Private Delivery Group/Shared Delivery Site Isolation Model

The Private Delivery Group/Shared Delivery Site isolation model provides isolation at the virtual machine layer. Tenants share a single XenDesktop Delivery Controller management network (including a shared XenDesktop site and infrastructure components). Session Machines, on the other hand, are connected to the tenant's private management network, supplying isolation through tenant-specific virtual machines. More and more CSPs are moving to this method. Although it does not provide the strict security of the Private Delivery Site isolation model (which is described next), for many tenants this model provides arguably the most optimal blend of isolation, performance, customization, self-service administration, and cost — a combination that translates into a very attractive offering.

Figure 24 Multi-Tenancy: Private Delivery Group/Shared Delivery Site Isolation



Key characteristics of this model include:

- Each tenant has a dedicated pool of session servers. Delivery Groups and Session Machine Catalogs in App Orchestration simplify deployment. As a best practice, administrators should still always lock down individual Session Machine hosts.
- Because users from one tenant can have sessions only on designated servers, a user cannot negatively impact the performance of another tenant's users. Administrators can further guarantee performance to users by using additional capabilities within XenDesktop.
- In addition to the customization capabilities mentioned in the shared deployment, each tenant can have customized machine images for RDS and VDI workloads.
- CSPs can allow tenants to perform some level of administration for their pool of session hosts or dedicated desktops (e.g., helpdesk activity for viewing which users are logged onto which servers, shadowing a session, or resetting a session).
- Though each tenant has dedicated session hosts or desktops, the costs might not be much higher than that of the shared model. This deployment method offers a blendof multi-tenancy capabilities at a very reasonable cost.

Private Delivery Site Isolation Model

In the Private Delivery Site isolation model, one XenDesktop site (or VDI-in-a-Box grid with dedicated infrastructure) is deployed per tenant. None of the infrastructure components are shared and Session Machines and Delivery Sites are connected to the tenant's private management network. This model is

best suited for tenants with stringent confidentiality and security requirements, such as federal agencies, healthcare, and so on, or those with heavy-duty performance or customization needs. These capabilities come at a cost, but most CSPs typically charge a premium for this type of service. It is understandably less common to see deployments of this nature, but important to understand that the option exists. This option is recommended for those environments where the tightest possible security, regardless of cost, is the primary requirement.

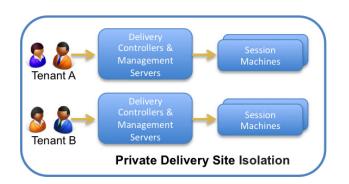


Figure 25 Multi-Tenancy: Private Delivery Site Isolation

Key characteristics of this model include:

- Tenants are completely isolated including dedicated brokering operations.
- Performance guarantees are similar to the Private Delivery Group/Shared Delivery Site isolation model.
- The customized experience aspects remain the same as that of the Private Delivery Group/Shared Delivery Site isolation model.
- Service providers have the option to allow the tenant to perform a much higher level of self-service administration (for example, help desk activity, managing session hosts, managing applications, etc.).
- The costs are higher for this model because the infrastructure components are not shared between tenants.

Citrix Provisioning Services 7.1

A significant advantage to service delivery via RDS and VDI is how these technologies simplify desktop administration and management. Citrix Provisioning Services (PVS) takes the approach of streaming a single shared virtual disk (vDisk) image rather than provisioning and distributing multiple OS image copies across multiple virtual machines. One advantage of this approach is that it constrains the number of disk images that must be managed, even as the number of desktops grows, ensuring image consistency. At the same time, using a single shared image (rather than hundreds or thousands of desktop images) significantly reduces the required storage footprint and dramatically simplifies image management.

Since there is a single master image, patch management is simple and reliable. All patching is done on the master image, which is then streamed as needed. When an updated image is ready for production, the administrator simply reboots to deploy the new image. Rolling back to a previous image is done in the same manner. Local hard disk drives in user systems can be used for runtime data caching or, in some scenarios, removed entirely, lowering power usage, system failure rates, and security risks.

After installing and configuring PVS components, a vDisk is created from a device's hard drive by taking a snapshot of the OS and application image, and then storing that image as a vDisk file on the network. vDisks can exist on a Provisioning Server, file share, or in larger deployments (as in this CVD), on a storage system with which the Provisioning Server can communicate (via iSCSI, SAN, NAS, and CIFS). vDisks can be assigned to a single target device in Private Image Mode, or to multiple target devices in Standard Image Mode.

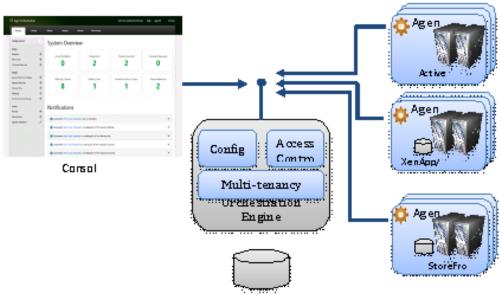
When a user device boots, the appropriate vDisk is located based on the boot configuration and mounted on the Provisioning Server. The software on that vDisk is then streamed to the target device and appears like a regular hard drive to the system. Instead of pulling all the vDisk contents down to the target device (as is done with some imaging deployment solutions), the data is brought across the network in real time, as needed. This greatly improves the overall user experience since it minimizes desktop startup time.

This release of PVS extends built-in administrator roles to support delegated administration based on groups that already exist within the network (Windows or Active Directory Groups). All group members share the same administrative privileges within a XenDesktop site. An administrator may have multiple roles if they belong to more than one group.

Citrix App Orchestration

App Orchestration follows the principle of "Desired State". When a change to an orchestrated deployment occurs, such as creating a Delivery Site or adding a Session Machine to a catalog, the change is saved as a desired configuration in the database. The App Orchestration engine then issues all of the actions required to apply the change. These actions are called workflows, which the administrator can monitor from the App Orchestration management console. The configuration server applies changes asynchronously, allowing multiple operations to occur across different products in the correct sequence and over extended periods of time. If any failures result, they can be corrected and the system will complete the change.





App Orchestration Database

Orchestrating Multi-Tenant Isolation

Citrix App Orchestration simplifies the complex task of multi-tenant isolation by implementing the three primary isolation models discussed earlier in this document. All three multi-tenancy isolation models — Shared Delivery Group, Private Delivery Group/Shared Delivery Site, and Private Delivery Site — can be delivered from the same datacenter. The reference architecture implements these isolation models through App Orchestration Delivery Groups, Active Directory OUs, and Group Policy Objects (GPOs). When administrators create a subscriber offering, they must specify the level of delivery isolation. They must also specify the level of StoreFront isolation for each tenant imported into App Orchestration to define whether the StoreFront server group is shared and whether the tenant uses a private or shared store.

Citrix CloudPortal Services Manager

CloudPortal Services Manager is an easy-to-use web portal that helps service providers manage the delivery of cloud services and offerings to their customers. It provides detailed management for customers, users, services, and applications through a single interface. It supports:

- Channel and reseller enablement. Sub-customers can be nested within other customers to create a hierarchy for reseller and channel use cases. CPSM sites can be branded for a personalized reseller experience.
- Layered services. Services can be enabled at various layers service provider, customer, and user
 for easier and faster management.

Key CPSM Components

The CPSM cloud platform has four primary components, listed in the table below with the corresponding DNS alias and shown in Figure 27.

Note
This is the Web server that is the user frontend. This server hosts the portal as
well as the APIs that are used to access CPSM.
This is the backend for the CPSM environment. The provisioning engine is
workflow rules-based. The engine consists of MSMQ and the queue
monitoring process. Rules and actions are stored in the SQL database.
This is the SQL database used by the frontend and provisioning engine.
This server is used to generate reports regarding usage.

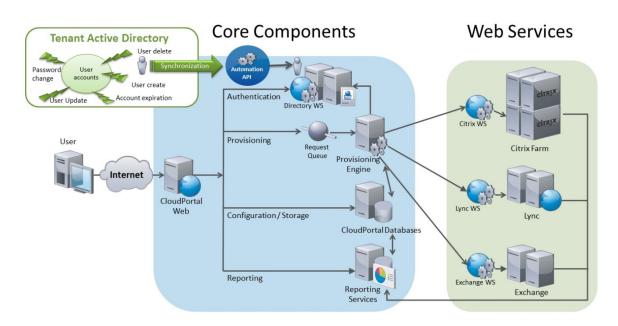
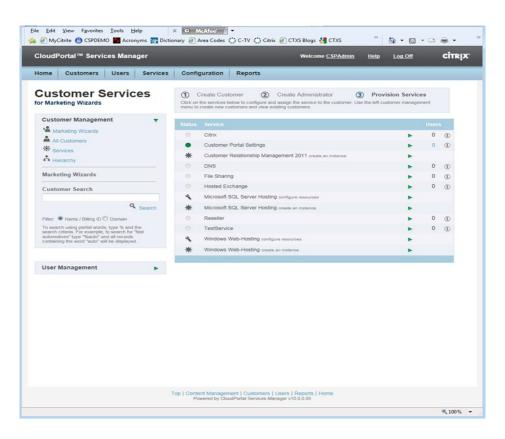


Figure 27 Citrix CloudPortal Services Manager Architecture

CloudPortal Services Manager User Interface

CloudPortal Services Manager (CPSM) provides a unified interface for CSP administration as well as delegated administration to resellers and end-customers. The CPSM Web UI (CortexWeb) is loosely coupled with the other CPSM components. This loose coupling provides several security benefits. The web server has no dependency on Active Directory so it can essentially operate outside of the managed domain. The website can be locked down and run with minimal administrative permissions while still allowing the CPSM system to complete administrative tasks.



CPSM System Databases

A Microsoft SQL Server (CortexSQL) provides the backbone of the CPSM system. The CPSM databases store configuration information for all provisioned services, as well as all customer and user details. The databases also act as a cache mechanism for Active Directory, ensuring rapid user response without the need for slower AD queries. In addition, the databases store logging and auditing information for all provisioning transactions that pass through the system.

CPSM Provisioning Engine

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The CPSM provisioning engine (CortexProvisioning) runs as a Windows Service. It monitors the provisioning queues for requests. When the provisioning engine receives a request, it follows provisioning rules to determine the actions required to complete the task.

The provisioning rules are easily customized using a simple Windows-based graphical interface that also provides a simple way to understand specific provisioning processes, which is helpful when troubleshooting problems. This interface can also be used to customize the provisioning process and to integrate new rules for custom services.

Each provisioning action performs a reusable piece of work, typically associated with provisioning applications. CPSM includes over 100 provisioning actions. Example actions include:

- Creating an Active Directory user
- Creating a security group in Active Directory
- Creating a folder in a file system
- Creating an address list in Microsoft Exchange

• Running a shell command or a Visual Basic script

All provisioning processes are built using provisioning actions, enabling quick setup with little coding, while giving the service providers visibility into the processes being executed in their environment.

Active Directory Web Service (ADWS)

The Active Directory web service provides a secure and simple interface to Active Directory. The CPSM website uses this service to perform real time tasks such as user authentication and password expiry status.

Reporting

CPSM uses Microsoft SQL Server Reporting Services to deliver usage reporting capability through the CloudPortal Services Manager user interface. CloudPortal Services Manager interacts directly with the reporting services web service interface and allows controlled publishing of reports to all users of the CloudPortal Services Manager system.



EMC VNX5600 Storage Configuration

Figure 28 shows the physical storage layout of the disks in the reference architecture to support up to 2000 desktops.

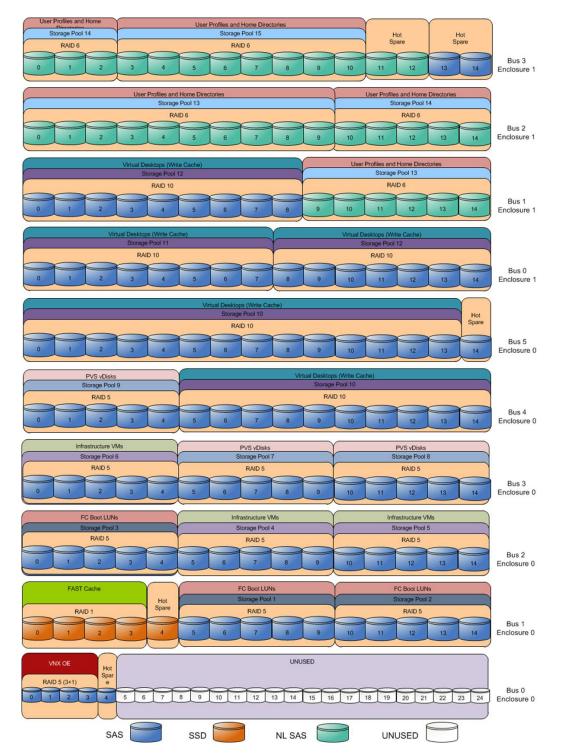


Figure 28 Storage Configuration

The above storage layout is used for the following configurations:

• Four SAS disks (0_0_0 to 0_0_3) are used for the VNX OE.

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- The VNX series does not require a dedicated hot spare drive. Disks 0_0_4, 1_0_4, 5_0_14, and 3_1_11 to 3_1_14 are unbound disks that can be used as hot spares when needed. These disks are marked as hot spares in the diagram.
- Four 200GB Flash drives are used for EMC VNX FAST Cache. See the "EMC FAST Cache in Practice" section below to follow the FAST Cache configuration best practices.
- Five SAS disks (1_0_5 to 1_0_9) on the RAID 5 storage pool 1 are used to store the first pool of FC boot LUNs for vSphere hosts.
- Five SAS disks (1_0_10 to 1_0_14) on the RAID 5 storage pool 2 are used to store the second pool of FC boot LUNs for vSphere hosts.
- Five SAS disks (2_0_0 to 2_0_4) on the RAID 5 storage pool 3 are used to store the third pool of FC boot LUNs for vSphere hosts.
- Five SAS disks (2_0_5 to 2_0_9) on the RAID 5 storage pool 4 are used to store the first pool of infrastructure VMs.
- Five SAS disks (2_0_10 to 2_0_14) on the RAID 5 storage pool 5 are used to store the second pool of infrastructure VMs.
- Five SAS disks (3_0_0 to 3_0_4) on the RAID 5 storage pool 6 are used to store the third pool of infrastructure VMs.
- Five SAS disks (3_0_5 to 3_0_9) on the RAID 5 storage pool 7 are used to store the first pool of PVS vDisks.
- Five SAS disks (3_0_10 to 3_0_14) on the RAID 5 storage pool 8 are used to store the second pool of PVS vDisks.
- Five SAS disks (4_0_0 to 4_0_4) on the RAID 5 storage pool 9 are used to store the third pool of PVS vDisks.
- Twenty four SAS disks (4_0_5 to 4_0_14 and 5_0_0 to 5_0_13) on the RAID 10 storage pool 10 are used to store the first pool of PVS write cache allocated for the virtual desktops.
- Eight SAS disks (0_1_0 to 0_1_7) on the RAID 10 storage pool 11 are used to store the second pool of PVS write cache allocated for the virtual desktops.
- Sixteen SAS disks (0_1_8 to 0_1_14 and 1_1_0 to 1_1_8) on the RAID 10 storage pool 12 are used to store the third pool of PVS write cache allocated for the virtual desktops.
- Sixteen NL-SAS disks (1_1_9 to 1_1_14 and 2_1_0 to 2_1_9) on the RAID 6 storage pool 13 are used to store the first pool of user profiles and home directories.
- Eight NL-SAS disks (2_1_10 to 2_1_14 and 3_1_0 to 3_1_2) on the RAID 6 storage pool 14 are used to store the second pool of user profiles and home directories.
- Eight NL-SAS disks (3_1_3 to 3_1_10) on the RAID 6 storage pool 15 are used to store the third pool of user profiles and home directories.
- FAST Cache is enabled on all storage pools.
- Disks 0_0_5 to 0_0_24 are unbound. They are not used for testing this solution.
- All SAS disks used for this solution are 300GB.

The graphic below illustrates how the EMC DataPools were defined per tenant prior to UCS Director configured datastores.

# of users	# of tenants	Total	Isolation Model	HexCast Model (90/10 HSD/SVDI	User data (CIFS)	User profile (CIFS)	BootLUN(FC)	Infra(NFS)	vDisk(CIFS)	Write Cache(NFS)	VLAN Isolation
		users			5GB per user	50MB per user	10GB per LUN	500GB per			
								DataStore			
50	4	200	Shared Site Private Group	Hosted Shared and Server VDI	DataPool1	DataPool1	BootLUNPool1	InfraPool1	vDiskPool1(1TB)	1.45 TB	Shared VLAN
100	1	100	Shared Site Private Group	Hosted Shared and Server VDI	DataPool2	DataPool2	BootLUNPool1	InfraPool1	vDiskPool1(1TB)	0.75 TB	Shared VLAN
150	2	300	Shared Site Private Group	Hosted Shared and Server VDI	DataPool1	DataPool1	BootLUNPool1	InfraPool1	vDiskPool1(1TB)	2.10TB	Shared VLAN
200	1	200	Private Delivery Site	Hosted Shared and Server VDI	DataPool3	DataPool3	BootLUNPool2	InfraPool2	vDiskPool2(500GB)	1.32 TB	Dedicated VLAN
500	1	500	Shared Site Private Group Server Isolated	Hosted Shared and Server VDI	DataPool2	DataPool2	BootLUNPool1	InfraPool1	vDiskPool1(1TB)	3.35 TB	Dedicated VLAN
700	1	700	Private Delivery Site	Hosted Shared and Server VDI	DataPool4	DataPool4	BootLUNPool3	InfraPool3	vDiskPool3(500GB)	4.63 TB	Dedicated VLAN
		2000			9.8 TB	98 GB	160GB	2.15 TB	2 TB	13.6 TB	

EMC FAST Cache in Practice

FAST Cache is best for small random I/O where data has skew; the higher the locality, the better the FAST Cache benefits.

General Considerations

EMC recommends first utilizing available flash drives for FAST Cache, which can globally benefit all LUNs in the storage system. Then supplement performance as needed with additional flash drives in storage pool tiers.

- Match the FAST Cache size to the size of active data set.
 - For existing EMC VNX/CX4 customers, EMC Pre-Sales have tools that can help determine active data set size.
- If active dataset size is unknown, size FAST Cache to be 5 percent of your capacity, or make up any shortfall with a flash tier within storage pools.
- Consider the ratio of FAST Cache drives to working drives. Although a small FAST Cache can satisfy a high IOPS requirement, large storage pool configurations will distribute I/O across all pool resources. A large pool of HDDs might be able to provide better performance than a few drives of FAST Cache.

Preferred application workloads for FAST Cache:

- Small-block random I/O applications with high locality
- · High frequency of access to the same data
- Systems where current performance is limited by HDD capability, not SP capability

AVOID enabling FAST Cache for LUNs that are not expected to benefit, such as when:

- The primary workload is sequential.
- The primary workload is large-block I/O.

AVOID enabling FAST Cache for LUNs where the workload is small-block sequential, including:

- Database logs
- Circular logs
- VNX OE for File SavVol (snapshot storage)

Enabling FAST Cache on a Running System

When adding FAST Cache to a running system, it is recommended to enable FAST Cache on a few LUNs at a time, and then wait until those LUNs have equalized in FAST Cache before adding more LUNs.

FAST Cache can improve overall system performance if the current bottleneck is drive-related, but boosting the IOPS will result in greater CPU utilization on the SPs. Systems should be sized so that the maximum sustained utilization is 70 percent. On an existing system, check the SP CPU utilization of the system, and then proceed as follows:

- Less than 60 percent SP CPU utilization enable groups of LUNs or one pool at a time; let them equalize in the cache, and ensure that SP CPU utilization is still acceptable before turning on FAST Cache for more LUNs/pools.
- 60-80 percent SP CPU utilization scale in carefully; enable FAST Cache on one or two LUNs at a time, and verify that SP CPU utilization does not go above 80 percent.
- CPU greater than 80 percent DON'T activate FAST Cache.

AVOID enabling FAST Cache for a group of LUNs where the aggregate LUN capacity exceeds 20 times the total FAST Cache capacity.

• Enable FAST Cache on a subset of the LUNs first and allow them to equalize before adding the other LUNs.

To enable FAST Cache as an array-wide feature in the system properties of the array in EMC Unisphere, complete the following steps:

1. Click the **FAST Cache** tab, then click **Create** and select the Flash drives to create the FAST Cache. RAID 1 is the only RAID type allowed. There are no user-configurable parameters for FAST Cache. In this solution, four 200GB SSD drives were used for FAST Cache.

VNX5600 - Storage System P	roperties		
General SP Cache FAST	Cache Sof	tware Envir	onment
FAST Cache			
State: Enabled			
Size: 366 GB	RAII	D Type: 1	
Disks			
Disk	Capacity	Model	State
Bus 0 Enclosure 0 Dis			
Bus 0 Enclosure 0 Dis			
Bus 0 Enclosure 0 Dis			
Statistics			
Properties	SI	P A	SP B
Percent Dirty Pages(%)	0		0
Refresh		Creat	e Destroy
	OK	époly C	appel Help
	<u>o</u> k	<u>Apply</u>	ancel <u>H</u> elp

2. To enable FAST Cache for a particular pool, navigate to the **Storage Pool Properties** page in Unisphere, and then click the **Advanced** tab. Select **Enabled** to enable FAST Cache.

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Advanced Tiering Deduplication			
hreshold: 70 🛛 %			
delete oldest snapshots			
delete oldest snapshots			
delete oldest snapshots			
ital pool space reaches 95 💭 % full, stop at 85 💭 %			
tal snapshot space reaches 25 💭 %, stop at 20 🖓 %			
te in Progress			
State: Idle			
uto-Delete			
n —————			
Savings: N/A			
	<u>o</u> k	<u>A</u> pply <u>C</u> ar	ncel H

EMC Additional Configuration Information

The following tuning configurations optimize NFS/CIFS performance on the VNX5600 Data Movers:

NFS/CIFS Active Threads Per Data Mover

The default number of threads dedicated to serve NFS/CIFS requests is 512 per Data Mover on VNX5600. Some use cases such as the scanning of desktops might require more number of NFS active threads. It is recommended to increase the number of active NFS and CIFS threads to 2048 on the active Data Mover to support up to 2000 desktops.

1. The nthreads parameters can be set by using the following commands:

```
# server_param server_2 -facility nfs -modify nthreads -value 2048
# server_param server_2 -facility cifs -modify nthreads -value 2048
Reboot the Data Mover for the change to take effect.
```

2. Type the following command to confirm the value of the parameter:

```
# server_param server_2 -facility nfs -info nthreads
server_2 :
                        = nthreads
name
facility_name
                        = nfs
default_value
                        = 384
current value
                        = 2048
configured value
                        = 2048
user action
                        = none
change_effective
                        = immediate
range
                        = (32, 2048)
description
                        = Number of threads dedicated to serve nfs requests, and
memory dependent.
```

- 3. The values of NFS and CIFS active threads can also be configured by editing the properties of the nthreads Data Mover parameter in Settings–Data Mover Parameters menu in Unisphere. Type nthreads in the filter field, highlight the nthreads value you want to edit and select Properties to open the nthreads properties window.
- 4. Update the Value field with the new value and click OK. Perform this procedure for each of the **nthreads** Data Mover parameters listed menu. Reboot the Data Movers for the change to take effect.

< > 🏦 🗐 VNX5600	-	Dashboard	System	🗊 Storage	🐌 Hosts	🐻 Data
<u>VNX5600</u> > <u>Settings</u> > Dat	a Mover Para	ameters				
Data Mover Parameters						
🝸 🗸 nthreads	Show Serv	ver Parameters for:	server_2	🖌 All F	acilities 🔽	All Paramete
Name	Facility	¥alue		Da	ata Mover	
🖥 nthreads	nfs	🖉 VNX5600 - nthr	eads - Serv	er Parameter Pro	perties - Inter	
📓 nthreads	cifs	l https://10.70.0.9	95/action/par	amDisplay	😵 Certific	ate error
🖥 nthreads	lockd	Name:	nthread	s		
📓 ×lateMinThreads	ufs	Data Mover:	server_	2		
		Facility:	nfs			
		Value:	2048			
		Default Value:	512			
		Description:		of threads ded ests, and mem		
		Detailed Description:	threads The par- sure sys configur The upd several nfs.nthr	am represents dedicated to se am is memory of stem memory of ration. late of nfs threa minutes to take eads value cant ate is done.	erve nfs reques dependent, ma an support you ad count needs e effect, and t be changed u	ike ir

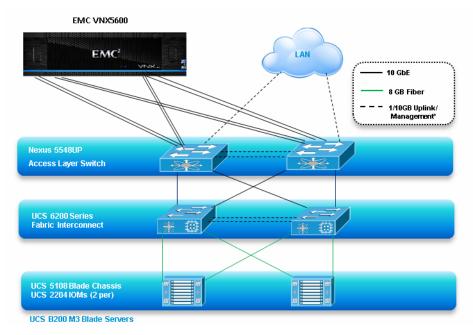
Solution Validation

This section details the configuration and tuning that was performed on the individual components to produce a complete, validated solution.

Configuration Topology for a Cisco-Citrix DaaS Solution

Figure 29 illustrates the architectural diagram for the purpose of this study.

Figure 29 Cisco Solutions for EMC VSPEX XenDesktop 7.5 2000 Seat Architecture Block Diagram



The architecture is divided into four distinct layers:

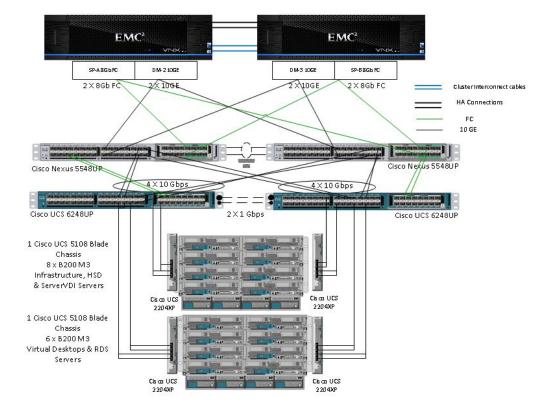
- Cisco UCS Compute Platform
- The Virtual Desktop Infrastructure and Virtual Desktops that run on Cisco UCS blade hypervisor hosts
- Network Access layer and LAN

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• Storage Access through NFS on EMC VNX5600 deployment

Figure 30 details the physical configuration of the 2000 seat Citrix DaaS environment.

Figure 30 Detailed Architecture of the EMC VNX5600, 2000 Seat DaaS Solution



EMC VNX5600 Array

Cisco UCS Director Configuration

This section talks about the configuration that was done to utilize UCS Director to assist in the provisioning of Infrastructure and DaaS components. The installation and configuration of the UCS Director and UCS Baremetal agent are detailed here.

Cisco UCS Director Deployment

For this project we deployed the Cisco UCS Director and Baremetal Agent appliances to an already existing infrastructure environment that is independent of the infrastructure that the DaaS components will use. It is recommended that the Cisco UCS Director and Baremetal Agents run outside of the environments they will be deploying or managing.

For installation and deployment of Cisco UCS Director for DaaS, please refer to http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/ucs-director/vsphere-install-guide/4-1/b_ Installing_UCSDirector_on_vSphere_41.html

Cisco UCS Director Bare Metal Agent Deployment

Refer to the "Cisco UCS Director Baremetal Agent Setup Guide" for information about installation and deployment of the "Cisco UCS Director Baremetal Agent".:

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http://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-director/products-installation-guides-list.html

In order to properly utilize Cisco UCS Director a series of "Day-0 Tasks" must be completed as prerequisites. These tasks are as follows.

Storage: VNX (Day-0)

- Initialize Storage Controllers (SP-A, SP-B & Control Station)
- Configure Management IP Address for SP-A, SP-B & Control Station
- Create required Storage Pools for Block
- Create and present file Storage (Disk Volumes) to DataMovers
- Cabling: FC Cables from SP-A & SP-B to N5K pair, 10G Cables from Datamover to N5K pair, Create LACP (NIC Teamed Interface) for each Datamover
- Configure CIFS server with DNS and AD Integration

Cisco Nexus N5K

Initialize Nexus 5K Switches, configure Management IP Address (See configuration section)

- Cable from Compute and Storage
- Create and configure required vPC & port channels for UCSM & Storage (See N5K configuration)
- Create VSAN-A and B for SAN (See N5K configuration)
- Configure minimum VLANs for Management Network access (See N5K Configuration)

Cisco UCS Manager

Cisco UCS Director provides support for Cisco UCS (Unified Computing System) infrastructure. It provides auto- discovery, monitoring and complete visibility to manage all Cisco UCS components. Following section(s) explain adding Cisco UCS account into Cisco UCS Director to support VSPEX functionality.

- Rack, Stack and Cabled
- Configure Fis in cluster mode with Management IP Address
- Configure bare-minimum pools and policies and management VLAN for at least to run a single ESXi Server

VMware

1. Bring up at least one ESXi Server with Management Network



For assistance in installation and configuration of Day-0 ESXi and vCenter server please reference this Validated Design on pages 125-135) http://www.cisco.com/c/dam/en/us/td/docs/unified computing/ucs/UCS CVDs/ucs vspex xd75.pdf

2. Install vCenter with required licenses



When Day-0 pre-requisite tasks are complete, you are ready to login to the Cisco UCS Director system and begin the configuration.

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3. Log in to the system by entering the appliance IP Address into a web browser. (Default username and passowrd: 'admin')

Cogin - Internet Expl	0.82.0.45/app/c 🔎 🗲	diffe Login	×		-□× © ★ ©
	Cisco U Username: Password: Login	CS Direct	or		
	© 2014, Cisco Systems, I registered trademarks or States and certain other	trademarks of Cisco Syster	to, the Cisco logo, and Cisco Systems, Inc. and/or its affiliates in the t	Inited CISCO	

4. UCS Director Home Dashboard

Cisco UCS Director - Interne		Cisco UCS Director	×		_□× ☆ ☆ ŵ
cisco UC	S Director			admin 🥹 logout Cisi	co about
Converged Virtual 🔻	Physical 🔻 Organia	ations 🔻 Policies 🔻	Administration 🔻	CloudSense™ ▼ Favorites	
Converged					
Add 📄 🖶 Add	💢 Delete				
Vmware marked and a second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec					

Add Data Center Pod

To add a Cisco UCS Manager (UCSM) account, a Data Center needs to be added first, complete the following steps:

- 1. Select Administrator \rightarrow Physical Accounts Pod tab
- 2. Click 'Add' to add a Data Center.
- 3. Specify the Data Center Pod 'Name', select the 'Type' of Data Center and the location 'Address'. Then click on 'Add' to create the Data Center.

Edit POD		
Name	DaaS Lab	
Site	<select site=""> 💌</select>	
Туре	VSPEX 🔻	
Description	DaaS Lab	
Address	Building 2	
		*
	Hide POD POD will be hidden only if it does not contain any physical or virtual a	ccounts
	Save	Close

Add Cisco UCS Account

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When a Data Center has been added, a Cisco UCS Manager account can be added; to do so, complete the following steps:

1. Select Administrator \rightarrow Physical Accounts \rightarrow Physical Accounts tab \rightarrow Add

Add Account	
Data Center	Default Datacenter 💌 🏶
Category	Computing 💌 🐐
Account Type	UCSM 💌 🔹
Authentication Type	Locally Authenticated 🔹 *
Account Name	*
Server Address	*
User ID	*
Password	*
Transport Type	http 💌 🔹
Port	80 *
Description	
Contact Email	
Location	
Service Provider	
	Add Close

Field Name	Description
Data Center	Select the Data Center to which the UCSM account will be associated to.
Category Type	Sepcify the type of infrastructure. In this case 'Computing'.
AccountType	Select the account type. In this case UCSM.
AuthenticationType	Specify the authentication Type , Locally Authenticated or Remotely Authenticated. Locally Authenticated User Accounts - A locally authenticated user account is authenticated directly through the fabric interconnect and can been enabled or disabled by anyone with admin or AAA privileges.
	Remotely Authenticated User Accounts - A remotely authenticated user account is any user account that is authenticated through LDAP, RADIUS, or TACACS+.
AccountName	Specify a name for the UCSM account.
Server Address	Specify the IP address of the UCSM.

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User ID	Specify the user id UCSM.
Password	Specify the password for the UCSM.
Field Name	Description
Transport Type	Select the transport type, either http or https.
Port	Specify the port number of the UCSM.
Description	Specify the description if required.
Contact Email	Specify the email address if required.
Location	Specify the location of the UCSM if required.
Service Provide	Service provider name if any.

Cisco UCS Director will automatically discover all infrastructure elements in the Cisco UCSM account like Chassis, Servers, Fabric Interconnects, Service Profiles, Server Pools etc. in the newly added UCSM account. Typically the discovery process takes about 5 minutes.

Cisco UCS Director Configuration for EMC VNX 5600

Cisco UCS Director provides support for EMC VNX storage. It supports auto- discovery, monitoring and complete visibility to manage all the VNX (VNX 5600) components. Following section(s) explain adding EMC VNX account into Cisco UCS Director to support DaaS Storage functionality.

Add EMC VNX Account

1. Select Administration \rightarrow Physical Accounts \rightarrow Physical Accounts tab \rightarrow Click on 'Add'

Add Account			
Data Center	Default Datacenter 💌 \star	4	4
Category	Storage 💌 *		
Account Type	EMC VNX	•	
Account Sub Type	VNX Unified 💌 *		
Account Name		•	
Server Address		•	
User ID		•	
Password		•	
Storage Processor A IP Address		•	
Storage Processor B IP Address]	
User Name for Block Access		•	
Password for Block Access		•	
Transport Type	http 💌 *		
Port	80	•	
Description] [
Contact Email			Ŧ
	Add	Close	

Table 4Add Account Fields Explanation

Field Name	Description
Data Center	Select the Data Center to which the compute account is added.
Category Type	Sepcify the type of infrastructure. In this case 'Storage'.
AccountType	Select the account type. In this case EMC VNX.
Account Sub Type	Select the VNX account sub type – File, Block or Unified.
AccountName	Specify a name for the VNX account.
Server Address	Specify the IP address of the VNX.
User ID	Specify the user id VNX.
Password	Specify the password for the VNX.
Storage Processor A IP	Specify the IP address of Storage Processor A.

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Storage	Specify the IP address of Storage Processor B.
Processor B IP	
11000330101	
User Name for	Specify the user name for block access.
Block Access	
DIOCK ACCESS	
Password	Specify the password for block access.
for Block	
TOT DIOCK	
Transport Type	Select the transport type, either http or https.
Port	Specify the port number of the VNX.
Description	Specify the description if required.
Contact Email	Specify the email address if required.
Location	Specify the location of the VNX if required.
Service Provide	Service provider name if any.
	· ·

Cisco UCS Director Nexus 5K Configuration

Cisco UCS Director provides support for a multitude of Network devices. Users can add the devices to the Cisco UCS Director and monitor them. The device categories currently supported are:

- Cisco IOS devices
- Cisco Nexus OS devices
- Cisco UCS Fabric Interconnect

The following sections explain adding Cisco 5K device(s) account into Cisco UCS Director to support DaaS functionality.

Add Network Devices

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To add Cisco Nexus Device(s) to the Cisco UCS Director required for this DaaS configuration's functionality:

Select Administrator → → Physical Accounts → → Manage Network Elements tab → → Click on 'Add Network Element'

Add Network Element		
Pod	DaaS Lab 💌 🔹	
Device Category	Cisco Nexus OS	
Device IP	10.70.0.3	
Protocol	ssh 💌	
Port	22	
Login	admin	
Password	*****	
Enable Password	*****	
	Submit Cl	ose

Field Name	Description
Data Center	Select the Data Center to which the other account compute
	and storage are added.
Device Category	Select the type of device category being added.
Device IP	Specify the IP address of the network device.
Protocol	Select the protocol used to communicate with the device.
	Either telnet or ssh can be used.
Port	The port number of the network device
Login	Specify the login id of the device
Password	Specify the device password
Enable Password	Certain devices require a separate password to enter in the
	command configuration mode. Specify any such password in
	this field.

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Cisco UCS Director will discover the devices and collect inventory from the network devices and display them in the form of tabular reports. To view device details that is already added to Cisco UCS Director .

- 2. Select Physical \rightarrow Network.
- 3. Select the Data Center name from the left column.
- 4. Select the 'Managed Network Element' tab.

To view details of a specific device:

1. Select a device from the list and click on 'View Details'

This will display all information related to the device; Interfaces, Configurations, Port Profiles, Private VLANs, and Port Capabilities, etc.

Add VMware Data Center Cloud

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To add a VMware Data Center to the Cisco UCS Director required for this DaaS configuration's functionality, complete the following steps:

1. Select Administrator \rightarrow Virtual Accounts $\rightarrow \rightarrow$ Click on 'Virtual Account'.

Edit Cloud			
Cloud Type	VMware 👻 *		
Cloud Name	vCenter_DaaS		
Server Address	10.71.0.12	•	
Server User ID	administrator@daas.local	•	
Server Password	*****	•	
Server Access Port	443	•	
VMware Datacenter]	
Server Access URL	/sdk	•	
Description]	
Contact Email]	
Location]	
Pod	DaaS Lab 💌		
Service Provider			
			Save Close

Field Name	Description
Cloud Type	Select Cloud Type to be used in UCS Director converged Data Center.
Cloud Name	Select Cloud name for display in UCS Director.
Server Address	Specify the IP address of the Vcenter machine.
Server User ID	Username for Vcenter administrator account.
Server	Vcenter administrator password.
Server Access	Port for Vcenter server communication.
VMware	VMware Datacenter name.
Server Access	URL of Vcenter server access.
Description	Description for Vcenter Datacenter
Contact E-mail	E-mail for Datacenter contacts.
Location	Location of Datacenter.
Pod	Pod created in initial setup
Service	Service Provider name if available.

Cisco UCS Director will discover the devices and collect inventory from the Vcenter Data Center cloud and display them in the form of tabular reports. To view device details that is already added to Cisco UCS Director.

Provisioning ESXi to Cisco UCS Blade Servers using Cisco UCS Director

In this project we provisioned a Cisco Custom ESXi 5.5 image to our Cisco B200 M3 servers using a custom workflow In UCS Director. We imported a custom workflow created by Cisco for deploying ESXi on EMC VNX systems. That custom workflow can be downloaded here:

https://communities.cisco.com/servlet/JiveServlet/download/55002-3-81893/Deploy_ESXi_Host_On_Vblock_3XX_with_VisionIO_v2_0.wfdx.zip

This workflow provisions ESXi Host booting from SAN and Integrates with vCenter Server and Nexus 1000v DVSwitch on VNX5600 Array.

To instuall, complete the following steps:

- 1. Download the attached .ZIP file below to your computer. *Remember the location of the saved file on your computer.
- 2. Unzip the file on your computer. Should end up with a .WFDX file.
- 3. Log in to UCS Director as a user that has "system-admin" privileges.
- 4. Navigate to "Policies-->Orchestration" and click on "Import".
- 5. Click "Browse" and navigate to the location on your computer where the .WFDX file resides. Choose the .WFDX file and click "Open".
- 6. Click "Upload" and then "OK" once the file upload is completed, Click "Next".
- 7. Click "Import".
- 8. A new folder called 'Vblock-3XX-Validated' should appear in "Policies-->Orchestration" that contains the imported workflow. You will now need to update the included tasks with information about the specific environment.

Prerequisites for Using this Workflow

- The DaaS Hardware Infrastructure components (VMware vCenter, Cisco UCSM, Cisco Nexus 5Ks, Cisco Nexus 1000v & EMC VNX5600 Storage Array) are added into UCS Director
- Cisco UCS Director BMA is integrated into Cisco UCS Director
- VMware ESXi Image (with N1Kv) from Cisco is configured in BMA. For more information please refer to Configure ESXi PXE Image.
- Modify 'ks.cfg' file under /opt/cnsaroot/templates/<ESXi_Image_Name> folder to enable ESXi Install on SAN Boot LUN
 - Comment the below line with '#"
 # install --firstdisk --overwritevmfs
 - Uncomment the below line by removing '#"

install -- firstdisk=remote -- overwritevmfs

 Cisco UCS Service Profile Template is created with 2 vNICs & 2 vHBAs, Boot Order is configured with FC Boot First and LAN Second, FC Target Ports are added into SAN Boot Policy and Boot LUN ID is set to '0'. vHBA-0 desired order set to '0' and vHBA-1 desired order set to '1'. Service Profile's Power State set to 'Off'.

• Cisco UCS Service Profile Template vNICs are configured with BMA PXE VLAN and set it as Native VLAN.

Workflow Tasks

- 1. Create UCS Service Profile from Template
- 2. Select UCS Server
- 3. Setup PXE Boot with BMA Selection
- 4. Generic Configure SAN Zoning
- 5. Create VNX LUN
- 6. Create VNX Storage Group
- 7. Add VNX Host Initiator Entry vHBA1
- 8. Add VNX Host Initiator Entry vHBA2
- 9. Add VNX Hosts to VNX Storage Group
- 10. Add VNX LUN to Storage Group
- 11. Associate UCS Service Profile
- 12. Reset UCS Server
- 13. Monitor PXE Boot
- 14. Reset UCS Server
- 15. Wait for Specified Duration
- 16. Register Host with vCenter
- 17. Create VMware Port Group
- 18. Add Hosts to DVSwitch
- 19. Migrate vSwitch VMkernel Port to DVSwitch (Custom Task)
- 20. Migrate Default vSwitch to DVSwitch by Mapping Policy
- 21. Add Virtual Adapter (vMotion Interface)

User Inputs

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The user inputs listed below should be provided by the user after executing the workflow.

User Input	User Input Description
ESXI_HOSTNAME	Enter ESXi Hostname
ESXI_CLUSTER	Select ESXi Cluster to which it need to be added
ESXI_MANAGEMENT_IP	Enter ESXi Management Network IP Address
ESXI_VMOTION_IP_OR_IPPO	Enter an IP Address or IP Pool range for VMotion
OL	interface
N1KV_L3_CONTROL_IP_OR_I	Enter IP Address or IP Address Pool Range for N1Kv L3
PPOOL	Control Access Interface.
	Select UCS Server Blade to install VMware ESXi
UCS_SERVER_BLADE	Hypervisor

Admin Inputs

The Admin Input values are pre-defined in the workflow by the admin user. Edit the Workflow properties, go to user inputs section and modify the below inputs appropriately.

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User Input	User Input Description
ESXI_ROOT_PASSWORD	Enter ESXi root user password
ESXI_MANAGEMENT_SUBNETMASK	Enter VMware ESXi Management Network's Subnet Mask
ESXI_MANAGEMENT_GATEWAY_IP	Enter VMware ESXi Management Network's Gateway IP
ESXI_MANAGEMENT_VLAN	Enter ESXi Management VLAN ID
ESXI_VMOTION_IP_POOL	Enter ESXi VMotion IP Pool (Ex: 192.168.100.100-192.168.100.200)
ESXI_VMOTION_SUBNET_MASK	Enter ESXi VMotion Subnet Mask
DOMAIN_NAME_SERVER_IP	Enter DNS Server IP Address
ESXI_HOST_LICENSE	Enter ESXi Host License Key
ESXI_VMOTION_DV_PORTGROUP	Select N1Kv DV Port Group for vMotion Interface
VCENTER_ACCOUNT	Select VMware vCenter Account
	Enter VMware vCenter Datacenter Name (The Datacenter in which the
VCENTER_DATACENTER_NAME	ESXi Host is going to be added)
ESXI_CLUSTER	Select ESXi Cluster to which host need to be added
N1KV_DVSWITCH	Select N1Kv DV Switch Name
N1KV_L3_CONTROL_PORTGROUP	Select N1Kv L3 Control Access Port Group
N1KV_MGMT_UPLINK_PORTGROUP	Select N1Kv Management Uplink Port Group
N1KV_L3_CONTROL_VLAN	Enter VLAN ID for N1Kv L3 Control Access Interface
	Enter IP Range for N1Kv L3 Control Access Network (Ex:
N1KV_L3_CONTROL_IP_RANGE	192.168.99.100-192.168.99.200)
N1KV_L3_CONTROL_SUBNET_MASK	Enter Subnet Mask for N1Kv L3 Control Access Network
MGMT_PORTGROUP_MAPPING_POLICY	Select N1Kv Management Portgroup Mapping Policy
UCS_ORGANIZATION	Select UCS Organization
UCS_SP_TEMPLATE	Select UCS Service Profile Template
SAN_FABRIC_SWITCH_A1	Select SAN Fabric Switch A
SAN_FABRIC_SWITCH_B1	Select SAN Fabric Switch B
SANBOOT_TARGET_PORTS_FABRIC_A	Select VNX FC Target Port for SAN Zoning on Fabric A
SANBOOT_TARGET_PORTS_FABRIC_B	Select VNX FC Target Port for SAN Zoning on Fabric B
SAN_CONTROLLER_ACCOUNT	Select SAN Boot Storage Controller
SANBOOT_LUN_SIZE	Select SAN Boot LUN Size (GB)
	Enter SAN Boot LUN Host ID (Should match UCS Service Profile
SANBOOT_HOST_LUN_ID	Template Boot Policy)
VNX_FC_TARGET_PORT_FABRIC_A	Select VNX FC Target Port for SAN Boot on Fabric A
VNX_FC_TARGET_PORT_FABRIC_B	Select VNX FC Target Port for SAN Boot on Fabric B

Additional Workflow Configuration

After configuring the admin inputs, open the workflow using workflow designer and modify the "TASKS" by completing the following steps:



In upcoming versions, the below inputs should be able to configured as admin input values

- Select UCS Server (Select UCS Server for ESXi Host): Open the Task > Click 'Next' > Click 'Next' > Click on 'Revalidate' button > Select appropriate 'UCSM' account, Click 'Next' > Click 'Submit'
- Setup PXE Boot with BMA Selection (Configure PXE Server for ESXi Install): Open the Task > Click 'Next' > Click 'Next' > Select BMA Account > Select configured ESXi OS Image in BMA and Set appropriate 'Timezone', Click 'Next' > Click 'Submit'
- 3. Create VNX LUN (Create SANBoot LUN for ESXi Host):Open the Task > Click 'Next' > Click 'Next' > Select EMC VNX Account, Select Storage Pool Type, Select RAID Type, and Select RIAD Group Name for New LUN, Click 'Next' > Click 'Submit'
- 4. Add VNX Host Initiator Entry (Add ESXi vHBA-1 Host Initiator): Open the Task > Click 'Next' > Click 'Next' > Select EMC VNX Account, Click 'Next' > Click 'Submit'
- 5. Add VNX Host Initiator Entry (Add ESXi vHBA-2 Host Initiator): Open the Task > Click 'Next' > Click 'Next' > Select EMC VNX Account, Click 'Next' > Click 'Submit'
- 6. Register Host with vCenter (Add ESXi Host to Cluster on vCenter): Open the Task > Click 'Next' > Click 'Next' > Click on 'Revalidate' button, Click 'Next' > Click 'Submit'

🕈 🥒 😫 🚱 🚭	R					
Input Label	Admin Input Value 1	Input Description				
ESXI_HOSTNAME		Enter VMware ESXi Hostname	fal	ge 🔺		
ESXI_ROOT_PASSWORD	*****	Enter ESXi root user password	fal	ра		
SANBOOT_HOST_LUN_ID	0	Enter SAN Boot LUN Host ID	fal	ge		
ESXI_MANAGEMENT_GATEWAY_IP	10.70.0.1	Enter VMware ESXi Management	fal	ipa		
DOMAIN_NAME_SERVER_IP	10.71.0.10	Enter DNS Server IP Address	fal	ipa		
ESXI_NFS_STORAGE_IP_RANGE	10.72.0.52-10.72.0.90		fal	St		
ESXI_VMOTION_IP_POOL	10.73.0.109-10.73.0.129	Enter ESXi VMotion IP Pool	fal	St		
MGMT_DV_PORTGROUP_MAPPING_POL	I 2		fal	VN		
SANBOOT_LUN_SIZE	20	Select SAN Boot LUN Size (GB)	fal	ge		
ESXI_MANAGEMENT_SUBNETMASK	255.255.255.0	Enter VMware ESXi Management	fal	su		
ESXI_NFS_STORAGE_SUBNET_MASK	255.255.255.0		fal	ge		
ESXI_VMOTION_SUBNET_MASK	255.255.255.0	Enter ESXi VMotion Subnet Mask	fal	su		
ESXI_MANAGEMENT_VLAN	70	Enter ESXi Management VLAN ID	fal	ge		
SAN_FABRIC_SWITCH_A	DaaS Lab@10.70.0.2	Select SAN Fabric Switch A	fal	ne 🔻		

User Inputs for Deploying ESXi to Blade Servers

Total 24 items				_
ESXI_VMOTION_DV_PORTGROUP	vMotion		fal	vn
SELECT_VMWARE_ACCOUNT	vCenter_DaaS		fal	
UCS_SP_TEMPLATE	UCSM_SP;org-root;org-ro	Select UCS Service Profile Templ	fal	uq
UCS_ORGANIZATION	UCSM_SP;org-root	Select UCS Organization	fal	uq
ESXI_DV_NFS_STORAGE_PORTGROUP	Storage		fal	vn
ESXI_HOST_LICENSE	R12C3-6825K-58341-0N88		fal	ge
SANBOOT_TARGET_PORTS_FABRIC_A	DaaS Lab@VNX5600@@50		fal	GE
SANBOOT_TARGET_PORTS_FABRIC_B	DaaS Lab@VNX5600@@50		fal	GE
SAN_CONTROLLER_ACCOUNT	DaaS Lab@VNX5600	Select SAN Boot Storage Control	fal	ΕM
SAN_FABRIC_SWITCH_B	DaaS Lab@10.70.0.3	Select SAN Fabric Switch B	fal	ne

Submit Close

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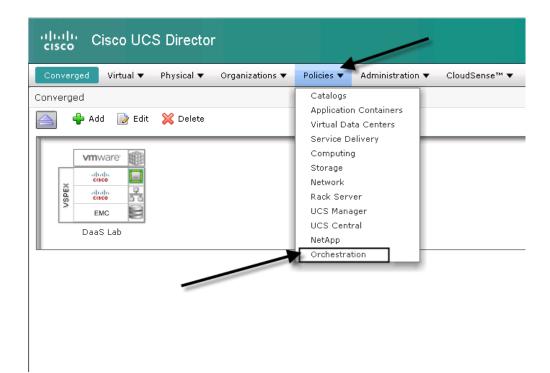


Figure 31 DaaS Workflow Diagram for Installing ESXi on Cisco UCS B200 M3 Servers

Deploying ESXi Install Workflow

To deploy ESXi to blades using the Cisco UCS Director workflow imported and customized earlier, complete the following steps.

1. From the main screen, Select 'Policies' \rightarrow 'Orchestration'.

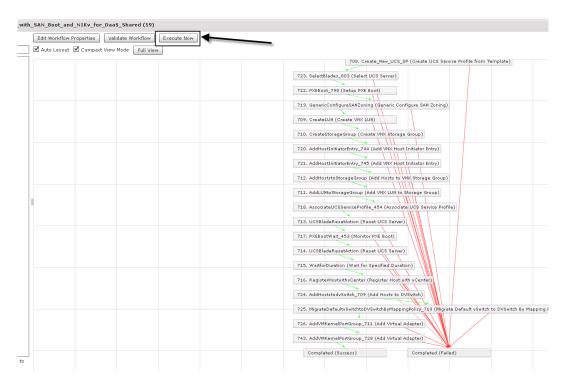


1

2. Double click the workflow created in the proper tenant.

Cisco UCS Direct	
Orchestration	
Workflows Triggers Context Work	kflow Mapping User VM Action Policy Workflow Templates Workflow Schedules Custom Approval Tasks
😵 Refresh 🔟 Favorite 🛛 🕂 Add V	Workflow 🛛 🗟 Import 📑 Export 💷 Task Library 🌸 Search and Replace
Workflows	
	Workflow Name
▶ 🔁 CloudGenie	
▶ 🗀 DaaS	
▶ 🗀 DaaS_FarmIso_T1	
▶ 🚞 DaaS_FarmIso_T2	
🔻 🗁 DaaS_Shared	
	Deploy_ESXi_Host_with_SAN_Boot_and_N1Kv_for_DaaS_Shared
	Add_NFS_Datastore_to_ESXi_Cluster_DaaS_Shared
🕨 🧰 Default	
▶ 🚞 System	
NDI 🔁 VDI	
▶ 🚞 VMware	

3. Double-click 'Execute Now'



4. Enter the hostname of the blade you are deploying too and click 'Submit'.

		teStora IostInit			+	11	11		iator Entr	y)
721.	. AddHo	lostInit	tiatorEr	ntry_7	45 (Ad	IN PF	IX Hos	st Initi	iator Entr	y)
									torage G	iroup)
AN_Bo	oot_ar	nd_N1	1Kv_f	or_D	aa\$_9	Shar	ed		ge Group	p)
		*							S Service	e Profil
		_								
				Sub	omit		Clos	e		
714.	. UCSBI	BladeRe	esetAd	tion (I	Reset	ucs	Serve			
					-	-				prDuration (Wait for Specified Duration)

Cisco UCS Director Workflow for Adding NFS Datastores to the DaaS Environment

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For this project we created a workflow to provision NFS datastores on demand for our Service Providers. Since we went through processes of onboarding 10 different tenants, some of which were private and some of which were shared infrastructures, we utilized different datastores for different tenants. We had to create new NFS datastores for user data (i.e. home drives, shared drives) and user profiles using Citrix UPM. We also used NFS datastores on the ESXi hosts to store the virtual machine files and write cache disks for the VMs provisioned by Citrix Provisioning Services. The following are steps and configuration we used to automate the NFS datastore provisioning using Cisco UCS Director.

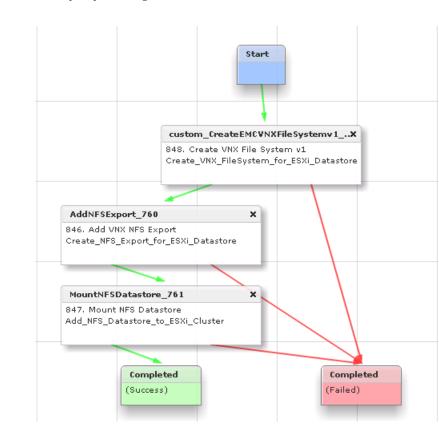


Figure 32 Workflow for Adding NFS to Hosts



♣∕ജ�₽		Q				
Input Label	Admin Input Value	1 🔺				
SELECT_STORAGE_POOL	Name CONTAINS WCPool1	fal:	Se	en		
DATASTORE_SIZE (GB)		fal:	Ent	ge		
DATASTORE_NAME		fal:	Ent	ge		
VNX_DATMOVER	DaaS Lab;VNX5600;server_2;1	fal:		ge		
VNX_CONTROLLER_ACCOUNT	DaaS Lab@VNX5600	fal:		EΝ		

Create a Catalog for Adding the NFS Datastore

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Cisco UCS Director was used to provision storage for user data and Citrix PVS write cache data. To create a catalog, complete the following steps:

1. Under 'Policies' select 'Catalogs

cisco UCS	Director					
Converged Virtual 🔻 🖡	Physical 🔻 🛛 Orga	anizations 🔻	Policies 🔻	Administration 🔻	CloudSense™ ▼	Favorites
atalogs			Catalogs			
Catalog			Application Virtual Dat	n Containers		
🚱 Refresh 🛛 💷 Favorite	🖶 Add		Service De			
	-	-	Computing			
Catalog			Storage			
Catalog Name	Catalog Desc	Cloud	Network			
Windows 2012 R2		vCenter_Da	Rack Serv			
Infra_NFS_Datastore			UCS Mana	· · · · · · · · · · · · · · · · · · ·		
Shared_NFS_Mount			UCS Centr	ral		
FarmIso1_NFS_Mount			NetApp			
FarmIso2_NFS_Mount			Orchestrat	tion		

2. Select 'Add' a new catalog.

Converged Virtual 🔻 Ph	ysical 🔻 🛛 Orgai	nizations 🔻 🛛 P	olicies 🔻	Admin	istration 🔻	CloudSense™
Catalogs						
Catalog						
🛞 Refresh 🛛 💷 Favorite ┥	Add					
Catalog						
Catalog Name	Catalog Desc	Cloud	Group	5		
Windows 2012 R2		vCenter_DaaS	All Group)5	ок	
Infra_NFS_Datastore			All Group)5	ок	
Shared_NFS_Mount			All Group)5	ок	
FarmIso1_NFS_Mount			All Group)5	ок	
FarmIso2_NFS_Mount			All Group)5	ок	

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- 3. Create catalog steps
 - **a.** Name the catalog
 - **b.** Select 'Advanced' in catalog type
 - c. Select 'Workflow Icon' for catalog Icon

Basic Information	Specify whether this of asked to select the vE	catalog item shall be available to all user groups or to specific groups. When requesting a new service, us DC within the Cloud specified here.	er will
vApp Workflow			
Summary	Catalog Name	DaaS_NFS	
	Catalog Description	n	
	Catalog Type	Advanced 🗸	
	Catalog Icon	Workflow Icon	
		Applied to all groups	

4. For Workflow, select the Workflow we created earlier.

I

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Create Catalog	
Freate Latalog ✓ Basic Information VApp Workflow Summary	VApp Workflow Workflow Select Add_NFS_Datastore_to_ESXi_Cluster_DaaS_Shared • Selected Workflow has 3 tasks (Add NFS Export, Mount NFS Datastore, custom_Create EMC VNX File System v1)
	Back Next Close

5. Select 'Submit' on the summary page

Create Catalog				
✓ Basic Information	Summary Review information be	low and click Submit to modify the Catalog.		
 Pasic Information vApp Workflow Summary 	Summary Review information be Catalog Catalog Description Groups Workflow Name Workflow Description	DaaS_NFS All Groups Add_NFS_Datastore_to_ESXi_Cluster_DaaS_Shared		

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Create a Service Request for Creating and Mounting NFS Datastore to Hosts

To create the Service Request to mount an NFS datastore to the VMware hosts, complete the following steps:

1. Select 'Organizations' then 'Service Requests'

Converged Virtual 🔻 Phy	sical 🔻	Organizations N	Policies 🔻	Administration 🔻 🛛 Cl	oudSens
Service Requests for All User Gr All User Groups Default Group FarmIsolation1 FarmIsolation2	oups Servia 😵 R Servi	Service Requi My Approvals Summary Virtual Resou Physical Reso Chargeback	rces Create		
Infra	Servic	e Request ID 176 175 174 173 172 171 170 169 168 167 166 165	Request T Create VM Create VM	ype Initiati admin admin admin admin admin admin admin admin admin admin admin admin admin	ng Umer

2. Click 'Create Request'

cisco C	isco UC	S Directo	or				
Converged	Virtual 🔻	Physical 🔻	Organizations	▼ Policies ▼	Administration 🔻	CloudSense™	 Favorites
Service Reque	sts for All Us	er Groups					
All User Groups		Serv	ice Requests	Archived Service R	equests Currer	nt Month Budget Av	ailability Pay
Default Group FarmIsolation1			Refresh 🔃 Fa	vorite 🏾 🏫 Create	Request 👙 Se	arch and Replace	
FarmIsolation2		Serv	vice Requests				
Infra		Serv	ice Request ID	Request T	уре І	initiating User	Gro
			17	6 Create VM	a	dmin	FarmIsolation2
			17	5 Create VM	a	dmin	FarmIsolation1
			17-	Create VM	a	dmin	Infra
			17	8 Create VM	a	dmin	Infra
			17	2 Create VM	a	dmin	Infra
			17	L Create VM	a	dmin	Infra
			17	Create VM	a	dmin	FarmIsolation1
			16	9 Create VM	a	dmin	FarmIsolation2
			16	8 Create VM	a	dmin	FarmIsolation2
			16	7 Create VM	a	dmin	FarmIsolation2
			16	6 Create VM	a	dmin	FarmIsolation2
			16	5 Create VM	a	dmin	FarmIsolation2
			16		-	dmin	FarmIsolation2
			16			dmin	FarmIsolation2
			16	2 Create VM	-	dmin	FarmIsolation2
			16			dmin	FarmIsolation2
			16	Create VM	a	dmin	FarmIsolation1

3. Enter inputs

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a. Select Group (pictured is Infrastructure, but change per tenant)

- **b.** Catalog Type : Advanced
- c. Select catalog created in prior section.

reate Service Request		
reate Service Request Catalog Selection Custom Workflow Summary	Catalog Selection Select catalog to be deployed. Select Catalog Type Advanced Select Catalog Infra_NFS_Datastore	

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4. Enter DataStore name, Size and select from proper pool

Create Service Request Custom Workflow If applicable, specify workflow input values. DataSTORE_NAME WriteCache_DS01 DataSTORE_SIZE (GB) SelectSTORAGE_POOL Select InfraPool2 + 		
Custom Workflow Summary DATASTORE_NAME WriteCache_DS01 DATASTORE_SIZE (GB) SELECT_STORAGE_POOL Select InfraPool2 •	Create Service Request	
Summary DATASTORE_NAME WriteCache_DS01 DATASTORE_SIZE (GB) 500 SELECT_STORAGE_POOL Select InfraPool2 •		Custom Workflow Inputs If applicable, specify workflow input values.
DATASTORE_NAME WriteCache_DS01 DATASTORE_SIZE (GB) 500 SELECT_STORAGE_POOL Select InfraPool2 •	Custom workflow	
DATASTORE_SIZE (GB) 500 SELECT_STORAGE_POOL Select InfraPool2 •	Summary	
SELECT_STORAGE_POOL Select InfraPool2 •		DATASTORE_NAME WriteCache_DS01 +
		DATASTORE_SIZE (GB) 500
Back Next Close		SELECT_STORAGE_POOL Select InfraPool2 •
Back Next Close		
		Back Next Close

5. Check Summary and Submit your request

Create Service Request	
 Catalog Selection 	Summary Review information below and click Submit to initiate the service request.
 Catalog Selection Custom Workflow Summary 	Review Information below and click Submit to initiate the service request. Catalog Infra_NFS_Datastore Catalog Description Port Groups
	\mathbf{X}
	Back Submit Clos

Create Virtual Machines in the VCenter_DaaS Cloud Using Cisco UCS Director

In our solution we created a VMware_DaaS Cloud that is part of our converged environment. This is detailed earlier in this document. With this Cloud, we were able to utilize Cisco UCS Director to provision virtual machines on demand. This process includes the creation of Virtual Data Centers and policies required to make them. Then creating a catalog to use when initiating the service request for VM provisioning.

Create Catalog for Virtual Machine Provisioning

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1. Click 'Catalogs' under the Policies tab

Converged Virtual ▼ Physical ▼ Organizations ▼	Policies ▼ Administration ▼ CloudSense™ ▼ F		
Converged	Catalogs Application Containers Virtual Data Centers		
Vmware vmware vmware vmware consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecution consecut	Service Delivery Computing Storage Network Rack Server UCS Manager UCS Central NetApp		

2. Click 'Add' to begin the process

Converged Virtual 🔻	Physical 🔻 Orga	anizations 🔻 🛛 Po	licies 🔻 🛛 Adm	ninistration ▼ CloudSense™ ▼ Favorites
atalogs				
Catalog				
😵 Refresh 🛛 🔟 Favorite	e 🛟 Add 🔶 e		-	
Catalog				
Catalog Name	Catalog Desc	Cloud	Groups	
Windows 2012 R2		vCenter_DaaS	All Groups	ок
Infra_NFS_Datastore			All Groups	ок
Shared_NFS_Mount			All Groups	ок
FarmIso1_NFS_Mount			All Groups	ок
FarmIso2_NFS_Mount			All Groups	ок

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- 3. Enter a Catalog Name
 - a. Catalog Type is 'Standard'
 - **b.** Select VM Operating System Type
 - c. Click 'All Groups'
 - d. Select the Vcenter Cloud created earlier
 - e. Select VM image Template from Vcenter

Basic Information	Specify whether this ca	talog item shall be available C within the Cloud specified h	to all user groups or to sp ere.	ecific groups. When req	uesting a new service, user v
Application Details					
User credentials	Catalog Name	DaaS_VM_Create	•		
Customization	Catalog Description				
VM Access					
Summary					
	Catalog Type	Standard 🔻 🍨			
	Catalog Icon	VM: SUSE Linux VM: Redhat Linux			
	Selected Groups	VM: CentOS Linux			
	Cloud Name	VM: Linux			
	Image	VM: Windows Image	2		
		VM: Windows Image	store		
		VM: VMware Image	3		
		VM: VMware Image	2		Next Clo
		VM: VMware Image			

4. Click 'Next'

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ate Catalog		
Basic Information	Specify whether this cata asked to select the vDC	alog item shall be available to all user groups or to specific groups. When requesting a new service, user will within the Cloud specified here.
Application Details		
User credentials	Catalog Name	DaaS_VM_Create
Customization	Catalog Description	
VM Access		
Summary		
	Catalog Type	Standard 💌 🔸
	Catalog Icon	VM: Windows Image 2
		☑ Applied to all groups
	Cloud Name	vCenter_DaaS 🔹 *
	Image	Tmplt_2k12R2
	Windows License Pool	Windows 2012 R2 License 💌
		Provision all disks in single datastore
		•
		Next Close

5. In this use case we used a Generic VM with no special settings for applications.

Create Catalo	g						
Basic Info Applicatio		Application category determines w Application categories and associa	which policies will be used by the vD tions with various policies are mana	C where the service is pro aged in vDC management	ovided.		
•	on Details lentials ation s	Application category determines w Application categories and associa Category Support Contact Email Address Specify OS Specify Other OS Specify Other OS Specify Other Applications Application Code	tions with various policies are mana]]]] nay be used in the VM nat			
					Back	Next	Close

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6. Click Next through credential options

Cre	ate Catalog	
~	Basic Information	Specify VM user credential access options. User credential for the VM in the template can be shared with users or it can be reset before sharing. If shared, user can retrieve credentials for the active VM.
 ✓ 	Application Details	
	User credentials	Credential Options Do not share
	Customization	
	VM Access	
	Summary	
		Back Next Close

7. Click Next through the defaults.

Create Catalog	
Basic Information	Specify customization options and custom actions. The custom actions are executed in the workflow after provisioning.
 Application Details User credentials Customization 	Automatic Guest Customization
VM Access Summary	Post Provisioning Custom Actions
	Enable Virtual Storage Catalog
	Enable
	Cost Computation
	VM App Charge Frequency Hourly -
	Inactive VM Application Cost USD 0.0
	Back Next Close

8. Click Next through the defaults

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Create Catalog	
 Basic Information Application Details 	VM Access Specify whether the end users will have access to the VM via web interface or other remote interfaces.
 User credentials 	Web Access Configuration
 Customization 	Enable
VM Access	Remote Desktop Access Configuration
Summary	
	Back Next Close

9. Click Submit to create Catalog

 Basic Information 	Summary Douise information hal	ow and click Submit to modify the Catalog.	
Application Details		ow and circk submit to mouny the catalog.	
' User credentials	Catalog	DaaS_VM_Create	
Customization	Catalog Description		
	Cloud	vCenter_DaaS	
VM Access	Image	Tmplt_2k12R2	
Summary	Groups	All Groups	
	Category Name	Generic VM	
	Support Email		
	os	Windows Server 2012	
	Other OS		
	Applications		
	Other Applications		
	Template User		
	Web Access URL		
	Web Access Label		
	Remote Desktop Se	rver	
	Remote Desktop Po	t	
	Remote Desktop La	pel	
	Workflow Name		\
	Workflow Descriptio	۱ ۱	\
	Application Code		7

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Create vDC (Virtual Data Center) Required for VM Provisioning Workflows

Before utilizing the catalog for provisioning virtual machines we created in the prior steps, we need to create vDCs or Virtual Data Centers for each tenant model used. Virtual Data Center is made up of a collection of policies that direct the virtual machines to be properly configured, named and placed when the provisioning workflows are executed. The policies we used for this project were System, Computing, Network and Storage. We did not utilize a Cost Model Policy in this project.

Create System Policy for vDC

1. Click 'Service Delivery' under the 'Policies' Tab

iysical 🔻 Organi	zations 🔻	Policies Administratio	on 🔻 Cloud	iSense™ ▼ F	avorites				
		Catalogs							
	Policy Ra	Virtual Data Centers Service Delivery	Cost Model	Public Cloud	Cost Model	Storage Tier Cost Mo	odel OS License	Data Collectio	n Policy (
		Computing Storage							
Policy Descrip	Host Nam	Network	Suffix Li	DNS Server L	VM Name 1	er Product ID	Domain/Work	Domain Admi	
	\${VMNAI			10.71.0.10			daas.local	administrator	Infra_vD0
				10.77.0.10				administrator	FI2_vDC FI1_vDC
	l	NetApp Orchestration	J						
	azon Deployment I P Add	ezon Deployment Policy Ra Add Policy Descrif Host Nam	azon Deployment Policy R Add Catalogs Application Containers Yorkal Data Centers Service Delivery Computing Storage Policy Descrit Host Nam Network \${VMNA Ack Server \${VMNA UCS Central \${VMNA UCS Central	Add Catalogs Application Containers Add Service Delivery Policy Descript Host Nam \${VMMAR \${VMMAR \${VMMAR \${VMMAR Storage Descript Host Nam Network Storage Suffix Li Storage Suffix Li	azon Deployment Policy Re Application Containers Add Catalogs Add Storage Policy Descript Host Nam Storage Policy Descript Host Nam StVMMAR Rack Server StVMAR Rack Server StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR StVMAR 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Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage 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Domain/Work \$ (VMNAT Rack Server 10.71.0.10 Image Fiz.local Fiz.local \$ (VMNAT VCS Gentral 10.76.0.10 Fiz.local Fiz.local Fiz.local	azon Deployment Policy Ra Add Catalogs Add Computing Storage Policy Descript Hot Nam Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage Storage S

2. Click 'Add' to create policy.

ervice Delivery										
Mware System Policy Am	azon Deployment	Policy Rackspa	ce Deployment P	olicy Cost Mode	el Public Cloud	Cost Model Sto	rage Tier Cost M	odel OS License	Data Collectio	n Policy E
🛞 Refresh 🛛 🔝 Favorite 🔹	Add 🔶									
VMware System Policy	-									
Policy Name	Policy Descrip	Host Name Te	DNS Domain	DNS Suffix Li	DNS Server L	VM Name Ter	Product ID	Domain/Work	Domain Admi	
Infra_system_policy F12_system_policy		\${VMNAME} \${VMNAME}	daas.local FI2.local		10.71.0.10 10.77.0.10			daas.local FI2.local	administrator administrator	Infra_vDC FI2_vDC
FI1_system_policy		\${VMNAME}	FI1.local		10.76.0.10			FI1.local	administrator	FI1_VDC

- 3. In the System Policy Information box we defined the following fields
 - a. Policy Name
 - **b.** Host Name Template
 - c. DNS Domain
 - d. Time Zone

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- e. DNS server IP
- f. VM Image Type set to Windows and Linux

- g. Define Windows License Model
- h. Local Administrator password
- i. Domain/workgroup set to 'Domain' so machines can auto join the domain

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- j. Domain name
- k. Domain User account that can add machines to the domain
- I. Above accounts Password

System Policy Informat	ion	
Policy Name	Infra_system_policy	
Policy Description		
VM Name Template	If empty, name provided by end user is taken as VM Name. If End User VM Name or VM Prefix Power On after deploy	
Host Name Template		
DNS Domain	daas.local +	
Linux Time Zone	US/Pacific 🔹	
DNS Suffix List		
DNS Server List	10.71.0.10	
VM Image Type	Windows and Linux 💌 🔶	
Windows Parameters	(applicable only for Windows)	
Product ID	Please make sure to provide the value in OS License Pool or enter the id here.	
License Owner Name	CompanyFullName	
Organization	CompanyName +	v

License Mode	Per-Seat 🔻 🚸			
Number of License Users	5]		
WINS Server List]		
	Create a unique SID			
	🗌 Auto Logon			H
Auto Logon Count	5]		
Administrator Password	*****	•		
Domain/Workgroup	Domain 🔻 🚸			
Windows Time Zone	Pacific Time	*		
Domain	daas.local	•		
Domain Username	administrator]*		
Domain Password	*****]*		
	Define VM Annotation			
			Submit Close	

Create a Computing Policy for vDC

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1. Under 'Policies' select 'Computing'

Converged Virtual ▼ Physical ▼ Organizations ▼	Policies 🔻 Administrati	on ▼ CloudSense™ ▼ Favorites	
omputing "Nware Computing Policy KVM Computing Policy Hyp Refresh 🔡 Favorite 🌳 Add 📰 View 🍃 Edit VMware Computing Policy	Catalogs Application Containers Virtual Data Centers Service Delivery Computing	esktop Computing Policy	
	Storage Network		
Policy Name vCenter_DaaS - Default Computing Policy	Rack Server	ally created	vCenter_DaaS
Infra_comp_policy	UCS Manager	ally created	vCenter_DaaS
FI2_Infra_comp_policy	UCS Central		vCenter DaaS
FI1_Infra_comp_policy	NetApp Orchestration]	vCenter_DaaS

2. Click 'Add'

Converged Virtual ▼ Physical ▼ Organizations ▼	Policies ▼ Administration ▼ CloudSense™ ▼ Fave	orites
mputing		
Mware Computing Policy KVM Computing Policy H	yperV Computing Policy XenDesktop Computing Policy	
😵 Refresh 🛯 💷 Favorite 🛛 🖶 Add 📰 View 📄 Ed	it 💥 Delete 🏽 🖣 Clone	
VMware Computing Policy		
Policy Name vCenter DaaS - Default Computing Policy	Policy Description Default policy - automatically created	vCenter DaaS
Infra_comp_policy	Denaal policy datematically created	vCenter_DaaS
FI2_Infra_comp_policy		vCenter_DaaS
FI1_Infra_comp_policy		vCenter_DaaS

3. When creating the computing policy, we need to provide a name, specify our Vcenter Cloud created earlier and select the cluster that this VM will use. In our case, we defined a separate cluster per tenant model. Lastly we provided disk resizing values to allow us to resize VMs during provisioning. Once these parameters are defined, click 'Save' to create the System Policy.

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Edit Computing Policy			
Policy Name	Infra_comp_policy		
Policy Description			
Cloud Name	vCenter_DaaS 💌 🏶		
Host Node/Cluster Scope	Include Selected Clusters		
Selected Clusters	Select DaaS Infrastructure *		
Resource Pool	Select		
ESX Type	Any ESX/ESXi 💌		
ESX Version	Any		
Minimum Conditions	Total VMs in the Host Node	less than or equals 💌	
	Active VMs in the Host Node	less than or equals 💌	
	Number of CPU Cores in the Host Node	less than or equals 💌	
	CPU Speed Per Core (GHz)	less than or equals 💌	
	Total Memory (GB) Host Node	less than or equals 💌	
	VCPUs Ratio - Provisioned/Total	less than or equals 🔻	▼
Deployment Options			
	🗌 Override Template		
Resizing Options			
			Save Close

Resizing Options		
	✓ Allow Resizing of VM	
Permitted Values for vCPUs	1,2,4	
Permitted Values for Memory in MB	512,1024,1536,2048,4096,8192	
Deploy to Folder		
		ľ
	Save Close	

Create Network Policy for vDC

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1. Select 'Network' under 'Policies' Tab

Converged Virtual ▼ Physical ▼ Organizations ▼	Policies 🔻 Administratio	on ▼ CloudSense™ ▼ Favorite	35
letwork /Mware Network Policy Network Provisioning Policy S 🛞 Refresh 💷 Pavorite 🗳 Add	Catalogs Application Containers Virtual Data Centers Service Delivery Computing	ol Policy VXLAN Pool Policy G	Slobal VLAN Pool Usage Global VXLAN P
VMware Network Policy	Storage		
Policy Name	Network Rack Server	y Description	Cloud Name
Infra_network_policy FI2_Infra_network_policy FI1_Infra_network_policy	UCS Manager UCS Central NetApp Orchestration		vCenter_DaaS vCenter_DaaS vCenter_DaaS

2. Click 'Add'

Converged Virtual ▼ Physical ▼ Organizatio	ns ▼ Policies ▼ Administration ▼ CloudSense™ ▼ F	avorites
letwork		
Mware Network Policy Network Provisioning Police	cy Static IP Pool Policy VLAN Pool Policy VXLAN Pool Poli	cy Global VLAN Pool Usag
🛞 Refresh 🛛 🕮 Favorite 🛛 🕂 Add 🚤		
VMware Network Policy		
Policy Name	Policy Description	
vCenter_DaaS - Default Network Policy	Default policy - automatically created	vCenter_DaaS
Infra network policy		vCenter DaaS
FI2_Infra_network_policy		vCenter_DaaS
FI1_Infra_network_policy		vCenter_DaaS

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3. Select the Vcenter Cloud under Cloud Name, then click the '+' to add VM Networks

	policy			
vCenter_DaaS	*			
Allow end use	er to select option	al NICs		
₽ ∕ 🐹			Q	
NIC Alias	Mandatory	Allow end use	Copy from Te	Adapter Type
NIC1	Yes	No	Yes	pcnet32
Total 1 items				
	Allow end use	Allow end user to select option.	Allow end user to select optional NICs	Allow end user to select optional NICs

4. When adding VM Network, click the '+' button to add port groups found in the Vcenter Cloud.

IC Alias	NIC1		*			
	Mandatory					
	Allow end u	ser to choose	portgroups			
	🗹 Copy Adapt	er Type from	Template			
ort Group	s 🗣 🖉 🐹					
	Port Group	IP Address	IP Address	IPv6	IPv6 Addre	IPv6 Addre
	vCenter_Daa	Static	Inline IP Pool	No	Static	
			_			
	Total 1 items					

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5. For Port Group Name, click 'Select' and find Vcenter Port group in the list.

Alias NI	01	*		
	Edit Port Groups Entry			
- -	Port Group Name	Select Infrastructure *		
Groups	IPv4 Configuration			
P	Select IP Address Type	Static 💌 🏶		Add
V	Select IP Address Sourc	e Inline IP Pool 🔻		
	Static IP Pool	10.71.0.65-10.71.0.95	*	
	Subnet Mask	255.255.255.0	*	
	Gateway IP Address	10.71.0.1		
	IPv6 Configuration			
		IPv6		
		Submit	Close	

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							A
	Cloud Name	Host Node	Switch Name	Port Group N	VLAN ID	Promiscuous	Port Group Type
	vCenter_DaaS	10.70.0.109	vSwitch0	CIFS	72	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	AD_Trust	701	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	Internet	78	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	DMZ	75	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	n1kv-mgmt	70	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	n1kv-control	70	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	FarmIso2	77	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	FarmIso1	76	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	Shared	74	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.109	vSwitch0	Server Isolation	75	Disabled	Virtual Machine Portgroup
~	vCenter_DaaS	10.70.0.109	vSwitch0	Infrastructure	71	Disabled	Virtual Machine Portgroup
	vCenter_DaaS	10.70.0.113	vSwitch0	CIFS	72	Disabled	Virtual Machine Portgroup
	vCenter DaaS	10.70.0.113	vSwitch0	AD Trust	701	Disabled	Virtual Machine Portgroup

6. Define an Inline IP Pool to allocate a block of IPs for VMs to be configured with. We also defined the Subnet Mask and Default Gateway the VMs will use.

Edit Port Groups Entry	
Port Group Name	Select Infrastructure *
IPv4 Configuration	
Select IP Address Type	Static 💌 *
Select IP Address Source	Inline IP Pool 🔻
Static IP Pool	10.71.0.65-10.71.0.95
Subnet Mask	255.255.255.0
Gateway IP Address	10.71.0.1
IPv6 Configuration	
	IPv6
	Submit Close

Create a Storage Policy for vDC

Γ

1. Select 'Storage' under 'Policies' Tab

Converged Virtual Physical Organizations	Policies 🔻 Administratio	on ▼ CloudSense™ ▼
etwork /Mware Network Policy Network Provisioning Policy Stati 😵 Refresh 🍱 Favorite 🕂 Add	Catalogs Application Containers Virtual Data Centers Service Delivery Computing	Policy VXLAN Pool
VLAN Pool Policy Pod Name	Storage Network Rack Server UCS Manager UCS Central NetApp Orchestration	

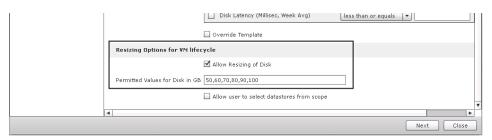
2. Select the 'VMware Storage Policy' Tab and then click 'Add'

orage		
rtual Storage Catalog VMware Storage Policy Stora	age Network Scheme HyperV Storage Policy	
🗞 Refresh 🔟 Favorite 📫 Add 🛶		
/Mware Storage Policy		
Policy Name	Policy Description	
Center_DaaS - Default Storage Policy nfra_storage_policy 12_Infra_storage_policy 11_Infra_storage_policy	Default policy - automatically created	vCenter_Daa8 vCenter_Daa8 vCenter_Daa8 vCenter_Daa8

1

3. In Storage Resource Allocation Policy we define the Policy Name, Select the Vcenter Cloud we created earlier, and then select the Data Stores that we added to the Vcenter environment in our NFS Provisioning Workflows. We used NFS for this project. We also defined parameters to resize VM disk size upon provisioning.

System Disk Policy	Storage Policy - System Disk	Policy	
Additional Disk Policies	Policy Name	Infra_storage_policy	
	Policy Description		
	Cloud Name	vCenter_DaaS 🔻 🔶	
	System Disk Scope		
	Data Stores Scope	Include Selected 💌	
	Selected Data Stores	Select DS_DaaS_Infra1 🔹 👞	
	L	Use Shared Data Store only	
	Storage Options		
		Use Local Storage	
		Use NFS	
		Use SAN	
	Minimum Conditions	Data Store Capacity (GB)	less than or equals 🔻
		Data Store Free Space (GB)	less than or equals 💌
		Data Store Free Space (%)	less than or equals 💌
		Disk Usage (KBps, Week Avg)	less than or equals 💌
		Disk Usage (KBps, 24hr Avg)	less than or equals 💌



4. Image shows the Datastore selection screen.

System Disk Policy Storage			olicy - System Disk	Policy					
dditional Disk Policies		S Policy	Name	Infra_stora	ge_policy				
		Policy	Description						
S	elect								
							V		
	Data Store N	Data Center I	Capacity (GE	Free(GB)	Free (%)	Used(GB)	Is Accessible	No. of VMs	No. of Ho
	datastore1 (20)	SP DaaS	12.5	11.6	93.0	0.8	😜 ON	()
	DS_DaaS_FI1	SP DaaS	492.3	299.3	60.7	193.0	😜 ON	14	4
	datastore1 (7)	SP DaaS	552.7	250.3	45.2	302.3	😑 ON	() (
	datastore1 (9)	SP DaaS	552.7	551.7	99.8	0.9	😑 ON	(
	datastore1 (1)	SP DaaS	12.5	11.6	93.0	0.8	😑 ON	(0
	datastore1 (6)	SP DaaS	12.5	11.6	93.0	0.8	😜 ON	(0
	datastore1 (16)	SP DaaS	12.5	11.6	93.0	0.8	😑 ON	(0
	datastore1 (5)	SP DaaS	12.5	11.6	93.0	0.8	😝 ON	0	0
	datastore1 (8)	SP DaaS	12.5	11.6	93.0	0.8	😑 ON	(
	DS_DaaS_Infre	P. DaaS	492.3	401.3	81.5	91.0	\varTheta ON	7	7
	datastore1 (4)	SP DaaS	552.7	435.1	78.7	117.6	😑 ON	-	7
	datastore1 (17)	SP DaaS	12.5	11.6	93.0	0.8	😜 ON	(
◄									•
Te	otal 28 items								
1222								Select	Cancel
				Disk	Usage (KBps, We	ek Avg)	less than c	r equals 🔻	
					Usage (KBps, 24H	- 4	less than o	r equals	

Cisco Unified Computing System Configuration

This section describes the Cisco UCS configuration that was done as part of the infrastructure build out. The racking, power and installation of the chassis are described in the install guide (see www.cisco.com/c/en/us/support/servers-unified-computing/ucs-manager/products-installation-guides-l ist.html) and it is beyond the scope of this document. More details on each step can be found in the following documents:

- Cisco UCS Manager Configuration Guides GUI and Command Line Interface (CLI)
- Cisco UCS Manager Configuration Guides Cisco

Base Cisco UCS System Configuration

To configure the Cisco Unified Computing System, complete the following steps:

1. Bring up the Fabric Interconnect (FI) and from a serial console connection set the IP address, gateway, and the hostname of the primary fabric interconnect. Now bring up the second fabric interconnect after connecting the dual cables between them. The second fabric interconnect automatically recognizes the primary and ask if you want to be part of the cluster, answer yes and set the IP address, gateway and the hostname. Once this is done all access to the FI can be done

remotely. You will also configure the virtual IP address to connect to the FI, you need a total of three IP address to bring it online. You can also wire up the chassis to the FI, using either 1, 2, 4 or 8 links per IO Module, depending on your application bandwidth requirement. We connected four links to each module.

- 2. Connect using your favorite browser to the Virtual IP and launch the UCS-Manager. The Java based UCSM will let you do everything that you could do from the CLI. We will highlight the GUI methodology here.
- 3. Check the firmware on the system and see if it is current. Visit: Download Software for Cisco UCS Infrastructure and UCS Manager Software to download the most current UCS Infrastructure and UCS Manager software. Use the UCS Manager Equipment tab in the left pane, then the Firmware Management tab in the right pane and Packages sub-tab to view the packages on the system. Use the Download Tasks tab to download needed software to the FI. The firmware release used in this paper is 2.2(2c).

📑 Main Topology View 🛛 🚥 Fabric Interconnects 🗋 🥪 Server	s 🧹 Thermal 🔊 Decommissioned 👬 Firmware f	lanagement 🖾 Policies 🕂 Faults		
Installed Firmware Firmware Auto Install Catalog Package I	Download Tasks Packages Images Upgrade Validat	ion Faults		
🛨 👝 🛋 Filter 🛥 Export 🎃 Print				
Name	Туре	State	Vendor	
🖅 🛞 ucs-k9-bundle-b-series.2.1.2.110.B.gbin	B Series Bundle	Active		2.1(2.110)B
🗈 😵 ucs-k9-bundle-b-series.2.1.2.143.B.bin	B Series Bundle	Active		2.1(2.143)B
🗄 🛞 ucs-k9-bundle-b-series.2.1.2.52.B.gbin	B Series Bundle	Active		2.1(2.52)B
🗄 🛞 ucs-k9-bundle-b-series.2.1.3a.B.bin	B Series Bundle	Active		2.1(3a)B
🗄 🛞 ucs-k9-bundle-b-series.2.2.1b.B.bin	B Series Bundle	Active		2.2(1b)B
🗈 🐶 ucs-k9-bundle-b-series.2.2.1c.B.bin	B Series Bundle	Active		2.2(1c)B
💼 🛞 ucs-k9-bundle-b-series.2.2.2c.B.bin	B Series Bundle	Active		2.2(2c)B
🗄 🐶 ucs-k9-bundle-infra.2.1.2.110.A.gbin	Infrastructure Bundle	Active		2.1(2.110)A
🗄 🛞 ucs-k9-bundle-infra.2.1.2.143.A.bin	Infrastructure Bundle	Active		2.1(2.143)A
🗄 🛞 ucs-k9-bundle-infra.2.1.2.52.A.gbin	Infrastructure Bundle	Active		2.1(2.52)A
🗄 🛞 ucs-k9-bundle-infra.2.1.3a.A.bin	Infrastructure Bundle	Active		2.1(3a)A
🗄 🛞 ucs-k9-bundle-infra.2.2.1b.A.bin	Infrastructure Bundle	Active		2.2(1b)A
🗄 🛞 ucs-k9-bundle-infra.2.2.1c.A.bin	Infrastructure Bundle	Active		2.2(1c)A
💼 🛞 ucs-k9-bundle-infra.2.2.2c.A.bin	Infrastructure Bundle	Active		2.2(2c)A

4. If the firmware is not current, follow the installation and upgrade guide to upgrade the UCS Manager firmware. We will use UCS Policy in Service Profiles later in this document to update all UCS components in the solution.

Note

The Bios and Board Controller version numbers do not track the IO Module, Adapter, nor CIMC controller version numbers in the packages.

5. Configure and enable the server ports on the FI. These are the ports that will connect the chassis to the FIs.

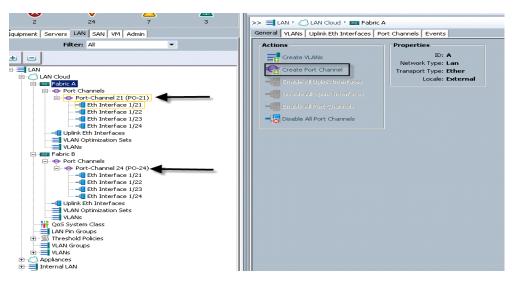
Fault Summary	🕯 😋 💿 🖬 New - 🕞 Options 🛛 🚱 🕕 Pending Activities 🛛 🔯 Exit
2 24 7 3	>> 👸 Equipment 🕴 🚥 Fabric Interconnects 🕴 🚥 Fabric Interconnect A (subordinate) 🖓 🎫 Fixed Module 👌 📲 Ethernet Ports 👌 📲 Port 1
Equipment Servers LAN SAN VM Admin	General Faults Events FSM Statistics
Filter: All	Fault Summary Physical Display
te = = tequpment te tequpment tequpment	Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: S
Rack-Mounts FEX	Overal Status: 1 Up Additional Info:
	Admin State: Enabled ID: 1 Slot ID: 1
	Admin Sato: tradited Uit 1 Stot D: 1 Actions Mich Label: Mich Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Start Mich Start Image: Start Mich Start

6. Configure and enable uplink Ethernet ports:

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1	Skt	Port ID	MAC	If Role	If Type	Overal Status	A
1	1	1	54:7F:EE:77:74:A8	Server	Physical	1 Up	Enabled
aupment	1	2	54:7F:EE:77:74:A9	Server	Physical	1 Up	t Enabled
(Chassis	1	3	54:7F:EE:77:74:AA	Server	Physical	1 Up	t Enabled
Rack-Mounts	1	4	54:7F:EE:77:74:AB	Server	Physical	1 Up	t Enabled
Rex FEX	1	5	54:7F:EE:77:74:AC	Server	Physical	t Up	1 Enabled
Servers	1	6	54:7F:EE:77:74:AD	Server	Physical	1 Up	Enabled
Fabric Interconnects	1	7	54:7F:EE:77:74:AE	Server	Physical	1 Up	1 Enabled
Fabric Interconnect A (subordinate)	1	8	54:7F:EE:77:74:AF	Server	Physical	1 Up	Enabled
	1	9	\$4:7F:EE:77:74:80	Unconfigured	Physical	V Sfp Not Present	Disabled
FC Ports	1	10	54:7F:EE:77:74:B1	Unconfigured	Physical	V Sfp Not Present	Disabled
F I Expansion Module 2	1	11	54:7F:EE:77:74:82	Unconfigured	Physical	V Sfp Not Present	Disabled
B Fans	1	12	54:7F:EE:77:74:B3	Unconfigured	Physical	V Sfp Not Present	Disabled
🕀 🎆 PSUs	1	13	54:7F:EE:77:74:84	Unconfigured	Physical	V Sfp Not Present	Disabled
E Fabric Interconnect B (primary)	1	14	54:7F:EE:77:74:85	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	15	54:7F:EE:77:74:B6	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	16	54:7F:EE:77:74:87	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	17	54:7F:EE:77:74:88	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	18	54:7F:EE:77:74:89	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	19	54:7F:EE:77:74:8A	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	20	54:7F:EE:77:74:88	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	21	54:7F:EE:77:74:BC	Network	Physical	V Sfp Not Present	1 Enabled
	1	22	54:7F:EE:77:74:BD	Network	Physical	1 Up	1 Enabled
	1	23	54:7F:EE:77:74:BE	Network	Physical	1 Up	1 Enabled
	1	24	54:7F:EE:77:74:8F	Network	Physical	100	1 Enabled
	1	25	54:7F:EE:77:74:C0	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	26	54:7F:EE:77:74:C1	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	27	54:7F:EE:77:74:C2	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	28	54:7F:EE:77:74:C3	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	29	54:7E:EE:77:74:C4	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	30	54:7F:EE:77:74:C5	Unconfigured	Physical	V Sfp Not Present	Disabled
	1	31	54:7F:EE:77:74:C6	Fooe Uplink	Physical	1 00	t Enabled
	1	32	54:7F:EE:77:74:C7	Fcce Uplink	Physical	t Up	t Enabled

- **a.** On the LAN tab in the Navigator pane, configure the required Port Channels and Uplink Interfaces on both Fabric Interconnects.
- b. Configure the ethernet uplink port channels using the ethernet Network ports configured above



1

c. 5b Configure the FC uplink ports:

Equipment Servers LAN SAN VM Admin	General Faults Events FSM Statistics	
Filter: All	Fault Summary	Physical Display
Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis Chasis	Status 0 0 0 Status 0 0 0 Overall Status: 0 Up Address Status: 0 Additional Info: Admin State: Enabled Image: Status Status: 0 Actions Image: Status: Enable Port Image: Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status Status	Up Admin Down Fail Link Down Properties D: 11 Slot ID: 2 User Label: Works: 20:48:54:7F:EE:77:74:C0 Mode: N Proxy VSAN: Fabric dual/vsan default (1) Voltated Speed: 8 Gbps License Details License State: License Ok License Grace Period: 0 0 Discussion of the state

	Slot	Port ID	WWPN	If Role	If Type	Overall Status	
± =	P	11	20:48:54:7F:EE:77:74:C0	Network	Physical	1 Up	1 Enable
Equipment	2	12	20:4C:54:7F:EE:77:74:C0	Network.	Physical	t Up	1 Enable
⊞ •spl Chassis	2	13	20:4D:54:7F:EE:77:74:C0	Network.	Physical	V Stp Not Present	1 Enable
🕀 🐗 Rack-Mounts	2	14	20:4E:54:7F:EE:77:74:C0	Network	Physical	👽 Sfp Not Present	1 Enable
Em Fabric Interconnects	2	15	20:4F:54:7F:EE:77:74:C0	Network.	Physical	👽 Sfp Not Present	1 Enable
Fabric Interconnect A (subordinate) Fired Module	2	16	20:50:54:7F:EE:77:74:C0	Network.	Physical	V Sfp Not Present	1 Enable

7. On the Equipment tab, expand the Chassis node in the left pane, the click on each chassis in the left pane, then click Acknowledge Chassis in the right pane to bring the chassis online and enable blade discovery.



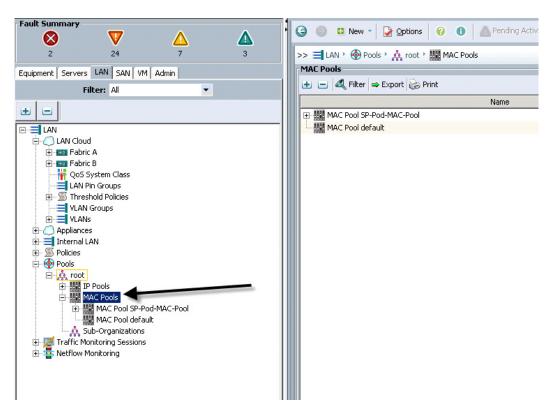
8. Use the Admin tab in the left pane, to configure logging, users and authentication, key management, communications, statistics, time zone and NTP services, and Licensing. Configuring your Management IP Pool (which provides IP based access to the KVM of each UCS Blade Server,) Time zone Management (including NTP time source(s)) and uploading your license files are critical steps in the process.

🚔 Cisco Unified Computing System Manager - UCS-EXC-SP		
Fault Summary		
	🕴 Ġ 💿 🖬 New - 🔛 Options 😥 🚯 🧥 Pending Activities 🛛 🔯 Exit	
2 24 7 3	>> 🖀 Al	
Equipment Servers LAN SAN VM Admin	General Policy Backup & Export	
Filter: Al	Actions Properties	
	System Name: UCS-EXC-SP	
	A Management Interfaces System Name: UCS-FXC-SP Withul IPVA Address: 10.700.010	
Example 2 Faults, Events and Audit Log	Address: # HA Configuration HA Configuration: Cluster	
	Import Configuration Fabric Information -	
	Fabric Taburan and A (and a direction)	
	Create and Download Tech Support	
Syslog	Out-Of-Band Access In-Band Access	
TechSupport Files	IPv4 IPv6 Admin State: Disable	
- Settings		
😑 🔒 User Management	IP Address: 10.70.0.11	
😟 🚔 Authentication	Subnet Mask: 255.255.240.0	
E DAP	Default Gateway: 10.70.0.1	
B - B RADIUS		
TACACS+ E- Services		
Locales		
🕂 🍱 Locally Authenticated Users		
Remotely Authenticated Users Reles		
🕀 🚟 Roles	Fabric Interconnect B (primary)	
E P Key Management	Out-Of-Band Access In-Band Access	
Communication Management	IPv4 IPv6 Admin State: Disable	
Communication Services		
- To DNS Management	IP Address: 10.70.0.12	
- 🚠 Management Interfaces	Subnet Mask: 255,255,240.0	
UCS Central	Default Gateway: 10.70.0.1	
E Stats Management		
Collection Policies		
S Collection Policy diagram		
- S Collection Policy fex		
🐒 Collection Policy host		
- S Collection Policy port		
💯 Collection Policy server		
E = fabric		
E C LAN Cloud		
E SAN Cloud		
E A root		
🗐 thr-policy-default		
A Sub-Organizations		
Time Zone Management		
😑 🧰 Capability Catalog		

9. Create all the pools: MAC pool, UUID pool, WWNN pool, WWPN Pool, External Management IP Address Pool and Server pools

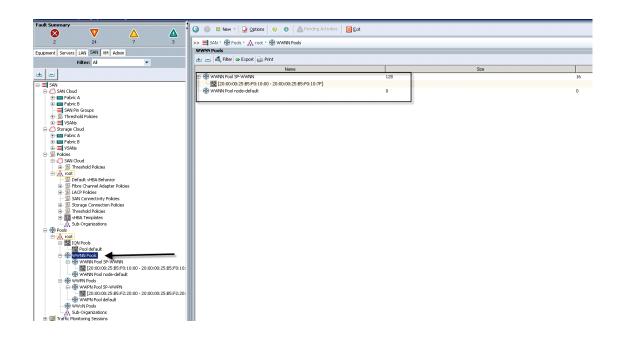
I

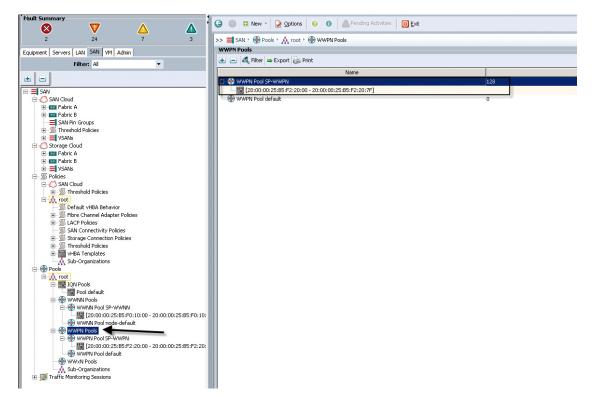
10. From the LAN tab in the navigator, under the Pools node, we created a MAC address pool of sufficient size for the environment. In this project, we created a single pool with two address ranges for expandability.



11. For Fiber Channel Connectivity, WWN and WWPN pools must be created from the SAN tab in the navigator pane, in the Pools node:

WWPN





12. For this project, we used a single VSAN, the default VSAN with ID 1:

I

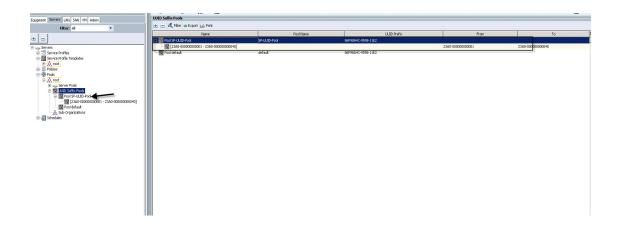
Fault Summary						
🛛 🗸 🗸	🔾 🔘 💷 New - 📝 Options 🛛 🚱 🇴 🥼	Pending Activities	t			
3 24 7 3	>> 🚍 SAN + 🙆 SAN Cloud + 🚍 VSANs					
Equipment Servers LAN SAN VM Admin	VSANs					
Filter: Al	🛨 👝 🕰 Filter 👄 Export 🗞 Print					
	Name	ID	Fabric ID	If Type	If Role	Transport
• =						
E-= SAN	VSAN default (1)	1 D	ual N	<i>i</i> irtual	Network	Fc 4
🖻 👶 SAN Cloud	Fabric A					
Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Email: Emai	E-Baric B					
SAN Pin Groups						
Threshold Policies						
E-E VSANs						
= VSAN default (1)						
O Storage Cloud						
E S Policies						
Coud SAN Cloud E- S Threshold Policies						
mreshold Policies						
S Default vHBA Behavior						
Fibre Channel Adapter Policies						
IACP Policies IACP Policies Interview						
🚿 SAN Connectivity Policies						
Storage Connection Policies						
⊕ S Threshold Policies ⊕ The A Templates						
Sub-Organizations						
E Pools						
E & root						
IQN Pools						
Pool default						
E 💮 WWNN Pools						
- I WWNN Pool SP-WWNN						
- WWPN Pool SP-WWPN						
20:00:00:25:85:F2:20:00 - 20:00:00:25:85:F2:20:						
- 🛞 WWPN Pool default						
- 💮 WWxN Pools						
A Sub-Organizations						
Image: Traffic Monitoring Sessions						

1

13. From the LAN under the Pools node, we created an External Management IP address pool for use by the Cisco UCS KVM connections to the blade servers in the study.

Equipment Servers LAN SAN VM Admin		vddresses IP Blocks Faults Eve	ents					
Filter: All	IPv4 Blocks	IPv6 Blocks						
	+ - 4	🛨 👝 🕰 Filter 👄 Expert 😹 Frint						
		Name	From	To	Subnet	Default Gateway		
E CAN Cloud	- 部語 (10.70	0.0.25 - 10.70.0.48]	10.70.0.25	10.70.0.48	255.255.255.0	10.70.0.1		
R Carl Carlo	- 胡麗 [10.74	0.0.49 - 10.70.0.64]	10.70.0.49	10.70.0.64	255.255.255.0	10.70.0.1		
+ som Fabric D								
- 🙀 QoS System Class								
IN STATES Threshold Policies								
ULAN Groups								
Applances								
11 Internal LAN								
10 SP Policies								
🗇 💮 Pools								
A root Pools								
- Mar IP Pools								
12 12 DP Pool ext-mont								
(+) MAC Poole								
- 🔬 Sub-Organizations								
III 🖀 Netflow Monitoring								
	1 1111							

14. The next pool we created is the Server UUID pool. On the Servers tab in the Navigator page under the Pools node we created a single UUID Pool for the test environment. Each UCS Blade Server requires a unique UUID to be assigned by its Service profile.

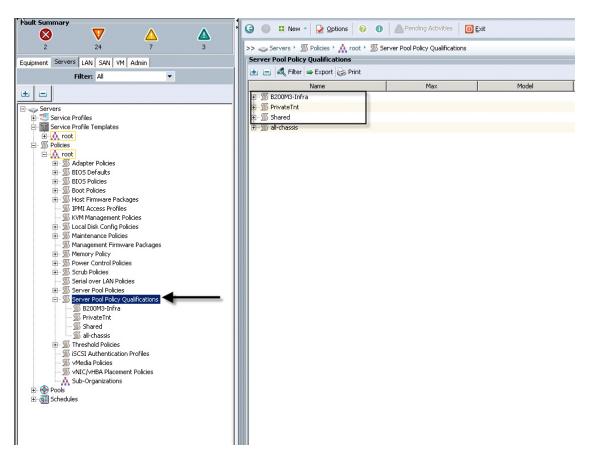


15. We created four Server Pools for use in our Service Profile Templates as selection criteria for automated profile association. Server Pools were created on the Servers tab in the navigation page under the Pools node. Only the pool name was created, no servers were added:

🚔 Cisco Unified Computing System Manager - UCS-EXC-SP	
Fault Summary	🕞 💿 🗄 New - 😧 Options 😥 🕘 📥 Pending Activities 🛛 📴 Exit
2 24 7 3	>> 🥪 Servers * 🛞 Pools * 🔬 root * 🥪 Server Pools
Equipment Servers LAN SAN VM Admin	Server Pools
Filter: All	🛨 🖃 💐 Filter 👄 Export 🍃 Print
	Name Size
* =	
E-up Servers	a Server Pool SP-Infrastructure 2
🗄 🖑 Service Profiles	-Server Pool ServerIso 0
Service Profile Templates	P Server Pool Shared 7
B A root	Server Pool default 0
🖻 💮 Pools	
E A root	
Server Pools Server Pool PrivateTenant	
Server Pool Privace I enanc Server Pool SP-Infrastructure	
Server Pool Server Iso	
Server Pool default	
WIII Suffix Pools Asure Sub-Organizations	
E - G Schedules	
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16. We created three Server Pool Policy Qualifications to identify the blade server model, its processor and the amount of RAM onboard for placement into the correct Server Pool using the Service Profile Template. In this case we used slot id to segregate tenant hosts into specific slots. (We could have used a combination of chassis, slot, server model, etc or any combination of those things to make the selection.)

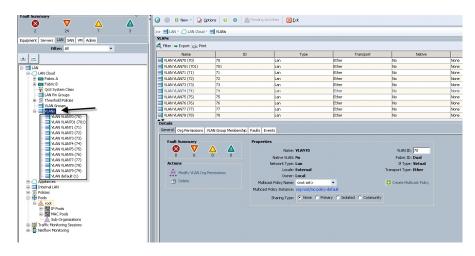
Γ



The next step in automating the server selection process is to create corresponding Server Pool
Policies for each UCS Blade Server configuration, utilizing the Server Pool and Server Pool Policy
Qualifications created earlier.

ipment Servers LAN SAN VM Admin	Server Pool Policies	
Filter: Al	Name	Target Pool
-	Server Pool Policy SharedTenant	org-root/compute-pool-Shared
	Server Pool Policy B200M3-Infra	org-root/compute-pool-SP-Infrastructure
Servers Service Profiles	Server Pool Policy PrivateTenant	org-root/compute-pool-PrivateTenant
Service Profile Templates	Server Pool Policy Server Iso	
E A root	Server Pool Policy Shared	org-root/compute-pool-Shared
Policies	2 Janvan dary shared	org root compare poor shared
E A root		
Adapter Policies		
🐵 🚿 BIOS Defaults		
BIOS Policies		
	🚖 Create	Server Pool Policy X
Host Firmware Packages		
S IPMI Access Profiles	Creat	e Server Pool Policy 🥹
 Local Disk Config Policies 		-
Maintenance Policies		
S Management Firmware Packages		ne: SharedTenant
Memory Policy	No.	ine: Shared enant
Sever Control Policies	Descripti	on:
🗄 🚿 Scrub Policies	Target P	ol: Server Pool Shared 🔻
🗐 Serial over LAN Policies		n: Shared
🖻 🚿 Server Pool Policies	Quanicau	Contraction of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second seco
🐒 Server Pool Policy B200M3-Infra		
📓 Server Pool Policy PrivateTenant		
📓 Server Pool Policy ServerIso		
Server Pool Policy Shared		
Server Pool Policy Qualifications Server Pool Policy Qualifications Server Pool Policy Qualifications		
Shared		
S all-chassis		
Threshold Policies		
🛒 iSCSI Authentication Profiles		
🗐 vMedia Policies		OK Cancel
🗐 vNIC/vHBA Placement Policies		
Sub-Organizations		
🗄 💮 Pools		
🗄 🚮 Schedules		

- **18.** To create the policy, right-click the Server Pool Policy node, select Create Server Pool Policy, provide a name, description (optional,) select the Target Pool from the dropdown, the Qualification from the dropdown and click OK. Repeat for each policy to be created.
- 19. On the LAN tab in the navigator pane, configure the VLANs for the environment:



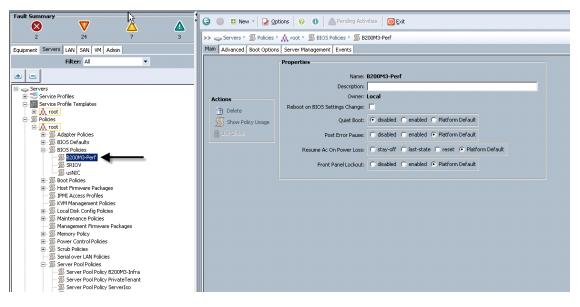
- **20.** In this project we utilized nine VLANs to accommodate our four traffic types and a separate native VLAN for all traffic that was not tagged on the network. The Storage VLANs provided communications for NFS and CIFS storage traffic.
- 21. On the LAN tab in the navigator pane, under the policies node configure the vNIC templates that will be used in the Service Profiles. In this project, we utilize two virtual NICs per host, one to each Fabric Interconnect for resiliency. QoS is handled by Cisco Nexus 1000V for the VM-Network, so no QoS policy is set on the templates. Both in-band and out-of-band management VLANs are trunked to the eth0 and eth1 vNIC templates. The Default VLAN is 79 and used for PXE booting for UCS Director Baremetal Imaging.

It Summary	🔨 🔍 🖾 New - 🖓 Qotions 🛛 🕢 🕘 🖾 Pending Activities 🗌 🔯 Ext.		
	3 >> = LAW * 5 Policies * A root * 1 will C Templates		
pment Servers LAN SAN VM Admin	vNIC Templates		
	+ - 4 Filter = Export 🚱 Print		
Filter: Al			
-	Name	VLAN	Native VLAN
	I WIIC Template DaaS-A		
LAN	Network VLAN70	VLAN70	с
🕀 🍊 LAN Cloud	Network VLAN701	VLAN701	c
E E Fabric A		VLAN71	c
🖶 🚥 Fabric B	Network VLAN72	VLAN72	c
	Network VLAN73	VLAN73	C
- Threshold Policies	Network VLAN74	VLAN74	C
VLAN Groups	Network VLAN75	VLAN75	С
H VLANS		VLAN76	с
E C Appliances		VLAN77	С
🕀 🚍 Internal LAN		VLAN78	C
🖃 🚿 Policies		VLAN79	•
🗄 🕘 Appliances	WIIC Template Daas-B		
E-C LAN Cloud	while Template FarmIso1-A		
E Sink Profile	- Network VLAN70	VLAN70	C
Threshold Policies Section 2018 Section 2	Network VLAN701	VLAN701	C
E S UDLD Link Policy	Network VLAN71	VLAN71	0
E R root	Network VLAN72	VIAN72	C
- S Dynamic vNIC Connection Policies	- Network VLAN73	VLAN73	
Flow Control Policies		VLAN75	č
Si LACP Policies		VLAN79	
5 LAN Connectivity Policies	WIC Template FarmIso1-B	VLAN79	e
1 - 5 Link Protocol Policy			
+ S Multicast Policies	WIIC Template FarmIso2-A	VLAN70	
10-55 Network Control Policies	Network VLAN70		0
@ QoS Policies	Network VLAN701	VLAN701	0
Image: Threshold Policies		VLAN71	c
S VMQ Connection Policies	Network VLAN72	VLAN72	С
- SusNIC Connection Policies	Network VLAN73	VLAN73	c
WIIC Template Daas-A		VLAN77	с
- TT VNUC Template Deas-A	Network VLAN79	VLAN79	e
VNIC Template ParmIso1-A	Im villC Template FarmIso2-B		
VNIC Template FarmIso1-B	WIIC Template Shared-A		
VIIC Template FarmIso2-A		VLAN70	0
vNIC Template FarmIso2-B		VLAN701	с
- 11 vNIC Template Shared-A		VLAN71	c
VNIC Template Shared-B	Network VLAN72	VLAN72	С
-A Sub-Organizations	Network VLAN73	VLAN73	C
- 💮 Pools	Network VLAN74	VLAN74	c
E & root	- Network VLAN79	VLAN79	e
1 III IP Pools	Im vIIC Template Shared-B		
MAC Pools			
Sub-Organizations Traffic Monitoring Sessions			

I

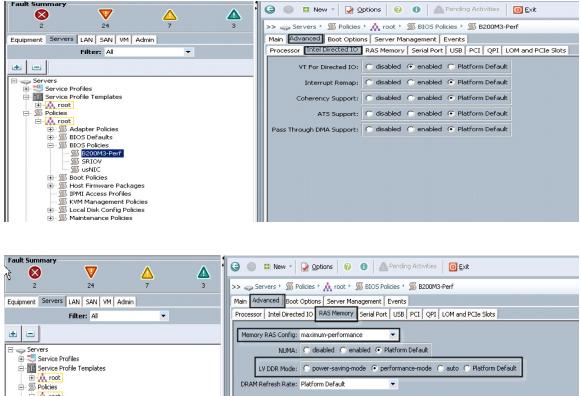
22. To create vNIC templates for eth0 and eth1 on both fabrics, select the Fabric ID, select all VLANs and set the MTU size to 9000, select the MAC Pool, then click OK.

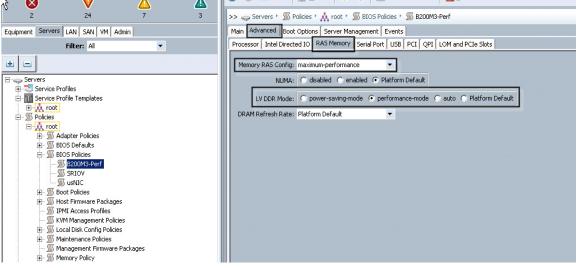
23. Prepare the Perf-Cisco BIOS Policy. From the Server tab, Policies, Root node, right-click the BIOS Policies container and click Create BIOS Policy. Provide the policy name and step through the wizard making the choices indicated on the screen shots below:



The Advanced Tab Settings

ult Summary	* 😂 💿 🗳 New - 📝 Options 🕜 🕕 📥 Pending Activities 🔯 Exit
2 24 7 3	>> 🚙 Servers + 📓 Policies + 👗 root + 📓 BIOS Policies + 📓 B200M3-Perf
upment Servers LAN SAN VM Admin	Main Advanced Boot Options Server Management Events
Filter: All	Processor Intel Directed IO RAS Memory Serial Port US8 PCI QPI LOM and PCIe Slots
	Turbo Boost: 🔿 disabled 📀 enabled 🔿 Platform Default
Servers	Enhanced Intel Speedstep: C disabled C Platform Default
Service Profile Templates	Hyper Threading: C disabled C enabled C Platform Default
E A root	Core Multi Processing: Platform Default
E d, root	Execute Disabled Bit: C disabled C Platform Default
S Adapter Policies S BIOS Defaults	
BIOS Policies	Virtualization Technology (VT): C disabled C Platform Default
55 B200M3-Perf	Hardware Pre-fetcher: C disabled C enabled Platform Default
usNIC	Adjacent Cache Line Pre-fetcher: C disabled C enabled I Platform Default
	DCU Streamer Pre-fetch: C disabled C enabled C Platform Default
SI IPMI Access Profiles	
	DCU IP Pre-fetcher: C disabled C enabled Platform Default
Maintenance Policies	Direct Cache Access: C disabled C Platform Default
S Management Firmware Packages S Memory Policy	Processor C State: C disabled C enabled C Platform Default
Power Control Policies	
Scrub Policies Serial over LAN Policies	Processor C1E:
Server Pool Policies	Processor C3 Report: 🕝 disabled 🔿 acpi-c2 🔿 acpi-c3 🔿 Platform Default
Server Pool Policy B200M3-Infra	Processor C6 Report: 🕫 disabled 🔿 enabled 🔿 Platform Default
Server Pool Policy ServerIso	Processor C7 Report: 🔿 disabled 🔿 enabled 🔿 Platform Default
Server Pool Policy Qualifications B200M3-Infra	CPU Performance: 🔍 enterprise 🔿 high-throughput 🔿 hpc 🔿 Platform Default
	Max Variable MTRR Setting: 🔿 auto-max 🔿 8 📀 Platform Default
Ill-chassis Imeshold Policies	Local X2 APIC: C xapic C x2apic C auto C Platform Default
💯 iSCSI Authentication Profiles	Power Technology: performance
	Energy Performance
Sub-Organizations	Frequency Floor Override: C disabled C enabled C Platform Default
Ger Pools Schedules	P-STATE Coordination: C hw-all C sw-all C sw-any @ Platform Default
	DRAM Clock Throttling: Platform Default
	Channel Interleaving: Platform Default
	Rank Interleaving: Platform Default
	Demand Scrub: C disabled C enabled Platform Default
	Patrol Scrub: C disabled C enabled Platform Default





The remaining Advanced tab settings are at platform default or not configured. Similarly, the Boot Options and Server Management tabs'settings are at defaults. Many of the settings in this policy are the UCS B200 M3 BIOS default settings. We created this policy to illustrate the combined effect of the Platform Default and specific settings for this use case.

Note

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Be sure to Save Changes at the bottom of the page to preserve this setting. Be sure to add this policy to your blade service profile template.

e Host F	^{e Package} irmware Package	,					
e: 2.2.2c							
n:							
CIMC BIOS ⇔ Export 💦 I	Board Controller FC Adapters	would you like to configure th		C Simple C Advanced			
Select	Vendor	Model	PID	Presence	Version		4
	Cisco Systems Inc	Cisco UCS M51KR-B	N20-AB0002	N/A	<not set=""></not>	-	-
	Cisco Systems Inc	Cisco UCS M81KR	N20-AC0002	N/A	<not set=""></not>	-	
Π	Cisco Systems Inc	Cisco UCS M71KR-E	N20-AE0002	N/A	<not set=""></not>	-	
Г	Cisco Systems Inc	Cisco UCS M72KR-E	N20-AE0102	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS M61KR-I	N20-AI0102	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS M71KR-Q	N20-AQ0002	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS M72KR-Q	N20-AQ0102	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS VIC 1280	UCS-VIC-M82-8P	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS M61KR-B	UCSB-MEZ-BRC-02	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS M73KR-E	UCSB-MEZ-ELX-03	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS M73KR-Q	UCSB-MEZ-QLG-03	N/A	<not set=""></not>	-	
~	Cisco Systems Inc	Cisco UCS VIC 1240	UCSB-MLOM-40G-01	N/A	2.2(2c)	-	

1

24. Continue through the CIMC, BIOS, Board Controller and Storage Controller tabs as follows:

pter CIMC BIOS	Board Controller FC Adapters	HBA Option ROM Storage Controlle	r Local Disk GPUs				
ilter 👄 Export 😹		1		-			
Select	Vendor	Model	PID	Presence	Version		₽
	Cisco Systems Inc	Cisco UCS B230 M2	B230-BASE-M2	N/A	<not set=""></not>	-	-
	Cisco Systems Inc Cisco Systems Inc	Cisco UCS B440 M2	B440-BASE-M2 N20-B6620-1	N/A N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS B200 M1 Cisco UCS B250 M1	N20-B6620-2	N/A	<not set=""></not>	*	
		Cisco UCS B200 M2	N20-B6625-1			•	
	Cisco Systems Inc			N/A N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS B250 M2	N20-B6625-2	N/A N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS B230 M1	N20-B6730-1	N/A N/A	<not set=""></not>		
	Cisco Systems Inc	Cisco UCS B440 M1	N20-B6740-2		<not set=""></not>	•	
2	Cisco Systems Inc	Cisco UC5 B200 M3	UC5B-B200-M3	N/A	2.2(2c)		
	Cisco Systems Inc	Cisco UCS B22 M3	UCSB-B22-M3	N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS B420 M3	UCSB-B420-M3	N/A N/A	<not set=""></not>	-	
	Cisco Systems Inc	Cisco UCS Scalable M4 Blade .	UC38-EX-M4-1	NA	<not set=""></not>	•	

. e. Y	2.2.2ε						
ription:							
		How v	vould you like to configure the I	Host Firmware Package	? C Simple 💽 Advanced		
oter CIM	IC BIOS Boa	ard Controller FC Adapters H	BA Option ROM Storage Controlle	r Local Disk GPUs			
lter 🔿 E	xport 😸 Prin	e e e e e e e e e e e e e e e e e e e					
S	elect	Vendor	Model	PID	Presence	Version	[₽
		Cisco Systems, Inc.	Cisco UCS B230 M2	B230-BASE-M2	N/A	<not set=""></not>	
		Cisco Systems, Inc.	Cisco UCS B440 M2	B440-BASE-M2	N/A	<not set=""></not>	-
		Cisco Systems, Inc.	Cisco UCS B200 M1	N20-B6620-1	N/A	<not set=""></not>	-
		Intel Corp.	Cisco UCS B200 M1	N20-B6620-1	N/A	<not set=""></not>	-
		Cisco Systems, Inc.	Cisco UCS B250 M1	N20-B6620-2	N/A	<not set=""></not>	-
		Intel Corp.	Cisco UCS B250 M1	N20-B6620-2	N/A	<not set=""></not>	-
		Cisco Systems, Inc.	Cisco UCS B200 M2	N20-B6625-1	N/A	<not set=""></not>	-
		Cisco Systems, Inc.	Cisco UCS B250 M2	N20-B6625-2	N/A	<not set=""></not>	•
		Cisco Systems, Inc.	Cisco UCS B230 M1	N20-B6730-1	N/A	<not set=""></not>	-
	—	Gisco Systems, Inc.	Cisco UCS B440 M1	N20-B6740-2	N/A	<not set=""></not>	-
	V	Cisco Systems, Inc.	Cisco UES B200 M3	UC5B-B200-M3	N/A	B200M3.2.2.2.0.042820	-
		Cisco Systems, Inc.	Cisco UCS B22 M3	UCS8-822-M3	N/A	<not set=""></not>	-
		Cisco Systems, Inc.	Cisco UCS B420 M3	UC58-8420-M3	N/A	<not set=""></not>	-
		Cisco Systems, Inc.	Cisco UCS Scalable M4 Blade	UCSB-EX-M4-1	N/A	<not set=""></not>	-
			Cisco UCS Scalable M4 Blade	UCS8-EX-M4-1	N/A	<not set=""></not>	•

ion:						
	How	would you like to configure the H	lost Firmware Package	2 C Simple Advanced		
			······			
		HBA Option ROM Storage Controller	Local Disk GPUs			
👄 Export 📚	Print					
Select	Vendor	Model	PID	Presence	Version	
	Cisco Systems Inc	Cisco UCS B230 M2	B230-BASE-M2	N/A	<not set=""></not>	-
	Cisco Systems Inc	Cisco UCS B440 M2	B440-BASE-M2	N/A	<not set=""></not>	-
	Cisco Systems Inc	Cisco UCS B250 M1	N20-B6620+2	N/A	<not set=""></not>	-
	Cisco Systems Inc	Cisco UCS B250 M2	N20-B6625-2	N/A	<not set=""></not>	•
	Cisco Systems Inc	Cisco UCS B230 M1	N20-B6730-1	N/A	<not set=""></not>	•
—	Cisco Systems Inc	Cisco UCS B140 M1	N20-B6740-2	N/A	<not set=""></not>	-
V	Cisco Systems Inc	Cisco UCS B200 M3	UC5B-B200-M3	N/A	13.0	-
	Cisco Systems Inc	Cisco UCS B22 M3	UC58-B22-M3	N/A	<not set=""></not>	-
	Cisco Systems Inc	Cisco UCS B420 M3	UC58-B420-M3	N/A	<not set=""></not>	-
	Cisco Systems Inc	Cisco UCS Scalable M4 Blade	UCSB-EX-M4-1	N/A	<not set=""></not>	-

Note

We did not use legacy nor third party FC Adapters nor HBA's so there was no configuration required on those tabs.

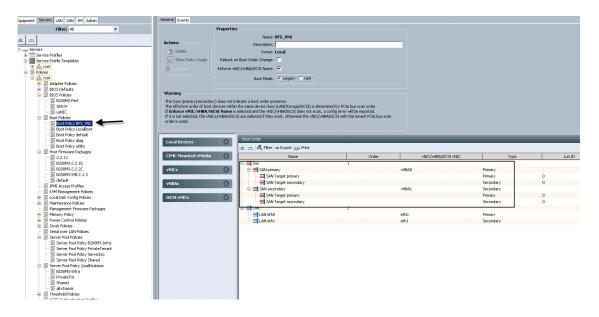
The result is a customized Host Firmware Package for the Cisco UCS B200 M3 blade servers.



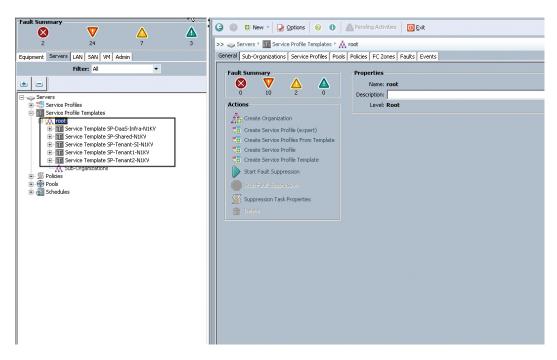
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For this project we utilized Fiber channel to boot from SAN.

- 25. In the Servers tab, expand Policies > root nodes. Select the Boot Policies node. Right-click and choose Create Boot Policy from the context menu.
- 26. In the Create Boot Policy dialog complete the following:
 - a. Expand Local Devices
 - b. Select Add CD-ROM
 - c. Expand vHBAs
 - d. Select Add SAN Boot (vHBA0) as Primary
 - e. Select Add SAN Boot (vHBA1) as Secondary
 - f. Adjust boot order so it is CD-ROM, vHBA0, vHBA1.
- 27. Click Save Changes.



28. Create a service profile template using the pools, templates, and policies configured above. We created a total of five Service Profile Templates, one for each tenant model, Shared, Server Isolation, Private Tenant 1, Private Tenant 2 and Infrastructure Hosts (Infra)as follows:



- **29.** To create a Service Profile Template, right-click the Service Profile Templates node on the Servers tab and click Create Service Profile Template. The Create Service Profile template wizard will open.
- 30. Follow through each section, utilizing the policies and objects you created earlier, then click Finish.

Note

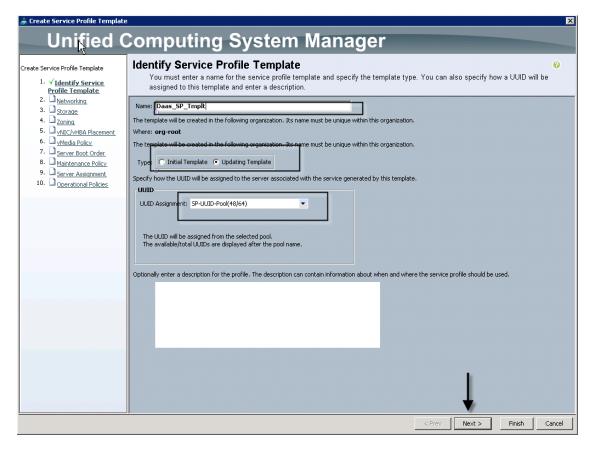
On the Operational Policies screen, select the appropriate performance BIOS policy you created earlier to insure maximum LV DIMM performance.



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For automatic deployment of service profiles from your template(s), you must associate a server pool that contains blades with the template.

31. On the Create Service Profile Template wizard, we entered a unique name, selected the type as updating, and selected the SP-UUIDs Suffix Pool created earlier, then clicked Next.



32. We selected the Expert configuration option on the Networking page and clicked Add in the adapters window:

📥 Cr	eate Service Profile Template			X
	Unified (Computing System Manager		
	Unneu	somputing System Manager		
Creat	e Service Profile Template	Networking		0
	1. √Identify Service Profile	Optionally specify LAN configuration information.		
8	Template			
ľ	2. √ <u>Networking</u> 3. □ <u>Storage</u>	Dynamic vMIC Connection Policy: Select a Policy to use (no Dynamic vMIC Policy by defa 🔻 🖶 Create Dynamic vMIC Connection Policy		
	4. Zoning			
	5. D <u>vNIC/vHBA Placement</u> 6. D <u>vMedia Policy</u>			
	7. Server Boot Order	How would you like to configure LAN connectivity? C Simple 📀 Expert C No vNICs C Use Connectivity Policy		
	8. Maintenance Policy	Click Add to specify one or more vNICs that the server should use to connect to the LAN.		
	 <u>Server Assignment</u> <u>Operational Policies</u> 			
	Operacional Policies	Name MAC Address Fabric ID Native VLAN		
		L		
			-	
		Delete 🕂 Add 🔤 Modify		
		iSCSI vNICs	8	
		<	Can	cel [

33. In the Create vNIC window, we entered a unique Name, checked the Use LAN Connectivity Template checkbox, selected the vNIC Template from the drop down, and the Adapter Policy the same way.

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🜲 Create yNIC		×
Create vNIC		Ø
Name: Daa5		
Use vNIC Template:		
vNIC Template: Daa5-A		
Adapter Performance Profile		
Adapter Policy: WMWare Create Ethernet Adapter Policy		
	ОК	Cancel

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34. We repeated the process for the remaining vNIC , resulting in the following:

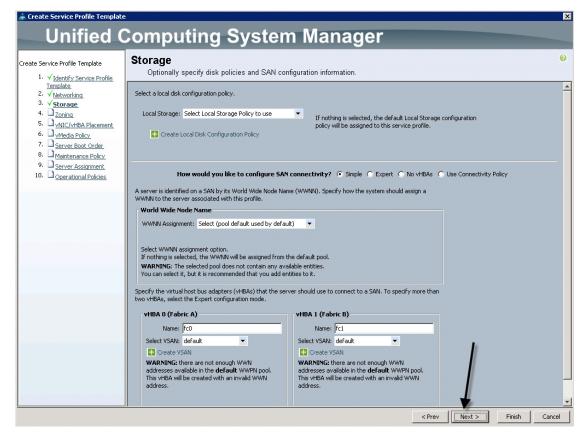
📥 Create Service Profile Templat	e				×
Unified (Computing Sy	stem Mana	ger		
Create Service Profile Template 1. √Identify Service Profile	Networking Optionally specify LAN configurat	tion information.			0
Template 2. √ <u>Networking</u> 3. □ <u>Storage</u> 4. □ <u>Zoning</u> 5. □ <u>VNIC/vHBA Placement</u>	Dynamic vNIC Connection Policy: Select a	Policy to use (no Dynamic VNIC Policy	by defa 💌 🚹 Create I	Dynamic vNIC Connection Policy	
6. D <u>yMedia Policy</u> 7. D <u>Server Boot Order</u> 8. D <u>Maintenance Policy</u> 9. D <u>Server Assignment</u>	How would you like to co	onfigure LAN connectivity? O Si the server should use to connect to the		C Use Connectivity Policy	
10. Departional Policies	Name	MAC Address	Fabric ID	Native VLAN	I
		Derived	derived		
	wNIC Daa5-B	Derived	derived		
					-
		👚 Delete 🛛 🕂 Ad	d 🚯 Modify		
					8
	ISCSI VNICS				v
			< Pre	/ Next > Finish	Cancel

35. Click Next.

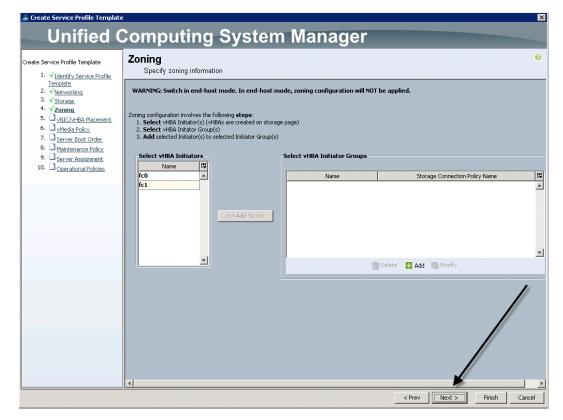
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36. Click Next.

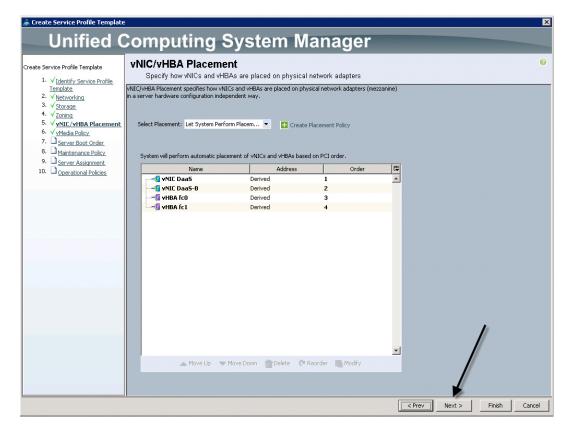


37. On the Zoning page, click Next.



38. On the vNIC/vHBA Placement page, click Next.

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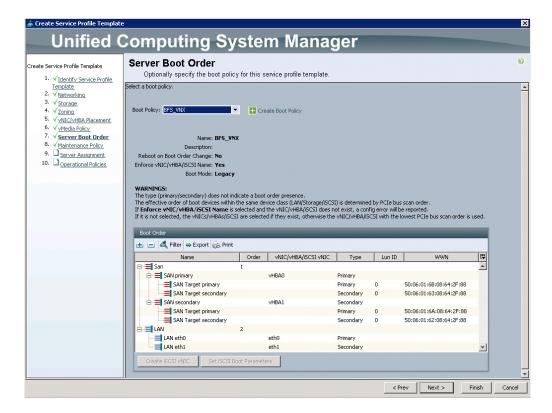
39. vMedia Policy click Next

🌧 Create Service Profile Template				×
Unified Computing System Manager				
Create Service Profile Template 1. √ Identify Service Profile 2. √ Identify Service Profile 3. √ Storage 3. √ Storage 3. √ Storage 3. √ VintC/VHBA Placement 6. √ VintC/VHBA Placement 6. √ VintC/VHBA Placement 7. √ Media Policy 8. Server Rost Order 9. Server Assignment 10. ○ Operational Policies				0
	< Prev	Next >	Fini	sh Cancel

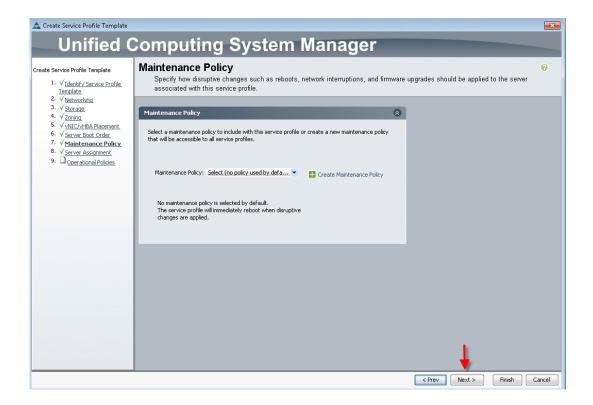
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40. On the Server Boot Order page, select the Boot From SAN Boot policy BFS_VNX, created earlier from the drop-down, then click Next to proceed.



41. Do not create a Maintenance Policy for the project, click Next to continue.



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42. On the Server Assignment page, make the following selections from the drop-downs and click the expand arrow on the Firmware Management box as shown:

🖨 Create Service Profile Templat	e	×
Unified (Computing System Manager	
Create Service Profile Template 1. √Identify Service Profile Template	Server Assignment Optionally specify a server pool for this service profile template. Trou can seek: a server poor you want to associate wait ruis service profile template:	0
2 < Metworking 3. ✓ Storage 4. ✓ Zoning 5. ✓ <u>MC/MRA Placement</u> 6. ✓ <u>Media Policy</u> 7. ✓ <u>Server Boot Order</u> 8. ✓ <u>Maintenance Policy</u> 9. ✓ <u>Server Assignment</u> 10. □ <u>Operational Policies</u>	Pool Assignment: Shared Image: Create Server Pool Select the power state to be applied when this profile is associated with the server. Image: Up Image: Down The service profile template will be associated with one of the servers in the selected pool. If desired, you can specify an additional server pool policy qualification that the selected server must meet. To do so, select the qualification from the list. Server Pool Qualification: Restrict Migration:	
	Firmware Management (BIOS, Disk Controller, Adapter) If you select a host firmware policy for this service profile, the profile will update the firmware on the server that it is associated with. Otherwise the system uses the firmware already installed on the associated server. Host Firmware: 0200/13-2:2:2C	

Note

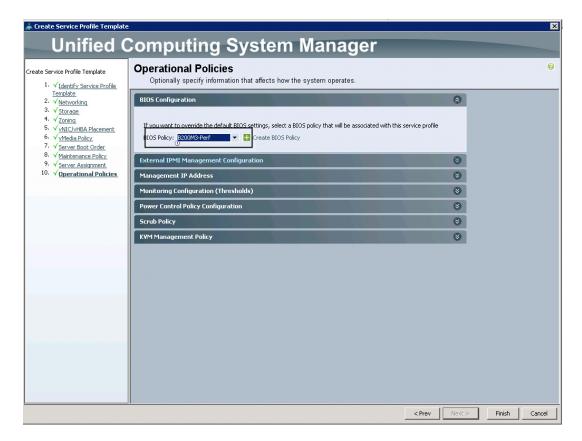
For the other four Service Profile Templates that were created for the project, we choose ServerIso, PrivateTenant or Infrastructure for Pool Assignments and PrivTnt or Infra for the Server Pool Qualification.

8. Note

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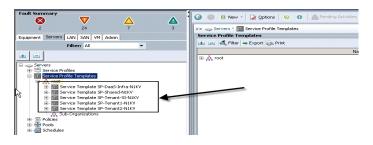
In all three cases, we utilized the Default Host Firmware Management policy for the Cisco UCS B200 M3 blades.

43. On the Operational Policies page, expand the BIOS Configuration drop-down and select the B200M3-Perf for User Workload Hosts, then click Finish to complete the Service Profile Template:



44. Repeat the Create Service Profile Template for the four remaining templates.

The result is a Service Profile Templates for each use case in the study and an Infrastructure template as shown below:



Now that the Service Profile Templates for each UCS Blade Server model used in the project have been created, utilize a UCS Director workflow to provision Service Profile Templates to blades during the Hypervisor installation.

QoS and CoS in Cisco Unified Computing System

Cisco Unified Computing System provides dfferent system class of service to implement quality of service including:

• System classes that specify the global configuration for certain types of traffic across the entire system

- · QoS policies that assign system classes for individual vNICs
- Flow control policies that determine how uplink Ethernet ports handle pause frames.

Applications like the Cisco Unified Computing System and other time sensitive applications have to adhere to a strict QOS for optimal performance.

System Class Configuration

Systems Class is the global operation where entire system interfaces are with defined QoS rules.

• By default system has Best Effort Class and FCoE Class.

Best effort is equivalent in MQC terminology as "match any"

- FCoE is special Class define for FCoE traffic. In MQC terminology "match cos 3"
- System class allowed with 4 more users define class with following configurable rules.
 - CoS to Class Map
 - Weight: Bandwidth
 - Per class MTU
 - Property of Class (Drop v/s no drop)
- Max MTU per Class allowed is 9217.
- Through Cisco Unified Computing System you can map one CoS value to particular class.
- Apart from FcoE class there can be only one more class can be configured as no-drop property.
- Weight can be configured based on 0 to 10 numbers. Internally system will calculate the bandwidth based on following equation (there will be rounding off the number).

(Weight of the given priority * 100)

Ø % b/w shared of given Class =

Sum of weights of all priority

Cisco UCS System Class Configuration

Cisco Unified Computing System defines user class names as follows.

- Platinum
- Gold

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- Silver
- Bronze

Table 5	Name Table Map Between Cisco Unified Computing System and the NXOS
---------	--------------------------------------------------------------------

Cisco UCS Names	NXOS Names
Best effort	Class-default
FCoE	Class-fc
Platinum	Class-Platinum
Gold	Class-Gold
Silver	Class-Silver
Bronze	Class-Bronze

Cisco UCS Class Names	Cisco UCS Default Class Value
Best effort	Match any
Fc	3
Platinum	5
Gold	4
Silver	2
Bronze	1

 Table 6
 Class to CoS Map by default in Cisco Unified Computing System

Table 7 Default Weight in Cisco Unified Computing System

Cisco UCS Class Names	Weight
Best effort	5
Fc	5

Enable QOS on the Cisco Unified Computing System

For this study, we utilized four UCS QoS System Classes to priorities four types of traffic in the infrastructure:

Table 8	QoS Priority to vNIC and VLAN Mapping
---------	----------------------------------------------

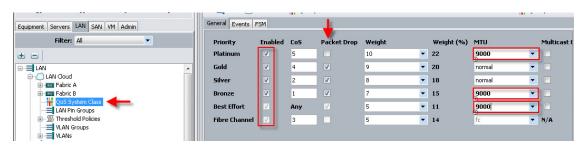
Cisco UCS Qos Priority	vNIC Assignment	VLAN Supported
Platinum	eth0, eth1	72 (Storage)
Gold	eth0, eth1	71,72,74,75,76,77 (VM Traffic)
Silver	eth0, eth1	70 (Management)
Bronze	eth0, eth1	73 (vMotion)

Note

In this study, all VLANs were trunked to eth0 and eth1 and both use Best Effort QoS. Detailed QoS was handled by the Cisco Nexus 1000V and Nexus 5548 switches, but it is important that the UCS QoS System Classes match what the switches are using.

Configure Platinum, Gold, Silver and Bronze policies by checking the enabled box. For the Platinum Policy, used for NFS and CIFS storage, Bronze for vMotion and Best Effort were configured for Jumbo Frames in the MTU column. Notice the option to set no packet drop policy during this configuration. Click Save Changes at the bottom right corner prior to leaving this node.

Figure 34 Cisco UCS QoS System Class Configuration



This is a unique value proposition for Cisco UCS with respect to end-to-end QOS. For example, we have a VLAN for the EMC VNX storage, configured Platinum policy with Jumbo frames and get an end-to-end QOS and performance guarantees from the Blade Servers running the Nexus 1000V virtual distributed switches through the Nexus 5548UP access layer switches.

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LAN Configuration

The access layer LAN configuration consists of a pair of Cisco Nexus 5548s (N5Ks,) a family member of our low-latency, line-rate, 10 Gigabit Ethernet and FC switches for our DaaS deployment.

Cisco UCS and EMC VNX Ethernet Connectivity

Two 10 Gigabit Ethernet uplink ports and 2, 8 Gigabit FC ports are configured on each of the Cisco UCS 6248 fabric interconnects, and they are connected to the Cisco Nexus 5548 pair in a bow tie manner as shown below in a port channel.

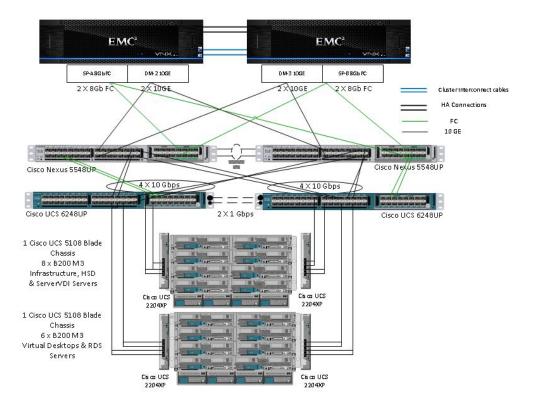
The 6248 Fabric Interconnect is in End host mode, and switch mode for fiber channel as we are doing both fiber channel as well as Ethernet (NAS) data access as per the recommended best practice of the Cisco Unified Computing System. We built this out for scale and have provisioned 20 GB per Fabric Interconnect for ethernet (Figure 32) and 16GB per Fabric Interconnect for fiber.

The VNX5600s are also equipped with two dual-port 10GB adapters which are connected to the pair of N5Ks downstream. Both paths are active providing failover capability. This allows end-to-end 10G access for file-based storage traffic. We have implemented jumbo frames on the ports and have priority flow control on, with Platinum CoS and QoS assigned to the vNICs carrying the storage data access on the Fabric Interconnects.

Note

The upstream configuration is beyond the scope of this document; there are some good reference document [4] that talks about best practices of using the Cisco Nexus 5000 and 7000 Series Switches. New with the Nexus 5500 series is an available Layer 3 module that was not used in these tests and that will not be covered in this document.

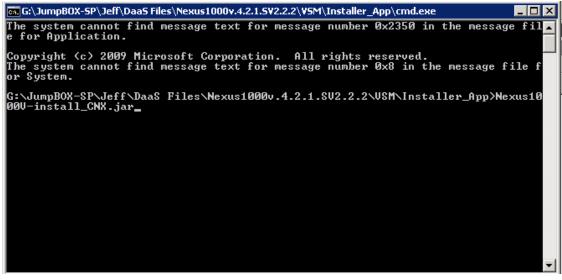
Figure 35Ethernet Network Configuration with Upstream Cisco Nexus 5500 Series from the Cisco Unified
Computing System 6200 Series Fabric Interconnects and EMC VNX5600



EMC VNX5600 Array

Cisco Nexus 1000V Configuration in L3 Mode

- To download the Nexus1000 V 4.2(1) SV2 (2.2), click the link below. https://software.cisco.com/download/release.html?mdfid=282646785&softwareid=282088129&re lease=5.2(1)SV3(1.2)&flowid=42790
- 2. Extract the downloaded N1000V .zip file on the Windows host.
- **3.** To start the N1000V installation, run the command below from the command prompt. (Make sure the Windows host has the latest Java version installed)



4. After running the installation command, you will see the "Nexus 1000V Installation Management Center"

출 Cisco Nexus 1000¥ Installer App		
	○ Cisco Nexus 1000V Complete Installation	
	○ Virtual Ethernet Module Installation	
cisco.	○ vCenter Server Connection	
Nexus 1000V	Nexus 1000V will be installed in 'Essential' edition. For Advanced edition, execute 'svs switch edition Advanced' after installation.	
	Exit	
		-

5. Type the vCenter IP and the logon credentials.

I

🕌 Cisco Nexus 1000¥ Installer App		
Steps	vCenter Server Cree	redentials
 Prerequisites VCenter Server Credentials Standard Configuration Data Standard Configuration Review Confirmation Hosts Selection Host Review 	IP Address / Hostname Port (https only) User ID Password	me 10.71.0.12 443 Administrator ********
CISCO Nexus 1000V		
Retrieving Hosts		
		< Prev Next > Finish Cancel

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6. Select the ESX host on which to install N1KV Virtual Switch Manager.

Steps	Custom Configuration Data	1		
1. Prerequisites		4		
2. vCenter Server Credentials	Import Configuration			-
3. Custom Configuration Data	Host 1 (Primary VSM's Host)		Sexus 1000¥ Installation	
 Custom Configuration Review 	IP Address / Name	10.70.0.109		
5. Confirmation	Data Store	datastore1	lie vCenter Inventory ⊡-∰ SP DaaS	
5. Hosts Selection 7. Host Review	vSwitch	vSwitch0	E-lig Hosts/Folders/Clusters	
, HUSE REVIEW			🛱 🥡 DaaS Infrastructure	
	Host 2 (Secondary VSM's Host) IP Address / Name		10.70.0.109	
	IP Address / Name	10.70.0.110	10.70.0.113	
	Data Store	datastore1 (1)	🖻 🥡 Shared Tenants	
	vSwitch		10.70.0.110	
	Switch Name		10.70.0.118	
	Admin User Name		I 10.70.0.111	
		admin	🖻 🥡 Farm Isolation Tenant 1	
CISCO	Admin Password		10.70.0.121	
	Confirm Admin Password		10.70.0.115	
Nexus 1000V	Virtual Machine Name	DaaS-VSM-01	🖻 🥡 Farm Isolation Tenant 2	
	OVA Image Location	2\VSM\Install\nexus-1000v		
	Layer 2 / Layer 3 Connectivity	C Layer 2	🧃 10.70.0.123	
	VSM IP Address	10.70.0.5		
	Subnet Mask	255.255.255.0	10.70.0.112	
	Gateway IP Address	10.70.0.1	10.70.0.117	
	Domain ID	5	···· 🥑 10.70.0.120	
	Data Center Name	-		
	Enable Telnet	, 		
	Control Port Group	C Create New C C	Select Host	
	Enter a valid seconday vSwitc	h.		

7. Configure all fields for the Custom Install.

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teps	Custom Configuration Da	ita				
Prerequisites						
vCenter Server Credentials	Import Configuration	1				
Eustom Configuration Data	Host 1 (Primary VSM's Host)	_				
Custom Configuration Review	IP Address / Name	10.70.0.109				Browse
Confirmation Hosts Selection	Data Store	datastore1				Browse
Host Review	vSwitch	v5witch0				
	Host 2 (Secondary VSM's Ho					Browse
	IP Address / Name	10.70.0.113				Browse
	Data Store	DS_Daa5_FI1				
	vSwitch					Browse
		v5witch0				Browse
	Switch Name	n1kvs-a				
	Admin User Name	admin				
	Admin Password	*******				
	Confirm Admin Password	********				
	Virtual Machine Name	DaaS-V5M-01				
	OVA Image Location		ff\DaaS Files\Nexus1000v.4.2.	1.5V2.2.2\V5M\Instal\nexus-1000v.	4.2.1.5	Browse
uluilu cisco.	Layer 2 / Layer 3 Connectiv	ty C Layer 2			C Layer 3	
	V5M IP Address	10.70.0.5				
	Subnet Mask	255.255.255.0				
CISCO	Gateway IP Address	10.70.0.1				
	Domain ID	5				
Nexus 1000V	Data Center Name	SP DaaS				Browse
110,400 10000	Enable Telnet					
	Control Port Group	C Create New	Choose Existing			
		C Create New	Choose Existing			_
		Port Group Name:		n1kv-control		Browse
		VLAN ID:		70		
	Management Port Group	C Create New	Choose Existing			
		Port Group Name:		n1kv-mgmt		Browse
		VLAN ID:		70		
	Packet Port Group	C Greate New	Choose Existing			
		Port Group Name:				Browse
				, 		
	Management VLAN	70				
	Migrate Host(s) to DV5	C Yes			No No	
	Save Configuration				(* NO	
	Bave connyuration					
						< Prev Next > Finish Car

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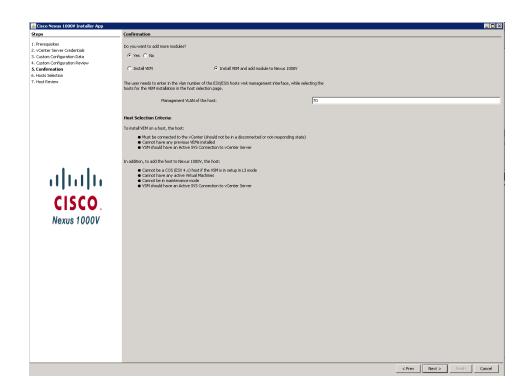
8. Confirm all settings and click next for the VSM Deployment.

Cisco Nexus 1000¥ Installer App	Gunham Canfinund' D				-
ps	Custom Configuration Rev	iew			
Prerequisites					
/Center Server Credentials					
Eustom Configuration Data					
Custom Configuration Review	Host 1 (Primary VSM's Host)				
Confirmation	IP Address / Name	10.70.0.109			
Hosts Selection Host Review	Data Store	datastore1			
IUSC REVIEW	vSwitch	vSwitch0			
	Host 2 (Secondary VSM's Host				
	IP Address / Name	10.70.0.113			
	Data Store				
	vSwitch	DS_DaaS_FI1			
		vSwitch0			
	Switch Name	n1kvs-a			
	Admin User Name	admin			
	Admin Password	*****			
	Virtual Machine Name	DaaS-V5M-01			
	OVA Image Location		ff\Daa5 Files\Nexus1000v.4.2.1.SV2.2.2\V	Mitestellingung 1000 / 4 2 1 502 2 2 mm	
	Layer 2 / Layer 3 Connectivity		n (Daas Hies)/vexus1000v.4.2.1.5v2.2.2(v)		
1 1				C L3	
ahaha	VSM IP Address	10.70.0.6			
	Subnet Mask	255.255.255.0			
• •	Gateway IP Address	10.70.0.1			
CISCO.	Domain ID	5			
	SVS Datacenter Name	SP DaaS			
	Enable Telnet	Г			
Nexus 1000V	Control Port Group	1			
	Control Port Group	C Create New	Choose Existing		
		Port Group Name:		n1kv-control	
		VLAN ID:		70	
	Management Port Group	VLAN ID:		1/0	
	management Port Group	C Create New	Choose Existing		
		Port Group Name:		n1kv-mgmt	
		VLAN ID:		70	
	Packet Port Group	VEAN ID:		1/0	
	Packet Port Group	C Create New	Choose Existing		
		Port Group Name:			
		VLAN ID:			
]]	
	Management VLAN	70			
	Migrate Host(s) to DV5	C Yes		No	
	Notes				
	1				
					< Prev Next > Finish Cano

9. Install VEM to the other hosts

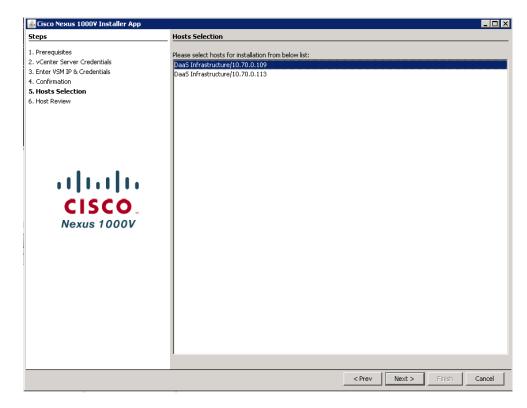
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10. Select the Hosts that you will deploy the VEM.



11. Host Review Page, click Finish

🕌 Cisco Nexus 1000¥ Installer App						
Steps	Host Review					
Prerequisites Venter Server Credentials Credentials Confirmation S. Hosts Selection 6. Host Review	Virtual Supervisor Module IP Address	10.71.0.12 10.70.0.6 Daa5 Infrastructure/10.	70.0.109			
CISCO Nexus 1000V						
			< Prev	Next >	Finish	Cancel

12. Log in (ssh or telnet) to the N1KV VSM with the IP address and configure VLAN for ESX Mgmt, Control, N1K Mgmt and also for Storage and vMotion purposes as mentioned below (VLAN ID differs based on your Network). First, create ip access lists for each QoS policy:

```
N1kvs# conf t
Enter the following configuration commands, one per line. End with CNTL/Z.
ip access-list mark Bronze
  10 permit ip any 10.73.0.0/24
  20 permit ip 10.73.0.0/24 any
ip access-list mark_Gold
10 permit ip any 10.74.0.0/24
                   11 permit ip any 10.76.0.0/24
                   12 permit ip any 10.77.0.0/24
                   20 permit ip 10.74.0.0/24 any
                   21 permit ip 10.76.0.0/24 any
                   22 permit ip 10.77.0.0/24 any
 ip access-list mark_Platinum
  10 permit ip any 10.72.0.0/24
  20 permit ip 10.72.0.0/24 any
ip access-list mark_Silver
     10 permit ip any 10.71.0.0/24
  20 permit ip 10.71.0.0/24 any
13. Create class maps for QoS policy
class-map type qos match-all Gold Traffic
     match access-group name mark_Gold
class-map type qos match-all Bronze_Traffic
     match access-group name mark Bronze
class-map type qos match-all Silver Traffic
     match access-group name mark Silver
class-map type qos match-all Platinum Traffic
```

```
match access-group name mark Platinum
14. Create policy maps for QoS and set class of service
policy-map type qos DaaS
  class Platinum Traffic
    set cos 5
  class Gold Traffic
    set cos 4
  class Silver_Traffic
    set cos 2
  class Bronze Traffic
    set cos 1
15. Set vlans for QoS
vlan 1,6,70-77,79
vlan 6
  name Native-VLAN
vlan 71
  name
Infrastructure
vlan
72
  name
NFS
vlan
73
  name
VMotion
vlan
74
  name
Shared
vlan 75
  name Server-Isolation
vlan 76
  name FarmIsol
vlan 77
  name FarmIso2
vlan 79
  name PXE
```

16. Create port profile for system uplinks and vethernet port groups. **Note:** There are existing port profiles created during the install. Do not modify or delete these port profiles.

I

```
port-profile type ethernet system-uplink
  vmware port-group
  switchport mode trunk
  switchport trunk allowed vlan 70-79,701
  system mtu 9000
  channel-group auto mode on mac-pinning
  no shutdown
  system vlan 70-74,76-77
  state enabled
port-profile type vethernet Management
  vmware port-group
  switchport mode access
  switchport access vlan 70
  service-policy type qos input DaaS
  no shutdown
```

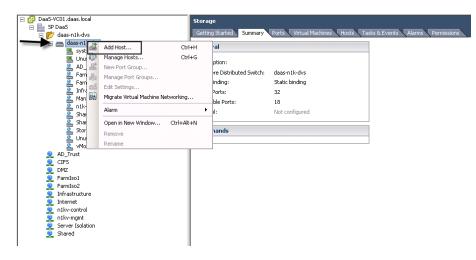
system vlan 70 max-ports 254 state enabled port-profile type vethernet Storage vmware port-group switchport mode access switchport access vlan 72 service-policy type qos input DaaS no shutdown system vlan 72 state enabled port-profile type vethernet vMotion vmware port-group switchport mode access switchport access vlan 73 service-policy type qos input DaaS no shutdown system vlan 73 state enabled port-profile type vethernet SharedIso vmware port-group port-binding static auto expand switchport mode access switchport access vlan 74 service-policy type qos input DaaS no shutdown system vlan 74 state enabled port-profile type vethernet FarmIso1 vmware port-group port-binding static auto expand switchport mode access switchport access vlan 76 service-policy type qos input DaaS no shutdown system vlan 76 state enabled port-profile type vethernet FarmIso2 vmware port-group port-binding static auto expand switchport mode access switchport access vlan 77 service-policy type gos input DaaS no shutdown system vlan 77 state enabled port-profile type vethernet Infrastructure vmware port-group port-binding static auto expand switchport mode access switchport access vlan 71 service-policy type qos input DaaS no shutdown system vlan 71 state enabled port-profile type vethernet n1k-L3 capability 13control vmware port-group

```
switchport mode access
switchport access vlan 70
service-policy type qos input DaaS
no shutdown
system vlan 70
```

- 17. After creating port profiles, make sure vCenter shows all the port profiles and port groups under the respective N1KV VSM. Then, Add the ESXi host to the VSM.
- 18. Go to Inventory \rightarrow networking \rightarrow select DVS for N1KV \rightarrow click on tab for hosts.

 □ 20aS-VC01.daas.local □ □ SP DaaS □ 20 20 20 20 20 20 20 20 20 20 20 20 20	Storage Getting Started Summary	Ports Virtual Machines Hosts Tasks & Events
adas-n1k-dvs	General	
AD_Trust FarmIso1 FarmIso2 Infrastructure Management Shared	Description: vSphere Distributed Switch: Port Binding: Total Ports: Available Ports: IP Pool:	daas-n1k-dvs Static binding 32 18 Not configured
SharedIso Storage Storage Unused_Or_Quarantine_Veth whotion	Commands	

19. Right-click and select add host to vSphere Distributed Switch.



This will bring up ESXi hosts which are not part of existing configuration.

20. Select the ESX host to add, choose the vNICs to be assigned, click on select an uplink port-group drop down and select system-uplink for both vmnic0 and vmnic1. After selecting appropriate uplinks click Next.

Network Connectivity			Setting	
	Host/Physical adapters	In use by switch	Settings	Uplink port group
Virtual Machine Networking	🖃 🗹 📱 10.70.0.109 🗲		View Details	
Ready to Complete	Select physical adapters			
	Vmnic0	vSwitch0	View Details	system-uplink
	Vmnic1	vSwitch0	View Details	system-uplink
	🖃 🗖 📳 10.70.0.113		View Details	
	Select physical adapters			
	🔲 🌇 vmnic0	vSwitch0	View Details	Select an uplink port
	🔲 🌆 vmnic1	vSwitch0	View Details	Select an uplink port

21. Network Connectivity tab select Destination port group for vmk0, then click Next

Network Connectivity Select port group to provide ne	etwork connectivity for the adapters (
Select Host and Physical Adapters Network Connectivity Virtual Machine Networking	🔥 Virtual NICs marked with th	 Assign adapters to a destination port group to migrate them. Ctrl+click to multi-select. Virtual NICs marked with the warning sign might lose network connectivity unless they are migrated to the vSpher distributed switch. Select a destination port group in order to migrate them. 				
Ready to Complete		Host/Virtual adapter Switch Source port group		Destination port group		
	□ □ 10.70.0.109	1				
	vmk0	vSwitch0	Management Network	Management		
	vmk1	vSwitch0	VMotion	vMotion		
	vmk2	vSwitch0	NFS	Storage		
	Virtual adapter details			Assign port grou		
	Virtual adapter details			Assign port grou		
		Disabled		Assign port grou		
	vmk2	Disabled Disabled		Assign port grou		
	vmk2 vMotion:			Assign port grou		

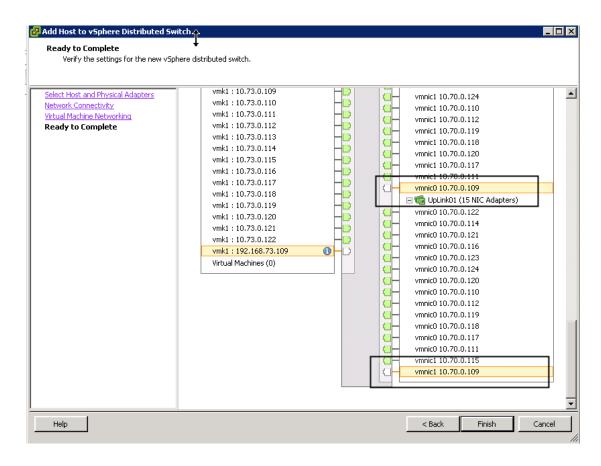
22. On the tab for virtual machine networking select VMs and assign them to a destination port-group if there is any. Otherwise click Next to Ready to complete.

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🛃 Add Host to vSphere Distributed Sw	itch			
Virtual Machine Networking Select virtual machines or network a	adapters to migrate to the vSph	ere distributed switch.		
Select Host and Physical Adapters Network Connectivity Virtual Machine Networking Ready to Complete	Host/Virtual machine/Network	apters to a destination port adapter NIC count 3 1	group to migrate them. Ctrl+click to mi Source port group Destination por Destination por Do not migrate Do not migrate	t group
	Network adapter details A001 Host: Network adapter 1 MAC address: Adapter type:	10.70.0.109 00:50:56:be:6b:3f VMXNET 3		Assign port group
Help			< Back Next	> Cancel

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23. Verify the Settings and Click Finish to add the ESXi host part of N1KV DVS.



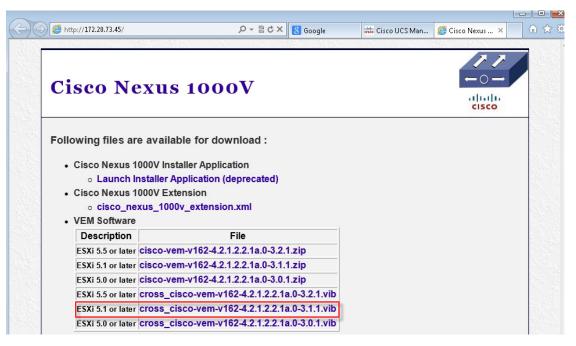


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This will invoke VMware update manger (VUM) to automatically push the VEM installation for the selected ESXi hosts. After successful staging, install and remediation process, now the ESXi host will be added to N1KV VSM. From the vCenter task manager, quickly check the process of VEM installation.

In the absence of Update manager:

1. Upload vib file cross_cisco-vem-v162-4.2.1.2.2.1a.0-3.1.1.vib for VEM installation to local or remote datastore which can be obtained by browsing to the management IP address for N1KV VSM.



- 2. Login to each ESXi host using ESXi shell or SSH session.
- 3. Run following command:

```
esxcli software vib install -v /vmfs/volumes/ datastore/
cross_cisco-vem-v162-4.2.1.2.2.1a.0-3.1.1.vib
```

To verify the successful installation of ESXi VEM and the status of ESXi host:

□ SP Dea5 □ deas-n1k-dvs □ deas-n1k-dvs □ deas-n1k-dvs □ deas-n1k-dvs □ durused_or_Quarantine_Uplink ▲ AD_Trust FarmIso1 ■ ▲ FarmIso2 ■ Infrastructure ▲ Management ■ Shared Shared Storage	Nam		mary Networks State Connected Connected Connected	``````````````````````````````````````	Configuration Status Up
deas-n1k-dvs deas-n1k-dvs deas-n1k-dvs dused_or_Quarantine_Uplink AD_Trust AP_Trust FarmIso1 FarmIso2 Infrastructure	Nam	ne 10.70.0.119 10.70.0.112 10.70.0.110	State Connected Connected	VDS	Status
 system-uplink Unused_or_Quarantine_Uplink AD_Trust FarmIso1 FarmIso2 Infrastructure 		10.70.0.119 10.70.0.112 10.70.0.110	Connected Connected	0	
Unused_Or_Quarantine_Uplink AD_Trust FarmIso1 FarmIso2 Infrastructure		10.70.0.119 10.70.0.112 10.70.0.110	Connected Connected	0	
AD_Trust B_FarmIso1 B_FarmIso2 Infrastructure		10.70.0.119 10.70.0.112 10.70.0.110	Connected Connected	0	
💁 FarmIso1 🏝 FarmIso2 🏝 Infrastructure		10.70.0.112 10.70.0.110	Connected		Up
💁 FarmIso1 🏝 FarmIso2 🏝 Infrastructure		10.70.0.110		Ö	
🎴 FarmIso2 🎴 Infrastructure		10.70.0.110	Connected		Up
🚨 Infrastructure				ă	Up
Anagement nik-L3			Connected		Up
n1k-L3		10.70.0.111	Connected		
Shared					Up
Shared		10.70.0.117	Connected	•	Up
🔮 SharedIso		10.70.0.120	Connected	- 📀	Up
🚨 Storage		10.70.0.121	Connected	- 0	Up
🎴 Unused_Or_Quarantine_Veth 🎴 vMotion		10.70.0.114	Connected	0	Up
		10.70.0.115	Connected	0	Up
🧕 AD_Trust		10.70.0.122	Connected	- Ā	Up
🧕 CIFS		10.70.0.124	Connected	ă	Up
🧕 DMZ		10.70.0.123	Connected		Up
🧕 FarmIso1					
🧕 FarmIso2		10.70.0.116	Connected		Up
🧕 Infrastructure	L				
👰 Internet	L				
👳 n1kv-control	L				
🧕 n1kv-mgmt					
🧕 Server Isolation					
🧕 Shared					

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SAN Configuration

The pair of Nexus 5548UP switches was used in the configuration to connect between the 10 Gbps ethernet ports on the EMC VNX5600 and the 10 GE ports of the UCS 6248 Fabric Interconnects. We also used a pair of 8 Gbps Fiber Channel ports for Boot from SAN.

Boot from SAN Benefits

Booting from SAN is another key feature which helps in moving towards stateless computing in which there is no static binding between a physical server and the OS/applications it is tasked to run. The OS is installed on a SAN LUN and boot from SAN policy is applied to the service profile template or the service profile. If the service profile were to be moved to another server, the pwwn of the HBAs and the Boot from SAN (BFS) policy also moves along with it. The new server now takes the same exact character of the old server, providing the true unique stateless nature of the UCS Blade Server.

The key benefits of booting from the network:

- Reduce Server Footprints: Boot from SAN alleviates the necessity for each server to have its own direct-attached disk, eliminating internal disks as a potential point of failure. Thin diskless servers also take up less facility space, require less power, and are generally less expensive because they have fewer hardware components.
- Disaster and Server Failure Recovery: All the boot information and production data stored on a local SAN can be replicated to a SAN at a remote disaster recovery site. If a disaster destroys functionality of the servers at the primary site, the remote site can take over with minimal downtime.
- Recovery from server failures is simplified in a SAN environment. With the help of snapshots, mirrors of a failed server can be recovered quickly by booting from the original copy of its image. As a result, boot from SAN can greatly reduce the time required for server recovery.
- High Availability: A typical data center is highly redundant in nature redundant paths, redundant disks and redundant storage controllers. When operating system images are stored on disks in the SAN, it supports high availability and eliminates the potential for mechanical failure of a local disk.
- Rapid Redeployment: Businesses that experience temporary high production workloads can take advantage of SAN technologies to clone the boot image and distribute the image to multiple servers for rapid deployment. Such servers may only need to be in production for hours or days and can be readily removed when the production need has been met. Highly efficient deployment of boot images makes temporary server usage a cost effective endeavor.
- Centralized Image Management: When operating system images are stored on networked disks, all upgrades and fixes can be managed at a centralized location. Changes made to disks in a storage array are readily accessible by each server.

With Boot from SAN, the image resides on a SAN LUN and the server communicates with the SAN through a host bus adapter (HBA). The HBAs BIOS contain the instructions that enable the server to find the boot disk. All FCoE-capable Converged Network Adapter (CNA) cards supported on Cisco UCS B-series blade servers support Boot from SAN.

After power on self-test (POST), the server hardware component fetches the boot device that is designated as the boot device in the hardware BOIS settings. When the hardware detects the boot device, it follows the regular boot process.

Configuring Boot from SAN Overview

In this project we used a custom workflow in UCS Director to deploy our hypervisor to the blade hardware as well as configure the Nexus 5548Ups switches for zoning and the EMC VNX5600 for boot LUNs. Earlier in this solution we had configured our storage pools on the VNX5600 as part of a prerequisite for UCS Director workflows. The following are the prerequisite steps we completed as part of our "Day-0" tasks for UCS Director. These settings along with the custom workflow in UCS Director allowed us to configure a Boot from SAN solution and install the ESXi Hypervisor.

- 1. Create VSAN-A & B for SAN on Nexus 5548UP
- 2. Configuring Boot from SAN on EMC VNX
- 3. Cisco UCS configuration of Boot from SAN policy in the service profile template

In each of the following sections, each high-level phase will be discussed.

Create VSAN-A & B for SAN on Nexus 5548UP

For a detailed Cisco Nexus 5500 series switch configuration, refer to Cisco Nexus 5500 Series NX-OS SAN Switching Configuration Guide. (See the Reference Section of this document for a link.)

Configuring Boot from SAN on EMC VNX

To configure boot from SAN LUNs on EMC VNX, complete the following steps:

 Create a storage pool from which LUNs will be provisioned. RAID type, drive number and type are specified in the dialogue box below. Five 300GB SAS drives are used in this example to create a RAID 5 pool. Uncheck "Schedule Auto-Tiering" to disable automatic tiering.

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/NX5600 - Create Storage	Pool					_ 🗆
eneral Advanced						
	_					
Storage Pool Parame		~				
Storage Pool Type: (O <u>R</u> AID Group				
		eduled Auto-Tier	ing			
	15					×
Storage Pool Name:	BootLUN	Pool1				
- Extreme Performan	ce —					
RAID Configuration		Number of Flas	sh Disks 🗊			
RAID5 (4+1)	~	0	~			
Performance		Number of CAS	e Dialua 🙃			
RAID Configuration RAID5 (4+1)	*	Number of SAS				
RAIDS (4+1)	•	5 (Recommen	ded) 🔽			
Capacity			_			
RAID Configuration		Number of NL	SAS Disks 🚺			
RAID6 (6+2)	*	0	*			
Distribution						
Performance : 1342.0	17 GB	(100.00%)				
Disks						
Automatic Use Poul	wer Sav					
() <u>M</u> anual			<u>S</u> elect	Т	otal Raw Capacity	y: 1342.017
Disk		Capacity	Drive Type		Model	State
🔗 Bus 2 Enclosure 0 Di		268.403 GB	SAS		ST930065 CL	
Pus 2 Enclosure 0 Di		268.403 GB	SAS		ST930065 CL	
🔗 Bus 2 Enclosure 0 Di		268.403 GB	SAS		ST930065 CL	
Pus 2 Enclosure 0 Di		268.403 GB	SAS		ST930065 CL	
🔗 Bus 2 Enclosure 0 Di	isk O	268.403 GB	SAS		ST930065 CL	Unbound
🗹 Perform a background	d verify	on the new stor	rage			
			0	ĸ	Apply Ca	ncel Help
			<u> </u>			

2. Provision LUNs from the storage pool and assign host-to-LUN mapping using UCS Director from here. After storage pools are created, our UCS Director workflow will handle creating the boot luns as well as VSAN configuration. In a typical Cisco CVD we would detail the steps we take to create Service Profiles and templates with a Boot from SAN Policy as well as how to connect and use them. This CVD utilized UCS Director for building out ESXi hosts. The Workflow for UCS Director handled the, usually manual tasks related to create a boot LUN and mount it to the blade host. See the UCS Director section for workflow details.

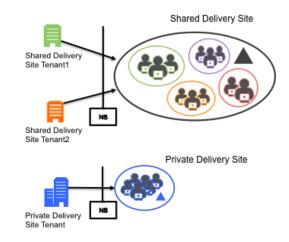
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Solution Validation: Citrix DaaS Implementation

This CVD solution allows service providers to deliver Windows applications and desktops as Desktop-as-a-Service (DaaS) through an integrated set of Cisco, Citrix, and partner technologies. The procedures in this section build out the Citrix software components. These same procedures were followed to deploy the environment for scalability testing.

Topology Overview of the Validated Solution

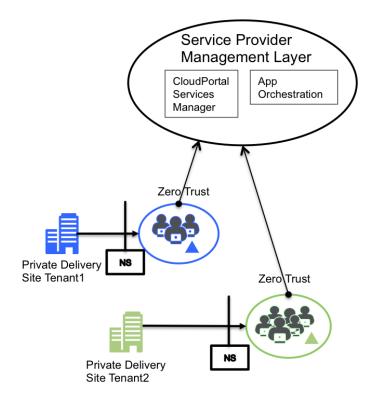
The DaaS solution documented in this CVD constructs a provider environment that can support both shared and private delivery sites, as shown in the diagram below. The procedures create a shared delivery site that provisions hosted desktops and applications to shared tenants (using Private Delivery Group/Shared Delivery Site isolation). In addition, zero trust mechanisms are used to provision hosted desktops and applications to private Delivery Site isolation).



Both models are implemented using the Citrix software components:

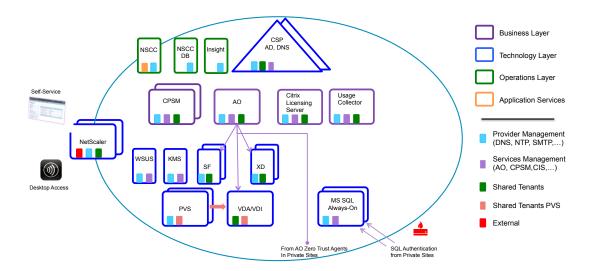
- CloudPortal Services Manager simplifies the management of tenant on-boarding and user subscriptions. Delegated management roles allow tenant administrators to self-provision and monitor provisioning requests.
- Citrix App Orchestration allows providers to automate and manage the delivery of desktop and application offerings in a comprehensive multi-tenant environment that uses an array of isolation
- models. It enables a common management interface across all managed tenants.
- Citrix XenDesktop supports the delivery of hosted applications and desktops, supplying both Hosted Shared Desktop (HSD) and Server Virtual Desktop Infrastructure (VDI) services.
- Citrix NetScaler provides secure access to the Service Provider domains over SSL (TCP 443) across the public Internet.

Within this architecture, App Orchestration supplies the provider with a single unified interface to manage services for all tenants regardless of whether they are shared or private delivery sites. The provider can operate hosted desktops and application services and deliver capabilities to multiple tenants within a shared site as well as providing managed services to tenants in private sites.



The diagram above emphasizes the relationship between a service provider and two managed private delivery site tenants. App Orchestration 2.5 provides a zero trust agent that simplifies connectivity between the App Orchestration configuration server and orchestrated delivery controllers. Domain trusts are no longer required between the target orchestrated domain and the App Orchestration domain.

The CVD creates an environment designed to support 10 tenants (2 private delivery site/8 shared delivery site) and 2000 users. It assumes a mixed user workload of 90% HSD and 10% Server VDI (SVDI). The diagram below illustrates the topology for the full implementation. It shows logical functions in the architecture and the required virtual servers, illustrating the overall datacenter implementation for the DaaS provider.



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Critical Concepts

The following concepts and definitions are critical in understanding how to deploy this DaaS solution at provider sites:

- Zero Trust. By installing SSL certificates on all servers that communicate with App Orchestration, the service provider can create a solution that easily integrates with existing Active Directory domains. The Zero Trust Agent establishes a secure SSL-encrypted communication channel to the App Orchestration configuration server and authenticates using certificates. In the CVD implementation described here, zero trust communication is enabled between the shared delivery site infrastructure domain (daas.local) and the private delivery site tenant domains (e.g., fi1.local and fi2.local).
- Unified tenant management with tiered and delegated tenant administration and self-service capabilities. App Orchestration supplies the provider with a common management interface for both shared and private tenants, allowing the provider to onboard tenant subscribers, provision session services, and manage offerings from a single interface for all tenants. In addition, a provider can choose to delegate subscriber management capabilities and enable self-service provisioning of hosted applications and desktops. CloudPortal Services Manager implements delegated management by defining tenant-specific administrators that can approve workflows for self-service hosted application and desktop provisioning.
- Network isolation. It is assumed that virtual networks are implemented to provide the necessary network security isolation. VLANs deployed for this CVD include:
 - Private VLANs for each Private Delivery Site tenant
 - Shared Tenant VLAN for Shared Delivery Site infrastructure and tenants
 - Provider Management VLAN (for DNS, NTP, SNMP, etc.)
 - Services Management vLAN
 - (for services such as App Orchestration, CPSM, and licensing)
 - Provisioning vLANs (one for PVS provisioning to the Shared Delivery Site tenants as well as one for each Private Delivery Site tenant)
 - Application vLAN (for back office applications)
 - Storage network (for resource separation)

The following documentation is useful when planning a deployment.

- Terminology in App Orchestration 2.5
- Getting Started with Citrix App Orchestration 2.5
- Known Issues for App Orchestration 2.5
- CloudPortal Services Manager 11.0 Documentation
- Known Issues for CloudPortal Services Manager
- Configuring SSL for App Orchestration 2.5

It is highly recommended that providers take advantage of experienced consultants in the Citrix Services organization to plan, perform, and assist with Citrix software installation and integration tasks. In doing so service providers can be confident in achieving an optimal deployment configuration that provides rigorous security, optimal scale, and ease of ongoing management and customer onboarding.

Prerequisites

The installation and integration procedures for Citrix App Orchestration and CloudPortal Services Manager in this environment depend on a number of prerequisites and assumptions. Refer to the documentation above for checklists and detailed explanations of the requirements and assumptions. Specifically:

- For CloudPortal Services Manager, see System Requirements for CloudPortal Services Manager, Firewall requirements for Services Manager, and Verify deployment readiness and create system databases.
- For App Orchestration, see the Setup Checklist in Getting Started with Citrix App Orchestration 2.5. The procedures here assume the checklist items have been completed in advance.

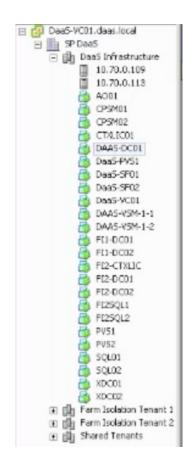
Prior to installing App Orchestration and CloudPortal Services Manager for this CVD, there are a few additional setup procedures that can be performed out-of-band:

- Installing and configuring Citrix Provisioning Services 7.1
- · Installing Virtual Delivery Agents on Microsoft Windows server and workstation operating systems
- Setting up and configuring NetScaler functionality

These procedures are included in subsequent sections.

Shared Delivery Site VMs

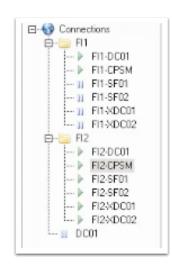
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The procedures in this section assume that Cisco UCS Director has provisioned the following VMs (via VMware ESXi) with Windows Server 2012 R2 (minimum) to support Citrix software and infrastructure services:

- 1 domain controller with Windows Server 2012 R2
- 1 Citrix License Server
- 1 NetScaler Gateway
- 2 Servers
- for the CloudPortal Services Manager provisioning (one can also host CloudPortal Services Manager Web services)
- 1 server for the App Orchestration configuration server
- 1 server for PVS provisioning
- 1 server (minimum) for the Session Machines that will host applications and desktops for users
- 2 database servers for each delivery site running Microsoft SQL Server 2012 with all recommended updates installed
- 2 servers for the Delivery Controllers that make up each delivery site
- 2 servers for the StoreFront servers that make up one StoreFront server group

Private Delivery Site VMs



As shown in the screenshot, the CVD defines two private delivery site tenants: Farm Isolation Tenant 1 (FI1) and Farm Isolation Tenant 2 (FI2). Each private delivery site tenant has these dedicated infrastructure components:

- 1 domain controller with Windows Server 2012 R2
- 1 server to host CloudPortal Services Manager and the App Orchestration Zero Trust (Domain) Agent
- 2 servers for the StoreFront servers that make up one StoreFront server group
- 2 servers for the XenDesktop Delivery Controllers
- 1 server (minimum) for the Session Machines that will host applications and desktops for users

In addition, each tenant uses a dedicated Active Directory domain for user and group data. Tenant user data is isolated using Organizational Unit (OU) lockdown provided by CloudPortal Services Manager. Users and groups created under each tenant's OU are locked down to fully isolate one tenant from another.

Other Prerequisites and Setup Tasks

The following is a quick synopsis of additional prerequisites and assumptions:

- Accessible media. It is assumed that Citrix software installation packages are available on a partition accessible to the servers.
- Active Directory. Prepare the required Active Directory domain to be used as the shared resource domain (Windows Server 2012 R2 was used). Extend the Active Directory schema to include the standard Exchange attributes and prepare the environment for multi-tenancy.
- **Group Policy object.** Configure the App Orchestration Group Policy object that will be associated with all machines in the shared resource domain. Configure the PowerShell execution policy, PowerShell remoting, and remote administration with WMI.
- **DNS aliases.** Services Manager uses DNS aliases internally for the core components. Create CNAME records for the following roles and components:

Platform component	Alias
Database server	CORTEXSQL
Provisioning server	CORTEXPROVISIONING
Web server	CORTEXWEB
Reporting Services	CORTEXREPORTS

The XenDesktop zero trust agent in a private Delivery Site domain must have network access to the App Orchestration configuration servers and must be able to resolve the FQDN address of the configuration servers. To do this, create a DNS forward lookup zone on the DNS server for the isolated domain. For more information see

http://support.citrix.com/servlet/KbServlet/download/37594-102-711575/cao-zero-trust-agent.pdf

- Other CloudPortal Services Manager requirements. The Services Manager server role installer (Setup Tool) handles many prerequisites, such as installing .NET Framework 4.0, enabling Web Server roles, and enabling MSMQ features.
- SSL certificates. An SSL certificate is used to secure communication:
 - On each StoreFront server.
 - Between an App Orchestration agent on each XenApp or XenDesktop delivery controller and the domain agent installed on a dedicated machine residing behind a NAT-enabled device.
 - Between the CloudPortal Services Manager web console and the App Orchestration configuration server (to secure administrative tasks).

The SSL certificate is installed on the App Orchestration server, as described later in this section. See Configuring SSL for App Orchestration 2.5 for more information. A public SSL certificate is also installed on the NetScaler Active Gateway to secure access from user devices.

PVS Installation and Configuration

PVS installation can occur out–of-band from the installation of App Orchestration and CloudPortal Services Manager. This CVD assumes that UCS Director has allocated VMs for the PVS servers and the following procedures have been used to install PVS on those VMs.

Prerequisites

PVS software and hardware requirements are available at http://support.citrix.com/proddocs/topic/provisioning-7/pvs-install-task1-plan-6-0.html.

Only one MS SQL database is associated with a farm. You can choose to install the Provisioning Services database software on an existing SQL database, if that machine can communicate with all Provisioning Servers within the farm, or with a new SQL Express database machine, created using the SQL Express software that is free from Microsoft. Microsoft SQL was installed separately for this CVD.

Instructions	Visual
From the Citrix Provisioning Services 7.1 ISO, let AutoRun launch the installer.	CITRIX" Provisioning Services
Click the Server Installation button.	Server Installation Iarget Device Installation telp and Support telp and Support Install the Console.
Click the Install Server button.	CITRIX Provisioning Services
The installation wizard will check to resolve dependencies and then begin the PVS server installation process. It is recommended that you temporarily disable anti-virus software prior to the installation.	Install Server Citrix Licetory Discle Eacle Install the Provisioning Services server.

Click Install on the prerequisites dialog.	Citrix Provisioning Services x64 - InstallShield Wizard
	Citrix Provisioning Services x64 requires the following items to be installed on your computer. Citck Install to begin installing these requirements.
	Status Requirement Pending Broker Snapin v2 x64 Pending Host PowerShell SnapIn v2 x64 Pending DelegatedAdmin PowerShell SnapIn x64 Pending ConfigLogging_PowerShellSnapInx64 Pending SQLnxx64 Pending Configuration_PowerShellSnapInx64
	Install Cancel
Click Yes when prompted to install the SQL	Citrix Provisioning Services x64 - InstallShield Wizard
Native Client.	Citrix Provisioning Services x64 optionally uses SQLncx64. Would you like to install it now?
	Yes No
Click Next when the Installation wizard starts.	Citrix Provisioning Services x64
	Welcome to the Installation Wizard for Citrix Provisioning Services x64
	The InstallShield(R) Wizard will install the Citrix Provisioning Services x64 on your computer. It is recommended that you disable any AntiVirus software before continuing. To continue, dick Next.
	WARNING: This program is protected by copyright law and international treaties.
	< Back Next Cancel
Review the license agreement terms.	岁 Citrix Provisioning Services x64 X
If acceptable, select the radio button labeled "I	You must view the entire license agreement in order to continue.
accept the terms in the license agreement."	
	CITRIX LICENSE AGREEMENT
Click Next	This is a legal agreement ("AGREEMENT") between you, the Licensed User, and Citrix Systems, Inc., Citrix Systems International GmbH or Citrix Systems Asia Pacific Pty Ltd. Your location of receipt of this product or feature release (both hereinafter] "PRODUCT") or technical support (hereinafter "SUPPORT") determines the providing entity hereunder (the applicable entity is hereinafter referred to as "CITRIX"). Citrix Systems, Inc., a Delaware corporation licenses this PRODUCT in the Americas and Japan and provides SUPPORT in the Americas. Citrix Systems International GmbH, a Swiss company wholly owned by Citrix Systems, Inc., licenses this PRODUCT and provides Support in Europe, the Middle East, Africa, and © I accept the terms in the license agreement O I do not accept the terms in the license agreement Instal/Shield
	< Back Next > Cancel

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Provide User Name, and Organization information.	Citrix Provisioning Services x64
Select who will see the application.	Customer Information CiTRIX
Click Next	Install this application for:
Accept the default installation location.	Citrix Provisioning Services x64 Destination Folder Click Next to instal to this folder, or dick Change to instal to a different folder. Citrix
Click Next	InstallShield
	< Back Next 1 Cancel
Click Install to begin the installation.	Citrix Provisioning Services x64 Ready to Install the Program The wizard is ready to begin installation. Clck Install to begin the installation. If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard. InstallShield Keady InstallShield

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Click Finish when the install is complete.	🖞 Citrix Provisioning Services x64 🗴	
	CITRIX Installation Wizard Completed	
	The Installation Wizard has successfully installed Otrix Provisioning Services x64. Click Finish to exit the wizard.	
	< Back Finish Cancel	
Click OK to acknowledge the PVS console has	Citrix Provisioning Services x64	
not yet been installed.	The PVS Console is not detected in your system. You will need the Console to log into your PVS Farm from this system. Please install it.	
	OK Mg	
The PVS Configuration Wizard starts	Provisioning Services Configuration Wizard	
automatically.	The Configuration Wizard provides an easy way to setup a "basic" Server configuration.	
	For advanced configurations, see the Installation and Configuration Guide.	
Click Next	You can always run the Configuration Wizard again later from the Start Menu.	
	< Back Waxt > Cancel	
Since the PVS server is not the DHCP server for	Provisioning Services Configuration Wizard	
the environment, select the radio button labeled,	DHCP Services Specify the service that will provide IP address assignments to Provisioning Services target devices.	
"The service that runs on another computer."	The service that runs on this computer	
	Microsoft DHCP Provisioning Services BOOTP service	
Click Next	Other BOOTP or DHCP service The service that runs on another computer	
	< Back Nyst > Cancel	

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Since this server will be a PXE server, select the	Provisioning Services Configuration Wizard
radio button labeled, "The service that runs on	PXE Services Specify which service will deliver this information to target devices.
this computer."	
Click Next	During the PXE boot process the bootstrap file name and FQDN/IP address of the TFTP service hosting the bootstrap are delivered via a PXE service or DHCP options 66/67. (e) The service that runs on this computer Provisioning Services PXE service (c) The service that runs on another computer
	< Back Nert> Cancel
Since this is the first server in the farm, select the	Provisioning Services Configuration Wizard
radio button labeled, "Create farm".	Farm Configuration Create a new Farm or join an existing Farm. Can be skipped if already configured.
Click Next	Create farm Join existing farm
	< Back Nextby Cancel
Enter the name of the SQL server.	
Note: If using a cluster, instead of AlwaysOn groups, you will need to supply the instance	Database Server Enter the Server and Instance names.
name as well.	Server name: SQL01 Browse
Click Next	Optional TCP port:
	< Back Next > Cancel

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Optionally provide a Database name, Farm	
name, Site name, and Collection name for the	Provisioning Services Configuration Wizard
PVS farm.	New Farm Enter the new Database and Farm names.
Select the Administrators group for the Farm Administrator group.	Database name: ProvisioningServices v Farm name: Farm Site name: Site Collection name: Collection
Click Next	Use Active Directory groups for security Use Windows groups for security Farm Administrator group: deas.local/Users/Domain Admins
Provide a vDisk Store name and the storage path	Provisioning Services Configuration Wizard
to the vDisk share.	New Store Enter a new Store and default path.
Click Next	Store name: Store Default path: C:\vCtsis
	< Back Next > Cancel
Provide the FQDN of the License Server.	
Optionally, provide a port number if changed on	Provisioning Services Configuration Wizard
the license server.	License Server Enter the license perver hostname and port.
Click Next	License server name: 27000 License server port: 27000 Validate license server version and communication
	< Back Next > Cancel

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If an Active Directory service account is not	A Description of a first description of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second seco
2	Provisioning Services Configuration Wizard
already setup for the PVS servers, create that	User account The Stream and Soap Services will run under a user account. Please select what
account prior to clicking Next on this dialog.	user account you will use.
Select the Network service account radio	Network service account Specified user account
button.	User home:
	Domain:
Click Next	Pasoword:
CHCK NEXT	Confirm password:
	Note: The database will be configured for access from this account.
	< Back Next > Cancel
Set the Days between password updates.	Provisioning Services Configuration Wizard
	Active Directory Computer Account Password
NOTE: This will vary per environment. "7 days"	Automate computer account password updates?
for the configuration was appropriate for testing	
purposes.	Automate computer account password updates
r · · r · · · · ·	Days between password updates: 7 v
Click Next	
	< Back Next > Cancel
	CORAL CORAL
Keep the defaults for the network cards.	Provisioning Services Configuration Wizard
Reep the defaults for the network cards.	
	Network Communications Specify network settings.
Click Next	▼■3 172.16.65.1
	Streaming network cards:
	■裂 172.16.65.1
	Management network card:
	Enter the base port that will be used for network communications. A total of 20 ports
	are required. You must also select a port for console communications.
	Note: All servers must have the same port configurations.
	First communications port: 6890
	Console port: 54321
	< Back Next > Cancel

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Leave the Use the Provisioning Services TFTP	Provisioning Services Configuration Wizard
service checkbox enabled.	TFTP Option and Bootstrap Location Typically only one TFTP server is deployed as part of Provisioning Services.
Click Next	Use the Provisioning Services TFTP service C:\ProgramData\Citrix\Provisioning Services\TFtpboot\VARDBP32.63N Browse Browse Cancel
Confirm at least one boot server is listed. Add or	
remove boot servers as appropriate for your configuration.	Image: Stream Servers Boot List Specify at least 1 and at most 4 boot servers. Image: Stream Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers Servers S
Click Next	The bootstrap file specifies what servers target devices may contact to complete the boot process.
	boot process. Server IP Address Server Port Device Subnet Mask Device Gateway 10.71.0.77 69 10 Add Edit Remove Move up Move down Advanced < Back Next > Cancel
Click Finish to start the installation.	Finish Image: Configuration Settings. PXE - Instal Service Image: Configuration Settings. Ste and Colection = Site, Colection Image: Configuration Set Server: Float Path - Store, Col/Obiss Store and Default Path - Store, Col/Obiss Image: Configuration Set Server: Float Path - Store, Col/Obiss User Account = Network Service Account Image: Configuration = FirstPart = 6909 Communications = FirstPart = 6909 Consumer Sole Path = 54321 Oracle Set Path = Service Image: Consult = Sole Path IP = 10.710.77 Image: Path = Setiet Path IP = 10.710.77 Management NIC - Selected IP = 10.710.77 Image: Path = Setiet Path IP = 10.710.77 Management NIC - Selected IP = 10.710.77 Image: Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path = Setiet Path Early Path =

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Finish Confirm configuration settings.
Stopping Network Services Stopping Software Stream Service Starting Software Stream Services Starting Network Services Starting Network Services
CITRIX Provisioning Services
Console Installation
Server Installation
tep[tgd Support
Install the Console.
j Citrix Provisioning Services Console x64 - InstallShield Wizard
Wekcome to the InstallShield Wizard for Citrix Provisioning Services Console x64
The InstallShield(R) Wizard will install Citrix Provisioning Services Console x64 on your computer. To continue, click Next.
WARNING: This program is protected by copyright law and international treaties.
< Back Net > Cancel

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Read the Citrix License Agreement.	😕 Citrix Provisioning Services Console x64 - InstallShield Wizard
· ·	License Agreement
If acceptable, select the radio button labeled "I	You must view the entire license agreement in order to continue.
accept the terms in the license agreement."	CITRIX LICENSE AGREEMENT
Click Next	This is a legal agreement ("AGREEMENT") between you, the Licensed User, and Citrix Systems, Inc., Citrix Systems International GmbH or Citrix Systems Asia Pacific Pty Ltd. Your location of receipt of this product or feature release (both hereinafter "PRODUCT") or technical support (hereinafter "SUPPORT") detemines the providing entity hereinafter ("SUPPORT") detemines the providing entity hereinafter "SUPPORT") detemines the providing entity hereinafter and the applicable entity is hereinafter referred to as "CITRIX"). Citrix Systems, Inc., a Delaware corporation licenses this PRODUCT in the Americas and Japan and provides SUPPORT in the Americas. Citrix Systems International GmbH, a Swiss company wholly owned by Citrix Systems, Inc., licenses this PRODUCT and provides Support in Europe, the Middle East, Africa, and I accept the terms in the license agreement I to not accept the terms in the license agreement I nstallShield
	< Back Next> Cancel
Optionally provide User Name and	15 Citrix Provisioning Services Console x64 - InstallShield Wizard
Organization.	Customer Information
0	Please enter your information.
	User Name:
C1:-1- N4	Doos
Click Next	Organization:
	DaaS
	Install this application for:
	Anyone who uses this computer (all users)
	Orly for me (Das5)
	InstalSheld
	< Back Next > Cancel
Accept the default path.	Citrix Provisioning Services Console x64 - InstallShield Wizard
recept the default putit.	Destination Folder
	Click Next to install to this folder, or click Change to install to a different folder.
Click Next	Install Citrix Provisioning Services Console x64 to: C:Program Files/Citrix/Provisioning Services Console \ Change
	InstallShield Cancel

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Leave the Complete radio button selected.	授 Citrix Provisioning Services Console x64 - InstallShield Wizard
1 I	Setup Type Choose the setup type that best suits your needs.
	Choose the setup type that best suits your needs.
Click Next	Please select a setup type.
	Complete
	All program features will be installed. (Requires the most disk space.)
	Choose which program features you want installed and where they
	Choose which program features you want installed and where they will be installed. Recommended for advanced users.
	InstalShield
	< Back Next> Cancel
Click the Install button to start the console	🙀 Citrix Provisioning Services Console x64 - InstallShield Wizard
installation.	Ready to Install the Program
instanation.	The wizard is ready to begin installation.
	Click Install to begin the installation.
	If you want to review or change any of your installation settings, dick Back. Click Cancel to exit the wizard.
	InstallShieldCancel
	Citrix Provisioning Services Console v64 - InstallShield Wizard
When the installation completes, click Finish to	Citrix Provisioning Services Console x64 - InstallShield Wizard
close the dialog box.	InstallShield Wizard Completed
	GITKIA
	The InstallShield Wizard has successfully installed Citrix Provisioning Services Console x64. Click Finish to exit the
	wizard.
	and the second second second second second second second second second second second second second second second
	< Back Finith Cancel

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Configuring Store and Boot Properties for PVS1

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Instructions	Visual
From the Windows Start screen for the Provisioning Server PVS1, launch the Provisioning Services Console .	
Select Connect to Farm.	Image: Second services Image: Second services Image: Second service Image: Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service Image: Second service Second service
Enter localhost for the PVS1 server. Click Connect .	Connect to Farm Server Information Name: jocalhost (Name or IP address of a server on the farm.) Port: 54321 (Port configured for server access.) Credentials • Use my Windows credentials to login Use my Windows credentials to login Use my Windows credentials to login Use mame: Domain: Password: Save password Auto-login on application start or reconnect Connect Tencel

Select Store Properties from the pull-down	Provisioning Services Console Provisioning Services Console File Action View Window Help	
	Action View Window Help	9 ×
menu.	Invisioning Services Censule Serves Serves	
In the Store Properties dialog, add the Default	Store Properties	x
store path to the list of Default write cache paths.	General Servers Paths	
store path to the list of Default write cache paths.	Default store path:	
	Vvnx5400\vDiskStore1	
	Default write cache paths: \\vnx5400\vDiskStore1	
Click Validate. If the validation is successful,	E dit	
click OK to continue.	Remove	
	Move Up	
	Move Down	
	Validate OK Cancel Help	

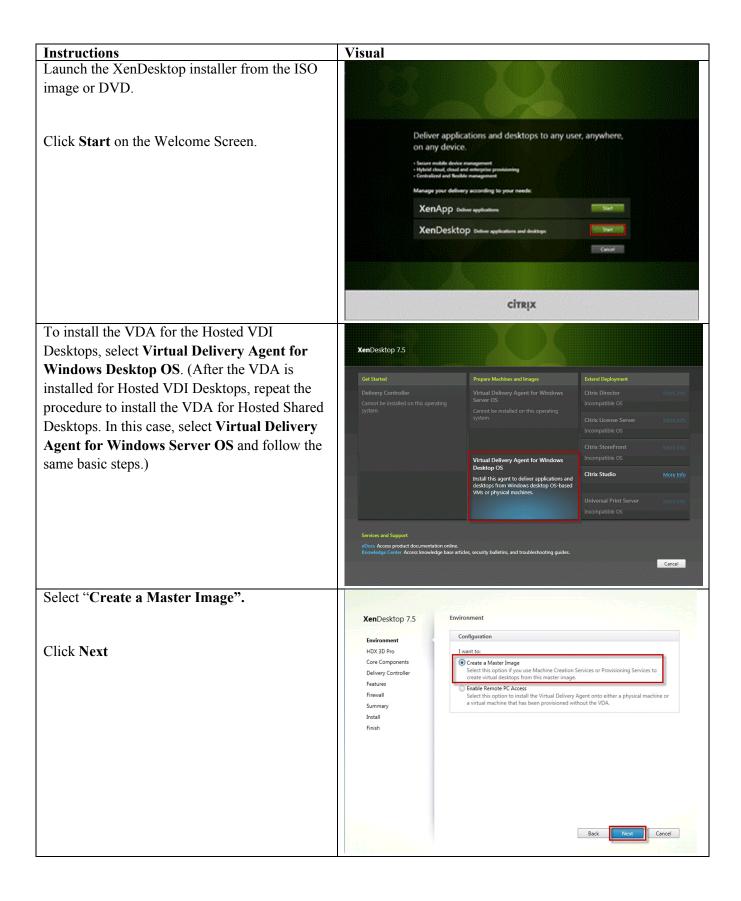
In this CVD, we repeated the procedure to add a second PVSserver (installing the Provisioning Services console on the second PVS virtual machines is optional).

After completing the steps to install the second PVS server, launch the Provisioning Services Console to verify that the PVS Servers and Stores are configured and that DHCP boot options are properly defined.

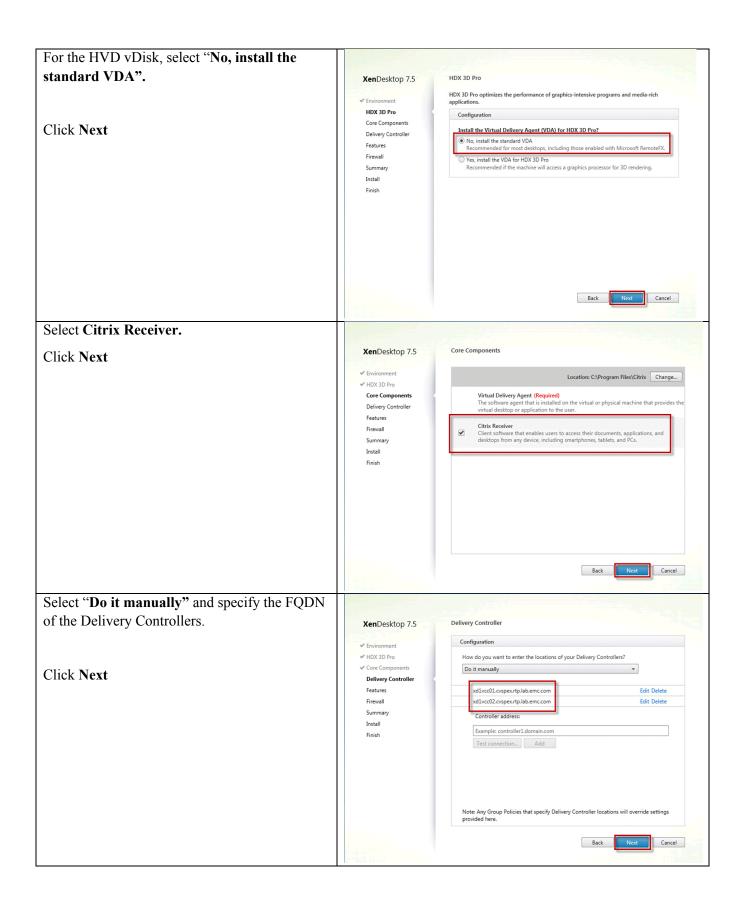
VDA Installation and Configuration

Virtual Delivery Agents (VDAs) are installed on Microsoft Windows server and workstation operating systems, and enable connections for desktops and apps. VDA installation can occur out–of-band from the installation of App Orchestration and CloudPortal Services Manager. This CVD assumes that the following procedures have been used to install VDAs for both HSD and Server VDA environments.

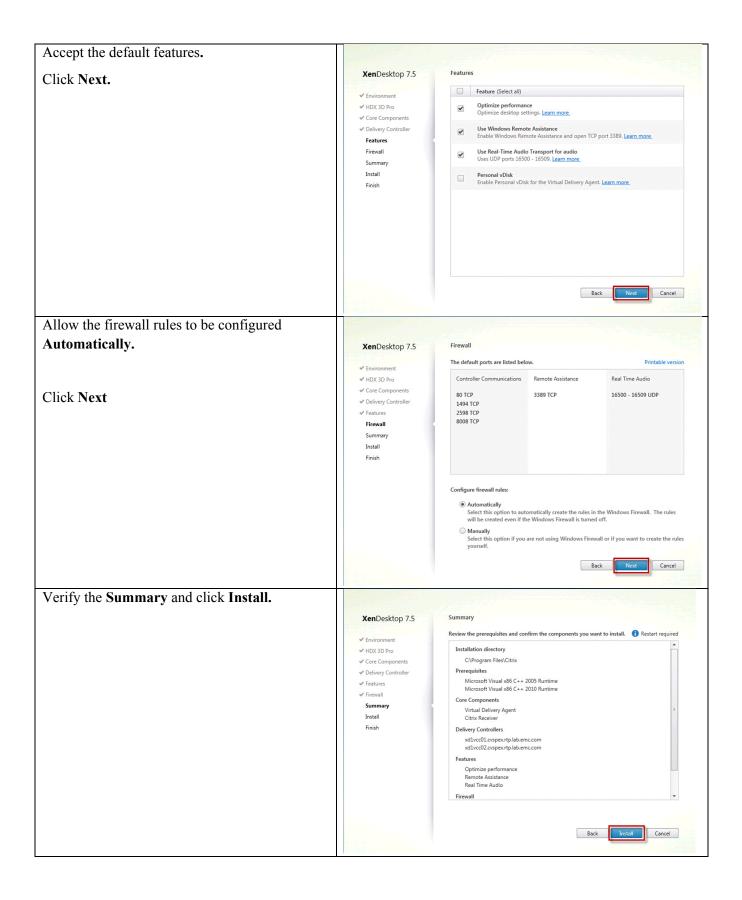
By default, when you install the Virtual Delivery Agent, Citrix User Profile Management is installed silently on master images. (Using profile management as a profile solution is optional.)



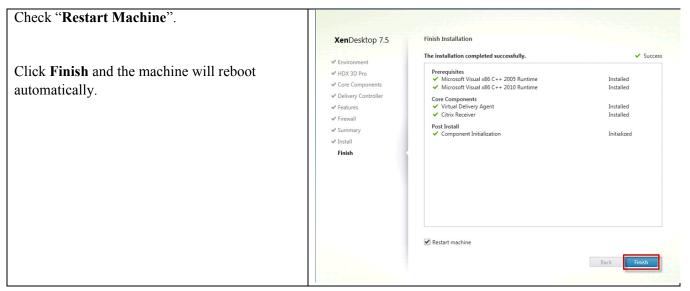
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Repeat the procedure so that VDAs are installed for both HVD (using the Windows 7 OS image) and the HSD desktops (using the Windows Server 2012 image).

Citrix NetScaler Setup

This section describes the configuration of Citrix NetScaler components.

Citrix NetScaler VPX Configuration

Citrix NetScaler VPX provides the complete NetScaler all-in-one feature set in a simple, easy-to-install virtual appliance. NetScaler VPX is a web application delivery virtual appliance that accelerates internal and external web applications up to five times, optimizes application availability through advanced L4-L7 traffic management, increases security with an integrated application firewall, and substantially lowers costs by increasing web server efficiency.

There are several key configuration elements required for using NetScaler VPX as the Global Server Load Balancer (GSLB) in this DaaS architecture.

- NetScalers must be the authoritative DNS for the Access Gateway URLs.
- App Orchestration must be configured to have the tenant primary site in the first datacenter and the secondary site in a second datacenter. This is needed for each tenant requiring GSLB support.
- There must be back-end replication on the XenDesktop site for failover to succeed. This is typically implemented through storage replication of LUNS for the XenDesktop site and vDisk filesystems.

Tenant	IP Туре	IP/Netmask	Purpose
Shared	NetScaler IP (NSIP)	10.71.0.20/24	NetScaler 1 Management
	NetScaler IP (NSIP)	10.71.0.21/24	NetScaler 2 Management
	Subnet IP (SNIP)	10.71.0.22/24	Source IP to Servers
	NetScaler Gateway IP	10.71.0.23/24	Client IP
Tenant 1	NetScaler IP (NSIP)	10.76.0.20/24	NetScaler 1 Management
	NetScaler IP (NSIP)	10.76.0.21/24	NetScaler 2 Management
	Subnet IP (SNIP)	10.76.0.22/24	Source IP to Servers
	NetScaler Gateway IP	10.76.0.23/24	Client IP
Tenant 2	NetScaler IP (NSIP)	10.77.0.20/24	NetScaler 1 Management
	NetScaler IP (NSIP)	10.77.0.21/24	NetScaler 2 Management
	Subnet IP (SNIP)	10.77.0.22/24	Source IP to Servers
	NetScaler Gateway IP	10.77.0.23/24	Client IP

NetScaler IP Configuration

Global Configurations

Tenant	Option		Description
TCP Optimizations	Nagle's Algorithm	Enabled	Reduces number of TCP Packets
	Selective	Enabled	TCP Retransmission mechanism
	Acknowledgement		
	(SACK)		
	Windows Scaling	4	Increase TCP Receive Windows Size
	RNAT TCP Proxy	Enabled	Dynamic RNAT Proxy
HTTP	Cookie Version	1	Uses UTP for time values
Optimizations	Drop Invalid HTTP	Enabled	Detects and drops invalid HTTP headers
	Requests		

Load Balancing

All services should be load balanced in the interest of increasing service availability. Load balancing also sources traffic to back-end servers from the NetScaler Subnet IP (SNIP). Load balanced services include LDAPS (TCP 636) to domain controllers, DNS (UDP/TCP 53) to DNS servers, and HTTP/HTTPS (TCP 80/443) to StoreFront servers, as shown in the table below.

Protocol	Port(s)	Target	Notes
LDAPS	TCP 636	Domain Controllers	NetScaler Authentication
	TCP/UDP 53	Domain Controllers	DNS Requests
HTTPS	TCP 443	Storefront Servers	NetScaler ICA Proxy Target
Citrix XML	TCP 8080	Citrix XML Brokers	vIP to which XenApp/XenDesktop Server refer for XML
			Load Balancing

NetScaler Gateway

Citrix NetScaler Gateway VPX is a secure application, desktop and data access solution that provides administrators granular application- and device-level control while enabling user access from anywhere using SmartAccess and the XenMobile Micro VPN. It is a virtual appliance that runs on all industry standard hypervisors.

NetScaler Gateway offers a single point of management and tools to ensure the highest levels of information security across and outside the enterprise. At the same time, it empowers users with a single point of access-optimized for roles, devices, and networks-to the enterprise applications and

data they need. This unique combination of capabilities helps maximize the productivity of today's mobile workforce.

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Authentication

NetScaler Gateway will proxy Active Directory authentication for clients.

Tenant	Setting	Detail
Shared	Name	LDAPS_authpol
	Priority	100
	Expression	Ns_true
	Profile	LDAPS_authsrv
	Profile	-serverIP 192.0.2.2 -serverPort 636 -ldapBase "DC=daas,DC=local"
	Configuration	-ldapBindDn administrator@daas.local -ldapBindDnPassword
		d02d067f26957177a4 -encrypted -ldapLoginName samAccountName
		-searchFilter "memberOf=CN=DaasUsers,OU=Customers,DC=daas,DC=local"
		-groupAttrName memberOf -subAttributeName CN -secType SSL
Tenant 1	Name	LDAPS_authpol
	Priority	100
	Expression	Ns_true
	Profile	LDAPS_authsrv
	Profile	-serverIP 192.0.2.2 -serverPort 636 -ldapBase "DC=daas,DC=local"
	Configuration	-ldapBindDn administrator@FL1.local -ldapBindDnPassword
		d02d067f26957177a4 -encrypted -ldapLoginName samAccountName
		-searchFilter "memberOf=CN=DaasUsers,OU=Customers,DC=FL1,DC=local"
		-groupAttrName memberOf -subAttributeName CN -secType SSL
Tenant 2	Name	LDAPS_authpol
	Priority	100
	Expression	Ns_true
	Profile	LDAPS_authsrv
	Profile	-serverIP 192.0.2.2 -serverPort 636 -ldapBase "DC=daas,DC=local"
	Configuration	-ldapBindDn administrator@FL2.local -ldapBindDnPassword
		d02d067f26957177a4 -encrypted -ldapLoginName samAccountName
		-searchFilter "memberOf=CN=DaasUsers,OU=Customers,DC=FL2,DC=local"
		-groupAttrName memberOf -subAttributeName CN -secType SSL

Session

NetScaler VPX Session configuration provides different user experiences depending on the client used to access the DaaS as shown in the table below.

Tenant	Setting	Detail
Shared	Name	AG_receiver_pol
	Priority	50
	Expression	REQ.HTTP.HEADER X-Citrix-Gateway EXISTS && REQ.HTTP.HEADER
		User-Agent CONTAINS CitrixReceiver
	Profile	clientless_prof
	Profile	-dnsVserverName DNS_lbvsrv -transparentInterception OFF
	Configuration	-defaultAuthorizationAction ALLOW -icaProxy ON -wihome
		"https://sf-lb.daas.local/Citrix/Tenant2Site" -wiPortalMode NORMAL
		-ntDomain daas -storefronturl "https://sf-lb.daas.local/Citrix/Tenant2Site"

Shared	Name	AG_browser_pol		
	Priority	60		
	Expression	REQ.HTTP.HEADER User-Agent NOTCONTAINS CitrixReceiver &&		
		REQ.HTTP.HEADER Referer EXISTS		
	Profile	web_prof		
	Profile	-dnsVserverName DNS_lbvsrv -transparentInterception OFF		
	Configuration	-defaultAuthorizationAction ALLOW -icaProxy ON -wihome		
		"https://sf-lb.daas.local/Citrix/Tenant2Site" -wiPortalMode NORMAL		
		-ntDomain daas		
Tenant 1	Name	AG_receiver_pol		
	Priority	50		
	Expression	REQ.HTTP.HEADER X-Citrix-Gateway EXISTS && REQ.HTTP.HEADER		
	-	User-Agent CONTAINS CitrixReceiver		
	Profile	clientless prof		
	Profile	-dnsVserverName DNS_lbvsrv -transparentInterception OFF		
	Configuration	-defaultAuthorizationAction ALLOW -icaProxy ON -wihome		
	U	"https://sf-lb.daas.local/Citrix/Tenant2Site" -wiPortalMode NORMAL		
		-ntDomain daas -storefronturl "https://sf-lb.daas.local/Citrix/Tenant2Site"		
Tenant 1	Name	AG browser pol		
	Priority	60		
	Expression	REQ.HTTP.HEADER User-Agent NOTCONTAINS CitrixReceiver &&		
		REQ.HTTP.HEADER Referer EXISTS		
	Profile	web prof		
	Profile	-dnsVserverName DNS_lbvsrv -transparentInterception OFF		
	Configuration	-defaultAuthorizationAction ALLOW -icaProxy ON -wihome		
	configuration	"https://sf-lb.daas.local/Citrix/Tenant2Site" -wiPortalMode NORMAL		
		ntDomain daas		
Tenant 2	Name	AG_receiver_pol		
	Priority	50		
	Expression	REQ.HTTP.HEADER X-Citrix-Gateway EXISTS && REQ.HTTP.HEADER		
	Expression	User-Agent CONTAINS CitrixReceiver		
	Profile	clientless_prof		
	Profile	-dnsVserverName DNS_lbvsrv -transparentInterception OFF		
	Configuration	-defaultAuthorizationAction ALLOW -icaProxy ON -wihome		
	Configuration	"https://sf-lb.daas.local/Citrix/Tenant2Site" -wiPortalMode NORMAL		
		-ntDomain daas -storefronturl "https://sf-lb.daas.local/Citrix/Tenant2Site"		
Tenant 2	Name	AG browser pol		
		60		
	Priority	REQ.HTTP.HEADER User-Agent NOTCONTAINS CitrixReceiver &&		
	Expression	REQ.HTTP.HEADER Oser-Agent NOTCONTAINS CHITXReceiver &&		
	Profile	web prof		
	Profile	-dnsVserverName DNS lbvsrv -transparentInterception OFF		
	Configuration	-defaultAuthorizationAction ALLOW -icaProxy ON -wihome		
		"https://sf-lb.daas.local/Citrix/Tenant2Site" -wiPortalMode NORMAL		
		-ntDomain daas		

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Virtual Server

Virtual server setup is summarized in the table below.

	Setting	Detail
Shared	Name	Tenant2_agvsrv
	IP/Port	10.77.0.23 TCP 443
	STA	http://10.77.0.70 http://10.0.77.0.69
Tenant 1	Name	Tenant2_agvsrv
	IP/Port	10.77.0.23 TCP 443
	STA	http://10.77.0.70 http://10.0.77.0.69
Tenant 2	Name	Tenant2_agvsrv
	IP/Port	10.77.0.23 TCP 443
	STA	http://10.77.0.70 http://10.0.77.0.69

NetScaler VPX Configuration Procedures on VMware ESXi

The following summary provides an overview of how to setup a NetScaler VPX appliance on VMware ESXi and how to configure the NetScaler appliance as described above. The procedures provided here follow steps in the online documentation (see http://edocs.citrix.com).

Downloading the NetScaler Virtual Appliance Setup Files

The NetScaler virtual appliance setup package for VMware ESX follows the Open Virtual Machine (OVF) format standard. You can download the files from MyCitrix.com. You need a My Citrix account to log on. If you do not have a My Citrix account, access the home page at http://www.mycitrix.com, click the New Users link, and follow the instructions to create a new My Citrix account.

When logged on, navigate the following path from the My Citrix home page: MyCitrix.com > Downloads > NetScaler > Virtual Appliances.

Copy the following files to a workstation on the same network as the ESX server. Copy all three files into the same folder.

- NSVPX-ESX-<release number>-<build number>-disk1.vmdk (for example, NSVPX-ESX-9.3-39.8-disk1.vmdk
- NSVPX-ESX-<release number>-<build number>.ovf (for example, NSVPX-ESX-9.3-39.8.ovf)
- NSVPX-ESX-<release number>-<build number>.mf (for example, NSVPX-ESX-9.3-39.8.mf)

For more information see

http://support.citrix.com/proddocs/topic/netscaler-vpx-10-1/ns-vpx-install-on-esx-wrapper-con.html

Labeling the physical network ports of VMware ESXi

Before installing a NetScaler virtual appliance, label of all the interfaces that you plan to assign to virtual appliances, in a unique format. Citrix recommends the following format: NS_NIC_1_1, NS_NIC_1_2, and so on. In large deployments, labeling in a unique format helps in quickly identifying the interfaces that are allocated to the NetScaler virtual appliance among other interfaces used by other virtual machines, such as Windows and Linux. Such labeling is especially important when different types of virtual machines share the same interfaces. To label the ports, complete the following steps:

- 1. Log on to the VMware ESXi server by using the vSphere client.
- 2. On the vSphere client, select the Configuration tab, and then click Networking.
- 3. At the top-right corner, click Add Networking.
- 4. In the Add Network Wizard, for Connection Type, select Virtual Machine, and then click Next.

- 5. Scroll through the list of vSwitch physical adapters, and choose the physical port that will map to interface 1/1 on the virtual appliances.
- 6. Enter NS_NIC_1_1 as the name of the vSwitch that will be associated with interface 1/1 of the virtual appliances.
- 7. Click Next to finish the vSwitch creation. Repeat the procedure, beginning with step 2, to add any additional interfaces to be used by your virtual appliances. Label the interfaces sequentially, in the correct format (for example, NS_NIC_1_2).

Setting Up the Initial Configuration by Using the NetScaler Virtual Appliance Console

The first task after installing a NetScaler virtual appliance on a virtualization host is to use the NetScaler virtual appliance console in the vSphere client to configure the following initial settings.

- NetScaler IP address (NSIP): This is the IP address at which you access a NetScaler or a NetScaler virtual appliance for management purposes. A physical NetScaler or virtual appliance can have only one NSIP. You must specify this IP address when you configure the virtual appliance for the first time. You cannot remove an NSIP address.
- Netmask: This is the subnet mask associated with the NSIP address.
- Default Gateway: A default gateway is needed on the virtual appliance to access it through SSH or the configuration utility from a remote administrative desktop on a different network.

To configure initial settings on the virtual appliance, use the management application on the virtual appliance Console:

- 1. Connect to the VMware ESXi server on which the virtual appliance is installed by using the vSphere client.
- 2. In the details pane on the Console tab, log on to the virtual appliance by using the administrator credentials. The default user name and password are "nsroot."
- **3.** At the prompts, enter the NSIP address, subnet mask, and default gateway and then save the configuration.

After you have set up an initial configuration through the NetScaler virtual appliance console in the management application, you can use either the NetScaler command line interface or the configuration utility to complete the configuration or to change the initial settings.

For more information see

http://support.citrix.com/proddocs/topic/netscaler-vpx-10-1/ns-vpx-config-basic-settings-set-initial-config-use-nsvpx-console-tsk.html

Load Balancing

The load balancing feature distributes user requests for web pages and other protected applications across multiple servers that all host (or mirror) the same content. You use load balancing primarily to manage user requests to heavily used applications, preventing poor performance and outages and ensuring that users can access protected applications. Load balancing also provides fault tolerance; when one server that hosts a protected application becomes unavailable, the feature distributes user requests to the other servers that host the same application.

Basic load balancing consists of the following 4 steps:

Step 1 Add a Server

From command line interface:

add server <name> (<ipAddress> | (<domain> [-ipv6Address (YES | NO)]) [-state (ENABLED | DISABLED)] [-comment <string>]

Example

add server DC01_srv 10.0.71.10 -state DISABLED -comment "Domain Controller"

To add a server by using the configuration utility, complete the following steps:

- 1. Navigate to Traffic Management > Load Balancing > Virtual Servers.
- 2. In the details pane, click Add.
- 3. In the Create Server dialog box, specify values for the following parameters:
- Server Name—name
- IP Address—ipAddress (Select IP Address and type the address. Before typing an IPv6 address, select the IPv6 check box.)
- Domain Name—domain (For a domain-name based server, select Domain Name and type the name of the server's domain.)
- Enable after Creating—state
- Comment—comment
- 4. If you specify the domain name of the server and you want the domain name to be resolved to an IPv6 address, select the IPv6 Domain check box.
- 5. Click Create, and then click Close. The server you named appears in the Servers pane.

Step 2 Add a Service

From the command line interface, at the command prompt, type:

add service <name> <serverName> <serviceType> <port>

To create a service by using the configuration utility, complete the following steps:

- 1. Navigate to Traffic Management > Load Balancing > Services.
- 2. In the details pane, click Add.
- 3. In the Create Service dialog box, specify values for the following parameters:
- Service Name—name
- Server—serverName
- Protocol—serviceType
- Port—port
- 4. Click Create, and then click Close. The service you created appears in the Services pane.
- Step 3 Create a Virtual Server

From the command prompt:

add lb vserver <name> <serviceType> <ip> <port>

To create a virtual server by using the configuration utility, complete the following steps:

- 1. Navigate to Traffic Management > Load Balancing > Virtual Servers.
- 2. In the details pane, click Add.
- **3.** In the Create Virtual Server (Load Balancing) dialog box, specify values for the following parameters:
- Name—name
- IP Address—IPAddress

- Protocol—serviceType
- Port—port
- 4. Click Create, and then click Close. The virtual server you created appears in the Load Balancing Virtual Servers pane.
- Step 4 Bind Services to Virtual Server

From the command prompt:

bind lb vserver <name> <serviceName>

From the configuration utility, complete the following steps:

- 1. Navigate to Traffic Management > Load Balancing > Virtual Servers.
- 2. In the details pane, select the virtual server for which you want to bind the service.
- 3. Click Open.
- 4. In the Configure Virtual Server (Load Balancing) dialog box, on the Services tab, select the Active check box next to the service that you want to bind to the virtual server.
- 5. Click OK.

For more information see http://support.citrix.com/proddocs/topic/netscaler-vpx-10-1/ns-lb-wrapper.html

NetScaler Gateway LDAPS Authentication

- 1. In the configuration utility, on the Configuration tab, expand NetScaler Gateway > Policies > Authentication/Authorization > Authentication.
- 2. Click LDAP.
- 3. In the details pane, on the Policies tab, click Add.
- 4. In Name, type a name for the policy.
- 5. Next to Server, click New.
- 6. In Name, type the name of the server.
- 7. Under Server, in IP Address and Port, type the IP address and port number of the LDAP server.
- 8. In Type, select either AD for Active Directory or NDS for Novell Directory Services.
- 9. Under Connection Settings, complete the following:
 - a. In Base DN (location of users), type the base DN under which users are located.
 - **b.** The base DN is usually derived from the Bind DN by removing the user name and specifying the group where users are located.
 - c. In Administrator Bind DN, type the administrator bind DN for queries to the LDAP directory.
- **10.** In Administrator Password and Confirm Administrator Password, type the administrator password for the LDAP server.
- 11. In Security Type, select the security type and then click Create.
- 12. To allow users to change their LDAP password, select Allow Password Change.

For more information see

http://support.citrix.com/proddocs/topic/netscaler-gateway-101/ng-ldap-authen-config-overview-con.h tml

NetScaler Gateway Session

To create a session profile for Receiver, WorxHome, or StoreFront, complete the following steps:

- In the configuration utility, on the Configuration tab, in the navigation pane, expand NetScaler Gateway > Policies and then click Session.
- 2. In the details pane, on the Profiles tab, click Add.
- 3. In Name, type a name for the profile.
- 4. Click the Security tab and in Default Authorization Action, click Override Global, and then select ALLOW.
- 5. Click the Client Experience tab and then do the following:
 - a. Next to Plug-in Type, click Override Global and then select Java.
 - **b.** Next to Single Sign-on to Web Applications, click Override Global and then select the check box Single Sign-on to Web Applications.
 - c. Next to Clientless Access, click Override Global and then select Off.
- 6. Click the Published Applications tab and then configure the following settings:
 - a. Next to ICA Proxy, click Override Global, and then select ON.
 - **b.** Next to Single Sign-on Domain, click Override Global, enter the domain name and then click Create. For example, enter mydomain.
 - c. In Web Interface Address, click Override Global, and then type the web address for StoreFront. For example, enter https://storefront.t.com/Citrix/StoreWeb.



When you configure the StoreFront URL in NetScaler Gateway, such as https://<SFLite-FQDN>/Citrix/StoreWeb, the text StoreWeb is case sensitive.

7. Click Create.

To create the session profile for Receiver for Web, complete the following steps:

- 1. In the configuration utility, on the Configuration tab, in the navigation pane, expand NetScaler Gateway > Policies and then click Session.
- 2. In the details pane, on the Profiles tab, click Add.
- 3. In Name, type a name for the profile.
- 4. Click the Client Experience tab and then do the following:
 - a. In Clientless Access, click Override Global and then select Allow.
 - **b.** In Single Sign-on to Web Applications, click Override Global and then select the check box.
- 5. On the Published Applications tab, do the following:
 - a. Next to ICA Proxy, click Override Global, and then select ON.
 - **b.** Next to Web Interface Address, click Override Global and then enter the web address (URL) for StoreFront.



The StoreFront URL is case sensitive, such as https://<StoreFrontFQDN>/Citrix/<StoreWebName>/.

- c. In Single Sign-on Domain, type the domain name.
- 6. Click Create.

For more information see http://support.citrix.com/proddocs/topic/netscaler-gateway-101/ng-connect-users-wrapper-con.html

Virtual Server

- 1. In the configuration utility, on the Configuration tab, in the navigation pane, expand NetScaler Gateway and click on Virtual Servers
- 2. In the details pane, click on Add
- 3. In Name type a name for the virtual server
- 4. In IP Address type the IP of the virtual server
- 5. In SSL, add the appropriate SSL certificate
- 6. Click on the Authentication tab
- 7. Click on Insert Policy to bind the authentication policy to the virtual server
- 8. Click on the Policies tab
- 9. Click on Insert Policy to bind the session policies to the virtual server
- 10. Click on the Published Applications tab
- 11. Click on the Add link in the Secure Ticket Authority section to add the STA servers URL (http://x.x.x.x or http://server.domain.local)

For more information see http://support.citrix.com/proddocs/topic/netscaler-gateway-101/ng-install-wrapper-con.html

NetScaler Troubleshooting

The table below shows NetScaler Log Files, which can be useful in troubleshooting.

Log File	Purpose
/tmp/aaa.debug	Streaming file viewable with cat - Displays realtime
	NetScaler Gateway authentication events
/var/log/auth.log	logs ssh/sftp administrative logins to NetScaler
/var/log/cron	Logs cron job results
/var/log/httpaccess.log	Logs http/https administrative logins to NetScaler
/var/log/httperror.log	Logs NetScaler website errors
/var/log/license.log	Logs NetScaler licensing status
/var/log/messages	Logs history of commands in NetScaler shell
/var/log/ns.log	General NetScaler log
/var/log/nsvpn.log	Logs NetScaler Gateway access
/var/log/snmpd.log	Logs SNMP status
/var/nslog/aslearn.log	NetScaler Learning Server logs
/var/nslog/dmesg.boot	dmesg log file
/var/log/newnslog	Logfile readable with nsconmsg

The NetScaler stat command lists real time relevant statistics of most NetScaler objects. A few examples of the stat command are shown below.

Entity	Command
System Statistics	stat ns
	stat system
	stat cpu
	stat interface

NetScaler Object Statistics	stat serviceGroup
	stat lb vserver
	stat service
Protocol Statistics	stat ssl
	stat dns
	stat http

The NetScaler nsconmsg command lists useful metrics.

Command	Purpose
nsconmsg	Displays current real time NetScaler statistics
nsconmsghelp	Displays different options for nsconmsgconmsg
nsconmsg –d current –g cpu_use	Displays live CPU statistics
nscongmsg –K [newnslog-filename] –d event	Disaplys significant archived events
nsconmsg –d current –g pol_hits	Displays real time policy hits
nsconmsg –s ConSSL=2 –d oldconmsg	Displays real time SSL statistics

Tools for network tracing include the *nstcpdump.sh* script and the *nstrace.sh* script. The nstcpdump.sh script outputs network traffic details directly to stdout. It is not as detailed as nstrace.sh and more CPU-intensive, but useful for quickly viewing network traffic. The *nstrace.sh* script outputs information to a .cap or .pcap file, which is viewable with Wireshark and other tools.

Installing Citrix App Orchestration and CloudPortal Services Manager

The procedures in this section describe how to install the Citrix CloudPortal Services Manager and App Orchestration software components. It is assumed that the software prerequisites have been met in advance. The installation documentation includes checklists that should first be completed prior to software component installation.

Preparing and installing CloudPortal Services Manager software

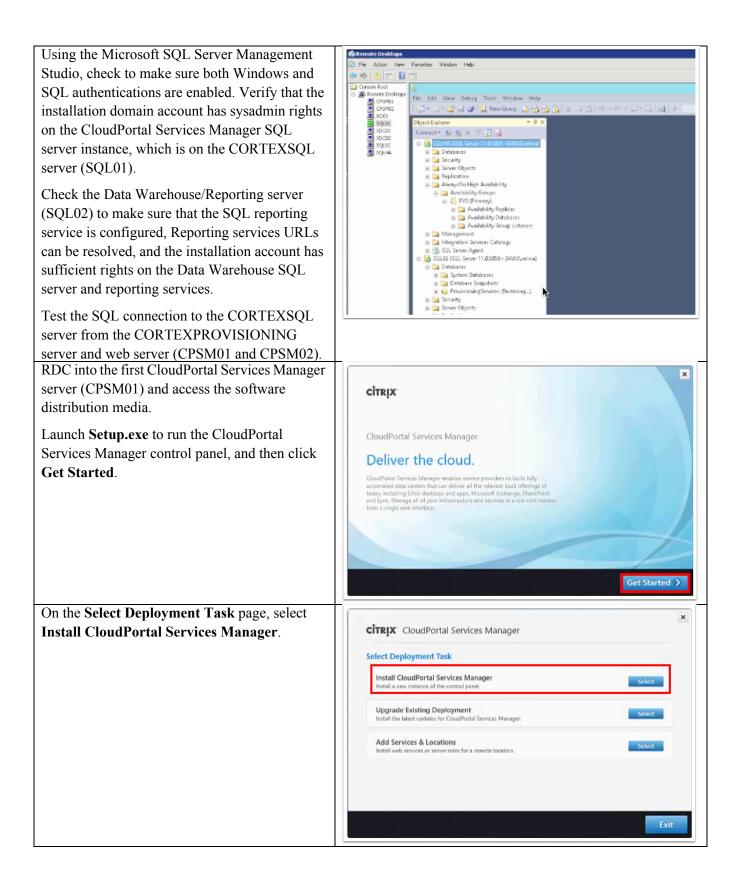
Review the pre-installation checklist in the documentation:

- CloudPortal Services Manager 11.0 Documentation
- Known Issues for CloudPortal Services Manager

It is assumed that all prerequisites have been met prior to beginning software installation.

Instructions	Visual
A critical prerequisite is to establish DNS aliases for servers that run CloudPortal Services Manager roles: CORTEXSQL, CORTEXPROVISIONING, CORTEXWEB, and CORTEXREPORTS. If this prerequisite has not already been completed, set up the CPSM DNS aliases using dnscommand or the DNS Manager (see <u>http://technet.microsoft.com/en-us/library/cc772</u> 053.aspx for instructions).	Image: DNS Manager File Action File
Remote Desktop Connect (RDC) to the first CloudPortal Services Manager server (CPSM01) and run the Roles & Features wizard in the	Add Roles and Features Wizard
Windows Server Manager to configure the required server roles. Configure the required prerequisites (e.g., .NET framework, MSMQ features, etc.).	Do you need to specify an alternate source path? One or more installation selections are missing source files on the destination. X Before You Begin Installation Type Server Selecton Server Selecton Server Roles Web Server Role (IIS) Rel Services Web Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (IIS) Rel Server Role (II
The CloudPortal Services Manager Setup Tool attempts to handle many unresolved prerequisites at installation (such as installing the .NET framework) if needed.	Confirmation Message Queuing Services HTTP Support Message Queuing Service Telect Client Web Server (IIS) Message Queuing Server Telect Client Web Server (IIS) Message Queuing Server Telect Client Web Server (IIS) Message Queuing Server Telect Client Web Server (IIS) Message Queuing Server
Repeat as needed to prepare and verify the second CloudPortal Services Manager server (CPSM02).	< Previous Next > Install Cancel

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On the Prepare Environment page, click Verify for the Extend Active Directory Scheme task.	CÎTRIX: CloudPortal Services Manager Prepare Environment
Since the aliases have been defined already, the Setup tool indicated the completion of that step.	Extend Active Directory Schema Verify CloudPortal Services Manager uses custom Active Directory attributes created by Microsoft Verify Create DNS Aliases Completed A control panel deployment can span multiple domains. Creating key DNS aliases will ensure more Completed Completed Mack Exit

Preparing and installing Citrix App Orchestration software

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Review the pre-installation checklist in the documentation:

- Getting Started with Citrix App Orchestration 2.5
- Known Issues for App Orchestration 2.5

Deploying App Orchestration typically occurs using the following phased approach:

Phase	Tasks
Prepare	 Download the software for App Orchestration and its components.
	• Prepare your environment and the machines you will use to deploy App Orchestration and design and deliver offerings.
Install	• Use the App Orchestration Install Center to install the required software on the configuration server, Delivery Controllers, Session Machines, and StoreFront servers.
Configure Define	Configure App Orchestration's global settings.Define additional domains.
	Create additional datacenters.
	• Set up and configure compute resources.
Design	Add instance configurations.Create Delivery Sites.
	• Create a Session Machine Catalog for on-demand provisioning or external provisioning.
	Create a StoreFront Server Group.
Deliver	Create an offering.Add a tenant and add users.
	Adjust capacity.
	• Subscribe the tenant to the offering.
	Enable tenant self-service provisioning with CloudPortal Services Manager.

Create Active Directory domains

App Orchestration manages multiple Active Directory domains: e.g., a shared resource domain and a default user domain.

- Shared resource domain: The domain where the App Orchestration configuration server resides. This domain contains components that are shared with multiple tenants. This is also where the App Orchestration root OU is created.
- **Default user domain:** The domain where App Orchestration user accounts reside. This domain also includes the tenant users and groups that will access offerings delivered from the shared resource domain.

Create Root OU and Admin Group

Delivery Groups in Citrix App Orchestration and CloudPortal Services Manager correspond to Active Directory Organizational Units (OUs). The implementation of App Orchestration relies on the proper configuration of the root App Orchestration OU.

Within the root App Orchestration OU, an AD group identifies the set of privileged CSP administrators that are permitted to perform management tasks across the CSP domain. Early implementation tasks for App Orchestration include creating the root OU, adding the administrative users to this OU, and adding them to the Domain administrative group.

Instructions	Visual
In the shared resource domain, create a new Active Directory OU that will be the root OU for	New Object - Organizational Unit
the deployment. In this CVD, assign the name	Create in: daas local/
CitrixAppOrchestration.	
	Name: DimeAppOrchestration
	Protect container from accidental deletion

In the CitrixAppOrchestration OU, create a new	New Object - Group
Active Directory group. Assign the name	
AOAdmins.	Create In: daas.local/OtrixAppOrchestration
	Group name:
	AOAdjnins
	Group name (pre-Windows 2000): AOAdmins
	Group scope Group type
	Domain local Security Global Distribution
	O Universal
	OK Cencel
In the CitrixAppOrchestration OU, create a new	New Object - User
user. Assign the logon name AOAdmin.	
Click Next.	Create In: daas local/OtrovAppOrchestration
	First name: AO Inbials:
	Last name: Admin
	Ful name: AO Admin
	Userlogon name:
	ADAdmini @daaa local v
	User logon name (pre-Windows 2000): DAAS\ ADAdmin
	< Back Next > Cancel
Add a password for this user, and disable all	
checkboxes on the New Object – User page.	New Object - User
Click Next.	Create in: daas local/OnterAppOrchestration
	Password:
	Confirm paseword:
	User must change password at next logon
	User cannot change password
	Password never expires
	Account is disabled
	< Back Next > Cancel

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Confirm user information, and click Finish.	New Object - User
	Create In: datas local/ChrstAppOrchestration
	When you click Finish, the following object will be created:
	Full name: AO Admin @daas Jocal
	< Back Finish Cancel
Next, add the new user to the group: Edit the properties for the new user (AOAdmin). Click	AO Admin Properties ? X
Member Of tab. Then, click Add.	Security Environment Sessions Remote control Remote Desktop Services Profile OOM+ /embute Editor Genaral Address Account Profile Telephones Organization Published Cartificates Member OF Password Replication Dial-in Object Member of: Name Active Directory Domain Services Folder Domain Users Comman Users Add Remove Remove Remove Remove Group Domain Users Add Remove Remove Remove Group There is no need to change Primary group unless you have Macintosh clients or POSIX-compliant applications.
	OK Cancel Apply Help

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Enter the name of the group (aoadmins).	Select Groups ? X
Click OK .	Select the object type:
	Groups or Built-in security principals Object Types
	From this location:
	daas local Locations
	Enter the object names to select (examples):
	oadmine Check Names
	Advanced OK Cancel
Next, edit the properties for the	CitrixAppOrchestration Properties ? X
CitrixAppOrchestration OU. Select the Security	General Managed By Object Security COM+ Attribute Editor
tab.	Group or user names:
Click Add.	A Everyone
	BB, SELF III
	BR SYSTEM
	Bit, Domain Admins (DAAS\Domain Admins) Bit, Enterprise Admins (DAAS\Enterprise Admins) V
	Add Bemove
	Permissions for Everyone Allow Deny
	Ful control
	Viite 🗌 🗌
	Create all child objects
	For special permissions or advanced settings, click Advanced
	Advanced.
	Learn about access control and permissions
	OK Cancel Apply Help
Enter the name of the new group (aoadmins).	
Enter the name of the new group (abaumins).	Select Users, Computers, Service Accounts, or Groups ? X
Click OK .	Select the object type:
	Users, Groups, or Built-in security principals Object Types
	From this location:
	dass local Locations
	Enter the object names to select (examples):
	aoadminaj Check Names
	Advanced OK Cancel

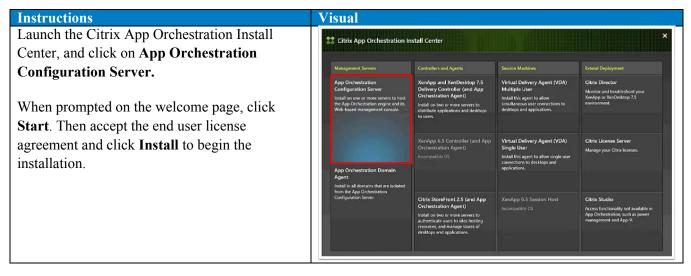
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Edit the permissions for the AOAdmins group,	CitrixAppOrchestration Properties ? X
and enable all Allow checkboxes.	CitrixAppOrchestration Properties ? General Managed By Object Security COM+ Attribute Editor Group or user namea: B2, Everyone B2, SELF B2, SELF B2, SYSTEM B2, SYSTEM B2, Domain Admins (DAA5\AD\Admins) B2, Domain Admins (DAA5\AD\Admins) B2, Domain Admins (DAA5\AD\Admins) B2, Domain Admins (DAA5\AD\Admins) B4, Moldmins (DAA5\AD\Admins) B4, Domain Admins (DAA5\AD\Admins) B4, Domain Admins (DAA5\AD\Admins) B4, Domain Admins (DAA5\AD\Admins) B4, Domain Admins (DAA5\Admins) B4, Domain Admins (DAA5\

Install AO Software

The Citrix App Orchestration Install Center is used to install App Orchestration software and prepare machines for deployment.



Installation progress is displayed.	Installing components Acquiring: Citrix App Orchestration Windows Feature Installer Applying:
	Cancel
The following status message indicates the installation was successful.	Citrix App Orchestration 2.5 Setup × Installation was successful The installation was completed successfully. Image: Citrix App Orchestration Server Configuration on exit
	Close

App Orchestration 2.5 High Availability Configuration

App Orchestration 2.5 provides failover capabilities from the application level. At the same time, Microsoft's SQL Server 2012/2014 Enterprise provides a new High Availability (HA) solution known as "AlwaysOn". With availability groups at the database level, SQL Server now allows you to create a group of databases which failover together as a unit from one replica/instance to another.

To support AlwaysOn availability groups, no special configuration is needed for App Orchestration. SQL Server provides the capability from a transaction level. This section will provide the step-by-step guide in SQL Server to enable this feature within App Orchestration 2.5 databases.

Process Overview

Citrix recommends the following installation sequence and key configuration steps to deploy an App Orchestration 2.5 farm that uses an AlwaysOn availability group

- 1. Select or create a Windows Server failover cluster.
- 2. Install SQL Server 2012 or 2014 on each cluster node.

- 3. Create and configure an availability group.
- 4. Install and configure App Orchestration multi-datacenter.
- 5. Add the App Orchestration databases to availability group.
- 6. Test failover for availability group.

Before You Begin

A SQL Server AlwaysOn Availability Group is not just a combination of database mirroring and database clustering. It is a completely new high availability and disaster recovery feature that co-exists with existing high availability and disaster recover options such as mirroring and log shipping. Before you begin deployment, review the following information about SQL Server AlwaysOn, the technologies that support AlwaysOn, and App Orchestration:

- Knowledge and skill requirements
- AlwaysOn Availability Group concepts
- Hardware and software requirements
- Permissions

Knowledge and Skill Requirements

To implement SQL Server AlwaysOn Availability Groups as a high availability and disaster recovery solution, several technologies interact and have to be installed and configured correctly. We recommend that the team responsible for setting up an AlwaysOn environment for App Orchestration products has a working knowledge of, and hands-on skills with the following technologies:

- Windows Server Failover Clustering (WSFC) services
- SQL Server 2012
- App Orchestration multi-datacenter deployment

High Availability Concepts for App Orchestration at Various Levels

- Multi-Controller for a delivery site several controllers forms one delivery site, it can provide HA capability for the connection request from end users
- Multi-Sites for the subscription by creating multiple delivery sites, the load can be distributed to different sites internally while creating the subscription
- Multi-Configuration Servers you can configure multi-configuration servers to provide the high availability of configuration server, each server can talk to AO Agent
- Multi-Datacenter To span different physical location, you can setup multiple datacenters in case one of the datacenter fail

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• Multi-Databases – it leverage SQL servers HA capability where App Orchestration database resides, in this document, we only discuss "AlwaysOn" availability group

SQL Server AlwaysOn Availability Group concepts

A SQL Server Availability Group enables you to specify a set of databases that you want to fail over together as a single entity. When an availability group fails over to a target instance or target server, all the databases in the group fail over also. Because SQL Server 2012 can host multiple availability groups on a single server, you can configure AlwaysOn to fail over to SQL Server instances on different servers. This reduces the need to have idle high performance standby servers to handle the full load of the primary server, which is one of the many benefits of using availability groups.

An availability group consists of the following components:

- Replicas, which are a discrete set of user databases called availability databases that fail over together as a single unit. Every availability group supports one primary replica and up to four secondary replicas.
- A specific instance of SQL Server to host each replica and to maintain a local copy of each database that belongs to the availability group.

For the details about the benefit of AlwaysOn Availability Groups and overview of AlwaysOn Availability Groups terminology, see AlwaysOn Availability Groups(SQL Server).

Windows Server Failover Clustering

To create and use SQL Server 2012 AlwaysOn Availability Groups, you have to install SQL Server 2012 on a Windows Server Failover Clustering (WSFC) cluster. For more information, see Windows Server Failover Clustering (WSFC) with SQL Server.

Although configuring a WSFC cluster is out of the scope for this article, you should be aware of the following requirements before you install and configure a cluster:

- All the cluster nodes must be in the same Active Directory Domain Services (AD DS) domain.
- Each availability replica in an availability group must reside on a different node of the same Windows Server Failover Clustering (WSFC) cluster.
- The cluster creator must have the following accounts and permissions:
 - Have a domain account in the domain where the cluster will exist.
 - Have local administrator permissions on each cluster node.
 - HaveCreate Computer objects and Read All Properties permissions in AD DS. For more information, see Failover Cluster Step-by-Step Guide: Configuring Accounts in Active Directory.

A very important aspect of configuring failover clustering and AlwaysOn is determining the quorum votes that are needed for the cluster nodes.

Failover clustering is based on a voting algorithm where more than one half of the voters, or quorum, must be online and able to communicate with each other. Because a given cluster has a specific number of nodes and a specific quorum configuration, the cluster service is able to determine what constitutes a quorum. The cluster service will stop on all the nodes if the number of voters drops below the required majority.

For more information, seeWSFC Quorum Modes and Voting Configuration (SQL Server) and Configure Cluster Quorum NodeWeight Settings.

Configure an AlwaysOn Group for App Orchestration

You should have 2 SQL Server instances to form one group and one availability group listener should be created for the database connection

Prepare the Windows Server Cluster environment

Obtain access to or create a three node Windows Server Failover Clustering (WSFC) cluster that you can use to install SQL Server 2012 on each cluster node. The following reference material provides guidance and detailed steps to configure a Windows Server failover cluster:

• Failover Clusters in Windows Server 2008 R2

This page provides links to Getting Started, Deployment, Operations, and Troubleshooting articles for Windows Server 2008 R2.

• Failover Clustering Overview

This page provides links to Getting Started, Deployment, Operations, and Troubleshooting articles for Windows Server 2012.

Prepare the SQL Server Environment

Before you can create an Availability Group for App Orchestration, you must prepare the SQL Server 2012 environment. To prepare the environment, complete the following tasks:

- Install the SQL Server prerequisites.
- Install SQL Server.
- Enable AlwaysOn.

Install SQL Server 2012

To install SQL Server 2012, complete the following steps:

1. Install SQL Server 2012 prerequisites on each cluster node.

For more information, see Prerequisites, Restrictions, and Recommendations for AlwaysOn Availability Groups (SQL Server).

2. Install SQL Server on each cluster node.

Choose the 2nd option "New SQL Server failover cluster installation", For more information, see Installation for SQL Server 2012.

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Enable AlwaysOn



You must enable AlwaysOn for each database server in the cluster.

To enable AlwaysOn, complete the following steps:

- Your logon account must have the permission levels to create an availability group. The account
 must have membership in the db_owner fixed database role and either CREATE AVAILABILITY
 GROUP server permission, CONTROL AVAILABILITY GROUP permission, ALTER ANY
 AVAILABILITY GROUP permission, or CONTROL SERVER permission, it recommended to
 change the logon account to the same domain user account for each instance
- 2. Log on to the server that will host the primary replica and start SQL Server Configuration Manager.
- 3. In Object Explorer, select SQL Server Services, right-click SQL Server (<instance name>), where <instance name> is the name of a local server instance for which you want to enable AlwaysOn Availability Groups, and then click Properties.
- 4. Select the AlwaysOn High Availability tab.
- 5. Select the Enable AlwaysOn Availability Groups check box, and then click OK.
- 6. Although the change is saved you must manually restart the SQL Server service (MSSQLSERVER) to commit the change. The manual restart enables you to choose a restart time that is best for your business requirements.
- 7. Repeat the previous steps to enable AlwaysOn for SQL Server on the other cluster nodes.

For more information, see Enable and Disable AlwaysOn Availability Groups (SQL Server) (http://go.microsoft.com/fwlink/p/?LinkId=267140).

Create and Configure the Availability Group

Use the following procedure to create an availability group on the primary replica, which is AO-SRV1 in our example.

If there is no user databases are on the instance of connected server, which is true in our case, since we have not created App Orchestration database yet in this step, you need to create empty AO database before creating the availability group

To create the empty AO databases, complete the following steps:

- 1. Make sure that your logon account has the correct permissions for this task. You require one of the following permissions in the master database to create the new database:
 - CREATE DATABASE
 - CREATE ANY DATABASE
 - ALTER ANY DATABASE
- 2. Log on to the server that will host the primary replica, which is AO-SRV1 in our example.
- 3. Start Management Studio.
- 4. In Object Explorer, right-click
- 5. Databases and then clickNew Database.
- 6. In the New Database dialog box, type the Database name: which is "AppOrchestration" for this example, Options->Collation, in the drop box, select "Latin1_General_100_CI_AS_KS", Click OK.
- Because the New Availability Group Wizard will not create an availability group unless the user database was backed up, you have to back up the database and set the Recovery model to "Full", From Options->Recovery model.
- 8. In Object Explorer expand Databases and right-click the database that you just created. Pick Tasks and then choose Back Up.

- 9. In the Back Up Database dialog box, click OK to accept all the default settings and create the back up.
- 10. Repeat above steps to create another database named "AppOrchestrationLogging"

Create the Availability Group

- 1. Make sure that your logon account has the required permissions to create an availability group. This requires membership in the db_owner fixed database role and either CREATE AVAILABILITY GROUP server permission, CONTROL AVAILABILITY GROUP permission, ALTER ANY AVAILABILITY GROUP permission, or CONTROL SERVER permission.
- 2. Log on to the server that will host the primary replica and start SQL Server Management Studio.
- **3.** To start the New Availability Group Wizard, right-click AlwaysOn High Availability and then click New Availability Group Wizard.
- 4. Click Next to advance to the Specify Name page. Enter AO-AG1 as the name of the new availability group in the Availability group name: box.

This name must be a valid SQL Server identifier, unique on the Windows Server Failover Clustering cluster and unique on the domain.

- 5. On the Select Databases page, all user databases that are eligible to become the primary database for the new availability group are listed on the User databases on this instance of SQL Server grid. Select the database which is "AppOrchestration" and "AppOrchestrationLogging", and then click Next.
- 6. On theSpecify Replicas page, use the following tabs to configure the replicas for AO-AG1: Replicas, Endpoints, and Backup Preferences.
- 7. An availability group listener is a virtual network name that provides client connectivity to the database a given availability group. Availability group listeners direct incoming connections to the primary replica or to a read-only secondary replica. The listener provides fast application failover after an availability group fails over. For more information, see Availability Group Listeners, Client Connectivity, and Application Failover (SQL Server).
- 8. On the Listener tab, configure an availability group listener for our example, use the name AOListener, if your deployment span multi-subnet, you can add multiple IP address to the AOListener's DNS records to provide fast connection
- 9. Select the desired configuration for each instance in the Selected instances grid, and then click Next.
- **10.** Click Finish to create the availability group.
- 11. The Select Initial Data Synchronization page lets you select a synchronization preference and specify the shared network location that all replicas can access. For our environment accept the default, Full, which performs full database and log backups. ClickNext.
- 12. The Validation page of the wizard displays the results of six checks before it lets you continue with availability group creation. If all checks pass, click Next to continue. If any tests fail, you cannot continue until you correct the error and then click Re-run Validation to run the validation tests again. When all the tests pass, click Next to continue.
- **13.** On theSummary page, verify the configuration of the replica that you are adding and then click Finish to save it. To change the configuration, click Previous to return to previous wizard pages.

Install App Orchestration and Configure Multi-datacenter

We recommend to read the Getting Started Guide and deploy a Multi-Datacenter Environment in App Orchestration 2.5, use the group listener DNS name as all database servers connection during the configuration, in this case, it's "AOListener" which is already created in the previous steps

- After the installation of configuration server, run "Citrix App Orchestration Server Configuration"->Create a new deployment in the Database name field, input "AppOrchestration" which is the empty database created in the previous step ,in the Database server field, input availability group listener DNS Name
- 2. Install and join the 2nd configuration server to the existing deployment right after the new deployment, launch "Citrix App Orchestration Server Configuration"->Join an existing deployment, input the first configuration server's address and finish the wizard

Note

If you have already configured the Delivery Sites, Storefront server group in App Orchestration before joining the 2nd configuration server, you should append the second configuration server address on each App Orchestration Agent machines

- 1. Open Registry editor, modify "ConfigurationServiceAddress" under "HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\CloudAppManagement\Agent", append 2nd configuration server information to it, like https://FQDN/cam/api
- 2. Restart the Agent services

Login Replication

App Orchestration logins are not replicated in the availability group, This occurs because login information is stored in the master database, the workaround is to manually copy the App Orchestration database's logins from the primary replica to the secondary replicas

- 1. Login to primary SQL instance by Management Studio
- 2. Go to each App Orchestration databases->Security->Users, you will find the machine account information like "domain name\host name\$", record all App Orchestration servers information
- 3. Execute the SQL query "CREATE LOGIN [domain name\host name\$] FROM WINDOWS WITH DEFAULT_DATABASE = [master]" on each secondary SQL instance's SQL query's window, replace "domain name\host name\$" by the machine account information from previous step
- 4. Repeat these steps if you add any new database to the availability group later, keep the login account synced manually

Use Failover Test to Validate the AlwaysOn Installation

After you synchronize the App Orchestration data with the secondary replicas, the final step is to test failover.

You must run extensive failover tests to make sure that the behavior of the AlwaysOn environment is as expected and that you completely understand the configuration requirements and procedures related to SQL Server 2012 Availability Groups.

Test availability group failover by using either the planned manual failover described in Perform a Planned Manual Failover of an Availability Group (SQL Server) or the forced manual failover described in Perform a Forced Manual Failover of an Availability Group (SQL Server).

You can perform either of the previous failovers by using the Failover Wizard in SQL Server Management Studio, Transact-SQL, or Windows PowerShell in SQL Server 2012.

Then test the database connectivity and App Orchestration functionality, these tests include and are not limited to the following:

- Verify that published App/Desktop from different datacenter are completely functional.
- Can login to configuration server web console, verify that App Orchestration data is preserved and not corrupted.

Migrate Existing Database Deployment to AlwaysOn Availability Group

If you have already deployed the App Orchestration databases, connecting to the SQL instance directly and want to add HA capability by enabling "AlwaysOn" availability group, you need to:

- Backup the databases (2 databases need to backed up, AppOrchestration and AppOrchestrationLogging)
- Restore the databases to the primary replica
- Add the App Orchestration databases to the availability group
- Modify the databases connection string pointing the connection to group listener

Restore the Databases on the Primary Replica

After restore, you need create the login account manually on the primary replica and each secondary replicas in the group, detail steps, refer to Login Replication section

To modify the databases connection string, complete the following steps:

- 1. On the configuration servers, open the registry editor, find the key "DatabaseConnectionString"
- 2. Under "HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\CloudAppManagement\Configuration", replace current SQL server FQDN with group listener's VNN, other connection string should be modified also in the follows:

 $HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\XDservices\ADIdentitySchema\DataStore\Connections\ConnectionString$

 $\label{eq:local_MACHINE} Key_LOCAL_MACHINE \\ SOFTWARE \\ Citrix \\ XD services \\ ConfigLoggingSiteSchema \\ DataStore \\ Connections \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionString \\ ConnectionStr$

 $HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\XDservices\ConfigurationSchema\DataStore\ConnectionS\ConnectionString$

 $HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\XDservices\DAS\DataStore\Connections\ConnectionString$

 $HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\XDservices\DesktopUpdateManagerSchema\Datastore\Connections\ConnectionString$

 $HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\XDservices\HostingUnitServiceSchema\DataStore\ConnectionS\ConnectionString$

 $HKEY_LOCAL_MACHINE\SOFTWARE\Citrix\XDservices\TrustServiceSchema\DataStore\Connections\ConnectionString$

CPSM High Availability Configuration

CloudPortal Services Manager consists of multiple components:

Core Components:

- Databases
- Provisioning Engine
- Directory Web Service
- Web Portal & API
- Reporting

Optional Components:

• Service-specific web services or tools (e.g. XenDesktop Web Service)

This document provides a basic guidance for deploying these components to support highly availability based on Windows Server 2012, 2012R2, and SQL Server 2012.

Databases

CloudPortal Services Manager uses DNS Alias (CNAME) that points to the SQL server instance name in connection strings, this simplifies the potential future database move from one SQL server cluster/group to another.

Prerequisite

SQL Server 2012 AlwaysOn Database Availability Group is configured correctly and operational following the Microsoft guidance.

Installation

For CPSM to support the SQL server AlwaysOn in a single subnet, first make the CORTEXSQL DNS alias point to the Listener name as part of the preparation for the initial deployment.

Follow the normal process to start the CloudPortal Services Manager system database installation: http://support.citrix.com/proddocs/topic/ccps-115/ccps-install-database-create.html. If the listener configured for the AlwaysOn Availability group is on a port other than 1433, the correct port number must be specified during the installation step of "Create System Databases":

Citrix CloudPo	rtal Servio	ces Manager	
Create Primary Data	abases		
Each CloudPortal Services Ma SQL Server to use (requires SC	-		configuration. Enter information about the
Server address:	CORTEXSQL		
Server port:	32244	✓ Use specific port	
Authentication mode:	Integrated	T]
Connect as:	Username		
	Password		Test Connection

When the installer completes "Create System Databases", verify that the two CPSM system databases OLM and OLMReports are restored on the primary replica.

Supporting multi-subnet failover (MultiSubnetFailover=True) requires the format of all CPSM connection strings to be re-evaluated and tested.

Adding CPSM Databases to the Availability Group

To add the CPSM databases OLM, OLMReports, and OLMReporting (Reporting database) to the database availability group, complete the following steps:

- 1. Logon to the SQL server that hosts the primary replica and start SQL Server Management Studio.
- 2. For each of the 3 databases, change the recovery model from "Simple" to "Full", and do a full backup.

0	_ 🗆 X		
Select a page	🔄 Script 👻 🎼 Help		
Files Filegroups Options	Collation:	SQL_Latin1_General_CP1_CI_AS	~
Change Tracking Permissions Extended Properties	Recovery model: Compatibility level:	Simple Full Bulk-logged	↓ k
Mirroring	Other options:	Simple	`

- 3. In Object Explorer, browse and expand the Availability Groups.
- 4. Right-click the relevant group, and then click Add Database.
- 5. On the Select Databases page, all databases that are eligible to become the primary database for the new availability group are listed in the table. The CPSM databases should be shown as "Meets requirements". Use the checkboxes to select the 3 CPSM databases and click Next. Alternatively these databases can be selected and added individually.

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6. On Select Initial Data Synchronization page, accept the default Full option, and Next.

- 7. If the Validation page displays the results of six checks as successful, click "Next" to continue. If any test fails, action must be taken to correct the error items and re-run the validation.
- 8. On the Summary page, verify the configuration of the replica, and then click Finish.

Login Replication

CloudPortal Services Manager SQL logins are not automatically replicated in the availability group so that need to be manually created on the secondary replicas.

From Management Studio, connect to the secondary replicas, replace the placeholders $\{...\}$ with the actual account password in the below SQL statement and run:

USE Master

EXEC sp_addlogin 'CortexProp', '{CortexPropPassword}'

EXEC sp_addlogin 'OLMUser', '{OLMUserPassword}'

EXEC sp_addlogin 'OLMReportsUser', '{OLMReportsUserPassword}'

EXEC sp_addlogin 'OLMReportingUser', '{OLMReportingUserPassword}'

Go

Provisioning Engine

CloudPortal Services Manager provisioning engine is dependent on Microsoft Message Queuing, for high availability requirement, MSMQ needs to be clustered, and so as the CPSM provisioning engine.

Prerequisites

The provisioning server cluster (Windows Server 2012 Failover Cluster) is created, and in addition, all servers must be able to see a shared storage device (i.e. a SAN drive) and be able to take ownership of it. Shared storage is not a requirement for Windows Server 2012 clusters but is a requirement for some Microsoft services, in this case Microsoft Message Queuing.

Installation

Install and configure CPSM Provisioning role on each of the cluster nodes using the CPSM v11.x installer: http://support.citrix.com/proddocs/topic/ccps-115/ccps-install-config-roles-gui.html. If you configure the Provisioning role on the secondary nodes with the same service accounts, make sure the password matches the ones specified for the same accounts when configuring on the primary node.

To configure the cluster, complete the following steps:

- 1. On the cluster node, open Failover Cluster Manager.
- 2. Expand Cluster and right click on Roles and select Configure Roles.
- 3. Click Next and select Message Queuing and click on Next.

豰	High Availability \	Wizard		x
Select R	ole			
Before You Begin Select Role	Select the role that you want to configure for high			
Select Storage	Generic Service	^	Description:	
Confirmation	GeiSCSI Target Server		Message Queuing enables distributed applications running at different times to	
Configure High	GiSNS Server		communicate across heterogeneous networks and with computers that may	
Availability	Kessage Queuing		be offline.	
Summary	Other Server Virtual Machine WINS Server	≡		
		~		
	More about roles that you can configure for high	availability < Pre	vious Next > Cancel	

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- 4. Enter the name that the clients will use to access this cluster role. Click Next.
- 5. Select the shared disk drive name to assign to the cluster role, and Next.

韵	Hig	gh Availability Wizar	d	×
Select S	torage			
Before You Begin Select Role	Select the storage volume th You can assign additional st	nat you want to assign to this orage to this clustered role a	s clustered role. after you complete this wizard.	
Client Access Point Select Storage	Name ⊡	Status		
Select Storage Confirmation Configure High Availability Summary	Volume: (G)	File System: NTFS	5 GB free of 5 GB	
]	< Previous Next > Ca	ncel

- 6. Click Finish when "High availability was successfully configured for the role" message and summary are displayed.
- 7. Right-click on the newly added role above, and select Add Resource > Generic Service.

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Roles (1)						
Search						P Querie
Name		Status	Туре		Owner Node	Priority
CPSMCluMSMQ		Burneine Start Role Stop Role Manage Mess Add File Share Move Change Startu Information D	up Priority	euina	CPSM04	Medium Preferred C
Name		Show Critical Add Storage	Events		Status	Information
Roles		Add Resource	•	•	Client Acces	ss Point
Storage		More Actions		•	Generic App Generic Scri	
Cluster Disk 1 Server Name	•	Remove Properties		[Generic Ser More Resou	h

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- 8. Select "Citrix Queue Monitor Service" from the list, click Next, follow the wizard and finish.
- 9. Right-click the new resource "Citrix Queue Monitor Service", and select Properties. On Dependencies tab, add MSMQ-{your new cluster role} as the dependency, and click Apply.

	Advanced F	olicies	Registry	Replication
	General	Dependenc	ies	Policies
	AND/OR	Resource		
	AND/OR	Resource		
•		MSMQ-CPSMCluMS	MQ	ĭ
*	Click here to a	Cluster Disk 1		K
		CPSMCluMSMQ IP Address 10.71.0.8	и	

10. Select General tab, check "Use Network Name for computer name", and OK. This step must be performed after step 9, otherwise an error would occur.

Advanced	Policies	Regis	try Replication
General	Deper	ndencies	Policies
Name:	Citrix Queue I	Monitor Service	
Туре:	Generic Serv	ice	
Status:	Online		
ervice name:	Cortex	QueueMonitor	
	:		

- 11. On each server node, stop "Citrix Queue Monitor Service", and open Registry.
- 12. Navigate to

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\CortexQueueMonitor, replace the value off the key "DependOnService" with MSMQ\$MSMQ-{YourClusterRoleName}.

CompositeBus	^	Name	Туре	Data
		ab (Default)	REG_SZ	(value not set)
		ab DependOnService	REG_MULTI_SZ	MSMQ\$MSMQ-CPSMCluMSMQ
		ab Deserintion	DEC 67	Descerptes provisioning requests for Citrix CloudPo
]] crypt32		Edit	Multi-String	× ueue Monitor Service
⊳]} CryptSvc				JTERNAME=CPSMCLUMSMQ_CLUSTER_N
⊳]} CsvFlt		Value name:		0001 (1)
		DependOnService		gram Files (x86)\Citrix\Cortex\Provisioning
⊳ 📲 CsvNSFlt	10000	Value data:		
⊳ - 🚹 csvvbus	=	MSMQ\$MSMQ-CPSMCluMSM		cortex_qmon_svc
DCLocator	=	MSMQSMSMQ-CPSMCIuMSM	n a	<u>^</u> 0003 (3)
DcomLaunch				010 (16)

- 13. From Failover Cluster Manager, Bring Online "Citrix Queue Monitor Service".
- 14. Logon to CloudPortal Services Manager portal as a Service Provider Administrator, go to Configuration > System Manager > Locations, and expand the relevant location.
- **15.** Change the server name or IP address of the following queue paths to the Message Queuing cluster role name or IP (not the Windows server cluster name), and Save.
- Primary Queue Path
- Bulk Queue Path
- Usage Data Queue Path

DAAS.LOCAL	▼ v	1
Location Service Manag Configure the core setting:		0
Name	DAAS.LOCAL	
Description	Location configured for DAAS.LOCAL	
Primary Queue Path	:DIRECT=http://CPSMCluMSMQ/msmq/j × The primary message queue path that will be used by the provisioning engine.	
Bulk Queue Path	FormatName:DIRECT=HTTP://CPSMCluM The bulk provisioning queue is where slower requests will be sent for processing.	
Usage Data Queue Path	FormatName:DIRECT=HTTP://CPSMCluM The usage data queue is v usage data collection requests will be sent for processing.	where

16. To view the message queue status, requests, and journals for monitoring and troubleshooting purposes, you can no longer use the local Message Queueing on each of the nodes, instead, from Failover Cluster Manager, select Message Queuing cluster role, and open Manage Message Queuing...

Roles (1)				
Search				
Name		Status	Туре	Owner Node
CPSMCluMSMQ		(1) Running	Message Queuing	CPSM04
	6	Start Role		
	()	Stop Role		
	1	Manage Message		
	2	Add File Share	45	

Directory Web Service

The directory web service is typically located on the same server as the Provisioning Engine and listens on port 8095. When the CPSM provisioning server is clustered, the Directory Web Service is also installed on all cluster nodes (refer to Provisioning Engine section).

To configure CPSM to achieve Directory Web Service high availability, complete the following steps.

- 1. Logon to CPSM portal as a service provider administrator.
- 2. Navigate to Configuration > System Manager > Servers. Click "Refresh Server List", the provisioning server cluster name should appear in servers list.

3. If you are configuring for a remote location domain and the DNS of the server names may not be resolvable in the primary location domain, expand the server cluster, and enter IP address in Alias field, and Save.

FI1CPSMCLU	Windows Server 2012 R2 Datacenter	
Server Setup Server	FI1CPSMCLU	0
Alias Specify an alias or special identifier for the server such as an IP address. If an alias is specified, it will take priority over the server name.		
Operating System	Windows Server 2012 R2 Datacenter	

- 4. Click Server Roles link on the left or got to Configuration > System Manager > Server Roles, expand the provisioning cluster, tick Directory under Server Connection Components and Save.
- Click Server Connections link or go to Configuration > System Manager > Server Connections, expand the existing entry for the Directory role, select the provisioning cluster name from the Server dropdown list, and click Save.
- 6. Test the connection via the icon on the right. It should go green if valid and there no firewall blocking issues.

Directory Web Service can also be load balanced, in this case the configuration should use the load balanced VIP address instead of the cluster name/address.

Web Portal and API

The web portal (interface) and API are under the same standard .NET framework 4.0 website in IIS which listens on ports 80 and/or 443. To enable high availability, it is recommended to run two (or more) nodes in a standard load-balancing setup. Sticky sessions are required.

To install the web portal, complete the following steps:

- 1. Install and configure Web server role on all load balanced servers: http://support.citrix.com/proddocs/topic/ccps-115/ccps-install-config-roles-gui.html. If you are adding additional web servers to an existing deployment with functional services, it is recommended to skip the Service Package Import (deselect the services and properties) or select Ignore to the
- 2. The following items of CPSM web on the first/primary web server must be replicated to all load balanced web servers. It is recommended to replicate all the files in CortexDotNet and CortexAPI sub sites (except the web.config files specific to the local sites) from the first/primary web server to all the rest of the web servers.
- Images for branding
- Stylesheets for branding
- Any custom downloads
- Any custom DLLs or pages
- Web.config configuration changes

properties of all enabled services.

- IS Security and authentication changes
- **3.** For AD Sync to use the same key for API on all web servers, the key must be exported from the first web server and imported to the rest of the web servers:
- Logon to the first/primary web server, open Command Prompt or Windows PowerShell (if UAC is on, use "Run as Administrator"), navigate to the directory: C:\Windows\Microsoft.NET\Framework\v4.0.30319>
- Run the following command (the export location can be anywhere, in this case we used C:\temp) aspnet_regiis -px "CortexAPI" "C:\temp\cortexapi.xml" -pri
- Copy the exported XML file to each of the load balanced web server.
- On the secondary load balanced web server open Command Prompt or Windows PowerShell (if UAC is on, use "Run as Administrator"), and navigate to the same directory: C:\Windows\Microsoft.NET\Framework\v4.0.30319>
- Run the following command to import the key: aspnet_regiis -pi "CortexAPI" "C:\temp\cortexapi.xml"
- 4. Add the same URL (internal and/or external) host headers to Cortex Management site on all web servers in IIS Manager.
- 5. Update the DNS for all the above host headers to point to the load balanced VIP address.
- 6. Recycle CortexMgmt application pool via IIS Manager on all web servers.

Reporting

The high availability of CloudPortal Services Manager Reporting role is dependent on the SQL Reporting Services HA configurations. The MS SQL Reporting Services achieves HA via a scale-out deployment so that they share the same report server database: https://msdn.microsoft.com/en-us/library/bb522745.aspx.

The data source DB (OLMReporting) of CPSM Reports can be added to AlwaysOn availability group (refer to Adding CPSM Databases to the Availability Group section), in this case when installing Reporting role via CPSM v11.x installer, the listener name and port should be specified for the Reporting SQL server.

Other Web Services

Similar to the Directory Web Service, other service integration related CPSM web services like Exchange, Lync, XenDesktop, XenApp, and IIS web services, etc. can be deployed to multiple servers for high availability:

- 1. Install and configure the web service on all HA servers using the installer: http://support.citrix.com/proddocs/topic/ccps-115/ccps-services-deploy.html.
- 2. Logon to CPSM portal as a service provider administrator to update the web service call configurations.
- 3. Navigate to Configuration > System Manager > Servers. Click "Refresh Server List", if the cluster or VIP name does not exist on the list, click Add a Server link, enter the VIP name and click Add Server.

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- 4. If you are configuring for a remote location domain and the DNS of the server names may not be resolvable in the primary location domain, expand the "server" name you have just added, enter the IP address in Alias field, and Save.
- 5. Click Server Roles link on the left or got to Configuration > System Manager > Server Roles, expand newly created VIP Server placeholder, tick the appropriate role under Server Connection Components and click Save.
- 6. Click Server Connections link or go to Configuration > System Manager > Server Connections, expand the existing entry for the web server or connection role to be updated, select the newly created VIP Server name from the Server dropdown list, and click Save.
- 7. Test the connection via the icon on the right. It should go green if valid and there no firewall blocking issues.

Initial Configuration of App Orchestration and CloudPortal Services Manager

This section describes initial software configuration procedures for the Citrix App Orchestration and CloudPortal Services Manager software, including:

- Running the PowerShell script to configure App Orchestration Group Policy and define policy settings
- Configuring SSL on the App Orchestration configuration server and creating a new App Orchestration deployment
- Configuring prerequisites for CloudPortal Services Manager, setting up server roles, and defining the primary location

Using the checklists in the documentation is recommended to avoid installation and configuration errors when performing these procedures.

Setting Up the App Orchestration Configuration Server

This section illustrates configuration steps that are required to set up the App Orchestration configuration server. It shows steps to prepare for setting up the configuration server (including how to create a Group Policy Object (GPO), configure the required policy settings, and install the SSL certificate). The procedure shows how to define settings and a delivery site for a new App Orchestration deployment. Generally these steps are performed by a top-level CSP administrator to initially set up and configure the environment.

Instructions	Visual
RDC to the App Orchestration server and launch	Apps by name v
Citrix App Orchestration Infrastructure	D Administrative Tools Cold App Ordentities International Value UPA
Tools from the Apps menu.	Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module for_ware Image: Construction Module
Run the Citrix-provided PowerShell script New-CamGPO.ps1. The script creates a Group	Cítrix App Orchestration Infrastructure Tools
Policy Object called CtxCloudAppManagement and configures the required policy settings.	<pre>To obtain help for all cndlets, use Get-CanCommand i Get-Help -Full</pre>
 After you create this policy, run gpupdate to link the GPO to the following objects: App Orchestration root OU in the shared resource domain. App Orchestration root OU in each additional private tenant resource domain that you create. 	Citrix App Orchestration Infrastructure Tools X Citrix App Orchestration Infrastructure Tools _ psn1

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At the end of the App Orchestration Setup procedure, enabling the checkbox "Launch Server Config on exit" causes the Citrix App Orchestration Server Configuration tool to start automatically.	Citrix App Orchestration Server Configuration
Click Create a new deployment.	 Citrix App Orchestration Server Configuration Choose an action to perform Create a new deployment Select this option if this is the first server in your Citrix App Orchestration deployment. Join an existing deployment Select this option if you want to join this server to an existing Citrix App Orchestration deployment.
Enter the information for the new App Orchestration deployment, including the database name, the database server, and the administrative group for the DaaS Shared Infrastructure (e.g., DaaS\AOAdmins). Click Yes when prompted: "The specified database does not exist. Do you want to create it?"	Citrix App Orchestration Server Configuration New deployment information Database name: AppOrchestration Database server: SQLHA Administrators group: DaaSVAOAdmins Administrators group: DaaSVAOAdmins Configure Cancel

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The SSL information screen advises that App Orchestration requires an SSL certificate to secure machine-to-machine communications. (It is assumed that an SSL certificate is established and available to meet this prerequisite.) Click Browse certificates installed on the local machine.	 Citrix App Orchestration Server Configuration SSL information Citrix App Orchestration requires an SSL certificate to enable secure communication between machines. The SSL certificate must contain a private key and must be configured for Server Authentication. Browse certificates installed on the local machine
	< Back Next > Configure Cancel
Select a certificate and click OK.	Windows Security X Citrix App Orchestration Server Configuration Select a certificate that will be used to secure Citrix App Orchestration network communication. *.daas.local Issuen daas-DAAS-DC02-CA Valid From: 8/17/2014 to 8/16/2016 Click here to view certificate properties OK
After you select the certificate, the configuration wizard is ready to bind it during the installation. Click Next .	Citrix App Orchestration Server Configuration SSL information Citrix App Orchestration requires an SSL certificate to enable secure communication between machines. The SSL certificate must contain a private key and must be configured for Server Authentication. Friendly name: *.daas.local Issued to: *.daas.local Issued by: class-DAAS-DC02-CA Expiration date: 8/16/2016 3:37:27 PM Browse certificates installed on the local machine kitestinue Configure Cancel

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Click Configure .	Citrix App Orchestration Server Configuration × Ready to configure Action: Create deployment Database name: AppOrchestration Database server: SQLHA Administrators group: DaaS\AOAdmins SSL cartificate store name: My SSL cartificate thumbprint: 791AECDE9D54AB615F846063554818920CA68CB9
A progress screen shows the steps for App Orchestration Server Configuration as each one completes.	Citrix App Orchestration Server Configuration × Updating server configuration Initializing environment Completed Creating database schema Completed Creating database schema Completed Creating database schema Completed Stopping services Completed Creating databases Completed Stopping services Completed Starting services Running
The "Configuration was successful" screen appears when the Server Configuration process is complete. Click Close.	 Citrix App Orchestration Server Configuration Configuration was successful The server configuration was completed successfully. Launch Citrix App Orchestration Web Console on exit If you use Internet Explorer, you must ensure that Internet Explorer Enhanced Security Configuration is disabled. You may also have to disable Internet Explorer Protected Mode or add this machine to the list of trusted sites. View the configuration log

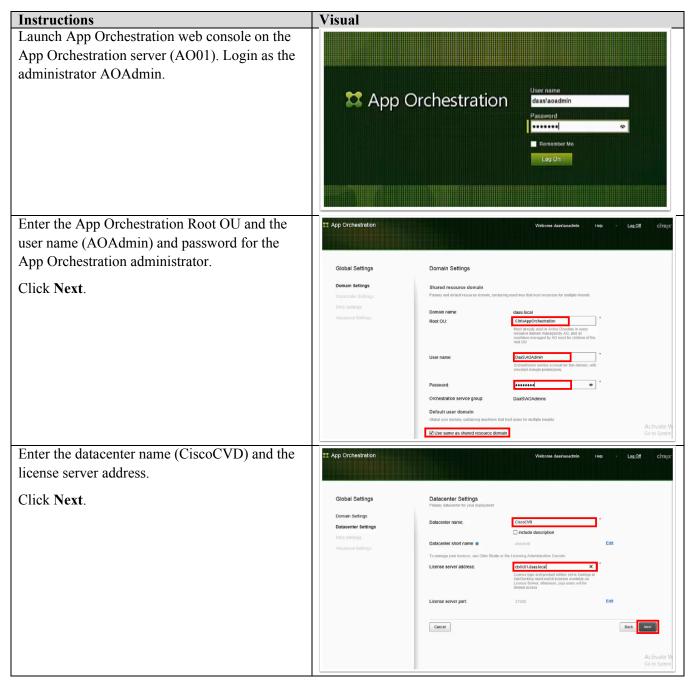
Defining Settings for the App Orchestration Deployment

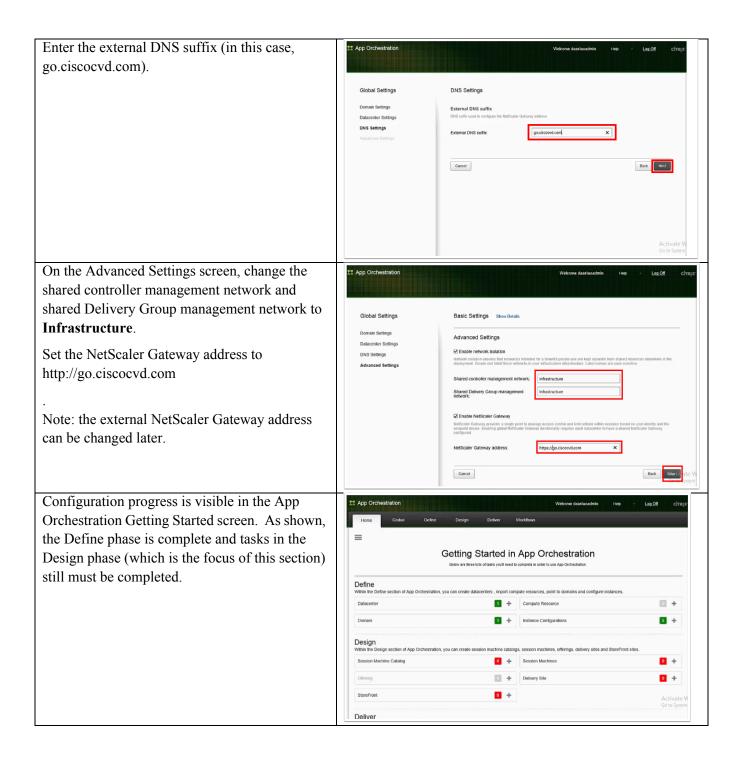
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This procedure shows how to define settings and a delivery site for a new App Orchestration deployment. As shown below, App Orchestration uses a phased deployment. This section focuses on the "Define" phase.

Review the following assumptions:

- Make sure each machine configured and deployed by App Orchestration has all of the minimum system requirements installed, including the Microsoft .NET Framework.
- Each machine under App Orchestration control requires PowerShell remoting.
- If there are multiple datacenters, make sure the App Orchestration configuration server can ping IP addresses in each datacenter.



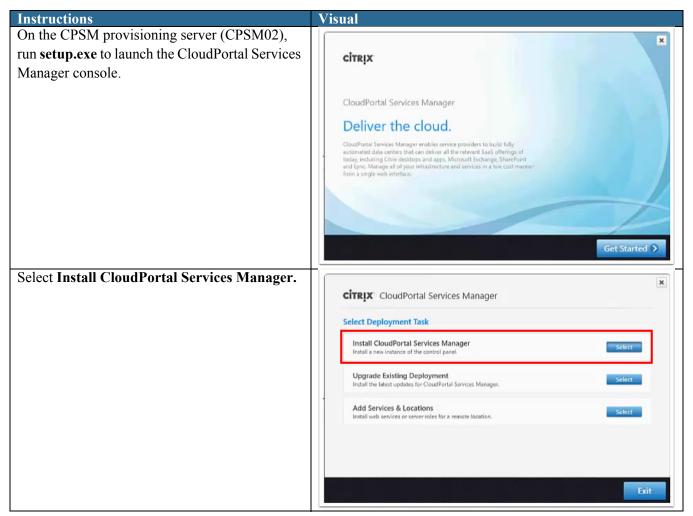


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On the Delivery Controller (DC01), run the App Orchestration Install Center. Select the option to install the XenApp and XenDesktop 7.5 Delivery Controller and App Orchestration Agent. When prompted, click Yes to continue. Repeat the same process above to install on the second Delivery Controller (DC02).

Setting Up the CloudPortal Services Manager Primary Location

Using the CloudPortal Services Manager console, server roles (provisioning, web, etc.) must be set up. Then, the primary CloudPortal Services Manager location is defined



Select Check Environment Prerequisites.	x
	Citrix: CloudPortal Services Manager
	Install CloudPortal Services Manager
	Check Environment Prerequisites Review and complete environment prerequisites before starting deployment.
	Deploy Server Roles & Primary Location Install and configure the components required for the primary location. Select
	Review Documentation Get the latest information and guidance from Citrix eDocs.
The prerequisites have been completed, so the	< Back Exit
environment is prepared. Click Exit.	citrix: CloudPortal Services Manager
	Prepare Environment
	Extend Active Directory Schema CloudPortal Services Manager uses custom Active Directory attributes created by Microsoft ✓ Completed
	Create DNS Allases A control panel deployment can span multiple domains. Creating key DNS aliases will ensure more ✓ Completed
	< Back Exit
Select Deploy Server Roles & Primary Location	citrix: CloudPortal Services Manager
	Install CloudPortal Services Manager
	Check Environment Prerequisites Review and complete environment prerequisites before starting deployment. Scloct
	Deploy Server Roles & Primary Location Install and configure the components required for the primary location. Select
	Review Documentation Get the latest information and guidance from Citrix eDocs.
	< Back Exit

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Click Create System Databases. This brings up Install Configuration Tool. When prompted, click Install to continue.	CİTRIX: CloudPortal Services Manager Deploy Server Roles & Primary Location
Accept the License Agreement, and click Next to continue.	Create System Databases Sclect Create the SQL databases required by CloudPortal Services Manager. Sclect Install Server Roles Install prerequisites and server roles of CloudPortal Services Manager Sclect Configure Server Roles All installed roles are configured. Select to edit settings. Sclect Configure Primary Location Sclect Provision the primary location, first customer, and first administrative user. Sclect
Click Install to confirm installation and	< Back Exit
continue.	CitRIX: CloudPortal Services Manager Ready to install Review the selections below and click 'Install' to continue. Roles & Services Configuration Tool STEP 1224 1 1 1 2 4 1 1 1 1 1 1 1 1 1 1 1 1
The installation completes. Click Finish to continue.	Citre X: CloudPortal Services Manager Deployment Complete Betup has completed successfully. Percequisites Microsoft SQL Server System Types Installed Microsoft SQL Server Shared Management Objects Installed Roles & Services Configuration Tool Installed

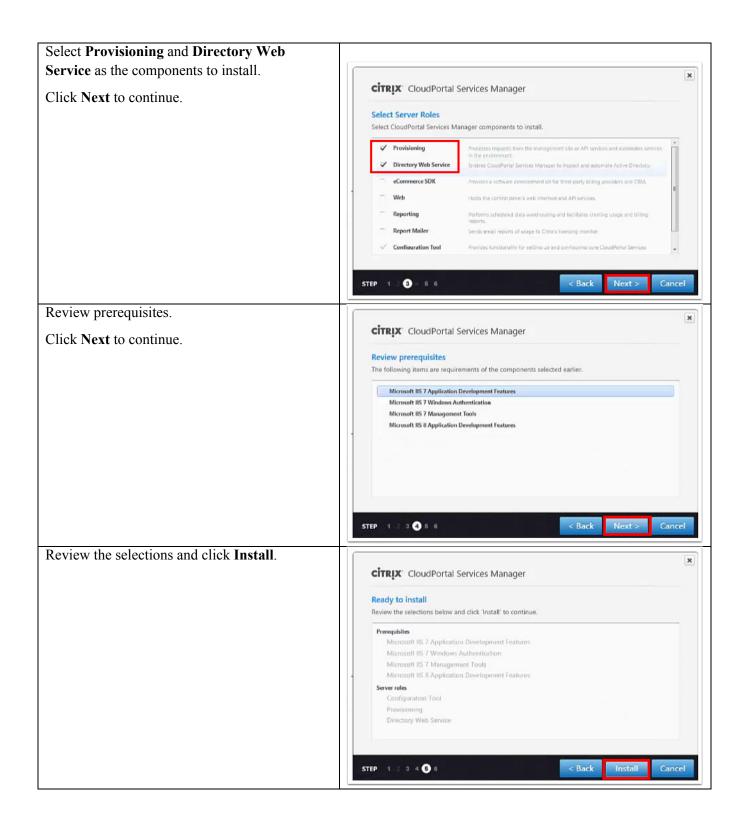
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Create a deployment configuration file. This is an XML file that will be accessed from each machine that is configured. Click Next.	Cirreix: CloudPortal Services Manager Crate Deployment Configuration stilings that are required in multiple places during the deployment. Specify where to ave the new configuration file. Note that it will need to be accessed and updated from each machine that will be configured. Configuration File: \lag{15.70.0.15\cirrwicPSMV11.0.1\cirrwicPSMVcmrfg.aml} Irrowne
Enter the information for the primary database. Click Test Connection to confirm that the database can be accessed. Click Next.	STEP 2 3 4 8 < Back Next > Cancel Image: Concel Im
Configure database logins. Click Next .	STEP 1 1 2 3 4 8 Next > Cancel STEP 1 2 3 4 8 1 2 2 1 STEP 1 2 3 4 8 1 2 2 1 2 4 8 1 2 2 4 8 1 2 2 1 2 2 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

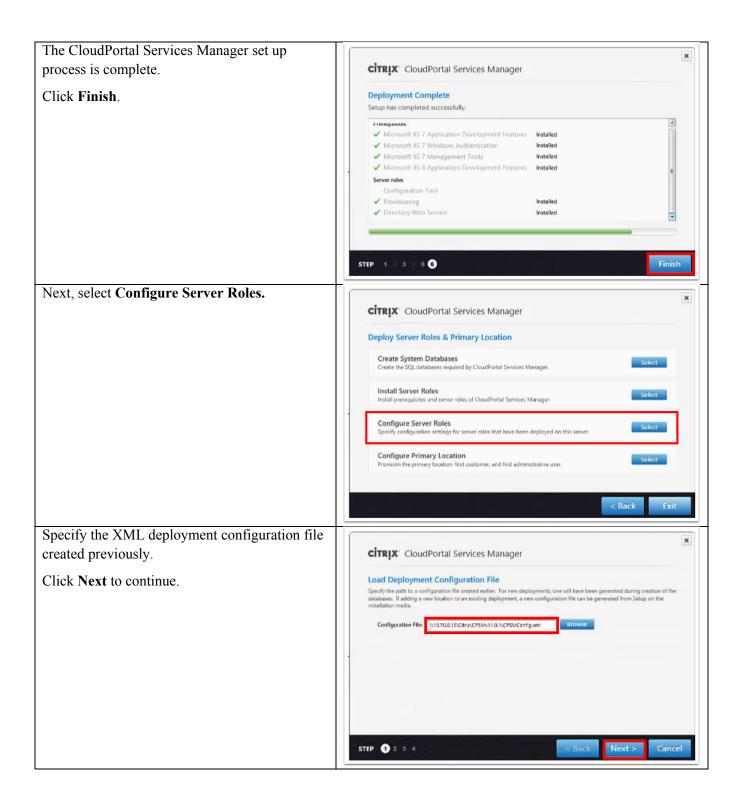
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Review the summary and Click Commit to	×
configure the CloudPortal Services Manager	citrix [®] CloudPortal Services Manager
database.	Summary
	Review the settings below and click 'Next' to continue.
	Primary Databases Server address CORTEXSOL Authentisation mode. Integrated Auth-orizet SQL logins: Parae
	STEP 1 2 3 6 6 Commit Cancel
The configuration is complete.	×
Click Finish to continue.	citrix CloudPortal Services Manager
	Configuration Complete!
	Configuration completed successfully. Please return to Autorum for any remaining tasks.
	Chable SQL Server Agent Configured Apply Database Updates Configured
	Adda cummum channes Coundiner
	STEP 1 2 3 4 🜒
Click on Install Server Roles. When prompted,	
read and accept the License Agreement.	citrix [®] CloudPortal Services Manager
Click Next to continue.	Deploy Server Roles & Primary Location
	Create System Databases Create the SQL databases required by CloudPortal Services Manager. Select
	Install Server Roles Select
	Install prerequisites and server roles of CloudPortal Services Manager
	Configure Server Roles All installed roles are coeffiquied. Select to edit settings. Select
	Configure Primary Location Provision the primary location, first customer, and first administrative user. Select
	< Back Exit

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Select configuration tasks for Provisioning and Directory Web Service .	Citre: CloudPortal Services Manager
Follow the prompts to configure the Mail Server, the Directory Web Service, the Queue Monitor, and Directory Monitor service.	Select Configuration Task The following configuration tasks can be performed at this time. Select one or more to begin.
Click Next to continue.	eContrinence SDIX
Review the summary and click Commit .	STEP 1 3 3 4 5 6 7 8 < Back Next > Cancel
	Citre X: CloudPortal Services Manager Summary Review the settings below and click 'Next' to continue. Prectory Web Service War name DAAS/startes, daves, arc Server point: 28 Prover address: certes, daves, arc Server point: 28 Prover Address: certes, daves, arc Desctory Monitoring user: certes, daves, arc Step 1 2 3 4 5 0 11
The task configuration is complete.	Citre X Cloud Portal Services Manager Configuration Completel Canfiguration completed successfully. Please return to Autorun for any remaining tasks. Create Site CortexServices Configured Configure IIS Application /Directory' Configured Create System Oble & Groups Configured Configure Message Queues Configured Configured Message Queues Configured Configured Monitor Account Configured Configured Tasks Configured Create Scheduled Tasks Configured Create Scheduled Tasks Configured Create Scheduled Tasks Configured Create Scheduled Tasks

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Repeat the Install Server Roles setup on the CloudPortal Services Manager web server (this time, the database is already created, so that step won't be necessary). Specify the same deployment configuration file that was created earlier.	citre ix Cloud Portal Services Manager Deploy Server Roles & Primary Location Create System Databases Install Server Roles Install percequisites and Server roles of CloudPortal Services Manager Configure Server Roles All installed roles are configured. Select Configure Primary Location Provision the primary location, first customer, and first administrative user. Configure Primary Location Frovision the primary location, first customer, and first administrative user.
Select Configuration Tool and Web as the Configuration Tasks to be performed on this server. Click Next to continue.	Configure CloudPortal Services Manager Detect Server Roles Detect Server Roles Detect CloudPortal Services Manager components to install. Provisioning Processes requests from the management site or API services and automate services the environment Directory Web Service Brabes CloudPortal Services Manager to hypert and automate Active Directory. Commerce SDK Provides a software development kill for third-party billing provides and CRM. Web Hosts the control panel's web interface and API services. Report Mailer Serds email reports of usage to Clink's licensing monitor Provides functionality for setting up and to CRM's licensing monitor Provides functionality for setting up and conflouring core CloudPortal Services
Click Configure Server Roles on the second CPSM server.	Citre X: Cloud Portal Services Manager Deploy Server Roles & Primary Location Create System Databases Create SQL databases required by CloudPortal Services Manager. Install Server Roles Install Server Roles Install Server Roles Mathematication Configure Server Roles All installed roles are configured. Select to edit settings. Configure Primary Location Reversion the primary location. first customer, and first administrative user. Cardigure Primary Location Reversion the primary location.

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Specify the deployment configuration file	
created previously.	CITRIX [®] CloudPortal Services Manager
Preview the Service Package Import page and click Next to continue.	Preview Service Package Import Setup detected potential conflicts would result from importing service packages. Review the items below and select the parts to inport. • Ø ADSync • Ø Service
Follow the prompts to configure the Web Server.	CÎTRIX: CloudPortal Services Manager
Click Next to continue.	Onfigure Web Server The Web server role includes the Services Manager portal and other services including the API service. The API service can be to setured Courdbatal Services Manager or integrate with customers' on-site environments. Specify an externally resolvable to server binding IP: Use SSI: SSL certificate This website will be publicly accessible. It is storegly recommended that it be configured to use SSL STEP 1 2 3 ② 5 4 STEP 1 2 3 ③ 5 4 STEP 1 2 3 ③ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ④ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑥ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 ⑤ 5 4 STEP 1 2 3 0 5 4 STEP 1 2 3 0 5 4 STEP 1 2 3 0 5 4 STEP 1 2 3 0 5 4
When the configuration is complete, click Finish.	Citrix CloudPortal Services Manager
Restart the Queue Monitor Service on the CPSM provisioning server.	Configure 1 is deventions for '/' Configure 6 accessfully. Please return to Autorun for any remaining tasks. Image: A configure 1 is deventions for '/' Configure 6 accessfully. Please return to Autorun for any remaining tasks. Image: A configure 1 is deventions for '/Cortex/Pri' Configure 6 accessfully. Please return to Autorun for any remaining tasks. Image: A configure 1 is deplication (Cortex/Pri' Configure 6 accessfully. Please return to Autorun for any remaining tasks. Image: A configure 1 is deplication (Cortex/DotNet') Configure 6 accessfully. Please return to Autorun for any remaining tasks. Image: A configure 1 is deplication Settings for '/Cortex/DotNet' Configure 6 accessfully. Please return to Autorun for any remaining tasks. Image: A configure 1 is deplication Settings for '/Cortex/DotNet' Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 accessfully. Configure 6 acces

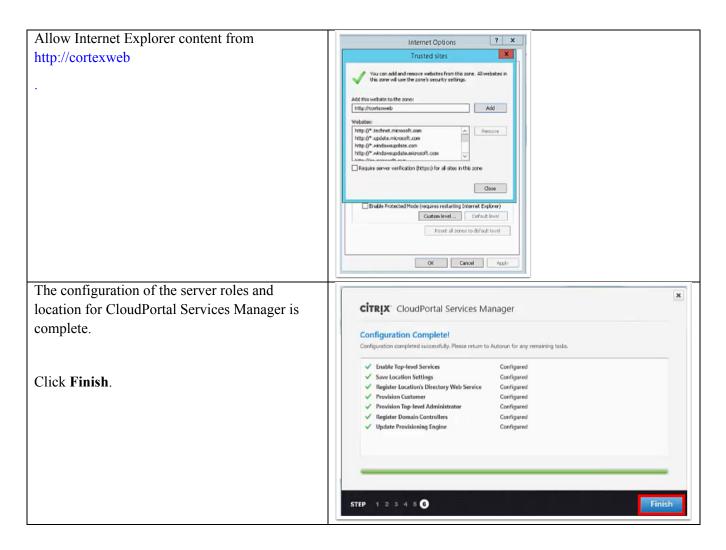
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Click Configure Primary Location.	
	citrix: CloudPortal Services Manager
	Deploy Server Roles & Primary Location
	Create System Databases Create the SQL databases required by CloudPortal Services Manager. Select
	Install Server Roles Install precequisites and server roles of CloudPortal Services Manager Select
	Configure Server Roles All installed roles are configured. Select to edit settings.
	Configure Primary Location Provision the primary location, first customer, and first administrative user. Select
	< Back Exit
Specify the deployment configuration file created earlier.	citrix: CloudPortal Services Manager
Click Next to continue.	Load Deployment Configuration File
	Specify the path to a configuration file created earlier. For new deployments, one will have been generated during creation of the databases. If adding a new location to an existing deployment, a new configuration file can be generated from Setup on the installation media.
	Configuration File: w10.70.0.13/Cltrix/CP5MV11.0.1/CP5MCenfg.xml Browse
	STEP 1 2 3 4 5 6 Cancel
Configure the CloudPortal Services Manager	×
primary location, which corresponds to an	citrix CloudPortal Services Manager
Active Directory domain or forest	Specify Location Details
Click Next to continue.	A CloudPortal Services Manager location is the main unit of isolation between tenants and corresponds to an Active Directory domain or forest. Enter some basic information about the new location.
	Location Settings
	Name: DAASLOCAL Description: Location configured for DAASLOCAL
	Description: Location configured for DAASLOCAL Customers' Organizational Unit
	Name: Customers
	Display name: Customers OU
	STEP 1 3 4 5 6 Cancel

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Enter details for the Service Provider.	
Click Next to continue.	CITRIX CloudPortal Services Manager
	Enter Service Provider Details
	Enter some basic information about your company.
	Display name: Cisco Service Provider
	Short name: CSP UPN sufficies: chacking
	Gran suffixers: Gaal.local
	Contact Details
	Contact name: Cisco Admin
	Contact email: acmin@dass.ioca
	STEP 1 2 2 4 8 6 Cancel
Create the First Administrator (cspadmin).	×
Click Next to continue.	CloudPortal Services Manager
	Create First Administrator
	Specify account details for the first CloudPortal Services Manager administrator. This will be the top-level administrative account within the control panel with the ability to add customers, assign services and manage delegated administration.
	User name: cspädmin
	Full name: CSP Admin
	Display name: CSP Admin
	Password:
	Confirm password: ••••••
	Password expiration: Versever expires
	Change password at logon
	STEP 1 2 3 🚯 6 Cancel
Review the summary and click Commit .	
	Citrix CloudPortal Services Manager
	Summary
	Review the settings below and click 'Next' to continue.
	First Administrator Usernamic cspadmin, CSP
	Password never expires True Change password at logon False
	Location Settings N_amer DAASLOCAL Short name: CSP
	UPR euffreed dansliech Service providen Cisco Service Providen
	STEP 1 2 3 4 🗨 6 Commit Cancel

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Setting Up the Shared Tenant Infrastructure

This section sets up the shared tenant infrastructure in the CVD. First, CloudPortal Services Manager is used to create and configure a new customer (named "Install Test Customer") and import the new version of the Hosted Apps and Desktops service schema. Then, Citrix App Orchestration is used to create a new shared Delivery Site (named "SharedSite") and a new StoreFront Server Group (named "SharedSFGroup").

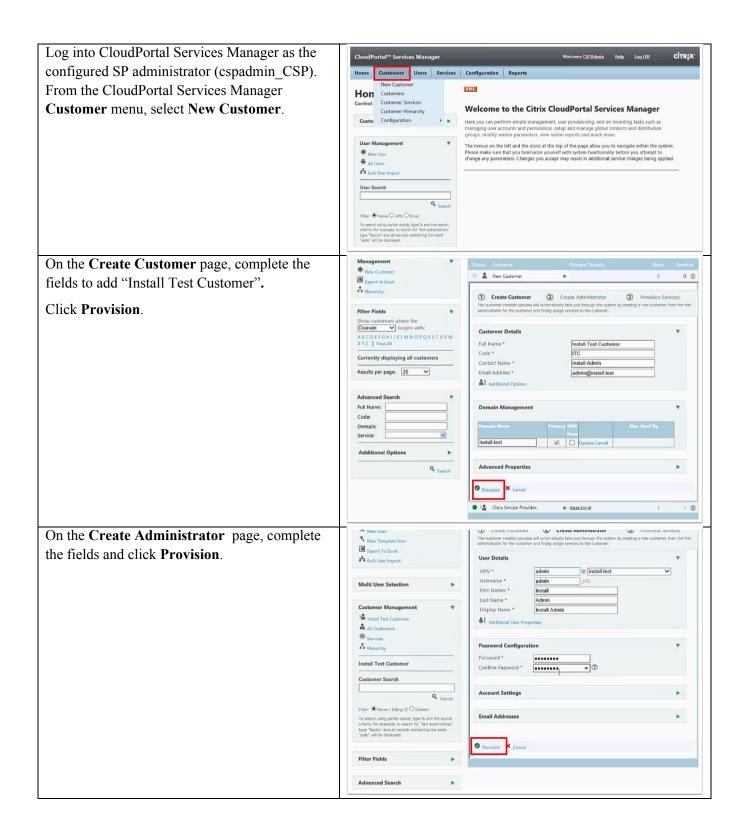
Create and Manage New Customer

CloudPortal Services Manager is used to create and manage a new customer (named "Install Test Customer"). After creating the customer, an administrator for this customer is created and the security roles and service deployment settings are configured.

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Instructions

Visual



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The new customer is now visible in the Active Directory hierarchy.	Active Directory Users and Computers - 0 Ele Active Directory Users and Computers - 0 Ele Active Directory Users and Computers - 0 Berog TC Construction - 0
Next, configure the service deployment settings. In CloudPortal Service Manager, select Configuration->System Manager->Service Deployment . On the Service Deployment page, filter by Active Directory Location Services , and select Customer Portal Settings .	CloudPortal ^{we} Services Manager Welcower (SD/Adm) Hete Log.Off CIRLX* Heme Customers Users Services Configuration Reports Service Deployment Services Overview Use His screen to configure settings, enable and deploy services in the control panet. Imagement Service Filter Customer Fortal Settings Service Customer Services Imagement Imagement Service Deployment Customer Fortal Settings Reelter Imagement Imagement Service Deployment Technologyment Imagement Imagement Imagement Imagement Service Deployment Service Consultons Imagement Imagement Imagement Imagement Service Deployment Service Consultons Imagement Imagement Imagement Imagement Imagement Service Deployment Imagement Imagement

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Select Service Settings.			
School Ser free Settings.	Configure Service Settings		
On the Configure Service Settings page, select the checkbox next to the DNS Templates	Use this screen to configure additional properties for a service. To override a setting, make sure the override option is checked and specify a new value. Settings can be returned to their default value by un-checking the override option. After the settings have been updated, the save button must be pressed to apply the changes.		
property to enable editing, clear the default "tick" of the property, and then scroll down and	Customer Portal Setting: Modify the cisplay name of the current item.		
	Property Value		
click Apply Changes.	Can Unlock User Account Allow users to unlock their accounts on reset of their passwords		
	Copy User Exclude Properties Specify a list of comma separated user properties that should not be copied for a new user		
	Customer Roles Attribute Used for maintainitst a list of user roles. Defaulto extensionAttribute13		
	DNS Templates Enable DNS templates. Select this option if the DNS service is configured		
	Service Message A description about the service		
	UPN Domains Domains that can be used for a UPN suffix (CustomerDomains) Delete		
	Il UserQuotaLimit UserQuotaLimit		
	LS00 Proxy Address Management Enable X.500 proxy address management		
	Approval Workflow		
	I Group Configuration		
Click Save.	Location Service Configuration O Marage the settings and access levels for a service. The service cannot be deleted if it is used by customers, users or dependent services. X Service Settlings Service Settlings Save X Cancel Delete		

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Next, configure security roles.	CloudPortal [™] Services Manager	Wekome C	SPAdmin Help Log.Off	CITRIX.
In CloudPortal Service Manager, select	Home Customers Users Services	Configuration Reports		
Configuration->Security->Security Roles.	Security Roles	Role Management Overview Use this screen to manage security roles. A security role is defines access to specific tasks. Multiple roles can subsequ	collection of permission identities	that
	Management	dennes access to specific tasks, workpite roles can subsequ	aenty be assigned to a user.	
On the Security Roles page, select Service	* New Role	Search Count: 40 1 [2]	41 4	- m. 30-
Provider Administrator.		Security Role My Exchange Service	Mandatory	Users 0
	Service Filter	My Hosted Apps and Desktops Service		0
		My Services Management	•	0
	Import	MySQL Administrator		0
	Browse	OCS Service Administrator OCS User		0
	Browse	Partial User Administrator (Reset Passwords)		2
		Reporting Users		2
		Reseller Full Administrator		1
		Reseller Partial Administrator Service Administrator		2
		Service Provider Administrator	*	1
		Service Schema Administrator	*	0
		SharePoint 2010 Service Administrator		0
		SQL Service Administrator SQL Users		0
		Template User and Service Administrator		0
		User Administrator		2
On the Role Permissions , select the Menus tab.	Use the permission section to con	nbine a unique set of access permissions to ma User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Use the permission section to con			
On the Role Permissions , select the Menus tab.	Use the permission section to con			
On the Role Permissions , select the Menus tab.	Kole Permissions Use the permission section to con Customers Services	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Customers Services	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Customers Services	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Customers Services	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Create Read Update	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Customers Customers Create Read Update Delete	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Customers Create Read Update Delete Enable/Disable Provision	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Create Read Update Delete Enable/Disable Provision Deprovision	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Entity Create. Read Update Delete Enable/Disable Provision Deprovision Reset	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Entity Create. Read Update Delete Enable/Disable Provision Deprovision Reset Reports	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Cervices Customers Cervices Create Read Update Delete Enable/Disable Provision Deprovision Reset Reports API Access	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Services Customers Services Create Read Update Delete Enable/Disable Provision Deprovision Reset Reports API Access System Content	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Services Create Read Update Delete Enable/Disable Provision Deprovision Reset Reports API Access System Content Full Logging	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Customers Services Customers Services Create Read Update Delete Enuble/Disable Provision Deprovision Reset Reports API Access System Content Full Logging Change Domain Owners	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Entity Create Read Update Delete Enable/Disable Provision Deprovision Reset Reports API Access System Content Full Logging Change Domain Owners Manage Brands	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Entity Create. Read Update Delete Enable/Disable Provision Deprovision Reset Reports API Access System Content Full Logging Change Domain Owners Manage Brands	User Services Users Menus Pa		
On the Role Permissions , select the Menus tab.	Role Permissions Use the permission section to con Customers Services Entity Create Read Update Delete Enable/Disable Provision Deprovision Reset Reports API Access System Content Full Logging Change Domain Owners Manage Brands	User Services Users Menus Pa		

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Expand the Services entry, and disable the	
checkboxes for the following entries:	Role Permissions Use the permission section to combine a unique set of access permissions to make up a security role.
· Citrix	Customers Services Users Menus Pages Reports
· CRM 2011	œ ■ ☑ Customers
· DNS	
· File Sharing Manager	Group Management SQL Hosting Summary
· MySQL	AD Sync BackupAgent Client
· SharePoint 2010	
· Virtual Machine	Downloads Exchange
· Windows Web Hosting	File Sharing Manager File Sharing Manager File Sharing Manager File Sharing Manager
[Only the checkbox for Hosted Apps and Desktops is enabled.]	MySQL SharePoint 2010 Virtual Machine
Click Save.	
	Key ○ None Selected ● Customer ● Sub-Customer Save × Cancel □ Copy ▲ Export □ Delete
	Save Cancel Copy Export III Detete
From CloudPortal Services Manager, select the Users tab.	CloudPortal [™] Services Manager Wekome CSPAdmin Liele Log.Off Cit
	Home Customers Users Services Configuration Reports
Expand the default administrator entry (cspadmin@daas.local) in the UPN column, and	Users Service to the 1 for Cisco Service Provider Status - Lell Name UI24 Service • ** CSPAdmin v cspadmin@daaslocal 0 ° C
select Edit User.	Management ▼ ★ New User User Functions Account Status
	New Template User
	Buik User Import Ceptovision Central Copy User
	Multi User Selection
	Customer Management Manage a user. Tasks that can be performed on the user edit screens are account and email address management.
	Cisco Service Provider

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Expand Account Settings, and click Advanced	UPN *	cspadmin @ daas.local	~
	Username *	cspadmin_CSP	
Options.	First Names *	CSP	
	Last Name *	Admin	
	Display Name *	CSPAdmin	
	Additional User Prop		
	- · Modificial Oser Proj	pennes	
	Password Reset		
	Account Settings		- •
	Change Password at Lo	ogon No O Ves	
	Account Disabled	●No ○Yes	
	Account Locked	No	
	Account Expires	Never O End Of	
	Password expires	Never	
	Advanced Options		
	Email Addresses		
	Provision × Cancel		
Check boxes for All Services Schema	Change Password at I	Logon O Yes	
Administrator and Service Schema	Account Disabled	● No ○ Yes	
Administrator.	Account Locked	No	
	Account Expires	Never O End Of	
Click Provision.	Password expires	Never	
	Al		
	Advanced Options Security Roles:	Configure a custom role collection	
	Security Roles.		
	Reseller - /		
		Reseller Full Administrator	
	Advanced Use	Reseller Partial Administrator	
	All Services Sch	hema Administrator	
	Customer Adm	ninistrator dministrator (Reset Passwords)	
	Reporting Use	rs	
	Service Admini		
	Service Schem		
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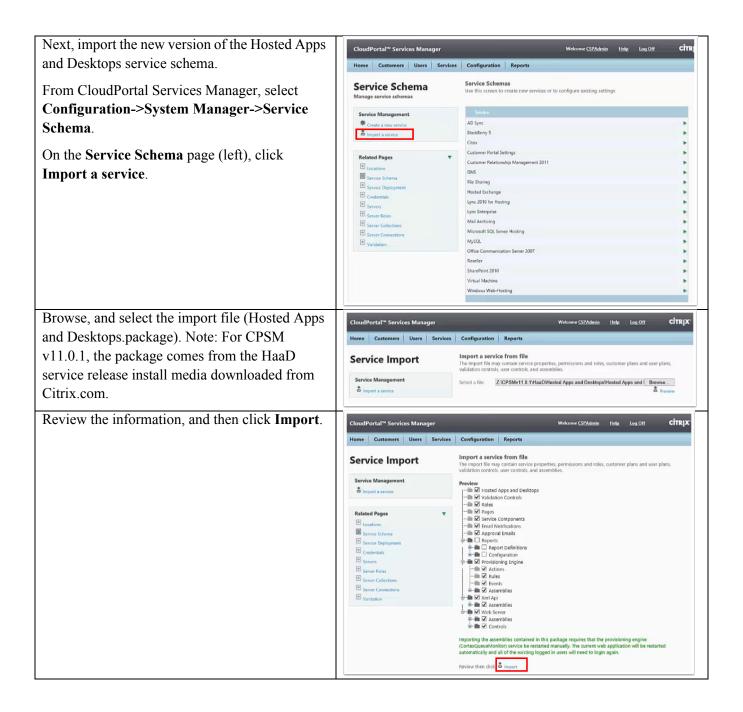
Import the Hosted Apps and Desktops (HaaD) Service

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The system has an existing (v1) Hosted Apps and Desktops service by default. Delete this default service, and then import the new version (v2) of the Hosted Apps and Desktops service schema.

Instructions	Visual				
First, delete the existing default Hosted Apps	CloudPortal™ Services Manager Wekome CSPAdmin Help Log.0ff Cit				
and Desktops service.	Home Customers Users Services Configuration Reports				
Login to CloudPortal Services Manager as the	Service Schema Manage service schemas	Service Schemas Use this screen to create new services or to configure existing settings			
configured SP administrator (cspadmin_CSP). Select Configuration->System Manager	Service Management # Create a new service \$ Import a service	Garadian AD Syne BlackBeny 5 Chris			
->Service Schema. On the Service Schema page, click Hosted	Related Pages Totations Service Schema	Customer Portal Settings Customer Relationship Management 2011 DNS	*		
Apps and Desktops.	Service: Deployment Credentials Servers Server Roies	File Sharing Hosted Apps and Desktops Hosted Exchange Lync 2010 for Hesting Lync Entreprise			
	Server Collections Server Connections Validation	Mail Archiving Microsoft SQL Server Hosting MySQL Office Communication Server 2007			
		Restler SharePoint 2010 Virtual Machine Windows Web-Hosting			
The Service Settings are displayed. Scroll down, and select Delete . When prompted, click OK to confirm the deletion.	web sites or database services can only have a single malbox Enable customer plans Allows the service to create an related service properties toge may provide a TGB ASP.NET Enable user plans Allows the service to provision properties together to simplify Enable user plans to be Allows the service to add and "1GB POP" and "5GB MAPP wit Enable multiple user pl Allows the service to provision	ored as multiple services instances. For example, a customer can have many single instance services are services such as hasted mailhows, where a user is dremove customer plans. A customer plan allows us to group customer there to simplify provisioning and billing. For example, a web hosting service and "2GB P+9" customer plan. user plans to users. A user plan allows us to group user related service provisioning and billing. For example, a web hosting service and "2GB P+9" customer plan. user plans to users. A user plan allows us to group user related service provisioning and billing. c readed or removed remove user plans. For example, a hosted mailbox service may provide a hive bacess' user plan rather than provisioning the default user glans. ans and ans and ans ans billing. control or removed remove user plans. For example, user plans for a storage service granted to users with user plans to assign "Read" or 'Write' access.			



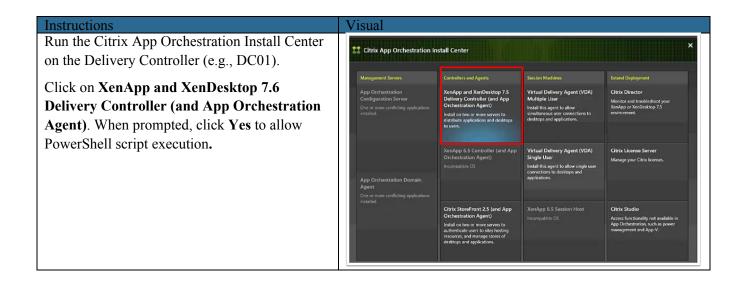
When the import operation completes, restart the	CloudPortal ^{®®} Services Manager	Welcome CSPAdmin Help Log.Off CITRIX
Citrix Queue Monitor Service.	Home Customers Users Services	Configuration Reports
	Service Import	Import a service from file The import file may contain service properties, permissions and roles, customer plans and user plans, validation controls, user controls, and assemblies.
	Service Management	Import Complete Service catalog deservalized Service catalog saved
	Related Pages T © Locators B B Service Schema B Codestulab B Codestulab B Server Rotes B Server Collections B Server Collections B Validation B	O Service descentilized Service descentilized Service descentilized Service descentilized Service descentilized Validation controls aved (Name: 'Citrix AppOrchestration StoreFront Isolation ') Validation control aved (Name: 'NotedAppsAndDesktopsDatacenters) Validation control aved (Name: 'NotedAppsAndDesktopsDatacenters) Validation control aved (Name: 'CutatomerkAcess') Property definition saved (Name: 'CutatomerkAcess') Property definition saved (Name: 'NotPorvisioned') Property definition saved (Name: 'ValidAcess') Property definition saved (Name: 'ValidAcess')

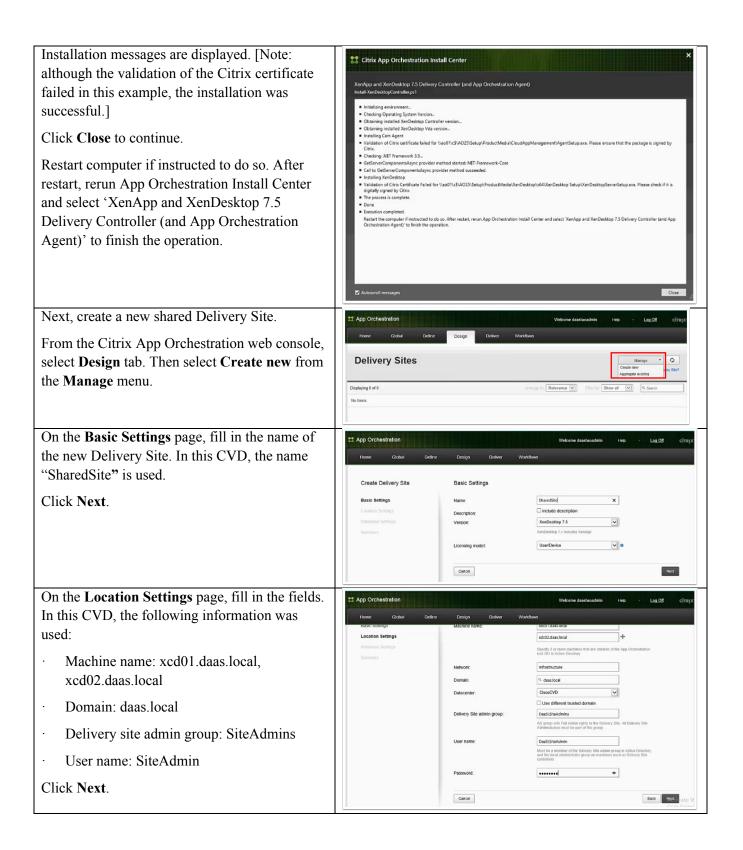
Create a new App Orchestration Delivery Site

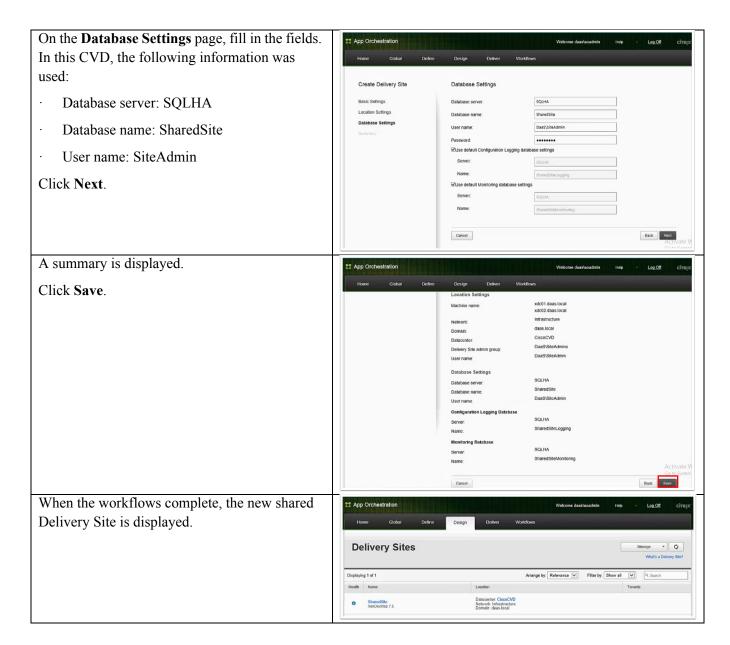
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This section illustrates adding a shared StoreFront server group. Before using Citrix App Orchestration to create a new StoreFront server group, the following prerequisites much be met:

- The .NET 3.5 Framework must be installed on Delivery Controllers (XDC01, XDC02)
- Internet Information Services Manager import certificate for *.daas.local
- Active Directory user/groups predefine user (SiteAdmin) and group (SiteAdmins) on Delivery Controller & SQL servers
- Microsoft SQL Server add login for DAAS\SiteAdmins





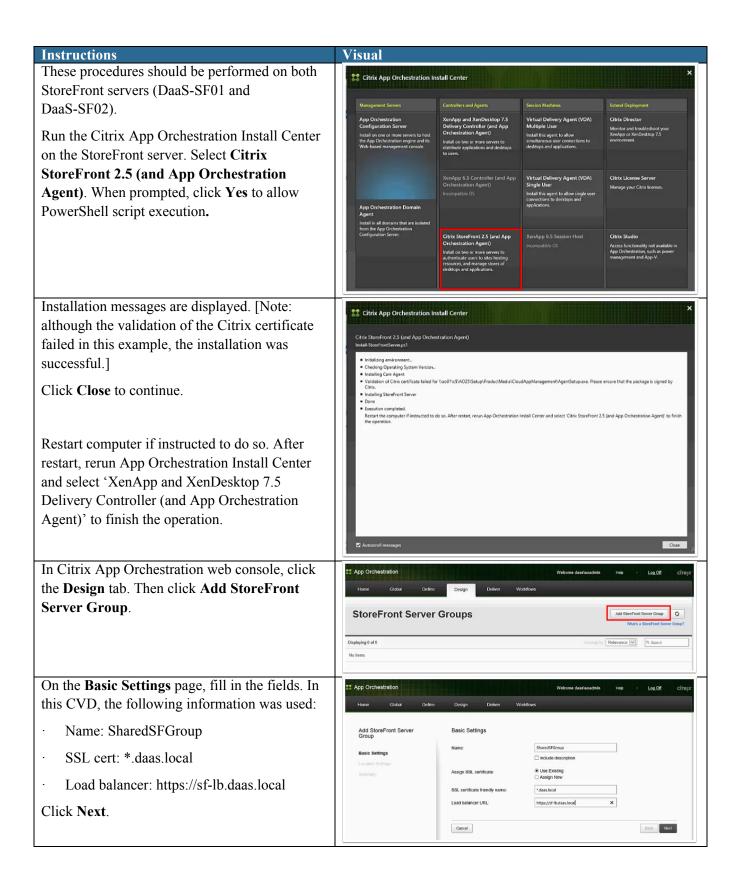


Create a StoreFront Server Group

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This section illustrates adding a shared StoreFront server group. Citrix App Orchestration Install Center is used to install Citrix StoreFront 2.5, and then the Citrix App Orchestration web console is used to create the shared StoreFront server group (named "SharedSFGroup" in this CVD).

Before starting, a URL should be configured in DNS for the load balancer. The actual load balancer virtual IP address can be configured later in NetScaler. If at the time of installation the NetScaler IP address is not available, the DNS entry for the load balancer URL can temporarily point to one of the StoreFront servers.



On the Location Settings page, fill in the fields. In this CVD, the following information was used:	App Orchestration Home Global Define Add StoreFront Server	Design Deliver World	Welcone daanaadmin	Help - Log.Off cîrrejx:
 Machine names: daas-sf01.daas.local, daas-sf02.daas.local 	Group Basic Settings Location Settings Semmary	Machine names:	daas-sl01.daas.local daas-sl02.daas.local Specily 2 or more machines that are childre the App Orchestration root OU in Active Da	m of vectory
· Network: Infrastructure		Network: Resource domain:	Infrastructure	
· Resource domain: daas.local		Datacenter:	CiscoCVD	v
· Datacenter: CiscoCVD		Cancel		Back Next
Click Next.				
A summary is displayed. Click Save .	App Orchestration Home Global Define	Design Deliver World	Welcome daas\aoadmin Iows	нер - <u>Log.Off</u> сітяця:
Click Save.	Add StoreFront Server Group basic Settings Lucation Settings Summary	Summary Basic Settings Name: SBL centificate friendly name: Load balancer URL:	SharedSPGroup * dans local https://sf-tb.daas.local	
		Location Settings Machine name: Domain: Dataconter: Network:	daas-st01.daas.local daas-st02.daas.local daas.local CiscoCVD intrastructure	
When the workflows complete, the new shared	2 App Orchestration	Cancel	Welcome daas\aoadmin	Back Save Activates W
StoreFront Server Group is displayed.	Home Global Define	Design Deliver Work		Help <u>Log Off</u> Cîtrejx
	StoreFront Server	Groups		Add EltereFront Server Group
	Displaying 1 of 1 Health Name SharedSF Group SharedSF Group SharedSF Group	Location Datacenter: CleveCVD Herrorit: Infrastructure Domain: dasa.local	Arrange by	Relevance () Q. Search Tenants
The Getting Started in App Orchestration status page now shows the StoreFront and Delivery Site design tasks now complete.	Characteristics	Design Deliver World	Welcome daastaoadmin	HAD - Leg.Off cirreja:
		Getting Started in Ap Below are three lists of tasks you'll need to compl	•	
	Define Within the Define section of App Orchestration	, you can create datacenters , import compute r		
	Datacenter		stance Configurations	C +
		n, you can create session machine catalogs, ses		
		<mark>0</mark> + St	ssion machines, offerings, delivery sites a ession Machines alivery Site	Ind StoreFront sites.
	Within the Design section of App Orchestration Session Machine Catalog	<mark>0</mark> + Se	ssion Machines	• +

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Configuring AO/CPSM Integration and Shared Delivery Site Offerings

CloudPortal Services Manager can extend an App Orchestration deployment to simplify customer and subscriber management, on-boarding, and self-service.

This section describes the software integration procedures for App Orchestration and CloudPortal Services Manager software and procedures to set up offerings for Shared Delivery Site tenants.

Configuring Hosted Apps and Desktops Service Roles and Connections

The Hosted Apps and Desktops web service for Services Manager allows service providers to manage and delegate end-user administration of applications, desktops, and resources. Service configuration typically involves these tasks, which are covered in this section:

- Create self-service account
- Add the servers associated with the service
- Enable the service at the top environment and location levels
- and specify service deployment with App Orchestration
- Assign service roles to the servers
- · Add credentials for accessing the servers and management tools
- Add service connections for the Hosted Apps and Desktops service to establish communication between the servers and CloudPortal Services Manager

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• Configure service settings

Check the box to install the App Orchestration Configuration Tool .	CloudPortal Services Manager	×
Click Next.	Select Web Services Select CloudPortal Services Manager components to install.	
	XenApp Web Service Wet applicable Service Service Service Service	
	XenDesktop Web Service (i) XenDesktop-direct provisioning support for the Hosted Apps and Desktop's service.	
	App Orchestration Configuration Tool App Orchestration setup and configuration tool for the Hosted Apps and Deadtops service.	
	STEP 1 2 4 8 6 7 Cancel	

Review installation prerequisites and click Next.		×
Review the Ready to install page.	CITRIX: CloudPortal Services Manager	
Click Install.	Ready to install Review the selections below and click 'Install' to continue.	
	Prerequisites Microsoft SQL Server System CLR Types Microsoft SQL Server Shared Management Objects Services App Orchestration Configuration Tool	
The Deployment Complete screen appears	STEP 1 : 3 4 🖗 6 7 Cance	
when the installation is complete.	CloudPortal Services Manager	×
Click Next.	Deployment Complete Setup has completed successfully.	
	Prerequisites Installed ✓ Microsoft SQL Server System CLR Types Installed ✓ Microsoft SQL Server Shared Management Objects Installed Services ✓ App Orchestration Configuration Tool Installed	
On the Configure Installed Components dialog,	STEP 1 2 3 4 5 🕼 7 Cancel	
click Configure for the App Orchestration	CloudPortal Services Manager	×
Configuration Tool.	Configure Installed Components Select the installed components to configure below.	
	App Orchestration Configuration Tool Configure	sh

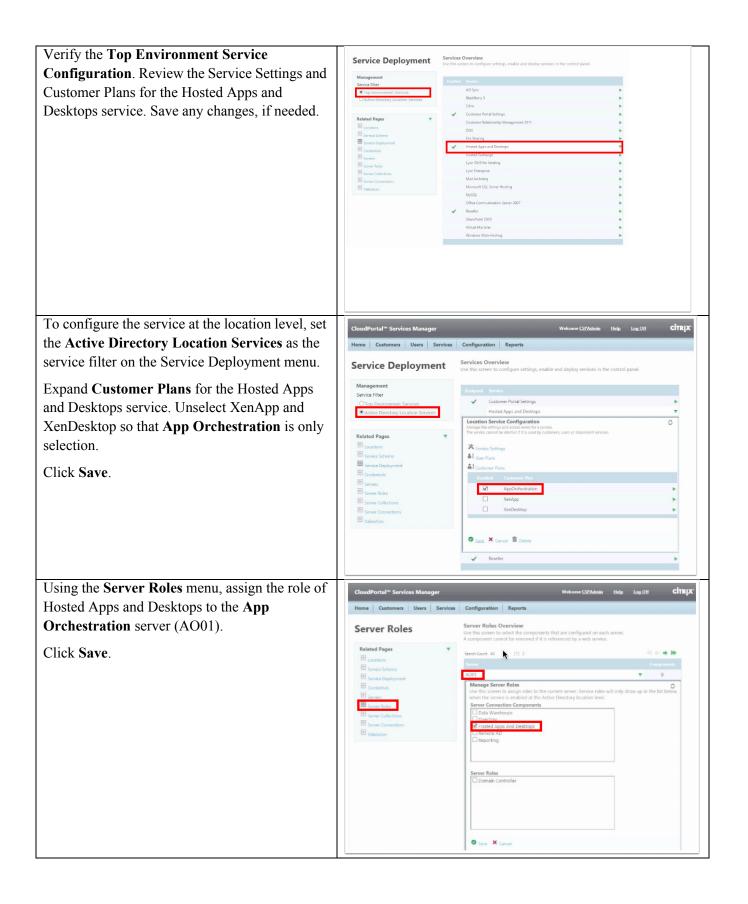
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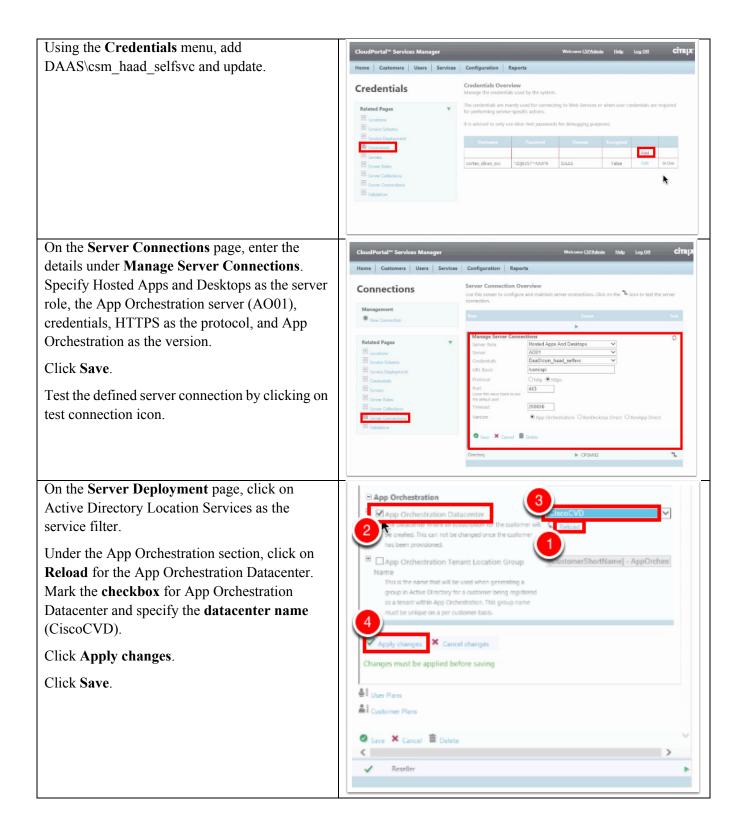
Enter the address of the App Orchestration Configuration Server (AO01.daas.local) and specify the administrative account with which to connect (DAAS\Administrator). Click Test Connection and if successful click Next .	CITRIX: Hosted Apps and Desktop Configuration (for App Orchestration) Specify Config Server Enter details for the App Orchestration configuration server. Server Address: A001 data local Connect as: DA45/Acministrator Test Connection
Create a service account (csm_haad_selfsvc) that will be used to enable self-service administration in App Orchestration. Click Next .	
	< Back Next > Cancel
Specify the CloudPortal Services Manager database server (CORTEXSQL). Click Next.	CITRIX Hosted Apps and Desktop Configuration (for App Orchestration)
Review the configuration summary, click Next , and the configuration is applied.	Specify SQL Server Enter connection details for the SQL server where the Services Manager system databases are installed. Server address: Server port: Authentication mode: Integrated Connect as: Password Test Connection Server John Server John Services Manager system databases are installed. Server port: Connect as: Password Test Connection Server John Server John Services Manager system databases are installed. Server port: Connect as: Password Test Connection Server John Server John Server John Services Manager system databases are installed. Server port: Server port: Connect as: Password Server John Server J

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A notification screen displays when the configuration operations complete. Click Finish . The next task is to add the servers associated with the Hosted Desktops and Applications service. On the CloudPortal Services Manager server (CPSM02), login as the CSP Administrator (cspadmin_csp) using the console.	Citre Mosted Apps and Desktop Configuration (for App Orchestration) Configuration Completed Teoperation completed successfully. Refer to documentation for the remaining steps. Image: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: Steps: S
Select Servers from the Configuration -> System Manager menu. Select and expand the entry for the App Orchestration server. Enter a server alias with the FQDN (in this CVD, AO01.daas.local). Verify other App Orchestration server details and Save .	CloudPartal [®] Services Manager Vetores CS2Main May 100 CircleX Home Gardo Services Configuration Reports Services Gardo Services Configuration Reports Services Description Service Configuration Reports Management Services Description Configuration Reports Services Description Configuration Reports Configuration Configuration Reports Nanagement Services Description Configuration Reports Configuration Configuration Configuration Reports Nanagement Services Configuration Configuration Reports Configuration Co

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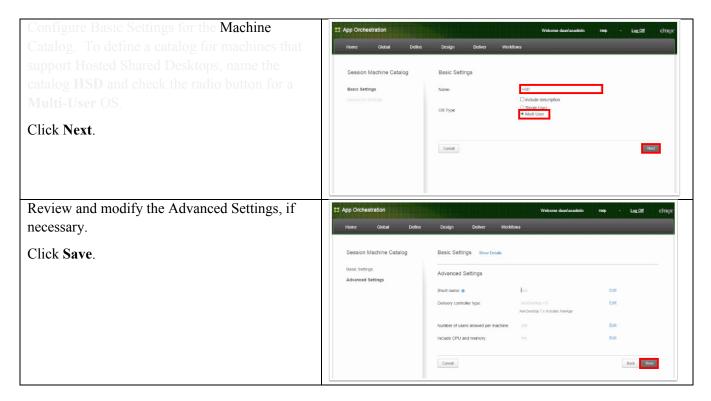
Configuring a Session Machine Catalog for Shared Delivery Site HSD Users

Session Machines host the applications and desktops that tenant users can access through Citrix Receiver. Session Machines are collected and organized in Session Machine Catalogs.

Configuring the Catalog

This section creates a Session Machine Catalog for the shared delivery site tenants that require Hosted Shared Desktop (HSD) services.

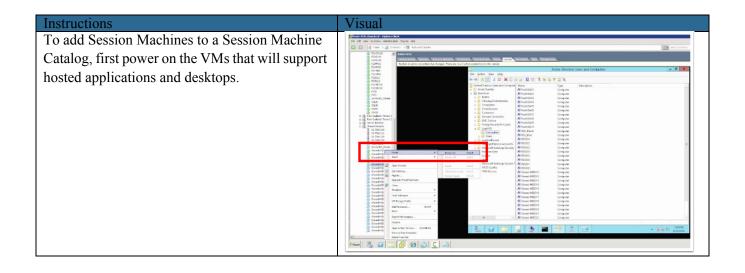
Instructions	Visual
Launch the App Orchestration Web Console and	X: App Orchestration vep - Log Off chragit
select Session Machine Catalogs from the	Home Global Define Design Deliver Workflows
Design tab. Select "Created externally" from	Session Machine Catalogs
the Use Machines pull-down.	Control enternal attacy? Proteiner on demand
	Displaying it of 0 Arrange by Relevance V Film by Show all V 9, Search
Specifying externally provisioned machines	No items.
allows other means, such as Citrix PVS or	
PowerShell scripts, to provision servers for the	
catalog. When additional capacity is needed,	
App Orchestration can notify the administrator	
(they are not deployed automatically).	



Adding Session Machines to the Catalog

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This section adds Session Machines to a catalog. For this CVD, Cisco UCS Director initially created virtual machines that were imported into PVS prior to the configuration of App Orchestration and CloudPortal Services Manager.



Launch the App Orchestration Web Console. On the Session Machine Catalogs page, select a Session Machine Catalog (the screenshot shows a catalog named CSP-SharedHSD.)	Image: Session Machine C Deploying 1 of 1 Heath Name CSP-SharedRND				Leg.Off Chrup: mess O essent Machine Catalog?
Click Add Machines.	Core Colour Define More Colour Define Session Machina Catalogs Define Define Storn name cepsharedhd Define Product syme cepsharedhd Define Direct syme Xentewather 5. Colour Questioner 2 Version Definings Session Machines Otherings Otherings	Design Deliver Work	Welcone deal aced	in Hep -	Log.Of cirrup:
	Health Name shared-hod001.dbas.local version: 1 shared-hod002.dbas.local version: 1	Location Network: Infrastructure Domain: daas.local Network: Infrastructure Domain: daas.local	Tenants	User	Delete
Specify Basic Settings (e.g., VM names, network, domain, and datacenter). Click Save to add the listed machines.	App Orchestration Home Global Define Add Session Machines	Design Deliver Work	Welcome date1aoadm	ên Help -	Log.Off citraja:
Checking the Workflows page will show background tasks as the machines are added to the catalog (e.g., CreateResourceand Get-MachineInfo operations).	Basic Settings	Machine names: Network: Resource domain: Datacenter: Cancel	Ishared-IsolitO3.das.local Ishared-IsolitO3.das.local Ishared-IsolitO3.das.local Af moutows most be stortically config updates againty Infrastructure ClacoCVD ClacoCVD	× + × and the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the stat	207
When the operation is complete, the Session Machine Catalog will list the available	App Orchestration Home Global Define	Design Deliver Work	Welcome daaslaoadm	in Help -	Log.Off citrejat
machines.	totic Coold Date Bestion Machine Catalogs Catalogs Catalogs Bornar may Coold accessing 7 5 Abcated: 0 Morators 2 Version: 1	Jesyn Deve Wor		Create New Version	Delete
	Session Machines Offerings Displaying 5 of 5	Subscriptions Delivery Groups			9. Search
	Health Name shared-hsd001.deas.local Version: 1	Location Network: Infrastructure Domain: daas.local	Tenants	User	Delete
	shared-hsd082.dnas.local Version: 1	Network: Infrastructure Domain: daas.local			Delete
	shared-hsd003.daas.local Version: 1	Network: Infrastructure Domain: daas.local			Delete
	shared-hed004.daas.local Version: 1	Network: Infrastructure Domain: daas local			Deteta a e W Ge to System i
	shared-hsd005.daas.local	Network: Infrastructure			Parlan.

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Setting up CPSM Reporting on Secondary SQL Server

Reporting for CloudPortal Services Manager delivers usage and billing reports to your customers and application vendors. It includes standard reports to support standard provisioned services and a data warehouse. The Reporting service communicates directly with the SQL Server Reporting Services web service.

For a large deployment, separate SQL servers are typically used for hosting the reporting and billing databases. CloudPortal Services Manager Report Mailer gathers anonymous usage data and emails usage reports to the Citrix license monitor.

Configure Reporting Service Prerequisites on the CPSM SQL Server

The following steps were performed on the secondary SQL server (SQL02) in this CVD to modify the Report Server configuration file . These steps are part of the Reporting (Data Warehouse) server prerequisites (see

Instructions Visual On the SQL02 server: Use the SQL Server 2012 - 🗆 X Reporting Services Configuration Manager: SOL02\MSSOLSERVER SQL Server 2012 Reporting Services Configuration Manager wizard to step through the configuration of the Connect SOL02/MSSQLSE Change Database reporting database. Choose whether to create or configure a report a er database These steps are part of the Reporting (Data The following information will be used to create a new report server database. Verify this information is consol before you continue. Database Ser Warehouse) Server pre-requisites: Database SQL Server Instar Temp Database http://support.citrix.com/proddocs/topic/ccps-11 Summary E-mail Setting Change Database English (United States) Report Server Language Report Server Mode: /ccp-10-system-requirements-roles.html Execution Au Authentication Type: Utername Scale-out D Previous Next Edt Edit the rsreportserver.config file and File Edit Format View Help checouptNonesHT add <RSWindowsNegotiate/>as C/URL> </URLs> {/ULUS> {/Aplication> diplication> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimeskeportNanager(Kame> dimesk AuthenticationType. Adding the tag <RSWindowsNegotiate/> <UrlString>http://+:80</UrlString> <AccountSid>S-1-S-20</AccountSid; <AccountName>NT Authority\Network allows the CPSM Web portal to call the C/URL> C/IRI SS reporting services web service. </Application (/URLReservations> <RSWindowsNegotiate/> </Auchenticationspes>
<GSW.hdowExtendedProtectionLevel>Off(/ESWindowsExtendedProtectionLevel>
<GSW.hdowsExtendedProtectionScenario>
<GnableAuchPersistence>true(/EnableAuchPersistence>
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</gnableAuchPersistence> ntication> </shows a state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the sta

http://support.citrix.com/proddocs/topic/ccps-11/ccp-10-system-requirements-roles.html.)

Install Server Roles for Reporting on SQL server

The following steps are performed on a CPSM server (CPSM02) to install server roles for reporting on a SQL server.

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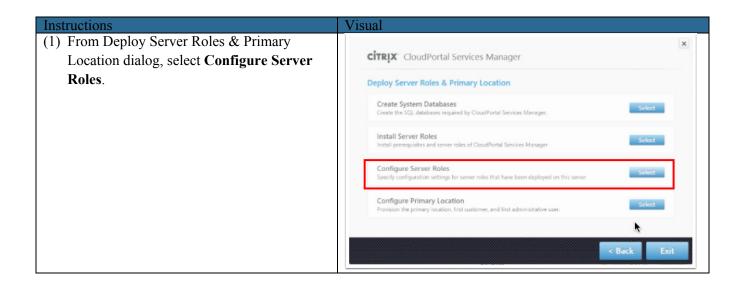
Instructions	Visual
Run setup.exe to launch the CloudPortal Services Manager console. From the Select Deployment Task dialog, select Install CloudPortal Services Manager .	
On the Install CloudPortal Services Manager dialog, select Deploy Server Roles & Primary Location .	Deploy Server Roles & Primary Location Select Install and configure the components required for the primary location. Select Review Documentation Select Get the latest information and guidance from Citrix eDocs. Select
When prompted, read and accept the user license and click Next .	k o k and minimum die gestie ninn die Groß
On the Select Server Roles dialog, enable the	
checkbox for Reporting (note: the	citrix: CloudPortal Services Manager
Configuration Tool is already checked, and should be left enabled).	Select Server Roles Select CloudPortal Services Manager components to install.
Click Next.	Provisioning Processes requests from the management site or API services and automates services in the environment.
	Directory Web Service Enables CloudPartal Services Manager to Impect and automate Active Directory. ecommerce SDK Enables a software devaluationment (at for third, each billion remaines and CRM.
	eCommerce SDK Provides a software development kit for third-party billing provides and CRM. Web Hots the control panel's web interface and API services.
	Reporting Performs scheduled data warehousing and facilitates creating usage and billing reports. Report Mailer Sends email reports of usage to Citrix's licensing monitor
	Configuration Tool Provides functionality for setting up and configuring care CloudPortal Services STEP 1 2 3 4 5 6 Cancel

Review the prerequisites and then click Install. When the installation completes, click Finish. Ready to install Review the selections below and click 'Install' to continue. Records SQL Server System Types Microsoft SQL Server System Types Microsoft IS 7 Application Development Features Microsoft IS 7 Application Development Features Server relations Configuration Tools Reporting

Configure Server Roles for Reporting on SQL Server

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CloudPortal Services Manager uses a 12-step process to configure server roles and services for SQL server reporting.



(2) Load the deployment file and click Next .	x			
	CloudPortal Services Manager			
Select the Configuration Task by enabling the checkbox for Reporting . Click Next .	Select Configuration Task The following configuration tasks can be performed at this time. Select one or more to begin.			
	eCommerce SDK () CoudPortal Services Manager eCommerce SDC.			
	Reporting Create the reporting database, configure data transfer services, and publish billing and usage reports.			
	STEP 1 3 4 5 6 7 8 9 10 11 12 < Back Next > Cancel			
(3) Enter Reporting Database Credentials.	×			
Click Next.	CloudPortal Services Manager			
	Reporting Database Credentials			
	A SQL Server login for the reports database will be created to ensure cross-domain accessibility. Specify the password for this new account or allow this tool to generate one.			
	Auto-generate credentials: User name: OUMReportingUser			
	Password:			
	STEP 1 2 3 4 5 6 7 8 9 10 11 12 < Back Next > Cancel			
(4) Configure the Mail Server as cpsm02.daas.local.	CloudPortal Services Manager			
Click Next.	SMTP server address: genmo2daas.ocal SMTP server pad: 25			
	STEP 1 2 3 S 6 7 8 9 10 11 12 < Back Next > Cancel			

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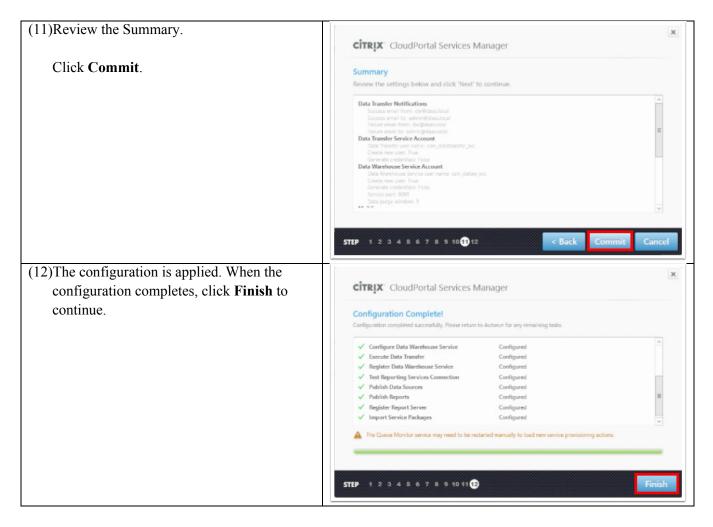
(5) The setup previews service packages for import into the control panel.	CITRIX [®] CloudPortal Services Manager		
Click Next.	Preview Service Package Import Setup is previewing service packages on the install media for import into the control panel. This step may take a few minutes.		
	Setup is previewing service packages on the install media for import into the control panel. This step may take a few minutes.		
	STEP 1 2 3 4 🕒 6 7 8 9 10 11 12		
 (6) On the Configure Reporting Database dialog, set the server address to an SQL server. This CVD uses a separate SQL server (SQLHA) for reporting. Click Test Connection to test the connection to the database. Click Next. 	CITREX: CloudPortal Services Manager Configure Reporting Database Dudfortal Services Manager uses a second stabase to foliate system reporting and biling without taking the privacy fatabase. Specify the database to foliate system reporting and biling without taking the privacy fatabase. Specify the database setting: Server sources setting: Server address: Vertification mode: Vertification mode: Personnel Test Connection: Vertification mode: Personnel Test Connection: Vertification mode: Personnel Test Connection: Vertification		
 (7) On the Configure Data Transfer Service dialog, enable the checkbox for Create if it doesn't exist. Click Next. 	CONCINCE CloudPortal Services Manager Configure Data Transfer Service The Data Transfer Service is a data wateboaring scheduled task that migrates and adapts data from the primary configuration databases to facilitate building reports with Microsoft SQL Server Reporting Services. Enter credentials for the user account this Auto-generate credentials: The name: am.datatransfer.soc Create if doesn't exist: STEP 12234 & 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 2 4 2 4 2 2 4 2 4 2 2 4 4 2 2 4 4 2 2 4 4 2 2 4 4 2 4 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		

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(8) On the Data Transfer Notifications dialog,			
enter email addresses for notification.	citrix CloudPortal Services Manager		
enter einan addresses for notification.	•		
	Data Transfer Notifications The Data Transfer task sends amail antifications with the rando of data warehousing operations amabies administrators to		
Click Next.	The Data Transfer task sensil notifications with the results of data warehousing operations enabling administrators to respond quickly to any interruptions in reporting functionality. Specify the source and destination email addresses to use in sending notifications.		
	Success Notifications		
	From: dw@desslocel		
	To: admin@daas.local		
	Failure Notifications		
	From: dw@daas.local		
	To: admin@daas.loca		
	STEP 1 2 3 4 5 6 7 8 9 10 11 12 < Back Next > Cancel		
(0) Enter information on the Specific Domesting		-	
(9) Enter information on the Specify Reporting	x		
Services Details dialog. Click Test	Citrix CloudPortal Services Manager		
Connection to verify the configuration.	Specify Reporting Services Details		
	CloudPortal Services Manager requires Microsoft SQL Server Reporting Services to run the service usage reports provided by Citrix. Specify the report server URL of the instance as it appears in Reporting Services Configuration Manager, and credentials		
Click Next.	for a domain account with administrative privileges. Note the password for this account should be never expire or this may result in interruption of service in the portal.		
Chek i text.	Report server URL: http://SQL02:80/ReportServer		
	Reporting Services Administrator		
	User name: DAAS\Administrator		
	Password: Test Connection		
	STEP 1 2 3 4 5 6 7 8 9 10 11 12 < Back Next > Cancel		
		_	
(10)Accept the defaults on the Data Warehouse	x		
Service dialog.	CITRIX CloudPortal Services Manager		
ç	Data Washawa Camira		
Click Next.	Data Warehouse Service The Data Warehouse Service is a web service that enables Services Manager to remotely configure reporting parameters and		
Chek Hext.	import new reports.		
	Auto-generate credentials:		
	User name: csm_dataw_svc Password: Password		
	Password: Pussavord Create if doesn't exist:		
	Service port 8095		
	Data purge window (months): 0 Configure		
	STEP 1 2 3 4 5 6 7 8 9 11 12 < Back Next > Cancel		
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Validate the Reporting Configuration

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The following steps were performed to validate the reporting configuration.

Instructions	Visual
On the SQL02 server: Select the Task Manager	C Task Scheduler
	Barn Verbrauer gestenst Wern running the task, use the following user excount: DAAS.com,datatranefer, use San velop verbrauers alogged in Wern Verbrauer alogged in

Select Billing from the SQL Server Reporting Service. You should see customer, distributor and reseller detail options.	Costomer Detail Diplay billing detail for services at custo		
Next, validate the Data Warehouse. Log into the	CloudPortal [™] Services Manager Weksme CSPAdmin Help Log Off CİTRİX		
CloudPortal Services Manager interface as	Home Customers Users Services Configuration Reports		
cspadmin_CSP. Select Reports->	Data Warehouse Use this screen to add and modify reporting views for a service. Reporting views are used to transfer service properties and stats counters to the data warehouse for reporting purposes.		
Configuration->Data Warehouse and select Transfer to move data from views to the Data	Management Description Rate View Generated View # New Reporting View AD Sync Detail [dbs], [mujpt_ADSync_ServiceFlam_Uter_Detail]		
Warehouse.	Filter AD Syrc (ber (ber (all block) pc, DADSyrc, Line /) [Bitbal (pc, pt, ADSyrc, Line /) Poperties] Service (AD Sync > AD Syrc (ber (ber (ber (ber (ber (ber (ber (ber		
Confirm the SQL02 server connection: Select Server Connections from the CloudPortal	Referesh Ø Ø Referesh		
Services Manager menu. Both Data Warehouse	Connections Server Connection Overview Use this screen to configure and maintain server connections. Click on the * icon to test the server		
and Reporting should be displayed as connecting to the SQL02 server. Click the Test icon to test	Management Factor Test * New Connection Data Warehouse 504.02 Test		
these two connections.	Related Pages Directory CPSM02 IL Incrutions Hosted Apps And Desitops - App Ontheritation >> A001 IL Incrutions Reporting - 2010 >> 504.02 IL Incrutions Service Deployment. IL IL Incrutions Server Connections IL IL Incrutions Server Connections IL IL Incrutions Server Connections IL IL		

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DAAS\csm_dataw_svc	Connections	Server Connection Overview Use this screen to configure and maintain server connections. Click on the T icon to test the server connection.
Retest the connection.	Management 兼 New Connection	Rule Server Text Data Warehouse ▶ 50(10) ℃ Dectory ▶ CPSM02 ℃
	Related Pages V Locations Service Schema Service Collapsment Contentials Servers Servers Servers Relats Server Collections Server Collections Server Collections Validation Validation	Diectory CPSM02 L Henterd Apps And Desktops - App Orchestration A001 L Reporting - 2010 SOL02 L Manage Server Connections O Server Role Reporting O Server Sol02 O GOL02 O Server Sol02 O O Server Sol02 O O Server Sol02 O Server Sol02 O O Server Sol02 O Server Sol02 O O Server Sol02 O Server Sol02
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Credentials page, and delete the credentials for	Home Customers Users Services	Configuration Reports
the Administrator. Edit csm_dataw_svc to	Credentials	Credentials Overview Manage the credentials used by the system.
encrypt the password. Click Update .	Related Pages V Locations Service Schemal Service Deployment Orestentials Servers Servers Server Collections Server Collections Server Collections Server Collections Validation Validation	The ordentials are mainly used for connecting to Web Services or when user credentials are required for performing service-specific actions. It is advised to only use clear-text passwords for debugging purposes. Uservices Password Demail Terryprint Add Enclose Context, dired, proc MUBDS*MUBDS DAAS True Edit In Use Context, dired, proc MUBDS*MUBDS DAAS True Edit In Use context, dired, perfore Instances DAAS True Edit In Use
Go to the CloudPortal Services Manager View	CloudPortal [™] Services Manager	Welcome CSIPAdmin Help Log Off CITRIX
Reports page. Expand the Billing item to	Home Customers Users Services	
display the customer, distributor, and reseller	View Reports	View Reports Configuration
detail options.	Customer Management	If AD Synce Version and Copyright Information Version and Copyright Information Version and Copyright Information Columner Oetal Display silling detail for annices at custome text. Columner Oetal Display using detail for samples at events reads. If BlackBerry 5 If Chin A If Chin 2011 If DNS If Chin Sample Hosted Apps and Desktops If Hosted Apps and Desktops If Hosted Apps and Desktops If Hosted Deshance

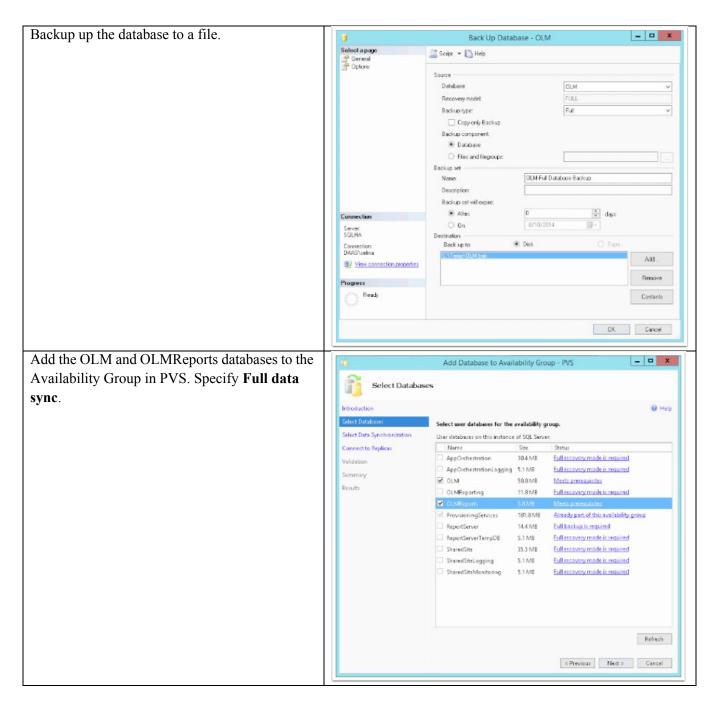
Configuring High Availability for the CPSM Databases

The following steps were performed to configure the CPSM databases for AlwaysOn availability.

Instructions

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Visual



Configuring Offerings for Shared Site Tenants

This section documents the steps performed in this CVD to configure offerings for shared site tenants. Key steps include:

- Create a desktop offering name "CSP-HSD" that uses Private Delivery Group isolation
- Assign shared apps (Microsoft Excel, Word, Outlook, PowerPoint, etc.) to the CSP-HSD offering
- · Test the connection to the HaaD service and publish the CSP-HSD offering as the default offering

· Allow the Reseller to provision apps within the CSP-HSD offering

Create a Desktop Offering ("CSP-HSD")

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Instructions	Visual	
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Complete the Advanced Settings:	23 App Orchestration Welcome destadministrator Help - Log Off chrag	ix.
• Isolation: Private Delivery Group	Home Global Define Design Delver Workflows	
• Name: CSP-HSD	New Desktop Offering Advanced Settings	
Click Save.	Advanced Settings tootation mode:	
Select the CSP-HSD offering and click Edit.	Edit Offering	0
The Edit Offering dialog appears. Edit the Basic Settings , and click Save Offering . Make sure the Name, Display Name, and Descriptions can easily be understood once imported into CPSM.	Basic Settings CSP-HSD Advanced Settings Display name CSP-HSD Display name Description CSP-HSD Toollip Shared HSD Enabled Ves CNo, but still visible ONo, and not visible	

Using the Citrix App Orchestration web console, create a desktop offering ("CSP-HSD") that uses Private Delivery Group isolation].

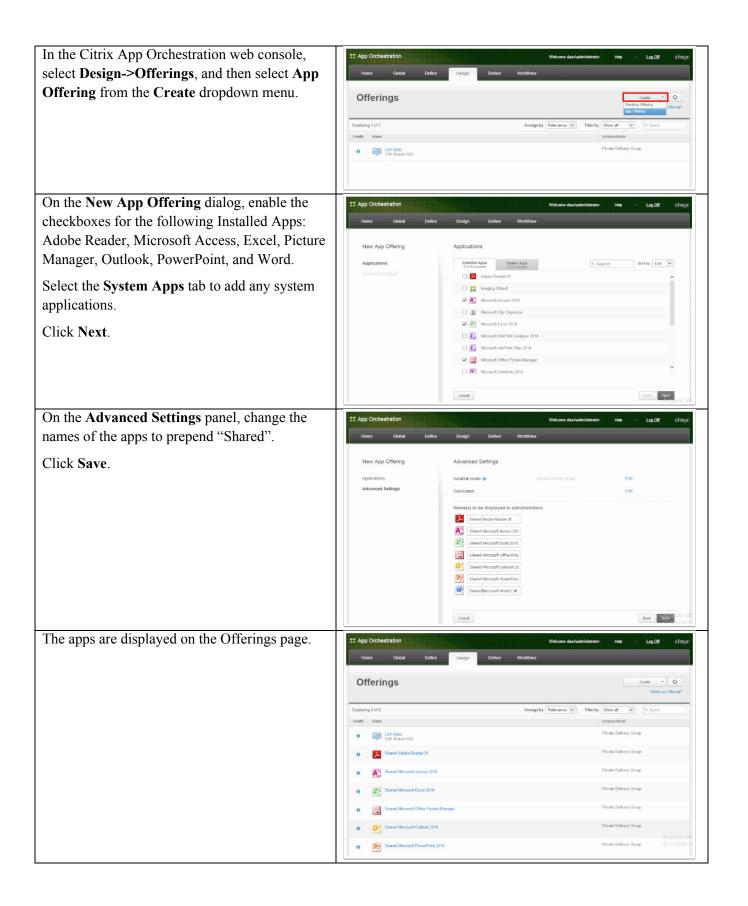
Assign Shared Apps to the CSP-HSD Offering

Use the Citrix App Orchestration web console to assign shared apps (such as Microsoft Excel and Word) to the CSP-HSD offering.

Instructions

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Visual



Select each app and modify the offering's	Edit Offering			0
Display name, prepending "Shared" to match the	Basic Sottings	Basic Settings		
Name.	Advanced Settings	Name: Short name:	Shared Microsoft Power Shared Microsoft PowerPoint 2010	
	Content rediraction	Display name Description	Shared Microsoft Pov ×	
			Ĵ	
		Toollip	Create and edit presentations for slide shows, meetings, and Web pages by using Microsoft	
		Enabled		
			ONo, and not visible	
			Canoel	Save Offering

Test Connection to the HaaD Service and Publish CSP-HSD Offering

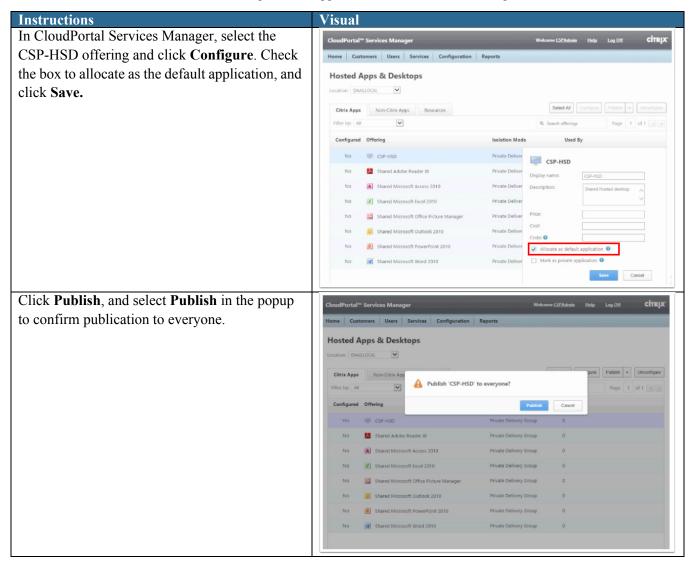
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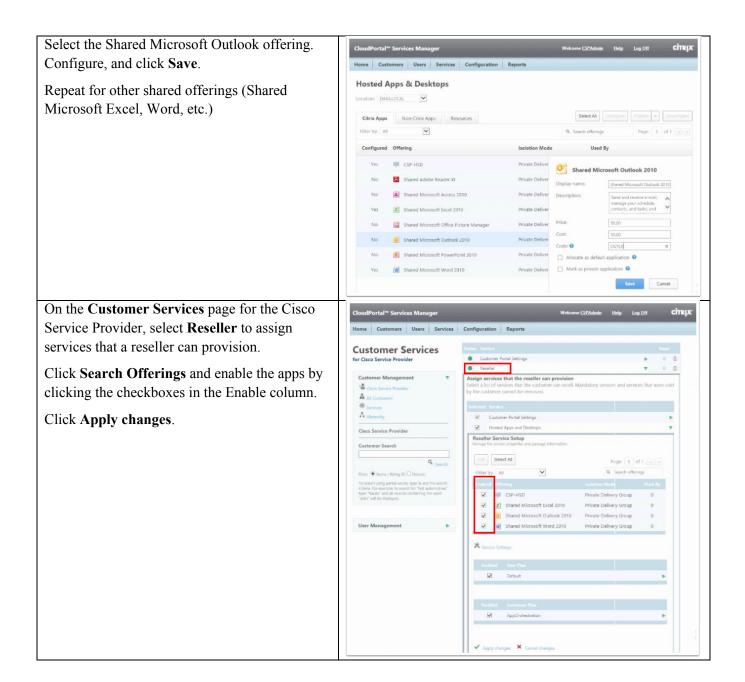
Using CloudPortal Services Manager, test the connection to the HaaD service and publish the CSP-HSD offering as the default offering.

Instructions	Visual	
Log in to the CloudPortal Services Manager	CloudPortal [®] Services Manager	Welcome CSPAdmin Help Log.Off CİTRİX
portal as the service provider administrator,	Home Customers Users Services Configuration Reports	
cspadmin_csp.	Connections Server Connection Overview Use this screen to configure and mainte connection.	in server connections. Click on the ${}^{\mathbf{q}_{\mathbf{s}}}$ icon to test the server
Select Configuration->System Manager->	Management Erric * New Connection Data Warehouse	Server Test
Server Connections.	Related Pages	
Selected Hosted Apps And Desktops – App	Service Scheme Service Deployment	
Orchestration, and click on the test connection	Condentials Servers	
icon.	Server Rates Server Collections	
	BB Server Connections i € Validation	
Select Services->Hosted Apps and	CloudPortal™ Services Manager	Wekome CSPAdmin Help Log.Off CiTRIX
Desktops->Offering Management. The app	Home Customers Users Services Configuration Reports	
offerings are displayed.	Hosted Apps & Desktops	
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	Citrix Apps Non-Citrix Apps Resources	
	and the last last	Select All Configure Publish + Unconfigure
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Provision apps within the CSP-HSD offering

Allow the Reseller to provision apps within the CSP-HSD offering.





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Click Provision .	CloudPortal [∞] Services Manager	Wekome (SPAdmin Help Log.Off CİT RJ
A green status icon indicates success.	Home Customers Users Services	Configuration Reports
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	User Management	Top Content Management Custormers Mans Reports Hume Powerd by CloudParts Services Manager v110.125

Configuring Example Shared Delivery Site Tenants

The steps in this section show how offerings are provisioned to two different shared delivery site tenants (shared delivery site tenants use private delivery group isolation). This section also describes how self-service workflows can be established for provisioning, which allows an on-site administrator to approve site-specific provisioning requests. (The sample customer "Install Test Customer" is configured to represent the use case of an on-site administrator to approving user self-service provisioning requests.)

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This section includes the following tasks:

- Configuring a service plan for two example customers
- · Setting up two users within the customer "Install Test Customer"
- · Setting up a workflow approval for the manager to approve user subscription requests
- Impersonating a user that subscribes to offerings
- Impersonating the user's manager to see and approve the request



On the Customer Services page, select Hosted	CloudPortal [™] Services Manager Wekome CSEAdmin Help Log.Off CİTRİX		
Apps and Desktops to configure the service	Home Customers Users Services Configuration Reports		
plan to be applied to this customer.	Status Service Users for Install Test Customer © Customer Portal Settings > 0 ①		
Enable the appropriate offerings for this tenant	Customer Management T O O Service Plan Configuration Service Plan Configuration Service Plan Configuration		
(in this case Hosted Shared Desktops and shared	Install Test Customer Customer Plan Concerner Plan Concerner Plan Concerner Plan to should be applied to the Concerner Plan to should be applied to the customer. Clock on the will buttom to sever or change		
Microsoft applications are enabled).	Services the package properties. A Hierarchy		
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Apps and Desktops to configure the service	Home Customers Users Services Configuration Reports		
plan to be applied to this customer.	Customer Services Status Service Users		
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Enable offerings for this tenant.	Customer Management Service Plan Configuration Customer Plan AppOrchestration Fish		
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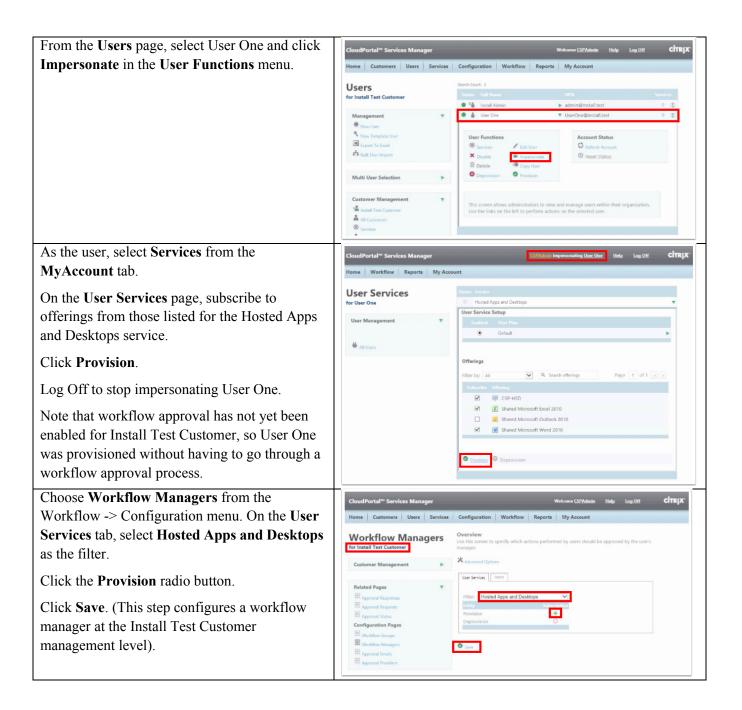
From the Configuration tab, select Workflow	CloudPortal [∞] Services Manager	Welcome CSPAdmin Help Log Off CİTR X
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Click Enable to enable workflow approval.	CloudPortal [™] Services Manager	Welcome CSPAdmin Help Log.Off CİTRİX
	Home Customers Users Services	Configuration Reports
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		Workflow approval is disabled.
On the Worldow Seture goes whethed Crown		
On the Workflow Setup page, uncheck Group approval. (Manager approval remains	CloudPortal ^{®®} Services Manager	Wekome CSPAdmin Help Log.Off CİTR İX
selected.)	Home Customers Users Services	Configuration Reports Workflow Approval
,	Workflow Setup	Workflow approval is enabled.
Enter the appropriate email information for approval notifications.		Components United the standard workflow approval components that should be enabled in the control panel.
Verify that the URL matches the current CPSM		Email Configure the approval email notification reply address and web uni settings.
web portal URL for the deployment; if not, make		Reply Email Address INREeply@WorkflowApproval.local Reply Email From CCloudPortal Services Manager Web Uni Inter, //contexen/ContextONIent/
the appropriate correction.		Maintenance Configure the number of days to keep resolved approval requests visible in the preval.
Click Save.		Retention Days 30
		Reset to default role settings
		Image Workflow approval was enabled successfully. Please re-login to apply the role and menu changes.
		Top Context Management Coatorees Uses Reports Home
Log off and then log back in as the same service		Poweed by CoudParts Service Manager V15.1.5
provider administrator for the newly enabled	CloudPortal [®] Services Manager Home Customers Users Service	Welcome C3PAdmin Help Log Diff CİTRİX is Configuration Workflow Reports My Account
Workflow menu group to appear.	Home Control Panel Home	Approval Responses Approval Requests Approval Status
Next, configure a Workflow Manager to approve	Customer Management	Welcome Configuration Workflow Managers ger Here you can perform simple management, user pric Approval Ymalls Emails such as managing user accounts and generations, setup pair Approval Providers bluckin
self-service Hosted Apps and Desktops	User Management	groups, modify service parameters, view online reports and mount more. The menus on the left and the icons at the top of the page allow you to navigate within the system.
provisioning, From the Workflow tab, select	★ New User ★ All Users ▲ Bulk User Import	Please make sure that you familiarize yourself with system functionality before you attempt to change any parameters. Changes you accept may result in additional service charges being applied.
Workflow Managers from the Configuration	User Search	
menu.	0	

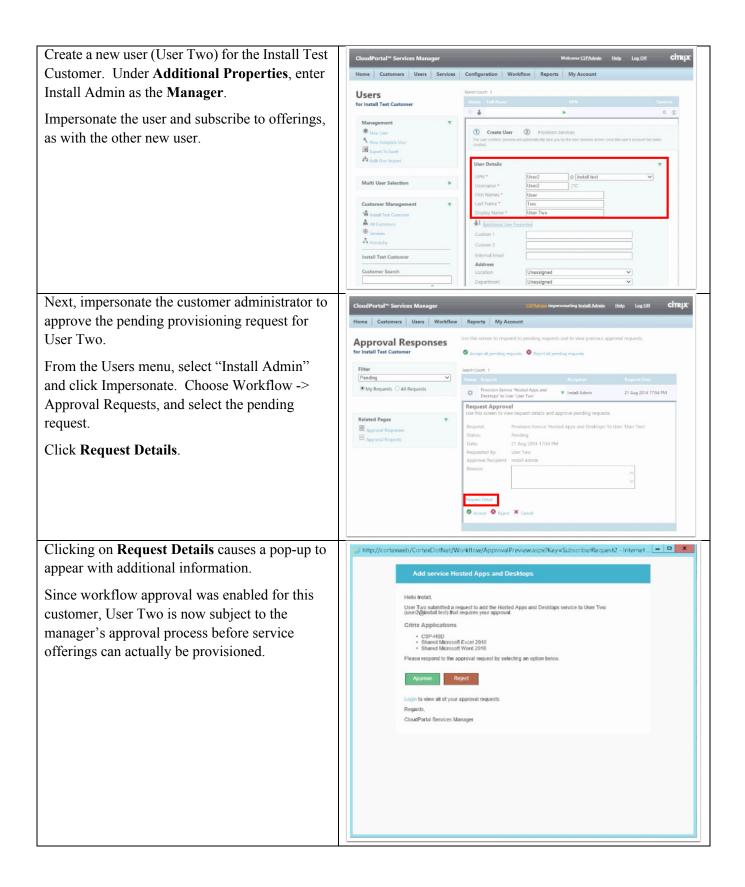
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Specify Hosted Apps and Desktops as the user services filter.	CloudPortal ^{~-} Services Manager Wekows (SPAdmin Help Log.0)/ CİTRİX Home Customers Users Services Configuration Workflow Reports My Account
Enable provisioning by clicking the Provision radio button. Click Save .	Workflow Managers for Cisco Service Provider Overview Use this screen to specify which actions performed by users should be approved by the user's manager. Customer Management X Advanced Options Related Pages Use Service Margine Approved Response There Hosted Apps and Desktops
	Approval Enguets Approval Statis Approval Statis Approval Statis Approval Statis Approval Statis Approval Englis Approval Englis Approval Providers
Creating users will demonstrate how the user	CloudPortal [™] Services Manager Weksme CSPAdmin Help Log.011 CTTRJX
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process works.	Users Seeth Court. 1
On the Customers page, select "Install Test	for Install Test Customer Status Full Name Unit Service Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Image: Status Ima
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Select the administrator (Install Admin) and	Deprovision Provision
click on Impersonate in the User Functions	Multi User Selection Impersonation allows you to navigate through the web interface as if you were logged
menu. (Impersonating Install Admin enables	Customer Management on as that user.
creating a new user for this customer.)	All Customers Services
Note the ID in the banner changes to	CloudPortal [™] Services Manager CloudPortal [™] Services Manager ClrupX
"CSPAdmin impersonating Install Admin".	Home Customers Users Workflow Reports My Account
Click on New User and create a sample user	Users Seven Court: 1 for Install Test Customer Status Fail Name UTN Services
(UserOne). Under Additional Properties, enter	Management V
Install Admin as the Manager.	New Uter Oreate User Provision Services New Template User results results results results results results results results results results
Click Provision at bottom of the form.	Export To Excel state the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second seco
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As the CSP administrator, select the DaaS Test	CloudPortal [™] Services Manager	Welcome CSPAdmin Help Log.Off	CITRIX
Customer and enable the default offerings for	Home Customers Users Services	Configuration Workflow Reports My Account	
users within this customer.	User Services	Status Service	
	for DaaS Admin	Hosted Apps and Desktops User Service Setup	
From the Customers menu, select the DaaS Test	User Management	Enabled User Flam	
Customer. Select Services from the User	★ New User ♣ DaaS Admin	Default	•
Functions menu. Select the offerings from those	북 All Users 최고 Bulk User Import	Offerings	
listed for the Hosted Apps and Desktops service.	DaaS Admin	Filter by: All Q. Search offerings Page 1 of 1	N.
Click Provision. This step demonstrates how the CSP administrator can manage any customer's users directly.	User Search Search Fitter: There O Lans O Lans The Lans O Lans O Lans O Lans The Lans For Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Search Sear	Schwarder Officinia Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD Image: CSP-45CD <	

Configuring a Session Machine Catalog for Shared Delivery Site VDI Users

The steps in this section set up a Session Machine catalog for users in a shared delivery site that require Server VDI desktops using XenDesktop (rather than Hosted Shared Desktops via XenApp).

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Instructions	Visual
Launch the App Orchestration Web Console and	App Orchestration Welcone dearlaoadmin Hep - Log.Off cirraja:
select Session Machine Catalogs from the	Home Global Define Design Deliver Wonktows
Design tab. Select "Created externally" from	Session Machine Catalogs
the Use Machines dropdown list.	Cost of matchine outcorogo
-	Displaying 1 of 1 Arrange by: Relevance V Filter by Show at V Q. South
The HSD catalog for shared delivery site tenants	Health Kame Product CSP ShavedHeE() XecDeslay 7.5
is visible in the session machine catalog listing.	
Configure Degie Settings for the new Server VDI	
Configure Basic Settings for the new Server VDI	Image: Second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second se
Session Machine Catalog. Name the catalog	Home Gkdaal Detine Design Deliver Workflows
(CSP-SVDI) and check the radio button for a	Session Machine Catalog Basic Settings
Single-User OS.	Basic Settings Name: CSP-SVD X
Click Next.	Advanced Settings Include description OS Type: Strate User Settings OS Type:
	Canot
On Advanced Settings, select Static for the type	2.2 App Orchestration Welcome deaslacedmin Hep - Log.Off citraj.x
of desktop.	Home Global Define Design Deliver Workflows
Click Next.	Session Machine Catalog Basic Settings Show Dutats
	Basi: Settings Advanced Settings
	Advanced Settings Stort name e copied Edit
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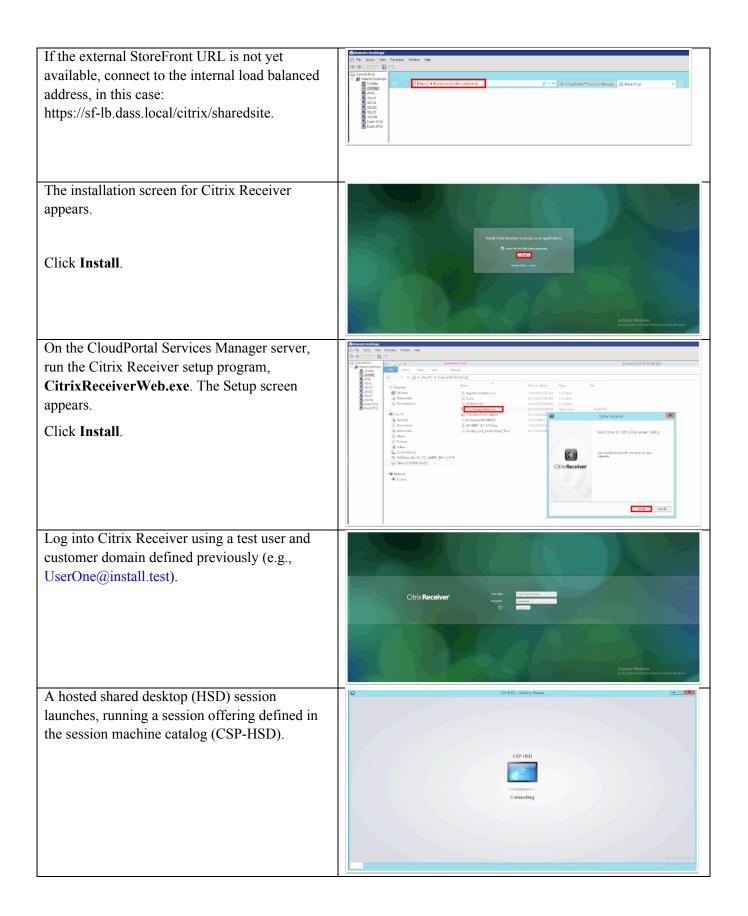
The Session Machine Catalogs page now shows two catalogs, one for shared SVDI and one for shared HSD sessions. Select the SVDI catalog (CSP-SVDI).	Item: Color Item: Color Deplaying 2 of 2 1 Heating Kases CSP-ShuredHSD CSP-ShuredHSD	Webcome describeradion Holp Log Off Define Design Deliver Webchlows Chine Catalogs Uses Machine Item Machine Webchlows Chine Catalogs Arrange by Referance Filter by Show all 0, Seech Placet XeeDesktop 7.5	-
On the StoreFront server in the Shared Delivery Site Domain (e.g., DaaS-SF01 or DaaS-SF02), launch the Citrix StoreFront console . From the Storefront console, expand the Authentication panel. Select add/remove Authentication Methods and check Domain pass-through . Click OK .	File Action Vine Help File Action Vine Help File Action Starfand Ceffer Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand File Action Starfand Fil	Clinix Storefront	× ×

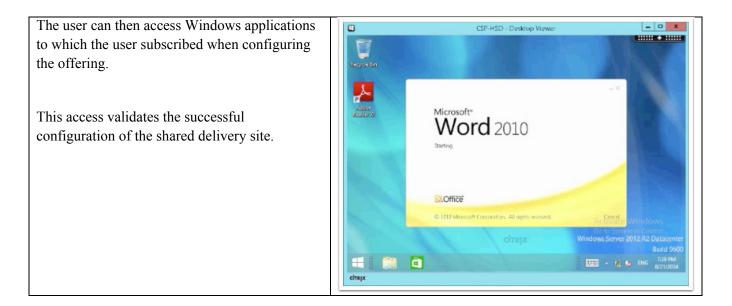
Validation with Citrix Receiver

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This section illustrates how a user connects to the shared delivery site, which validates the installation of the Citrix software components and the configuration of the shared delivery site. The load balancer runs Citrix Receiver, simulating a user from a shared delivery site tenant domain connecting to the site.

Instructions	I	Visual		
From Stores panel on the Storefront console,			Citrix StoreFront	_ _ X
select the SharedSiteStore . Note the URL for the load balancer.		The Action Year Heip Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construction Construc	Cirepz Exame Autoentone Autoenton toor UIL ConverticeCove Ve Ve Mept//dilutaseLocal/CirinyTour SharedSiteStore Overview Autoentone Ves Multi- Hetpu//dilutaseLocal/CirinyToureStellows Status © Service using NTTPS:	Actions Cost See Cost See Cost See Cost See Provisioning File Vice Provide File Cost See File Cost See File Cost Sec File Cost Sec Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Monage Cost Sector Cost Sector Provide Sector Provide Sector Cost Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provide Sector Provid
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Configuring DaaS Delivery for a Private Delivery Site

Access to published apps and desktops is controlled through the App Orchestration Delivery Groups and Delivery Sites. StoreFront Server Groups, which can be private or shared, manage desktop and application offerings for subscribers.

The following sections illustrate the following tasks in configuring service delivery for a new private tenant (Private Tenant2) in this CVD:

- Install and Configure the Zero Trust Agent (ZTA)
- Configure CloudPortal Services Manager (server roles and location)
- Configure Delivery Sites
- Configure a Session Machine Catalog
- Configure StoreFront Server Groups
- Configure Offerings

Install the Zero Trust Agent (ZTA)

This section illustrates installing and configuring the Zero Trust Agent for a new private delivery site (domain **fi2.local**). The Zero Trust Agent (also known as a domain agent) allows the App Orchestration configuration server to orchestrate resources in a private domain without requiring Active Directory trusts between the App Orchestration domain and the target orchestrated domain.

For more information, see the Citrix support document Deploying the ZeroTrust Agent in App Orchestration 2.5.

Install and Configure the Domain Agent

Instructions	Visual
On the server where you are installing the domain agent (FI2-CPSM, in this CVD), log on with a domain user account that is also a local administrator on the server. From the App Orchestration installation media, launch Setup.exe to run the Citrix App Orchestration Install Center and then click App	Citrix App Orchestration Install Center X Management Servers Controlles and Agents Session Machines Extend Deployment App Orchestration Configuration Servers Controlles and Agents Session Machines Extend Deployment Instal as one or more serves to host the App Orchestration might be out or more serves to distribute applications and destages to users Virtual Delivery Agent (VDA) Machines user on controls to destages and applications. Citrix Director Management consols. Manageness control for the distribute applications and destages to users. Virtual Delivery Agent (VDA) Machines user control for the destages and applications. Citrix License Server Manage pair Citris Kernes.
Orchestration Domain Agent.	App Orchestration Domain Agent Install in all domans that are isolated from the App Orchestration
When prompted, click Start and accept the End User License Agreement. The Citrix App Orchestration Domain Agent Setup installs the agent software.	Configuration Server: Citrix StoreFront 25 Grand App Orchestration Agen Install on Neor an excernent to subhotical superior batics hooding resource; and manage stores of decistops and applications. XanApp 6.5 Sensition Hoot Install on Neor an excernent to subhotical superior batics hooding resource; and manage stores of decistops and applications. XanApp 6.5 Sensition Hoot Incompatible OS Access functionality on available in App 0: Chestrations, such as gover management and App 9.4
When the installation completes, it prompts you to launch the Citrix App Orchestration Server Configuration wizard. Click Close to continue.	Citrix App Orchestration Domain Agent 2.5 Setup Installation was successful The installation was completed successfully. Launch Citrix App Orchestration Server Configuration on exit Close
From the Citrix App Orchestration Server Configuration wizard, select Create a new domain .	Citrix App Orchestration Server Configuration Choose an action to perform Create a new domain Select this option if you want to create a new domain in your Citrix App Orchestration deployment. Join an existing domain Select this option if you want to join an existing domain in your Citrix App Orchestration deployment.
	Cancel

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 Enter the information for the new domain: Configuration server — FQDN of one of the configuration servers, a user account that is defined as a Full Admin in AO, and the password for the configuration server user account. Domain — The name of the new domain to be defined (fi2.local), and the domain type. Service user — name and password of the user account to be used within this domain. This account must have Full Control permissions for the App Orchestration root OU in this domain. 	Citrix App Orchestration Server Configuration X New domain information Configuration server address: ao01.daas.local Configuration server user name: daaslacaadmin Configuration server password:
Click Next . The Ready to configure screen appears, summarizing the information for configuring the new domain in App Orchestration. Click Configure .	Note: if the certificate of the App Orchestration server or issuer is not in the trust store of this Zero Trust Agent machine, this step will fail. Citrix App Orchestration Server Configuration Ready to configure Action: Configuration server address: a001.dass.local Configuration server user name: dass\acadmin Domain type: Both (Resource Domain + User Domain) Service user name: fi2.local Domain type: Both (Resource Domain + User Domain) Service user name: fi2.locadmin Password protection: Disabled (Back Next > Configure Cancel
When finished, a notification appears confirming the configuration is successful. Click Close to continue.	Configuration was successful The server configuration was completed successfully. View the configuration log Close

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Verify New Domain Configuration

The following steps verify that the new domain is configured successfully.

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Instructions	Visual	
Log on to the App Orchestration web console	22 App Orchestration Welcome deathoustmin Help - Log 25 cTITE	x
and click Define > Domains .	Home Global Define Design Deliver Wicriflows	
	Workflows	
	Displaying 1 of 1 Dompins Annange by Relevance Filter by Active/Pending Q Search Instance Configurations Task Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending Active/Pending A]
	CostadOratal crista Dostadonan instaled by DASAdonan instaled et Grocold, 11493 AM Cancel	
Before using the new domain (fi2.local, which	화 App Orchestration Welcome das/Justidmin Hero - Log Of Citra	x
has a scope of Private), it should be verified that	Hume Global Define Design Deliver Workflows	
all appropriate workflows have successfully completed.	Domains O What's a Domain	
	Displaying 3 of 3 Arrange by: Relevance 💌 🔍 Search	
	Health Name Scope Tenant Type	
	daas local System <u>2 Tenants</u> Both (Resource Domain + User Domain) <u>Edi</u>	
	fil Jocal Private 1.Tenant Both (Resource Domain + User Domain) Edit Devide	
	Docal Pleate Both (Nessace Domain + User Domain) Est Durine	

Configure CloudPortal Services Manager

This section illustrates configuring CloudPortal Services Manager for the new private delivery site. Specific subtasks include:

Configure server roles for Web Directory Services and Provisioning

Configure the new location in Active Directory and the database

For more information, see the CloudPortal Services Manager 11.0 documentation.

Configure Server Roles

The following steps configure the server roles for a new remote location.

Instructions	Visual	
Log in to the FI2-CPSM server as Admin-User.	×	
Start CloudPortal Services Manager Installer,	CloudPortal Services Manager	
from the Configure Remote Location page of	Configure Remote Location	
the Setup Tool, select Configure Server Roles.	Generate Deployment Configuration File Specify the database details of the Services Manager instance and generate the configuration file	
	Install Server Roles Install prerequisites and server roles of CloudPortal Services Manager Select	
	Configure Server Roles Specify configuration settings for server roles that have been deployed on this server Select	
	Configure Location Provision the new location in Active Directory and the database. Select	
	< Back Exit	1
	< Back Exit	

Select Configure Server Roles.	put.ex
Scheet Configure Server Roles.	CITRIX CloudPortal Services Manager
	Select Configuration Task
	Configure Server Roles Select Apply or update settings for server roles installed on this computer.
	Deploy Database Updates Apply minor updates for the CloudPortal Services Manager database.
	STEP 3 4 5 Cancel
Enter the path to the configuration file (created	x
earlier in the installation process).	Citrix CloudPortal Services Manager
	Load Deployment Configuration File
	Specify the path to a configuration file created earlier. For new deployments, one will have been generated during creation of the databases. If adding a new location to an existing deployment, a new configuration file can be generated from Setup on the installation media.
	Configuration File: Cttemp(CPSMConfig.xm) Browse
	Consiguration File: Chtemp(Criskiconig.tm)
	STEP 1 2 3 4 5 Cancel
Enable the checkbox for Directory Web	
Service.	CITRIX CloudPortal Services Manager
Click Next.	Select Configuration Task The following configuration tasks can be performed at this time. Select one or more to begin.
	Directory Web Service Configure the service credentials and IIS settings for the Directory Web Service.
	compare one of the contract end in a compare of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contr
	Provisioning Configure the Provisioning server role, including the Queue Monitor service and Directory Monitoring services.
	STEP 1 2 3 4 5 6 <back next=""> Cancel</back>

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Accept defaults (from previously specified	x
configuration file).	CloudPortal Services Manager
Click Next.	Configure Directory Web Service The Directory Web Service authenticates users logging on to the Web server, and automates administrative requests. Specify credentials for the domain account this service will use. This account will be created if it doesn't exist.
	Service Account
	Auto-generate credentials:
	User name: cortex_dirws_svc
	Password:
	Create if doesn't exist:
	Service Details
	Service port: 8095
Confirm the information on the Summary page.	STEP 1 2 3 5 6 Cancel
Commit die mormation on die Summary page.	×
Click Commit.	CloudPortal Services Manager
Chek Commut.	Common Common Common Common Common Common Common Common Common Common Common Common Common Common Common Common
	Summary Review the settings below and click 'Next' to continue.
	Review the actuality below and talk. Next to containe.
	Directory Web Service User name: Fl2kohlek dirve; swc
	Service part: 8095
	STEP 1 2 3 4 5 6 Commit Cancel
When the configuration completes, click Finish	
	×
to continue.	CloudPortal Services Manager
	Confirm Control 141
	Configuration Complete! Configuration completed successfully. Please return to Autorun for any remaining tasks.
	contribution of a state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the
	Create Service Account Configured
	Verify ASP.NET 4.0 Settings Configured Create Site CortexServices Configured
	Configure IIS Application '/Directory' Configured
	Grant Proxy Users Logon Permission Configured
	STEP 1 2 3 4 5 6 Finish

1

Repeat, this time configuring Provisioning		×
server role.	CloudPortal Services Manager	No.
Select Configure Server Roles.	Configure Remote Location	
	Generate Deployment Configuration File Specify the database details of the Services Manager instance and generate the configuration file	
	Install Server Roles Install perceptisites and server roles of CloudPortal Services Manager Select	
	Configure Server Roles Specify configuration settings for server roles that have been deployed on this server Select	1
	Configure Location Select	-
	Provision the new location in Active Directory and the database.	
	< Back Exi	t
Select Configure Server Roles.		×
	CloudPortal Services Manager	
	Select Configuration Task	
	Configure Server Roles Apply or update settings for server roles installed on this computer.	
	Deploy Database Updates Apply minor updates for the CloudPortal Services Manager database. Select	
		ncel
	+	
Enter the path to the configuration file (created earlier in the installation process).	Citrix CloudPortal Services Manager	×
carrier in the instantion process).	Load Deployment Configuration File	
	Specify the path to a configuration file created earlier. For new deployments, one will have been generated during creation of the databases. If adding a new location to an existing deployment, a new configuration file can be generated from Setup on the	e I
	installation media. Configuration File: Chtempl/DSM/Configuration Browse	
	Contragonation rite: Chempic-SixContgami unoviazi	
	STEP 1 2 3 4 5 Canc	:el

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Enable the checkbox for Provisioning .	X
Click Next.	CloudPortal Services Manager
	Select Configuration Task
	The following configuration tasks can be performed at this time. Select one or more to begin.
	Directory Web Service Configure the service credentials and IIS settings for the Directory Web Service.
	eCommerce SDK () CloudPortal Services Manager eCommerce SDK.
	Provisioning Configure the Provisioning server role, including the Queue Monitor service and Directory Manitoring services.
	STEP 1 2 4 5 6 7 8 < Back Next > Cancel
Accept defaults, and then click Next.	×
	Citrix CloudPortal Services Manager
	Configure Mail Server
	CloudPortal Services Manager requires an SMTP mail server to automate sending email messages. These include system updates for administrators, account notifications for end users, as well as usage reporting to Citrix.
	SMTP server address: cpsm02.daas.local SMTP server port: 25 Test Connectivity
	STEP 1 2 3 S 6 7 8 <back next=""> Cancel</back>
Accept defaults, and then click Next.	x
	Citrix CloudPortal Services Manager
	Configure Queue Monitor Service The Queue Monitor service processes provisioning requests from the management site or the API service and automates services
	in the environment. Specify the credentials of a domain account this service will use. An account will be created if the one specified does not exist.
	Auto-generate credentials:
	User name: cortex_gmon_svc Password:
	Create if doesn't exist 🗸
	STEP 1 2 3 4 5 6 7 8 < Back Next > Cancel

1

Confirm the information in the Summary .	x
Click Commit.	Citrix CloudPortal Services Manager Summary Review the settings below and click 'Next' to continue. Mail Server Server part: 25 Provisioning Action Server contex, genon_sec Directory Monitoring user: contex, gimon_sec
When the configuration completes, click Finish to continue.	STEP 1 2 3 4 5 6 8 Commit Cancel Cirreix: CloudPortal Services Manager Image: Configuration Completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuration completel Image: Configuraticon completel
	 ✓ Create System OUs & Groups Configured ✓ Configure Queue Monitor Account Configured ✓ Configure Message Queues Configured ✓ Start Queue Monitor Service Configured ✓ Configure Directory Monitoring Account Configured ✓ Create Scheduled Tasks Configured
	STEP 1 2 3 4 5 6 7 O

Configure location

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Next, provision the location for this new private delivery site in Active Directory and the database. This task associates the new location with the existing Services Manager instance.

Instructions Visual	T ()	X7° 1
	Instructions	Visual

In CloudPortal Services Manager, click	×
Configure Location.	Citrix CloudPortal Services Manager
	Configure Remote Location
	Generate Deployment Configuration File Specify the database details of the Services Manager instance and generate the configuration file
	Install Server Roles Install prerequisites and server roles of CloudPortal Services Manager Select
	Configure Server Roles Specify configuration settings for server roles that have been deployed on this server. Select
	Configure Location Provision the new location in Active Directory and the database. Select
	< Back Exit
Enter the path to the configuration file (created	CITRIX CloudPortal Services Manager
earlier in the installation process).	
	Load Deployment Configuration File Specify the path to a configuration file created earlier. For new deployments, one will have been generated during creation of the
	databases. If adding a new location to an existing deployment, a new configuration file can be generated from Setup on the installation media.
	Configuration File: Chtemp\CPSMConfig.xml Browse
	STEP 1 2 3 4 Cancel
On the Specify Location Name Details page,	×
enter the name and description for the private	CITRIX CloudPortal Services Manager
delivery site, and the OU name and display name for the new tenant.	Specify Location Details A CloudPortal Services Manager location is the main unit of isolation between tenants and corresponds to an Active Directory
	domain or forest. Enter some basic information about the new location.
Note: content is loaded from previously	Name FI2LOCAL
specified configuration file. If this is not	Description: Location configured for FI2LOCAL Customers' Organizational Unit
prepared in the file, enter the appropriate values (e.g., Location Settings->Name).	Name: Customers Display name: Customers OU
Click Next.	
	STEP 1 2 3 4 < Back Next > Cancel

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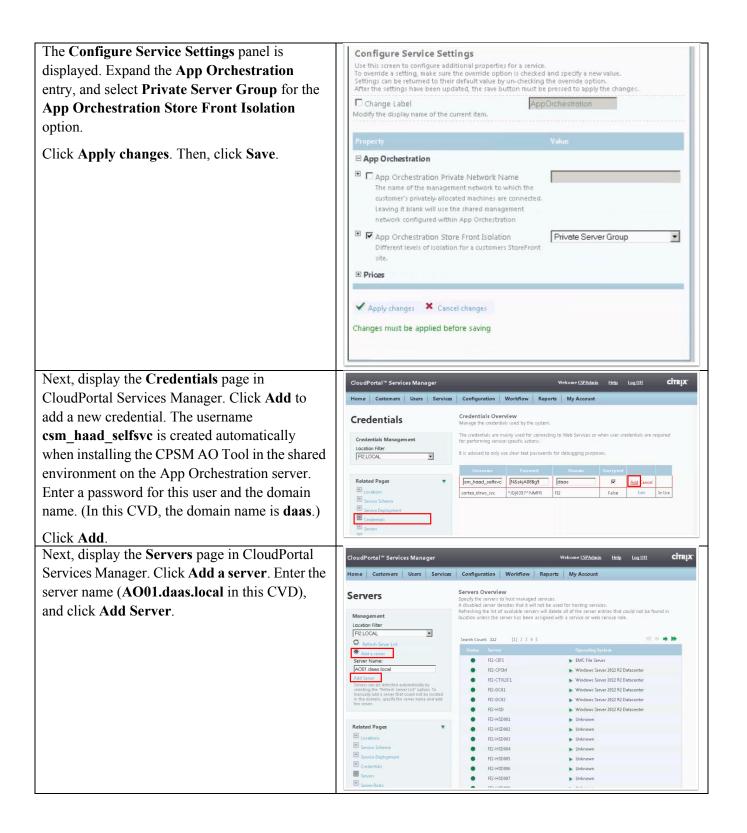
Confirm the information in the Summary .	×
Click Commit .	CitRIX CloudPortal Services Manager Summary Review the settings below and click 'Next' to continue. Iscation Settings Numer FIELOCAL
When the configuration completes, click Finish .	STEP 1 2 9 4 Commit Cancel
	Configuration Completel Configuration completed successfully. Please return to Autorun for any remaining tasks. • Save Location Settings • Configured • Argister Domain Controllers • Configured • Update Provisioning Engine • Configured • Update Provisioning Engine • Configured • Step 1 2 3 •

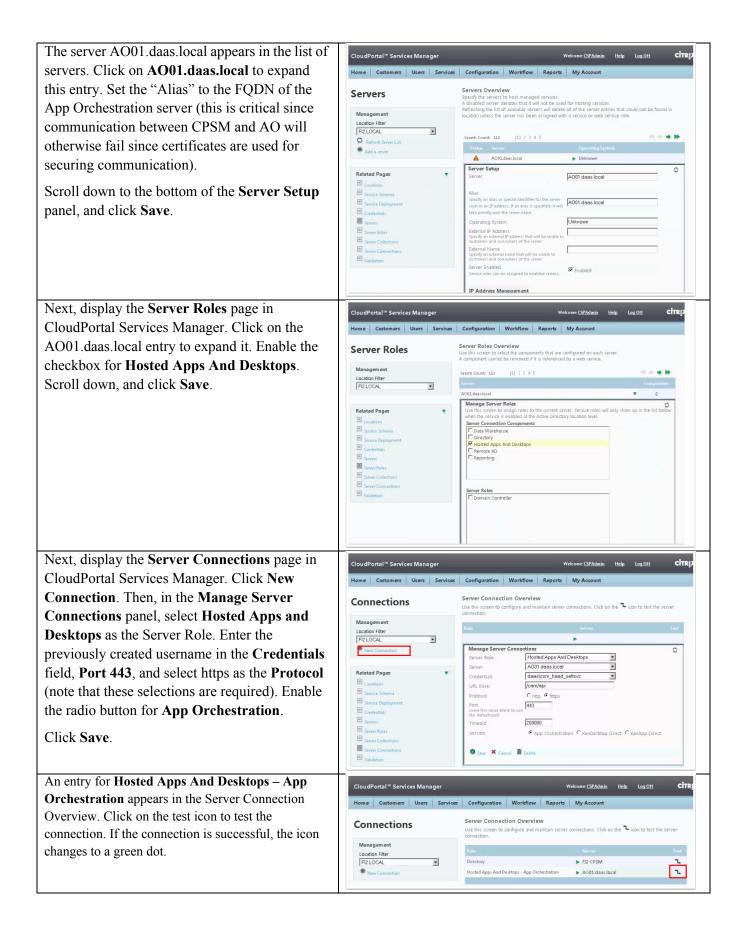
Configure Hosted Apps and Desktops Service

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Using CloudPortal Services Manager, configure the server, credentials, and server connections/roles for the Hosted Apps and Desktops service.







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Next, display the Service Deployment page in	CloudPortal ^{as} Services Manager Wekone (<u>SPAdmin Hop Log 01)</u>
CloudPortal Services Manager. Click on the	CloudPortal® Services Manager Wekene S284min Help Log.011 CITRIX Home Customers Users Services Configuration Workflow Reports My.Account
entry for Hosted Apps and Desktops to expand	
that entry, and then click Service Settings .	Services Deployment Services Overview Use this screen to configure settings, enable and deploy services in the control panel.
that entry, and then enex service settings.	Management Assigned Service
	C Top Environment Services Cutomer Portal Settings Active Directory Location Services Hosted Apps and Desktops
	Location Filter FI2LOCAL Filter FizLOCAL Filter FizLOCAL Filter FizLOCAL Filter FizLOCAL Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Filter Fi
	The service Carring be detected in the used by Countiers, such or supported strates.
	Related Pages Configure Service Settings Category Filter: Common Configure Service Settings Category Filter: Common Image: Category Filter: Common
	Service Schema To periods a strilling make sure the overfide option is detected and percept a new value. String: on the string of the street inservice option is detected and percept a new value. String: on the street inservice the street inservice and the street inservice option. After the setting is have been updated; the save button must be pressed to apply the danges.
	Createrial Servers Hosted Apps and Desk Hosted Apps and Desk Servers
	Servers ServerRoles Volve Volve
In the Configure Service Settings panel, scroll	Resource Path. It's only used if the administrator does
down and expand the App Orchestration entry.	not customize the Active Directory name upon creating a Resource. This group name MUST contain
Select FarmIso2 as the App Orchestration	{OfferingName} within the pattern
Datacenter.	Active Directory Resources Path Acomma separated path to an OU. This path will be
	the location within Active Directory where user
Click Apply changes.	groups are created for the "Resource" items under the HostedAppsandDesktops service. For example, to use
	the path "OU=HostedAppsandDesktops,OU=Services,
	OU= CortexSystem_DC= domain_DC= com* specify "HostedAppsandDesktops,Services,CortexSystem"
	C Service Message
	A description about the service
	ż.
	App Orchestration
	App Orchestration Datacenter Famlso2
	The Datacenter where all subscription for the Construction Reload Reload
	once the customer has been provisioned.
	Capp Orchestration Tenant Location Group (CustomerShortName) - AppOrches Name
	This is the name that will be used when generating a group in Active Directory for a customer being
	registered as a tenant within App Orchestration. This
	group name must be unique on a per customer basis.
	✓ Apply changes ★ Cancel changes
	Changes must be applied before saving
On the Location Service Configuration panel,	CloudPortal [®] Services Manager Wekome <u>(SPAdmin Help LogOff</u> Cl1
click Save.	Home Customers Users Services Configuration Workflow Reports My Account
	Service Deployment Services Overview Use this screen to configure settings, enable and deploy services in the control panel.
	Management Assigned Service
	Service Filter C Top Environment Services Customer Portal Settings
	Advie Directory Location Services Hosted Apps and Desitops V Location Filter Location Service Configuration O
	Fit2 LOCAL Manage the settings and sizes is feels for a service. The service cannot be deleted if it is used by customers, users or dependent services.
	Related Pages
	Locatoms Service Schema
	© Since Deployment Concel Deployment Concel Detete Concel Detete
	Servers Receller
	Server Roles

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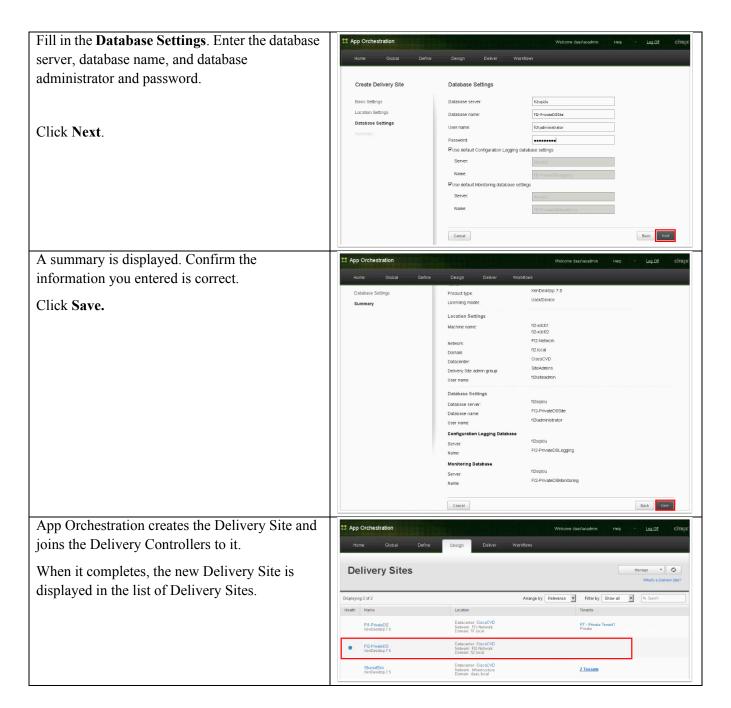
Configure Delivery Sites

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App Orchestration is used to create and configure a new private Delivery Site named **FI2-PrivateDS**. A Delivery Site consists of at least two Delivery Controllers (a primary Controller and a backup Controller). In this CVD, servers **fi2-xdc01** and **fi2-xdc02** are used as the Delivery Controllers for the private Delivery Site.

Instructions	Visual		
In the App Orchestration web console, display	23 App Orchestration		Welcome daastaoadmin Help - <u>Log Off</u> CÎTRIJK
the Delivery Sites.	Home Global Define	Design Deliver V	Vorkflows
Click Create new from the Manage menu.	Delivery Sites		Managa * O Dritki prev Agengale extrag
	Displaying 2 of 2		Arrange by: Relevance Filter by: Show all G. Search
	Health Name FII-PrivateDS	Location Datacenter: CiscoCVD	Tenants
	XenDesktop 7.5	Network: FI1-Network Domain: fi1.loc.al	PT - Private Tenant1 Private
	SharedSite XenDesktop 7.5	Datacenter: CiscoCVD Network: Infrastructure Domain: daas.local	2 Tenants
Fill in the Basic Settings information. In this	2 App Orchestration		Welcome dass\aoadmin Help - <u>Loo Of</u> CITRUX
example, the new Delivery site is named	Home Global Define	Design Deliver W	for Aflows
FI2-PrivateDS, and uses XenDesktop 7.5.			
	Create Delivery Site	Basic Settings	
Click Next.	Basic Settings	Name: Description:	F12-PrivateDS
	Database Settings	Version:	XenDesktop 7.5 VenDesktop 7.1 micludes XenApp
	oralision k	Licensing model:	User/Device 0
		Cancel	Next
Fill in the Location Settings information. Enter	22 App Orchestration		Welcome daaslaosadmin Help <u>Log Off</u> Citraja:
the machine name of the two servers to deploy as	Home Global Define		/orkflaws
Delivery Controllers to this Site (fi2-xdc01 ,			
fi2-xdc02), and specify the resource domain	Create Delivery Site	Location Settings	
(fi2-local) and datacenter (CiscoCVD) in which	Basic Settings Location Settings	Machine name:	fi2:xdx01 fi2:xdx02
they reside. Also enter the administrator group	Detabase Sattings Summary		Specify 2 or more machines that are children of the App Orchestration root OU in Active Directory
(SiteAdmins), user name (siteadmin), and		Network:	F12-Network
		Domain. Datacenter:	Q. fi2.local CiscoCVD ✓
password for the Site administrator.			Use different trusted domain
		Delivery Site admin group:	SteAdmins AD group with Full Admin rights to the Delivery Site. All Delivery Site Administrators must be part of this group.
		User name:	fi2\siteadmin
Click Next.			Must be a member of the Delivery Site activity group in Active Directory, and the local administrator group on machines used as Delivery Site controllers
		Password	
		Cancel	Back



Configure StoreFront Server Groups

This section describes configuration steps required to create a StoreFront Server Group and specify the servers to add to it. A Server Group consists of at least two StoreFront servers. StoreFront is Active/Active using load balancing. In this CVD, a StoreFront **FI2-PrivateSF** is created using servers **fi2-sf01** and **fi2-sf02**.

Instructions

Visual

In the App Orchestration web console, display the StoreFront Server Groups.	App Orchestration Hame Global Define	Design Deliver Wor	Welkome daashoodmin Heep <u>Log.05</u> Citteji x Milowa
Click the Add StoreFront Server Group	StoreFront Server Groups		
oution.	Displaying 2 of 2 Health Name	Location	Arrange by: Relevance Starch
	FI1-PrivateSF StoreFront 2.5	Datacenter: CiscoCVD Network: Fi1-Network Domain: fi1.local	PT - Private Tenant1 Private
	SharedSFGroup StoreFront 2.5	Datacenter: CiscoCVD Network: Infrastructure Domain: dass.local	2 Tenants
Fill in the Basic Settings information. Enter the name for the StoreFront (FI2-PrivateSF), SSL	App Orchestration Home Global Define	Design Deliver Wi	Wekcome daastaleadmin Help - Log.05 ciin Onfilowe
certificate information, and load balancer URL.	Add StoreFront Server Group	Basic Settings	
Click Next.	Basic Settings	Name:	F12-PrivateSF
		Assign SSL certificate:	C Use Existing @ Assign New
		SSL certificate friendly name:	wc_fi2.local
		SSL certificate location: Password	\\fi2-cpsm\aoshare\wc_fi2.local.pfx
		Load balancer URL:	https://storefront.fi2.local
		Cancel	Usik. Ned
Fill in the Location Settings information. Enter	2 App Orchestration		Welcome daaslaoadmin Help - Lo <u>s.Off</u> Cirt
the names of the two StoreFront servers	Hame Global Define	Design Deliver W	orkflows
(fi2-sf01, fi2-sf02) and the network	Add StoreFront Server	Location Settings	
(FI2-Network), resource domain (fi2.local), and	Group Basic Settings	Machine names:	fi2-sf01
datacenter (CiscoCVD) in which they reside.	Location Settings		fi2=sf02 Specify 2 or more machines that are children of the App Orchestration root OU in Active Directory
Click Next.	Summany	Network	F12-Network
chek Next.		Resource domain:	9. ft2.local
		Datacenter:	CiscoCVD •
		Cancel	Back
A summary is displayed. Confirm the information you entered is correct.	App Orchestration Home Global Define	Design Deliver Wo	Welcome daarlacadmin Help - Log_05 Cirrt
Click Save.	Add StoreFront Server Group	Summary	
	Basic Settings	Basic Settings Name:	FI2-PrivateSF
	Location Settings Summary	SSL certificate friendly name:	wc_fr2.local
		SSL certificate location: Load balancer URL:	\\Ifi2-cpsm\aoshare\wc_fi2.local.ptx https://storefront.fi2.local
		Leader Contract	
		Location Settings Machine name:	112-570 1
			fl2-sf02
		Domain	112. Jocal
		Domain: Datacenter: Network:	

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App Orchestration creates the new server group and adds the StoreFront servers to it.		o Orchestration	Welcome of Design Deliver Workflows	tasilaadmin Heip <u>Log Of</u> Cîtrej <i>e</i>
When this process completes, the new StoreFront Server Group is displayed in the list		oreFront Server Gro	oups	Add Store Front Server Group O What's a StoreFront Server Group? Arrange by: Reference O Scorch
of Server Groups.	Health	Name	Location	Tenants
T		FI1-PrivateSF StoreFront 2.5	Datacenter: CiscoCVD Network: FIT-Ketwork Domain: fit.local	PT - Private Tenant1 Private
	0	FI2-PrivateSF StoreFront 2.5	Datacenter: CiscoCVD Network: FI2-Network Domain: fI2-local	
		SharedSFGroup StoreFront 2.5	Datacenter: CiscoCVD Network: Infractructure Domain: daas.local	2 Tenants

Configure a Session Machine Catalog

App Orchestration is used to create and populate two Session Machine Catalogs. The first, **FI2-IsolatedHSD**, is used for delivering shared desktops to users in the private delivery site. The second, **FI2-IsolatedSVDI**, is used for delivering VDI sessions in the private delivery site.

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Instructions	Visual
In the App Orchestration web console, display	tt App Orchestration Velcome dass/basemin Herp - Log Off christy:
the current Session Machine Catalogs.	Home Global Define Design Deliver Workflows
Click Created externally from Use Machines	Session Machine Catalogs
menu.	Christia given at/ Provisioned on-demand
menu.	Disploying 4 of 4 Arrange by: Relevance Pitter by: Show all 9, Search
	Health Name Product CSP.5V/r Zer/Desiteo 7.5
	CSP-SV0. ADD/#34097-5 CSP-ShurveHSD XonDesitiop 7.5
	FIL-Isolated ISD Xer/Desitop 7.5
	FIT-IsolatedSV01 XanDesixtop 7.5
First, create the catalog for HSD. Fill in the	App Orchestration Welcome dearlucodmin Help - Log Off Citrage
Basic Settings information, specifying a name	Hume Global Define Design Deliver Workflows
(FI2-IsolatedHSD) for the Session Machine	Session Machine Catalog Basic Settings
Catalog and enabling the Multi User radio	Basic Settings Name: F2-Soliated+SD
button.	Advanced Statistips OS Type:
	** Niku User
Click Next.	
	Cancel
Fill in the Advanced Settings information.	t: App Orchestration Welcome data bloodmin Herp - Log Off citrapy
Change the Number of users allowed per	Home Global Define Design Deliver Workflows
machine to 50.	
machine to 50.	Session Machine Catalog Basic Settings Show Details
Note: this value of 50 is an example value only;	Basic Settings Advanced Settings
this value strongly depends on the sizing of the	Short name: 0 52/solatedh Edit
VMs.	Delivery controller type Xer0existo 7.5 Edit Xer0 existo 7.1 includes Xervlop
	Number of users allowed per machine.
Click Save.	Include OPU and memory: Virs Edit
	Cancel Buck Sove

Repeat, this time creating the catalog for VDI sessions.	App Orchestration Welcome dasabase Home Global Define Design Deliver Workflows	admin Help <u>Log.05</u> CİTRİX
Click Created externally from Use Machines	Session Machine Catalogs	
menu.	Displaying 5 of 5 Arrange by: Relevance Y Fil	Provisioned on-demand
	Heath Name CSP-SVD	Product XenDesktop 7.5
	FD-tolke#SD	XenDesktop 7.5
	CSP-SharedHSD	XenDesktop 7.5
	FH-IsolatedHSD FH-IsolatedHSD	XenDesktop 7.5 XenDesktop 7.5
Fill in the Basic Settings information, specifying	App Orchestration Welcome dashab	sermin Help - Log.05 Citraja:
a name (FI2-IsolatedSVDI) for the Session	Home Global Define Design Deliver Workflows	
Machine Catalog and enabling the Single User		
radio button.	Session Machine Catalog Basic Settings Basic Settings Name F2-toolsted700	
	Advanced Settings	
Click Next.	OS Type: C Multi User	
	Cancel	Next
Accept the defaults on the Advanced Settings	App Orchestration Welcome database	admin Help <u>Log Of</u> Cîtrejix
dialog.	Hame Global Define Design Deliver Workflows	
Click Save.	Session Machine Catalog Basic Settings Show Details	
	Basic Settings Advanced Settings Advanced Settings	
	Short name:	Edit
	Cancel	Back Save
Now that the catalogs are created, add session	Image: App Orchestration Welcome dasshop	admin Help - <u>Log Off</u> CÎTR <u>I</u> X.
machines to them.	Home Global Define Design Deliver Worldows	
Select the FI2-IsolatedHSD entry in the Session	Session Machine Catalogs	Use Machines
Machine Catalogs list.	Displaying 5 of 6 Arrange by: Referance Fil	ter by: Show all
	Heath Name	Product
	CSP-SVDr	XenDesktop 7.5
	Fi2-IsolatedSVDI	XenDesktop 7.5
	CSP-SharedHSD	XenDesktop 7.5
	Fit-Isolated*GD Fit-Isolated*GD	XenDesktop 7.5
Click the Add Machines button.		
Click the Add Machines button.	App Orchestration Welcome deschool	admin Help <u>Log.Off</u> CÎTR <u>I</u> X
	Home Global Define Design Deliver Workflows Session Machine Catalogs	
	FI2-IsolatedHSD Est Ast Machine	s Create New Version Delete
	Short name: fi2itsolatedh Froduct type: XenDesktop 7.5	
	Allocated: 0 Unallocated: 0 Version: 1 Ø Available applications are unknown. Add more machines.	
	Session Machines Officings Subscriptions Delivery Groups Displaying 0 of 0	9. Search
	No items.	

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Enter information in the Basic Settings dialog,	11 App Orchestration		Welcome dassNacadmin Help - Log Of CiTRUX
including the machine names, network, and	Home Global Define		Workflows
resource domain and datacenter in which these			
	Add Session Machines	Basic Settings	
session machines reside.	Basic Settings	Machine names:	F12-HSD001
Click Save.			FI2-HSD003
			FI2-HSD004
			Alt machines must be identically configured, including patchile and update applied
		Network	update scplied F12-Network
		Resource domain:	9, fi2.local
		Datacenter:	CiscoCVD -
		Cancel	Save
Repeat, this time adding machines to the SVDI	2 App Orchestration		Welcome daaslacadmin Help - <u>Log Off</u> CİTRİK
catalog. Select the FI2-IsolatedSVDI entry from	Home Global Define	Design Deliver	Workflows
the Session Machine Catalogs list.	Section Machine	Cataloga	Use Machines * O
C	Session Machine	Catalogs	What's a Session Machine Catalog?
	Displaying 6 of 6		Arrange by: Relevance 💌 Filter by: Show all 💌 Q. Starch
	Health Name		Product
	CSP-SVDI		XanDesktop 7.5
	FI2-IsolatedSVDI CSP-SharedHSD		XarDesktop 7.5 XarDesktop 7.5
	FI1-IsolatedHSD		XerDesktop 7.5
	FI1-IsolatedSVDI		XanDesktop 7.5
	FI2-IsolatedHSD		Xer/Desktop 7.5
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Chek the Aud Machines button.	Home Global Define	Design Deliver	vrekome daasadaamini reep <u>togsos</u> campa. Workflows
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	Displaying 6 of 6		Arrange by: Relevance 💌 Filter by: Show all 💌 🔍 Search
	Health Name		Product
	CSP-SVDI		XenDesktop 7.5
	FI2-IsolatedSVDI CSP-SharedHSD		XarDesktop 7.5 XarDesktop 7.5
	CSP-SharedHSD		XerDesktop 7.5
	FI1-IsolatedSVDI		XanDesktop 7.5
	FI1-IsolatedSVDI FI2-IsolatedHSD		
Enter information in the Basic Settings dialog			Xar/Desktop 7.5
Enter information in the Basic Settings dialog,	FI2-IsolatedHSD	Design Deliver	Xar/Desktop 7.5
Enter information in the Basic Settings dialog, including the machine names.	FD-Isolated+SD	Design Deliver	XenDexistop 7.5 XenDexistop 7.5 Welcome disaritoradmin Here - Log.Od Charga
	FD-Isolated+SD	Design Deliver Basic Settings	XenDexistop 7.5 XenDexistop 7.5 Welcome disaritoradmin Here - Log.Od Charga
including the machine names.	FI2-totale#CD ## App Orchestration Home Global Define		XenDexistop 7.5 XenDexistop 7.5 Welcome disaritoradmin Here - Log.Od Charga
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including the machine names.	FD-IndexePED	Basic Settings	XerDexktop 7.5 XerDexktop 7.5 Welcome dearlaasemm Hep <u>Log.02</u> chrupp Wortifiows
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including the machine names.	FD-IndexePED	Basic Settings Machine names Network:	YanDesister 7.5 WatCome dissibution Hap Log_GC Chapt Worthows Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates
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including the machine names.	FD-IndexePED	Basic Settings Machine names Machine names Machine names	YanDesister 7.5 WatCome dissibution Hap Log_GC Chapt Worthows Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates X Imp-shoates

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Configure Offerings

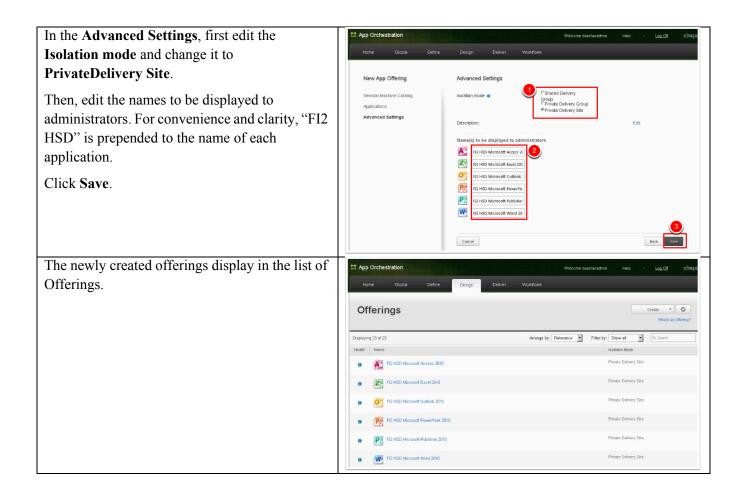
This section describes how to make applications and desktops (hosted on the Session Machines) available for tenant subscription. In this example, new offerings are added to the FI2-IsolatedHSD Session Machine Catalog. Then, a new customer (tenant) is added and given access to these offerings.

Create New Offering

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To create offerings, App Orchestration is used to specify the applications and desktops you want to include and the isolation level at which you want to provide the offering to tenants. In this example, a new offering is created in the FI2-IsolatedHSD session machine catalog.

Instructions	Visual	
In the App Orchestration web console, click	2 App Orchestration	Welcome daas\acadmin Help - Log.05 CiTRIX
Design->Offerings to display the current	Home Global Define	Design Deliver Workflows
offerings.	Offerings	Create * Q
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Then, from the Create menu, select Desktop	Displaying 17 of 17	Arrange by: Relevance 💌 Filter by: Show all 💌 🔍 Search
Offering.	Health Name	Isolation Mode Private Delivery Group
	Shared Adobe Reader X	
	Shared Microsoft Access 2010	Private Delivery Group
	Shared Microsoft Office Picture Mana	ager Private Delivery Group
The Session Machine Catalog is displayed.	22 App Orchestration	Welcome daastaosdmin Help - Log.Off ciTRIJK
Enable the radio button for the	Home Global Define	Design Deliver Worklows
FI2-IsolatedHSD Session Machine Catalog.	New App Offering	Session Machine Catalog
Click Next.	Session Machine Catalog	C CSP-SharedHSD Delvery corbolier type: Xer/Desktop 7.5 OS Type: Multi User
Cher Mat.	Applications	C FIT-IsolikiedHSD Delivery controllier type: XenDesktop 7.5 OS Type: Multi User
	Second of Contracts	C Fit-IsolatedBVDI Delivery controller hpie: XenDesktop 7.5 OS Type: Single User
		F12-IsolatedHSD Datwary controller type: XenDesktep 7.5 OS Type: Multi User
		C FI2-IsolatedSVDI Delvery controller type: XenDesktop 7.5 OS Type: Single User
		Cancel Root Koor
Scroll through the list of applications, and enable	2 App Orchestration	Welcome daastuosdmin Help - <u>Log Of</u> CITRUK
	Home Global Define	Design Deliver Warkflows
the checkboxes for the applications you want to		
include in this offering.	New App Offering	Applications
Click Next.	Session Machine Catalog	Instalted Apps Bystem Apps 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19 mentaled Dept 0+19
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		Kicrosoft SharePoint Workspace 2010 Strendburn
		Microsoft Word 2010 Services Device Optimizer
		I
		Cancel Back Kon



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Using CloudPortal Services Manager, view the offerings for the FI2.LOCAL domain.

Instructions	Visual
From the Services tab of CloudPortal Services	CloudPortal* Services Manager Wekone (<u>SPAdmin</u> Help: Log.Dtt CITRIX*
Manager, select Hosted Apps and Desktops	Home Customers Users Services Configuration Workflow Reports My Account
and then Offering Management.	Croup Management Connections Hosted Apps and Desktops Uter to accomp data accomp data accomp to the server Ick on the * Lon to test the server
	Management Location Filer Survey End of the Survey PLLOCAL Image: Survey FI2-CPSM Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey FI2-CPSM Image: Survey Image: Survey

Select the FI2.LOCAL from the Location menu CloudPortal[®] Services Manager Welcome <u>CSPAdmin Help Log Off</u> CITRIX to display the hosted apps and desktops for this Home Customers Users Services Configuration Workflow Reports My Acc location. Hosted Apps & Desktops cation: FI2.LOCAL Note that there are two offerings for Excel. Citrix Apps Non-Citrix Apps Resources Select All Configure Publich * Unce Because they have the same name, it's not Filter by: Private Delivery Site Q Search offering: Page 1 of 1 < > readily apparent which offering is for the Configured Offering Isolation Mode Used By FI2.Local location/HSD. Desktop Fil Private Delivery Site Desktop SVDI FI1 Private Delivery Site A Microsoft Access 2010 Private Delivery Site A Microsoft Access 2010 Private Delivery Site Microsoft Excel 2010 Private Delivery Site Microsoft Excel 2010 Private Delivery Site No N Microsoft OneNote 2010 Private Delivery Site 0 Microsoft Outlook 2010 Private Delivery Site 0 Microsoft Outlook 2010 Private Delivery Site R Microsoft PowerPoint 2010 No Private Delivery Site P. Microsoft PowerPoint 2010 Private Delivery Site R Microsoft Publisher 2010 Private Delivery Site

Edit Offering

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In this section, the newly created offerings are edited so that they have names that are more easily associated with the FI2-IsolatedHSD catalog. This is also useful for transparency in later CloudPortal Services Manager use.

Instructions	Visual	
In the App Orchestration web console Offerings	t App Orchestration Welcome deathaosdmin. Help	о <u>Log.Of</u> сіткіх:
list, select the FI2 HSD Microsoft Access 2010	Home Global Define Design Deliver Workflows	
offering.		
onenig.	Offerings	Create Create Vihat's an Offering?
	Displaying 23 of 23 Arrange by Relevance 🔹 Filter by Show all	Q. Search
	Health Name Isolation Mod	e
	FI2 HSD Microsoft Access 2010 Private Delive	ary Site
	K P2 HSD Microsoft Excel 2010 Private Defin	ery Site
	Private Deliv Private Deliv	ery Site
	Private Defin	ery Site
	Pinate Dativ Prinate Dativ	ery Site
	FI2 HSD Microsoft Weid 2010 Printe Date	ery Site
Click on the Edit button to edit this offering.	App Orchestration Welkome deathloadmin Height Home Global Define Design Deliver Workflows Cflinings Cflinings Deliver Workflows Deliver Workflows	9 - <u>Lo<u>2</u>.05 cîtrija</u>
	Ereite databases and programs to track and manage your information by using Microsoft Access. Bot amer Sector and the Control States Part RED Monsenet Access 2010 Partset Delivery Site Sectorargetops	eb Edit Capacity O
	Salado galaria Deplaying 0 of 0 No Rema.	Q. Search

Edit the settings for this offering. In this CVD, the Display name was changed to include "FI2 HSD". For example, "Microsoft Access 2010" was changed to "FI2 HSD Microsoft Access 2010".

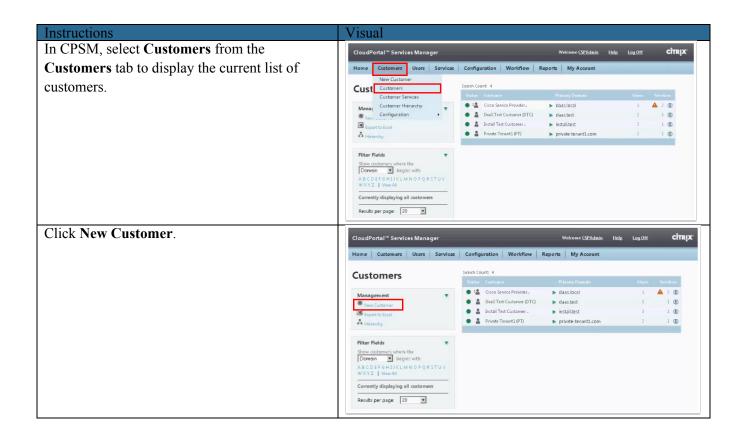
Click Save Offering.

Repeat this step for all other offerings. In this CVD, that includes Microsoft Excel, Outlook, PowerPoint, Publisher, and Word.

Basic Settings	Basic Settings		
	Name:	F12 HSD Microsoft Acces	
	Short name:	FI2 HSD Microsoft Access 2010	
	Display name	D Microsoft Access 2010	
	Description		
	Tooltip	Create databases and programs to	
		track and manage your information by using Microsoft Access.	
	Enabled	€ Yes	
		CNo, but still visible	
		CNo, and not visible	

Create New Customer

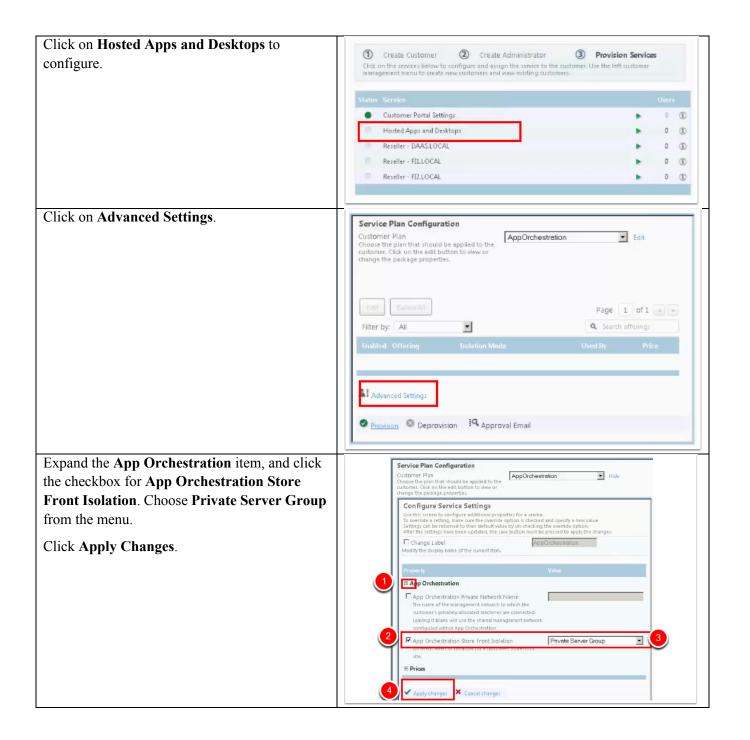
This section illustrated creating a new customer (tenant). To add a tenant, you create the tenant, create an administrator for this tenant, and provision services.



Enter Customer Details.	
In the Domain Management section, enter the domain name for this client. Click Update . Then, click Provision .	Create Customer • Create Customer • Create Administrator • Provision Services • Constance or construint automatically take you through the system by creating a new customer, • Provision Services • Customer oceation process will automatically take you through the system by creating a new customer, • Provision Services • Customer Details • Image Services • Provision • Customer Details • Image Services • Provision • Customer Details • Image Services • Provision • Customer Details • Image Services • Provision • Customer Details • Image Services • Provision • Custact Name * • Provision • Provision • Contact Name * • Provision • Provision • Contact Name * • Provision • Provision • Domain Managem ent • Provision • Provision <
Next, create the administrator for this new customer. Enter user details and password. Click Provision .	Create Customer Create Administrator The outstomer oreation process will automatically take you through the system by creating a new customer, the first administrator for the customer and finally assign services to the customer. UPN * edmin UPN * edmin I username * edmin Priz First Narmes * Last Narme * Private Tenanti2 Display Name * Admin Private Tenanti2 I dottomal User Properties Password Configuration Password * Confirm Password * Confirm Password * I confirm Password * Private Tenanti

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Click Provision .	Service Plan Configuration Customer Plan Choose the plan that should be applied to the customer. Click on the edit button to view or change the package properties. Edit Edit Select Adf
	Filter by: All Enabled Offering Enabled Offering Solution Mode Used By Price
When the provisioning for hosted apps and desktops completes successfully, the status light turns green.	CloudPortal * Services Manager Welcone CSEMain Lidity Log Diff Home Customers Users Services Configuration Workflow Reports My Account Customer Services Of Grada Customer Or create Administrator Provision Services For Private Tenant2 Of Grada Customer Or create Administrator Provision Services Customer Management Customer Portal Settings Of Grada Customer Private Tenant2 Intend Ages and Destitops 0 Private Tenant2 Rereller - PAASLOCAL 0 Private Tenant2 Rereller - RELOCAL 0

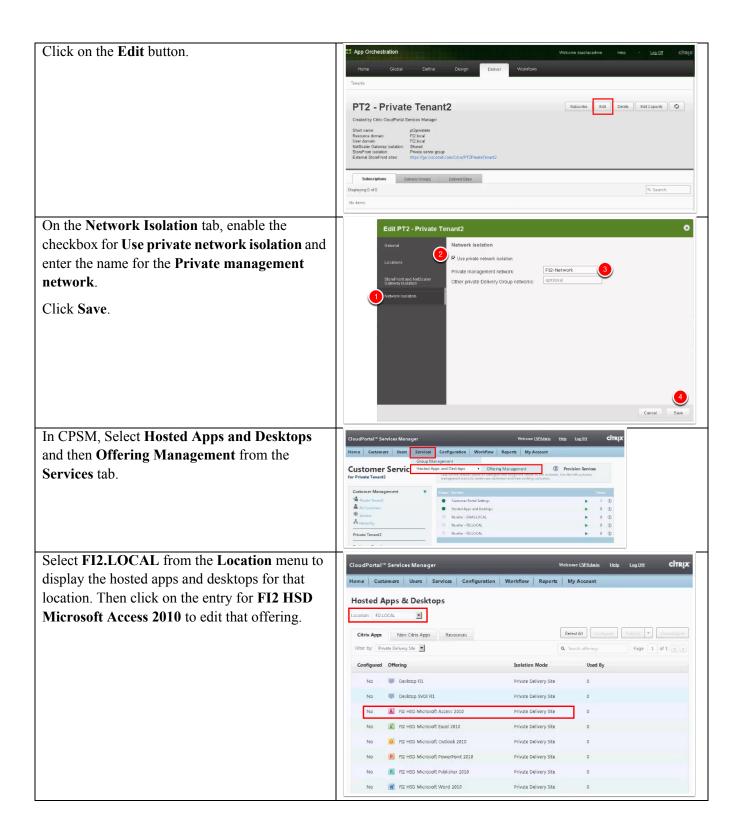
Configure Private Tenant

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After the new tenant is created, use App Orchestration to configure it. In this example, we configure the new tenant to use private network isolation.

Instructions	V	isual	
In the App Orchestration web console, click	u	App Orchestration	Welcome daaslacadmin Help - Lo <u>s OS</u> citrej <i>a</i> r
Deliver->Tenants to display the list of tenants.		Home Global Define Design t	Deliver Workflows
Click on the entry for PT2 – Private Tenant2 .		Tenants	Manage * O What's abrant?
	Dis	splaying 4 of 4	Arrange by: Relevance Filter by: Show all G, Search
	He	lealth Name	StoreFront Isolation
		DTC - DasS Test Customer Created by Citrix CloudPortal Services Manager	Shared site
		ITC - Install Test Customer Created by Citrix CloudPortal Services Manager	Shared site
		PT - Private Tenant1 Created by Citrix CloudPortal Services Manager	Phivate server group
		PT2 - Private Tenant2 Created by Citrix CloudPortal Services Manager	Private server group
	_		



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Enable the checkbox for Mark as private application . Enter the customer name ("Private Tenant2" in this example). Click Save .	Fight Price: Cost: Code: Allocate as default application Mark as private application Save Cancel
Now, the entry for the FI2 HSD Microsoft Access 2010 offering shows that it is configured and used by Private Tenant2. Repeat this configuration for other offerings. In this CVD, that includes Microsoft Excel, Outlook, PowerPoint, Publisher, and Word.	CloudPortal " Services Manager Wolcone (SEMain Holp Log Dit CitRix Home Customerz Users Services Configuration Workflow Reports My Account Home Customerz Users Services Configuration Workflow Reports My Account Home Customerz Users Services My Account Workflow Reports My Account Home Customerz Fill Services Services Page 1 of 1 Private Delivery Ser 0 No Desktop FR1 Private Delivery Ste 0 0 Private Delivery Ste 0 Yes Fiz HSD Microsoft Access 2010 Private Delivery Ste 0 0 Private Tenant2 No Fiz HSD Microsoft Excel 2013 Private Delivery Ste 0 0 0

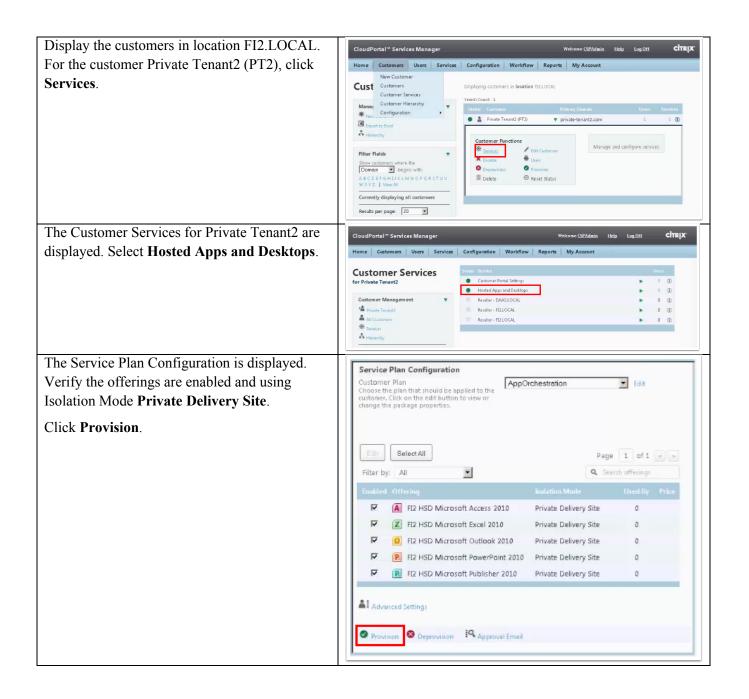
Configure Customer Services for Private Tenant

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Before provisioning the offerings to the customer, the following steps confirm that the offerings are provisioned to the customer.

Instructions	Visual



Configure Users for Private Tenant

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Instructions Visual In CPSM, display the Customer Services for CITRIX. CloudPortal[™] Services Manager Welcome <u>CSPAdmin Help Log Off</u> Private Tenant2. Home Customers Users Services Configuration Workflow Reports My Accou **Customer Services** Click Private Tenant2. 0 0 0 ① Customer Portal Settings for Private Tenant2 . Hosted Apps and Desktops Customer Management Reseller - DAASLOCAL 0 1 All Customers Reseller - FILLOCAL 0 1 Reseller - FI2.LOCA 0 1 A Hierarchy Private Tenant2 Customer Search 9 Search Information about Private Tenant2 is displayed. CITRIX CloudPortal[®] Services Manager Welcome <u>CSPAdmin Help Log Off</u> Home Customers Users Services Configuration Workflow Reports My Ac Click Users. Customers Displaying customers with ID 5 and in location FI2.LOCA Search Count: 1 Management Status * ... A Private Tenant2 (PT2) private-tenant2.com 1 Export to Excel A Hierarchy Customer Functions View and manage the users for this * Services Filter Fields Users Provision X Disable Show customers where the Domain Degins with: A B C D E F G H J K L M N O P Q R S T O V W X V Z View Ali S Deprovision Reset Status 🗊 Delete Currently displaying all customers Click New User to start adding a new user. CloudPortal[™] Services Manage CITRIX. Home Customers Users Services Configuration Workflow Reports My Ac Search Count: 1 Users for Private Tenant2 Admin Private Tenant2 admin@private-tenant2.com 0 0 Management * <u>New User</u> New Template User Beport To Excel 1 Bulk User in

Next, add and configure a user for Private Tenant2.

Enter user details and password information.	
Click Provision .	Create User Provision Services The user creation process will automatically take you to the user services screen once the user's account has
	been greated.
	User Details
	UPN * user1 @ private-tenant2.com
	Username * user1 _PT2
	First Names * User Last Name * One
	Display Name * User One
	Additional User Properties
	Password Configuration
	Password *
	Confirm Password *
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	Account Settings
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	Provision × Cancel IQ Approval Email
The User Service Setup screen is displayed.	Status Service
Enable the checkboxes for the offerings this user	Hosted Apps and Desktops
will subscribe to.	User Service Setup
Click Provision .	Enabled User Plan
CIICK Provision.	C Default
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	Filter by: All Q Search offerings Page 1 of 1
	Subscribe Offering Image: Contract of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second
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	FI2 HSD Microsoft Publisher 2010
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Test Setup, Configurations, and Results

In this project, we tested the functionality of provisioning 10 separate tenants with differing tenant models ranging from a shared infrastructure and workload server model to completely isolated tenants running on their own dedicated hardware and infrastructure.

Login VSI

We utilized Login VSI version 3.7 to configure a test that allowed us to have 10 separate tenants with up to 2000 users login simultaneously. We used the custom command .csv file option to have separate users from separate domains able to participate in a single test.

Since this was not a performance load test, no CPU or VSIMax graphs will be included in this paper.

Cisco UCS Test Configuration for Testing Tenant Offering Access

For our testing we provisioned our users as follows.

- 4 tenants with 50 users each to share the common infrastructure.
- 1 tenant with 100 users to share the common infrastructure.
- 2 tenants with 150 users each to share the common infrastructure.
- 1 tenant with 200 users in a private isolation model with dedicated hosts and infrastructure.
- 1 tenant with 500 users running on shared infrastructure but dedicated hardware.
- 1 tenant with 700 users in a private isolation model with dedicated hosts and infrastructure.

Hardware components

- 2 X Cisco UCS B200-M3 (E5-2650v2) blade servers with 256 GB of memory (16 GB X 16 DIMMS @ 1866 MHz) Infrastructure Servers
- 14 X Cisco UCS B200-M3 (E5-2680 @ 2.8 GHz) blade servers with 256 GB of memory (16 GB X 16 DIMMS @ 1866 MHz) to run SVDI and RDS workloads on.
- 1X VIC1240 Converged Network Adapter/Blade (B200 M3)
- 2 X Cisco UCS 6248UP Fabric Interconnects
- 2 X Cisco Nexus 5548UP Access Switches
- 1 X EMC VNX5600 system with 32 x 600GB SAS drives, 24 x 2TB Near Line SAS Drives, 3 x 100GB Flash Drives (Fast Cache) including hot spares.

Software components

- Cisco UCS firmware 2.2(2c)
- Cisco UCS Director 4.2Cisco Nexus 1000V virtual distributed switch
- VMware ESXi 5.5 Hosts
- Citrix XenDesktop 7.5 Server VDII Desktops and RDS Hosted Shared Desktops
- Citrix Provisioning Server 7.1
- Citrix User Profile Manager
- Microsoft Windows Server 2012 R2 64 bit, 1vCPU, 1.5 GB RAM, 24 GB hard disk/VM

Microsoft Windows Server 2012 R2 64 bit , 4 vCPU, 16GB RAM, 50 GB hard disk/VM

Testing Methodology and Success Criteria

All validation testing was conducted on-site within the Cisco labs in San Jose, California.

The testing results focused on pure functionality of the Citrix DaaS Provisioning process, new tenant on-boarding and the ability of 2000 users spread across 10 different tenants being able to login simultaneously.

The figure below shows the Citrix Studio results during the test of the shared DaaS tenants. Tenants 3-7 have 2 Delivery Groups each with 90% of their users on Hosted Shared Desktops and 10% on Server VDI desktops.

CITRIX				
Delivery Groups Applications (0)				
Delivery Group	Machine type	No. of machines	Sessions in use	No. of ap
ciscocvd-sharedtenan1-st4st4-PW-DA State: Enabled	Windows Desktop OS	5 Unregistered: 0	5 Disconnected: 0	
ciscocvd-sharedtenan1-st6st6-PW-DA State: Enabled	Windows Desktop OS	5 Unregistered: 0	5 Disconnected: 0	
ciscocvd-sharedtenan1-st8st8-PW-DA State: Enabled	Windows Desktop OS	15 Unregistered: 0	14 Disconnected: 0	
ciscocvd-sharedtenan1-st9st9-PW-DA State: Enabled	Windows Desktop OS	15 Unregistered: 0	15 Disconnected: 0	
ciscocvd-sharedtenan1-st7st7-PW-DA State: Enabled	Windows Desktop OS	10 Unregistered: 0	10 Disconnected: 0	
ciscocvd-sharedtenan1-st5st5-PW-DA State: Enabled	Windows Desktop OS	5 Unregistered: 0	5 Disconnected: 0	
ciscocvd-sharedtenan1-st3st3-PW-DA State: Enabled	Windows Desktop OS	5 Unregistered: 0	5 Disconnected: 0	
ciscocvd-sharedtenan1-st10st10-PW-DA State: Enabled	Windows Desktop OS	50 Unregistered: 0	47 Disconnected: 0	
ciscocvd-sharedtenant-st5st5-PW-DA State: Enabled	Windows Server OS	2 Unregistered: 0	42 Disconnected: 0	
ciscocvd-sharedtenant-st6st6-PW-DA State: Enabled	Windows Server OS	2 Unregistered: 0	45 Disconnected: 0	
ciscocvd-sharedtenant-st7st7-PW-DA State: Enabled	Windows Server OS	3 Unregistered: 0	88 Disconnected: 0	
ciscocvd-sharedtenant-st9st9-PW-DA State: Enabled	Windows Server OS	5 Unregistered: 0	134 Disconnected: 0	
ciscocvd-sharedtenant-st8st8-PW-DA State: Enabled	Windows Server OS	5 Unregistered: 0	134 Disconnected: 0	
ciscocvd-sharedtenant-st4st4-PW-DA State: Enabled	Windows Server OS	2 Unregistered: 0	45 Disconnected: 0	
ciscocvd-sharedtenant-st3st3-PW-DA State: Enabled	Windows Server OS	2 Unregistered: 0	44 Disconnected: 0	
ciscocvd-sharedtenant-st10st10-PW-DA State: Enabled	Windows Server OS	18 Unregistered: 0	448 Disconnected: 0	

The figure below shows the Studio results for our Private Isolated Tenant 1 model. They had a total of 200 users with 90% using Hosted Shared Desktops and 10% using Server VDI Desktops.

chine Catalogs					
ivery Groups Delivery Groups Applications (0)					
icies Delivery Group	+	Machine type	No. of machines	Sessions in use	No. of
farmiso1-fi1hsd-ptprivateten-PF-DA State: Enabled		Windows Server	7 Unregistered: 0	178 Disconnected: 0	
farmiso1-fi1svdi-ptprivateten-PF-DA State: Enabled		Windows Deskto	20 Unregistered: 0	20 Disconnected: 0	
V Publishing					

The figure below shows the Studio results for our Private Isolated Tenant 2 model. They had a total of 700 users with 90% using Hosted Shared Desktops and 10% using Server VDI Desktops.

farmiso2-fi2svdi-pt2privatete-PF-DA Windows Desktop OS 70	ps Delivery Groups Applications (0)			
State: Enabled Unregistered: 0 Disconne farmiso2-fi2svdi-pt2privatete-PF-DA Windows Desktop OS 70	Delivery Group	Machine type	No. of machines	Sessions in use
		Windows Server OS		62 Disconnected:
State: Enabled Unregistered: 0 Disconne	farmiso2-fi2svdi-pt2privatete-PF-DA State: Enabled	Windows Desktop OS	70 Unregistered: 0	7 Disconnected:
			-	

Scalability Considerations and Gudelines

There are many factors to consider when you begin to scale beyond 2000 Users, two chassis 8 mixed workload SVDI/HSD host server configuration, which this reference architecture has successfully tested. In this section we give guidance to scale beyond the 2000 user system.

Cisco UCS System Scalability

As our results indicate, we have proven linear scalability in the Cisco UCS Reference Architecture as tested.

- Cisco UCS 2.2(2c) management software supports up to 20 chassis within a single Cisco UCS domain on our second generation Cisco UCS Fabric Interconnect 6248 and 6296 models. Our single UCS domain can grow to 160 blades.
- With Cisco UCS 2.2(2c) management software, released in May 2014, each UCS 2.2(2c) Management domain is extensibly manageable by UCS Central, our new manager of managers, vastly increasing the reach of the UCS system.

- As scale grows, the value of the combined UCS fabric, Nexus physical switches and Nexus virtual switches increases dramatically to define the Quality of Services required to deliver excellent end user experience 100% of the time.
- To accommodate the Cisco Nexus 5500 upstream connectivity in the way we describe in the LAN and SAN Configuration section, we need two Ethernet uplinks to be configured on the Cisco UCS Fabric interconnect. And based on the number of uplinks from each chassis, we can calculate number of desktops can be hosted in a single UCS domain. Assuming eight links per chassis, four to each 6248, scaling beyond 10 chassis would require a pair of Cisco UCS 6296 fabric interconnects.
- A 25,000 virtual desktop building block, managed by a single UCS domain, with its support infrastructure services can be built out from the RA described in this study with eight links per chassis and 152 Cisco UCS B200 M3 Servers and 8 infrastructure blades configured per the specifications in this document in 20 chassis.

Of course, the backend storage has to be scaled accordingly, based on the IOP considerations as described in the EMC scaling section. Please refer the EMC section that follows this one for scalability guidelines.

Citrix DaaS Scalability Considerations

Citrix Desktop-as-a Service (DaaS) environments can scale to large numbers of tenants and users, especially given the simplicity of provisioning and managing the provider environment with the combined solution of Citrix App Orchestration and CloudPortal Services Manager.

For this CVD, the environment was configured to support, overall, 2000 users and 10 tenants. The distribution of Hosted Shared Desktops (HSD) and Server VDI desktops (SVDI) followed a ratio of 90% HSD and 10% SVDI, which is common is many real-world customer deployments.

When implementing Citrix DaaS with Citrix XenDesktop 7.5, system architects should carefully consider a number of factors, including the following:

- The number and types of tenants and whether each tenant uses a shared or private delivery site
- Types of desktops that will be deployed and the quantity of each type (HSD and SVDI)
- Types of storage in the environment
- Data protection requirements
- Write cache size and placement for pooled desktops

When designing a solution based on this CVD environment, it's recommended that solution architects follow the best practices used in this CVD's implementation:

- Use an N+1 schema for the virtualization host servers to provide resiliency. In the CVD environment, all host servers were configured with N+1 redundancy.
- Configure network adapters on all Provisioning Servers using static IP addresses. Separate management networks for these servers should also be configured.

EMC VNX5600 Storage Guidelines for Mixed Desktops Virtualization Workload

Sizing VNX storage system to meet virtual desktop IOPS requirement is a complicated process. When an I/O reaches the VNX storage, it is served by several components such as Data Mover (NFS), backend dynamic random access memory (DRAM) cache, FAST Cache, and disks. To reduce the complexity, EMC recommends using a building block approach to scale to thousands of virtual desktops.

For more information on storage sizing guidelines to implement your end-user computing solution on VNX unified storage systems, refer to the EMC VSPEX sizing tool portal.

Cisco Reference Doucments

Cisco Unified Computing System Manager Home Page

http://www.cisco.com/en/US/products/ps10281/index.html

Cisco UCS B200 M3 Blade Server Resources http://www.cisco.com/en/US/products/ps10280/index.html

Cisco UCS 6200 Series Fabric Interconnects http://www.cisco.com/en/US/products/ps11544/index.html

Cisco Nexus 5500 Series Switches Resources http://www.cisco.com/en/US/products/ps9670/index.html

Download Cisco UCS Manager and Blade Software Version 2.2(2c)

https://software.cisco.com/download/release.html?mdfid=283612660&softwareid=283655658&r elease=2.2%283e%29&relind=AVAILABLE&rellifecycle=&reltype=latest

Cisco UCS Director Resources

http://www.cisco.com/c/en/us/support/servers-unified-computing/ucs-director/tsd-products-suppo rt-series-home.html

Citrix Reference Documents

Citrix Product Downloads http://www.citrix.com/downloads/xendesktop.html

Citrix Knowledge Center

http://support.citrix.com

Citrix documentation http://www.citrix.com/edocs

XenApp 7.5 and XenDesktop 7.5 Documentation http://support.citrix.com/proddocs/topic/xenapp-xendesktop/cds-xenapp-xendesktop-75-landing.html

Citrix Provisioning Services http://support.citrix.com/proddocs/topic/provisioning-7/pvs-provisioning-7.html

Citrix XenDesktop 7.5 Reviewer's Guide (describes how to set up an evaluation) http://www.citrix.com/content/dam/citrix/en_us/documents/products-solutions/xendesktop-reviewers-g uide.pdf

Citrix App Orchestration 2.5 Documentation http://support.citrix.com/proddocs/topic/app-orchestration/cao-app-orchestration-25-landing.html

Known Issues for App Orchestration 2.5

<u>Terminology in App Orchestration 2.5</u> <u>Getting Started with Citrix App Orchestration 2.5</u> <u>Configuring SSL for App Orchestration 2.5</u> <u>Deploying the Zero Trust Agent in App Orchestration 2.5</u>

CloudPortal Services Manager Documentation http://support.citrix.com/proddocs/topic/cloudportal/ccps-services-manager.html

Known Issues for CloudPortal Services Manager

Login VSI http://www.loginvsi.com/documentation/

EMC References

- EMC VSPEX End User Computing Solution Overview
- EMC VSPEX End-User Computing: Citrix XenDesktop 7 and VMware vSphere for up to 2,000 Virtual Desktops Design Guide
- EMC VSPEX End-User Computing: Citrix XenDesktop 7 and VMware vSphere for up to 2,000 Virtual Desktops Implementation Guide
- EMC VSPEX End-User Computing: Citrix XenDesktop 7 and Microsoft Hyper-V for up to 2,000 Virtual Desktops Design Guide
- EMC VSPEX End-User Computing: Citrix XenDesktop 7 and Microsoft Hyper-V for up to 2,000 Virtual Desktops Implementation Guide

VMware References

VMware vCenter Server

http://www.vmware.com/products/vcenter-server/

VMware VSphere http://www.vmware.com/products/vsphere/

Appendix A Nexus 5548UP Configurations

N5548UP-A Configuration

ſ

version 5.1(3)N2(1)	
feature fcoe	
hostname N5KA-EXC	
feature npiv	
no feature telnet	
no feature http-server	
cfs eth distribute	
feature interface-vlan	
feature hsrp	
feature lacp	
feature dhcp	
feature vpc	
feature lldp	
username admin password 5 \$1\$6sb7/rvC\$ds.AAWPP3DFjJu.7VBd35/	role network-admin
no password strength-check	
ip domain-lookup	
logging event link-status default	
ip access-list VLAN77	
10 permit ip 10.77.0.0/24 any	
20 deny ip any any	
class-map type qos class-fcoe	
class-map type qos match-all VLAN77	
match access-group name VLAN77	
class-map type queuing class-fcoe	
match qos-group 1	
class-map type queuing class-all-flood	
match qos-group 2	
class-map type queuing class-ip-multicast	
match qos-group 2	
policy-map type qos VLAN77	
class VLAN77	
class class-default	
class-map type network-qos class-fcoe	
match qos-group 1	
class-map type network-qos class-all-flood	
match qos-group 2	
class-map type network-qos class-ip-multicast	
match qos-group 2	
policy-map type network-qos jumbo	

```
class type network-gos class-default
    mtu 9216
   multicast-optimize
system gos
  service-policy type queuing input fcoe-default-in-policy
  service-policy type queuing output fcoe-default-out-policy
  service-policy type gos input fcoe-default-in-policy
  service-policy type network-qos jumbo
slot 2
 port 1-8 type ethernet
 port 9-16 type fc
snmp-server user admin network-admin auth md5 0xcb74bb1d86558f73d4d8688660b53c49
priv 0xcb74bb1d86558f73d4d8688660b53c49 localizedkey
vrf context management
spanning-tree port type edge default
spanning-tree vlan 1-3967 priority 24576
service dhcp
ip dhcp relay
vpc domain 210
  role priority 1
 peer-keepalive destination 10.60.0.9
vsan database
  vsan 1 name "default"
device-alias database
  device-alias name CH1-BL5 pwwn 20:00:00:25:b5:03:00:05
  device-alias name CH1-BL6 pwwn 20:00:00:25:b5:03:00:03
  device-alias name CH1-BL7 pwwn 20:00:00:25:b5:03:00:02
  device-alias name CH2-BL5 pwwn 20:00:00:25:b5:03:00:04
  device-alias name CH2-BL6 pwwn 20:00:25:b5:03:00:01
  device-alias name CH2-BL7 pwwn 20:00:00:25:b5:03:00:00
  device-alias name Infral-A pwwn 20:00:00:25:b5:03:00:1f
  device-alias name Infra2-A pwwn 20:00:00:25:b5:03:00:1e
  device-alias name vnx5600 SPA 22 pwwn 50:06:01:63:08:64:2f:88
  device-alias name vnx5600 SPB 23 pwwn 50:06:01:6b:08:64:2f:88
  device-alias name SP-CH2-BL1 vHBA1 pwwn 20:00:00:25:b5:f2:20:03
  device-alias name SP-Shared-2 vHBA1 pwwn 20:00:00:25:b5:f2:20:05
  device-alias name SP-Shared-3_vHBA1 pwwn 20:00:00:25:b5:f2:20:07
  device-alias name SP-Shared-4_vHBA1 pwwn 20:00:00:25:b5:f2:20:01
  device-alias name SP-Shared-5 vHBA1 pwwn 20:00:00:25:b5:f2:20:09
  device-alias name SP-Shared-6_vHBA1 pwwn 20:00:00:25:b5:f2:20:0b
  device-alias name SP-Shared-7 vHBA1 pwwn 20:00:00:25:b5:f2:20:0d
  device-alias name SP-FarmIso-T1-1 vHBA1 pwwn 20:00:00:25:b5:f2:20:11
  device-alias name SP-FarmIso-T1-2 vHBA1 pwwn 20:00:00:25:b5:f2:20:0f
  device-alias name SP-FarmIso-T1-3 vHBA1 pwwn 20:00:25:b5:f2:20:13
  device-alias name SP-FarmIso-T2-1 vHBA1 pwwn 20:00:25:b5:f2:20:15
  device-alias name SP-FarmIso-T2-2 vHBA1 pwwn 20:00:00:25:b5:f2:20:17
  device-alias name SP-FarmIso-T2-3 vHBA1 pwwn 20:00:00:25:b5:f2:20:19
  device-alias name SP-FarmIso-T2-4 vHBA1 pwwn 20:00:00:25:b5:f2:20:1b
device-alias commit
fcdomain fcid database
```

vsan 1 wwn 21:00:00:24:ff:68:1d:dc fcid 0x940000 dynamic vsan 1 wwn 21:00:00:24:ff:68:2d:d4 fcid 0x940001 dynamic vsan 1 wwn 20:1f:54:7f:ee:f8:02:80 fcid 0x940002 dynamic vsan 1 wwn 20:20:54:7f:ee:f8:02:80 fcid 0x940003 dynamic vsan 1 wwn 20:00:00:25:b5:03:00:03 fcid 0x940011 dynamic

```
[CH1-BL6]
 vsan 1 wwn 20:00:00:25:b5:03:00:02 fcid 0x940012 dynamic
             [CH1-BL7]
н
 vsan 1 wwn 20:00:00:25:b5:03:00:00 fcid 0x940013 dynamic
1
            [CH2-BL7]
 vsan 1 wwn 20:00:00:25:b5:03:00:05 fcid 0x940014 dynamic
             [CH1-BL5]
 vsan 1 wwn 20:00:00:25:b5:03:00:01 fcid 0x940015 dynamic
             [CH2-BL6]
.
 vsan 1 wwn 20:4c:54:7f:ee:77:74:c0 fcid 0x940018 dynamic
  vsan 1 wwn 50:06:01:6b:08:64:2f:88 fcid 0x9400ef dynamic
             [vnx5600 SPB 23]
1
 vsan 1 wwn 50:06:01:63:08:64:2f:88 fcid 0x9401ef dynamic
1
             [vnx5600_SPA_22]
 vsan 1 wwn 20:00:00:25:b5:f2:20:01 fcid 0x940019 dynamic
н
             [SP-Shared-4 vHBA1]
 vsan 1 wwn 20:4b:54:7f:ee:77:74:c0 fcid 0x940016 dynamic
 vsan 1 wwn 20:00:00:25:b5:f2:20:1b fcid 0x940017 dynamic
             [SP-FarmIso-T2-4 vHBA1]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:03 fcid 0x94001a dynamic
             [SP-CH2-BL1 vHBA1]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:05 fcid 0x94001b dynamic
             [SP-Shared-2 vHBA1]
ï
 vsan 1 wwn 20:00:00:25:b5:f2:20:07 fcid 0x94001c dynamic
             [SP-Shared-3 vHBA1]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:09 fcid 0x94001d dynamic
            [SP-Shared-5 vHBA1]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:0b fcid 0x94001e dynamic
1
            [SP-Shared-6 vHBA1]
 vsan 1 wwn 20:00:00:25:b5:f2:20:0d fcid 0x94001f dynamic
             [SP-Shared-7 vHBA1]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:0f fcid 0x940020 dynamic
             [SP-FarmIso-T1-2 vHBA1]
1
  vsan 1 wwn 20:00:00:25:b5:f2:20:11 fcid 0x940021 dynamic
             [SP-FarmIso-T1-1 vHBA1]
 vsan 1 wwn 20:00:00:25:b5:f2:20:13 fcid 0x940022 dynamic
             [SP-FarmIso-T1-3 vHBA1]
 vsan 1 wwn 20:00:00:25:b5:f2:20:15 fcid 0x940023 dynamic
             [SP-FarmIso-T2-1 vHBA1]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:17 fcid 0x940024 dynamic
            [SP-FarmIso-T2-2 vHBA1]
 vsan 1 wwn 20:00:00:25:b5:f2:20:19 fcid 0x940025 dynamic
1
             [SP-FarmIso-T2-3 vHBA1]
 vsan 1 wwn 20:00:00:25:b5:f2:20:1d fcid 0x940026 dynamic
 vsan 1 wwn 20:00:00:25:b5:f2:20:21 fcid 0x940027 dynamic
 vsan 1 wwn 20:00:00:25:b5:f2:20:1f fcid 0x940028 dynamic
 vsan 1 wwn 21:00:00:24:ff:57:fa:c1 fcid 0x94002b dynamic
interface Vlan1
 no shutdown
interface Vlan70
```

no shutdown description SP Pod Management no ip redirects

```
ip address 10.70.0.2/24
 hsrp version 2
 hsrp 70
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.70.0.1
interface Vlan71
 no shutdown
 description SP Pod Infrastructure
 no ip redirects
 ip address 10.71.0.2/21
 hsrp version 2
 hsrp 71
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.71.0.1
  ip dhcp relay address 10.71.0.10
interface Vlan72
 no shutdown
 description SP Pod Storage
 no ip redirects
 ip address 10.72.0.2/24
 hsrp version 2
 hsrp 72
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.72.0.1
interface Vlan73
 no shutdown
 description SP Pod VMotion
 no ip redirects
 ip address 10.73.0.2/24
 hsrp version 2
 hsrp 73
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.73.0.1
interface Vlan74
 no shutdown
 description SP Pod Shared Tenant
 no ip redirects
 ip address 10.74.0.2/24
 hsrp version 2
 hsrp 74
   preempt delay minimum 240
   priority 130
   timers 1 3
```

```
ip 10.74.0.1
interface Vlan75
 no shutdown
 description SP Pod Server Isolation Tenant
 no ip redirects
 ip address 10.75.0.2/24
 hsrp version 2
 hsrp 75
   preempt delay minimum 240
   priority 130
   timers 1 3
    ip 10.75.0.1
interface Vlan76
 no shutdown
 description SP Pod Farm Isolation Tenant 1
 no ip redirects
 ip address 10.76.0.2/24
 hsrp version 2
 hsrp 76
   preempt delay minimum 240
   priority 130
    timers 1 3
    ip 10.76.0.1
  ip dhcp relay address 10.76.0.10
interface Vlan77
 no shutdown
  description SP Pod Farm Isolation Tenant 2
 no ip redirects
 ip address 10.77.0.2/24
 hsrp version 2
 hsrp 77
   preempt delay minimum 240
   priority 130
   timers 1 3
    ip 10.77.0.1
  ip dhcp relay address 10.77.0.10
interface Vlan78
  description SP Pod DMZ
  ip address 10.78.0.2/24
 hsrp version 2
 hsrp 78
   preempt delay minimum 240
   priority 130
    timers 1 3
    ip 10.78.0.1
interface Vlan79
 no shutdown
  description UCS Director PXE
  ip address 10.79.0.2/24
 hsrp version 2
 hsrp 79
```

I

```
preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.79.0.1
interface port-channel1
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type network
 vpc peer-link
interface port-channel15
  description VNX-DM3-0
  switchport mode trunk
  switchport trunk allowed vlan 72
  spanning-tree port type edge trunk
 vpc 15
interface port-channel16
 description VNX-DM2-0
  switchport mode trunk
  switchport trunk allowed vlan 72
  spanning-tree port type edge trunk
 vpc 16
interface port-channel17
 description FI-A-Uplink-Launcher
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 17
interface port-channel20
  description FI-B-Uplink-Launcher
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 20
interface port-channel21
 description FI-A-Uplink-SP
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,801
  spanning-tree port type edge trunk
 vpc 21
interface port-channel24
  description FI-B-Uplink-SP
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 24
interface port-channel25
  description FI-A-Uplink-HyperV
```

```
switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 25
interface port-channel28
  description FI-B-Uplink-HyperV
  switchport mode trunk
 switchport trunk allowed vlan 1,60-66,70-82,701,801
 spanning-tree port type edge trunk
 vpc 28
vsan database
 vsan 4094 interface vfc13
 vsan 4094 interface vfc14
interface fc2/9
 no shutdown
interface fc2/10
 no shutdown
interface fc2/11
 no shutdown
interface fc2/12
 no shutdown
interface fc2/13
 no shutdown
interface fc2/14
 no shutdown
interface fc2/15
  switchport trunk allowed vsan 1
 no shutdown
interface fc2/16
 no shutdown
interface Ethernet1/1
 switchport mode trunk
 switchport trunk allowed vlan 1,60-66,70-82,701,801
 channel-group 1 mode active
interface Ethernet1/2
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
 channel-group 1 mode active
interface Ethernet1/3
  switchport access vlan 60
  speed 1000
  duplex full
```

I

```
interface Ethernet1/4
  speed 1000
interface Ethernet1/6
 description TOR-Local60
  switchport access vlan 60
  speed 1000
interface Ethernet1/8
  speed 1000
interface Ethernet1/10
  description VNX-Mgmt
  switchport access vlan 70
  speed 1000
interface Ethernet1/11
  description SP-FI-Mgmt
  switchport access vlan 70
  speed 1000
interface Ethernet1/15
  switchport mode trunk
  switchport trunk allowed vlan 72
  spanning-tree port type edge
  channel-group 15 mode active
interface Ethernet1/16
  switchport mode trunk
  switchport trunk allowed vlan 72
  channel-group 16 mode active
interface Ethernet1/17
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 17 mode active
interface Ethernet1/18
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 17 mode active
interface Ethernet1/19
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 20 mode active
interface Ethernet1/20
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 20 mode active
```

```
interface Ethernet1/21
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,801
  spanning-tree port type edge trunk
  channel-group 21 mode active
interface Ethernet1/22
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,801
  spanning-tree port type edge trunk
  channel-group 21 mode active
interface Ethernet1/23
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 24 mode active
interface Ethernet1/24
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 24 mode active
interface Ethernet1/25
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 25 mode active
interface Ethernet1/26
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 25 mode active
interface Ethernet1/27
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 28 mode active
interface Ethernet1/28
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 28 mode active
interface Ethernet1/31
interface Ethernet1/32
interface Ethernet2/6
  speed 1000
interface mgmt0
```

```
ip address 10.60.0.8/24
line console
line vty
boot kickstart bootflash:/n5000-uk9-kickstart.5.1.3.N2.1.bin
boot system bootflash:/n5000-uk9.5.1.3.N2.1.bin
ip routing event-history general size large
ip routing event-history summary size large
interface fc2/9
interface fc2/10
interface fc2/11
interface fc2/12
interface fc2/13
interface fc2/14
interface fc2/15
interface fc2/16
!Full Zone Database Section for vsan 1
zone name B200M3-CH1-BL5-FC0 vsan 1
    member pwwn 20:00:00:25:b5:03:00:05
                [CH1-BL5]
1
zone name B200M3-CH2-BL5-FC0 vsan 1
    member pwwn 20:00:00:25:b5:03:00:04
1
                [CH2-BL5]
zone name UCS-VNX5600A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:1b
!
                [SP-FarmIso-T2-4 vHBA1]
    member pwwn 50:06:01:63:08:64:2f:88
!
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600 SPB 23]
1
    member pwwn 20:00:00:25:b5:f2:20:13
!
                [SP-FarmIso-T1-3 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:0f
l
                [SP-FarmIso-T1-2 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:0b
                [SP-Shared-6 vHBA1]
1
    member pwwn 20:00:00:25:b5:f2:20:07
1
                [SP-Shared-3 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:03
1
                [SP-CH2-BL1 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:17
!
                [SP-FarmIso-T2-2 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:01
1
                [SP-Shared-4 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:09
1
                [SP-Shared-5 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:05
!
                [SP-Shared-2 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:11
1
                [SP-FarmIso-T1-1 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:0d
1
                [SP-Shared-7 vHBA1]
    member pwwn 20:00:00:25:b5:f2:20:15
```

```
[SP-FarmIso-T2-1 vHBA1]
!
    member pwwn 20:00:00:25:b5:f2:20:19
                [SP-FarmIso-T2-3_vHBA1]
1
zone name SP-CH2-BL1 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:03
                [SP-CH2-BL1 vHBA1]
!
    member pwwn 50:06:01:63:08:64:2f:88
                [vnx5600 SPA 22]
1
    member pwwn 50:06:01:6b:08:64:2f:88
                 [vnx5600 SPB 23]
l
zone name SP-Shared-4 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:01
                [SP-Shared-4 vHBA1]
1
    member pwwn 50:06:01:63:08:64:2f:88
                [vnx5600 SPA 22]
ï
    member pwwn 50:06:01:6b:08:64:2f:88
l
                [vnx5600_SPB_23]
zone name SP-Shared-1 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:03
                [SP-CH2-BL1 vHBA1]
!
    member pwwn 50:06:01:63:08:64:2f:88
l
                [vnx5600_SPA_22]
    member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600 SPB 23]
1
zone name B200M3-CH1-BL6-FC0 vsan 1
    member pwwn 20:00:00:25:b5:03:00:03
1
                [CH1-BL6]
    member pwwn 21:00:00:24:ff:50:ab:b5
                [VNX5600-P1]
1
zone name B200M3-CH1-BL7-FC0 vsan 1
    member pwwn 20:00:00:25:b5:03:00:02
                [CH1-BL7]
1
    member pwwn 21:00:00:24:ff:50:ab:b5
                [VNX5600-P1]
!
zone name B200M3-CH2-BL6-FC0 vsan 1
    member pwwn 20:00:00:25:b5:03:00:01
1
                [CH2-BL6]
    member pwwn 21:00:00:24:ff:57:fa:c0
                [VNX560024TB-P1]
!
zone name B200M3-CH2-BL7-FC0 vsan 1
    member pwwn 20:00:00:25:b5:03:00:00
                [CH2-BL7]
1
    member pwwn 21:00:00:24:ff:50:ab:b5
                [VNX5600-P1]
!
zone name SP-Shared-2 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:05
!
                [SP-Shared-2 vHBA1]
```

```
member pwwn 50:06:01:63:08:64:2f:88
l
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600 SPB 23]
1
zone name SP-Shared-3 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:07
l
                [SP-Shared-3 vHBA1]
    member pwwn 50:06:01:63:08:64:2f:88
                [vnx5600 SPA 22]
1
    member pwwn 50:06:01:6b:08:64:2f:88
                 [vnx5600 SPB 23]
!
zone name SP-Shared-5 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:09
                [SP-Shared-5 vHBA1]
1
    member pwwn 50:06:01:63:08:64:2f:88
!
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
l
                [vnx5600_SPB_23]
zone name SP-Shared-6 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:0b
                [SP-Shared-6 vHBA1]
!
   member pwwn 50:06:01:63:08:64:2f:88
                [vnx5600_SPA_22]
1
   member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600_SPB_23]
!
zone name SP-Shared-7 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:0d
                [SP-Shared-7 vHBA1]
1
   member pwwn 50:06:01:63:08:64:2f:88
!
                [vnx5600_SPA_22]
    member pwwn 50:06:01:6b:08:64:2f:88
!
                [vnx5600 SPB 23]
zone name SP-FarmIso-T1-2_ZONE_A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:0f
!
                [SP-FarmIso-T1-2 vHBA1]
    member pwwn 50:06:01:63:08:64:2f:88
!
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
1
                [vnx5600_SPB_23]
[K
zone name SP-FarmIso-T1-1 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:11
                [SP-FarmIso-T1-1_vHBA1]
1
   member pwwn 50:06:01:63:08:64:2f:88
!
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600 SPB 23]
1
zone name SP-FarmIso-T1-3_ZONE_A vsan 1
```

member pwwn 20:00:00:25:b5:f2:20:13

Desktop-as-a-Service for Service Provider 2000-Seat Virtual Desktop Infrastructure

```
[SP-FarmIso-T1-3 vHBA1]
!
    member pwwn 50:06:01:63:08:64:2f:88
                [vnx5600 SPA 22]
1
    member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600_SPB_23]
1
zone name SP-FarmIso-T2-1 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:15
                [SP-FarmIso-T2-1 vHBA1]
1
    member pwwn 50:06:01:63:08:64:2f:88
1
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
l
                [vnx5600_SPB_23]
zone name SP-FarmIso-T2-2 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:17
                [SP-FarmIso-T2-2 vHBA1]
l
    member pwwn 50:06:01:63:08:64:2f:88
l
                [vnx5600 SPA 22]
    member pwwn 50:06:01:6b:08:64:2f:88
                [vnx5600 SPB 23]
1
zone name SP-FarmIso-T2-3 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:19
                [SP-FarmIso-T2-3 vHBA1]
!
    member pwwn 50:06:01:63:08:64:2f:88
                [vnx5600 SPA 22]
1
    member pwwn 50:06:01:6b:08:64:2f:88
l
                [vnx5600 SPB 23]
zone name SP-FarmIso-T2-4 ZONE A vsan 1
    member pwwn 20:00:00:25:b5:f2:20:1b
                [SP-FarmIso-T2-4 vHBA1]
1
    member pwwn 50:06:01:63:08:64:2f:88
                 [vnx5600 SPA 22]
l
    member pwwn 50:06:01:6b:08:64:2f:88
1
                [vnx5600_SPB_23]
zone name B200M4-CH1-BL7-FC0 vsan 1
    member pwwn 20:00:00:25:b5:00:00:3f
!
                [B200M4-CH1-BL7]
    member pwwn 21:00:00:24:ff:57:fa:c0
                [VNX560024TB-P1]
1
zone name B200M4-CH1-BL6 vsan 1
    member pwwn 20:00:00:25:b5:03:00:03
                [CH1-BL6]
!
    member pwwn 21:00:00:24:ff:57:fa:c0
                [VNX560024TB-P1]
1
zoneset name UCS-VNX5600A vsan 1
    member B200M3-CH1-BL8-FC0
    member B200M3-CH2-BL8-FC0
    member B200M3-CH1-BL1-FC0
    member B200M3-CH1-BL2-FC0
    member B200M3-CH1-BL3-FC0
```

```
member B200M3-CH1-BL4-FC0
   member B200M3-CH2-BL1-FC0
   member B200M3-CH2-BL2-FC0
   member B200M3-CH2-BL3-FC0
   member B200M3-CH2-BL4-FC0
   member B200M3-CH1-BL5-FC0
   member B200M3-CH2-BL5-FC0
   member SP-CH2-BL1 ZONE A
   member SP-Shared-4_ZONE_A
   member SP-Shared-1 ZONE A
   member B200M3-CH1-BL6-FC0
   member B200M3-CH1-BL7-FC0
   member B200M3-CH2-BL6-FC0
   member B200M3-CH2-BL7-FC0
   member SP-Shared-2 ZONE A
   member SP-Shared-3 ZONE A
   member SP-Shared-5 ZONE A
   member SP-Shared-6 ZONE A
   member SP-Shared-7 ZONE A
   member SP-FarmIso-T1-2 ZONE A
   member SP-FarmIso-T1-1_ZONE_A
   member SP-FarmIso-T1-3 ZONE A
   member SP-FarmIso-T2-1 ZONE A
   member SP-FarmIso-T2-2 ZONE A
   member SP-FarmIso-T2-3 ZONE A
   member SP-FarmIso-T2-4 ZONE A
   member B200M4-CH1-BL7-FC0
   member B200M4-CH1-BL6
zoneset activate name UCS-VNX5600A vsan 1
```

N5548UP-B Configuration

```
version 5.1(3)N2(1)
feature fcoe
hostname N5KB-EXC
feature npiv
no feature telnet
no feature http-server
cfs eth distribute
feature interface-vlan
feature hsrp
feature lacp
feature dhcp
feature vpc
feature lldp
username admin password 5 $1$VfkcAdcR$ioaEijZgf.0./cIoNDVUz. role network-admin
no password strength-check
ip domain-lookup
ip access-list VLAN77
  10 permit ip 10.77.0.0/24 any
  20 deny ip any any
[7m--More--_[27m
```

```
class-map type gos class-fcoe
class-map type qos match-all VLAN77
  match access-group name VLAN77
class-map type queuing class-fcoe
 match qos-group 1
class-map type queuing class-all-flood
  match gos-group 2
class-map type queuing class-ip-multicast
 match qos-group 2
policy-map type qos VLAN77
  class VLAN77
  class class-default
class-map type network-gos class-fcoe
  match qos-group 1
class-map type network-qos class-all-flood
 match qos-group 2
class-map type network-qos class-ip-multicast
  match qos-group 2
policy-map type network-gos jumbo
  class type network-qos class-default
    mtu 9216
   multicast-optimize
system qos
  service-policy type queuing output fcoe-default-out-policy
  service-policy type qos input fcoe-default-in-policy
  service-policy type network-qos jumbo
  service-policy type queuing input fcoe-default-in-policy
slot 2
 port 1-8 type ethernet
 port 9-16 type fc
snmp-server user admin network-admin auth md5 0xc97a3a05a3ee4e5eccd57e453bfe93e8
priv 0xc97a3a05a3ee4e5eccd57e453bfe93e8 localizedkey
vrf context management
  ip route 0.0.0.0/0 10.60.0.1
spanning-tree port type edge default
spanning-tree vlan 1-3967 priority 28672
service dhcp
ip dhcp relay
vpc domain 210
  role priority 2
  peer-keepalive destination 10.60.0.8
vsan database
  vsan 1 name "default"
  vsan 501 name "Fabric B"
device-alias database
  device-alias name CH1-BL5 pwwn 20:00:00:25:b5:03:00:15
  device-alias name CH1-BL6 pwwn 20:00:00:25:b5:03:00:13
  device-alias name CH1-BL7 pwwn 20:00:00:25:b5:03:00:12
  device-alias name CH2-BL5 pwwn 20:00:00:25:b5:03:00:14
  device-alias name CH2-BL6 pwwn 20:00:00:25:b5:03:00:11
  device-alias name CH2-BL7 pwwn 20:00:00:25:b5:03:00:10
  device-alias name SRA-FC2 pwwn 21:00:00:24:ff:68:1d:dd
  device-alias name SRB-FC2 pwwn 21:00:00:24:ff:68:2d:d5
  device-alias name Infral-B pwwn 20:00:00:25:b5:03:00:0f
  device-alias name Infra2-B pwwn 20:00:00:25:b5:03:00:0e
  device-alias name VNX5600-P2 pwwn 21:00:00:24:ff:50:ab:b4
  device-alias name B200M4-CH1-BL7 pwwn 20:00:00:25:b5:00:00:2f
```

```
device-alias name VNX560024TB-P1 pwwn 21:00:00:24:ff:57:fa:c1
  device-alias name vnx5600 SPA 20 pwwn 50:06:01:62:08:64:2f:88
 device-alias name vnx5600_SPB_21 pwwn 50:06:01:6a:08:64:2f:88
  device-alias name SP-CH2-BL1 vHBA2 pwwn 20:00:00:25:b5:f2:20:02
  device-alias name SP-Shared-2_vHBA2 pwwn 20:00:00:25:b5:f2:20:04
  device-alias name SP-Shared-3 vHBA2 pwwn 20:00:00:25:b5:f2:20:06
  device-alias name SP-Shared-4 vHBA2 pwwn 20:00:00:25:b5:f2:20:00
  device-alias name SP-Shared-5 vHBA2 pwwn 20:00:00:25:b5:f2:20:08
  device-alias name SP-Shared-6 vHBA2 pwwn 20:00:00:25:b5:f2:20:0a
  device-alias name SP-Shared-7 vHBA2 pwwn 20:00:00:25:b5:f2:20:0c
  device-alias name SP-FarmIso-T1-1 vHBA2 pwwn 20:00:00:25:b5:f2:20:10
  device-alias name SP-FarmIso-T1-2 vHBA2 pwwn 20:00:00:25:b5:f2:20:0e
  device-alias name SP-FarmIso-T1-3 vHBA2 pwwn 20:00:00:25:b5:f2:20:12
  device-alias name SP-FarmIso-T2-1_vHBA2 pwwn 20:00:25:b5:f2:20:14
  device-alias name SP-FarmIso-T2-2_vHBA2 pwwn 20:00:25:b5:f2:20:16
  device-alias name SP-FarmIso-T2-3 vHBA2 pwwn 20:00:00:25:b5:f2:20:18
  device-alias name SP-FarmIso-T2-4 vHBA2 pwwn 20:00:00:25:b5:f2:20:1a
device-alias commit
fcdomain fcid database
 vsan 1 wwn 21:00:00:24:ff:68:1d:dd fcid 0x730000 dynamic
             [SRA-FC2]
 vsan 1 wwn 21:00:00:24:ff:68:2d:d5 fcid 0x730001 dynamic
             [SRB-FC2]
1
 vsan 1 wwn 20:1f:54:7f:ee:83:42:00 fcid 0x730002 dynamic
 vsan 1 wwn 20:20:54:7f:ee:83:42:00 fcid 0x730003 dynamic
 .
               [Infra1-B]
 vsan 1 wwn 20:00:00:25:b5:03:00:0e fcid 0x730006 dynamic
1
             [Infra2-B]
  vsan 1 wwn 20:00:00:25:b5:03:00:05 fcid 0x73000e dynamic
 vsan 1 wwn 20:00:00:25:b5:03:00:14 fcid 0x73000f dynamic
             [CH2-BL5]
1
  vsan 1 wwn 21:00:00:24:ff:50:ab:b4 fcid 0x730010 dynamic
             [VNX5600-P2]
 vsan 1 wwn 20:00:00:25:b5:03:00:13 fcid 0x730011 dynamic
             [CH1-BL6]
1
  vsan 1 wwn 20:00:00:25:b5:03:00:12 fcid 0x730012 dynamic
1
             [CH1-BL7]
 vsan 1 wwn 20:00:00:25:b5:03:00:10 fcid 0x730013 dynamic
1
             [CH2-BL7]
 vsan 1 wwn 20:00:00:25:b5:03:00:15 fcid 0x730014 dynamic
1
             [CH1-BL5]
 vsan 1 wwn 20:00:00:25:b5:03:00:11 fcid 0x730015 dynamic
1
             [CH2-BL6]
 vsan 1 wwn 21:00:00:24:ff:57:fa:c0 fcid 0x730016 dynamic
 vsan 1 wwn 50:06:01:6a:08:64:2f:88 fcid 0x7300ef dynamic
1
             [vnx5600 SPB 21]
 vsan 1 wwn 50:06:01:62:08:64:2f:88 fcid 0x7301ef dynamic
             [vnx5600 SPA 20]
1
 vsan 1 wwn 20:4b:54:7f:ee:76:cd:00 fcid 0x730017 dynamic
 vsan 1 wwn 20:4c:54:7f:ee:76:cd:00 fcid 0x730018 dynamic
 vsan 1 wwn 20:00:00:25:b5:f2:20:1a fcid 0x730019 dynamic
1
             [SP-FarmIso-T2-4 vHBA2]
 vsan 1 wwn 20:00:00:25:b5:f2:20:00 fcid 0x73001a dynamic
             [SP-Shared-4 vHBA2]
1
```

```
vsan 1 wwn 20:00:00:25:b5:f2:20:02 fcid 0x73001b dynamic
1
             [SP-CH2-BL1 vHBA2]
  vsan 1 wwn 20:00:00:25:b5:f2:20:04 fcid 0x73001c dynamic
             [SP-Shared-2 vHBA2]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:06 fcid 0x73001d dynamic
             [SP-Shared-3 vHBA2]
1
 vsan 1 wwn 20:00:00:25:b5:f2:20:08 fcid 0x73001e dynamic
I
             [SP-Shared-5 vHBA2]
  vsan 1 wwn 20:00:00:25:b5:f2:20:0a fcid 0x73001f dynamic
             [SP-Shared-6 vHBA2]
1
  vsan 1 wwn 20:00:00:25:b5:f2:20:0c fcid 0x730020 dynamic
!
             [SP-Shared-7 vHBA2]
  vsan 1 wwn 20:00:00:25:b5:f2:20:0e fcid 0x730021 dynamic
L
             [SP-FarmIso-T1-2 vHBA2]
  vsan 1 wwn 20:00:00:25:b5:f2:20:10 fcid 0x730022 dynamic
н
             [SP-FarmIso-T1-1 vHBA2]
  vsan 1 wwn 20:00:00:25:b5:f2:20:12 fcid 0x730023 dynamic
             [SP-FarmIso-T1-3 vHBA2]
!
  vsan 1 wwn 20:00:00:25:b5:f2:20:14 fcid 0x730024 dynamic
             [SP-FarmIso-T2-1 vHBA2]
1
  vsan 1 wwn 20:00:00:25:b5:f2:20:16 fcid 0x730025 dynamic
             [SP-FarmIso-T2-2 vHBA2]
1
  vsan 1 wwn 20:00:00:25:b5:f2:20:18 fcid 0x730026 dynamic
             [SP-FarmIso-T2-3 vHBA2]
!
 vsan 1 wwn 20:00:00:25:b5:f2:20:1c fcid 0x730027 dynamic
  vsan 1 wwn 20:00:00:25:b5:f2:20:20 fcid 0x730028 dynamic
 vsan 1 wwn 20:00:00:25:b5:f2:20:1e fcid 0x730029 dynamic
  vsan 1 wwn 21:00:00:24:ff:57:fa:c1 fcid 0x73002a dynamic
             [VNX560024TB-P1]
 vsan 1 wwn 20:00:00:25:b5:00:00:2f fcid 0x73002b dynamic
             [B200M4-CH1-BL7]
1
interface Vlan1
  no shutdown
interface Vlan70
  no shutdown
  description SP Pod Management
  no ip redirects
  ip address 10.70.0.3/24
 hsrp version 2
 hsrp 70
    preempt delay minimum 240
    priority 130
    timers 1 3
    ip 10.70.0.1
interface Vlan71
 no shutdown
  description SP Pod Infrastructure
 no ip redirects
  ip address 10.71.0.3/21
  hsrp version 2
```

```
hsrp 71
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.71.0.1
  ip dhcp relay address 10.71.0.10
interface Vlan72
 no shutdown
 description SP Pod CIFS/NFS Storage
 no ip redirects
 ip address 10.72.0.3/24
 hsrp version 2
 hsrp 72
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.72.0.1
interface Vlan73
 no shutdown
 description SP Pod VMotion
 no ip redirects
 ip address 10.73.0.3/24
 hsrp version 2
 hsrp 73
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.73.0.1
interface Vlan74
 no shutdown
 description SP Pod Shared Tenants
 no ip redirects
 ip address 10.74.0.3/24
 hsrp version 2
 hsrp 74
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.74.0.1
  ip dhcp relay address 10.71.0.10
interface Vlan75
 no shutdown
 description SP Pod Server Iso Tenant
 no ip redirects
 ip address 10.75.0.3/24
 hsrp version 2
 hsrp 75
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.75.0.1
```

1

```
interface Vlan76
 no shutdown
 description SP Pod Farm Iso Tenant 1
 no ip redirects
  ip address 10.76.0.3/24
 hsrp version 2
 hsrp 76
   preempt delay minimum 240
   priority 130
   timers 1 3
    ip 10.76.0.1
 ip dhcp relay address 10.76.0.10
interface Vlan77
 no shutdown
 description SP Pod Farm Iso Tenant 2
 no ip redirects
 ip address 10.77.0.3/24
 hsrp version 2
 hsrp 77
   preempt delay minimum 240
   priority 130
   timers 1 3
   ip 10.77.0.1
  ip dhcp relay address 10.77.0.10
interface Vlan78
 no shutdown
  description SP Pod DMZ
  ip address 10.78.0.3/24
 hsrp version 2
 hsrp 78
   preempt delay minimum 240
   priority 130
    timers 1 3
    ip 10.78.0.1
interface Vlan79
 no shutdown
  description UCS Director PXE
 ip address 10.79.0.3/24
 hsrp version 2
 hsrp 79
   preempt delay minimum 240
   priority 130
   timers 1 3
    ip 10.79.0.1
interface port-channel1
 switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type network
 vpc peer-link
interface port-channel15
```

I

```
description VNX-DM3-1
  switchport mode trunk
  switchport trunk allowed vlan 72
  spanning-tree port type edge trunk
 vpc 15
interface port-channel16
  description VNX-DM2-1
  switchport mode trunk
  switchport trunk allowed vlan 72
  spanning-tree port type edge trunk
 vpc 16
interface port-channel21
  description FI-A-Uplink-SP
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,801
  spanning-tree port type edge trunk
 vpc 21
interface port-channel24
 description FI-B-Uplink-SP
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 24
interface port-channel25
 description FI-A-Uplink
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 25
interface port-channel28
  description FI-B-Uplink
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
 vpc 28
interface fc2/9
 no shutdown
interface fc2/10
 no shutdown
interface fc2/11
 no shutdown
interface fc2/12
 no shutdown
interface fc2/13
 no shutdown
```

```
interface fc2/14
  no shutdown
interface fc2/15
  no shutdown
interface fc2/16
  no shutdown
interface Ethernet1/1
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  channel-group 1 mode active
interface Ethernet1/2
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  channel-group 1 mode active
interface Ethernet1/8
  speed 1000
interface Ethernet1/9
  description JumpBox-Local80
  switchport access vlan 80
  speed 1000
interface Ethernet1/10
  description JumpBox-Local70
  switchport access vlan 70
  speed 1000
interface Ethernet1/11
  description SP-FI-Mgmt
  switchport access vlan 70
  speed 1000
interface Ethernet1/12
  description Launcher-FI-Mgmt
  switchport access vlan 801
  speed 1000
interface Ethernet1/13
  description VNX5600
  switchport access vlan 70
  speed 1000
interface Ethernet1/14
  description VNX5600
  switchport access vlan 70
  speed 1000
interface Ethernet1/15
  switchport mode trunk
  switchport trunk allowed vlan 72
  spanning-tree port type edge
```

```
channel-group 15 mode active
interface Ethernet1/16
  switchport mode trunk
  switchport trunk allowed vlan 72
  channel-group 16 mode active
interface Ethernet1/17
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 17 mode active
interface Ethernet1/18
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 17 mode active
interface Ethernet1/19
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 20 mode active
interface Ethernet1/20
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 20 mode active
interface Ethernet1/21
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,801
  spanning-tree port type edge trunk
  channel-group 21 mode active
interface Ethernet1/22
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,801
  spanning-tree port type edge trunk
  channel-group 21 mode active
interface Ethernet1/23
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 24 mode active
interface Ethernet1/24
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 24 mode active
```

```
interface Ethernet1/25
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 25 mode active
interface Ethernet1/26
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 25 mode active
interface Ethernet1/27
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 28 mode active
interface Ethernet1/28
  switchport mode trunk
  switchport trunk allowed vlan 1,60-66,70-82,701,801
  spanning-tree port type edge trunk
  channel-group 28 mode active
interface Ethernet1/31
interface Ethernet1/32
interface Ethernet2/5
interface Ethernet2/6
interface mgmt0
  ip address 10.60.0.9/24
line console
line vty
boot kickstart bootflash:/n5000-uk9-kickstart.5.1.3.N2.1.bin
boot system bootflash:/n5000-uk9.5.1.3.N2.1.bin
interface fc2/9
interface fc2/10
interface fc2/11
interface fc2/12
interface fc2/13
interface fc2/14
interface fc2/15
interface fc2/16
!Full Zone Database Section for vsan 1
zone name B200M3-CH1-BL8-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:0f
                [Infra1-B]
1
    member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH2-BL8-FC1 vsan 1
    member pwwn 20:00:00:25:b5:03:00:0e
1
                [Infra2-B]
```

```
member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
!
zone name B200M3-CH1-BL1-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:0d
!
                [VDI1-B]
   member pwwn 21:00:00:24:ff:50:ab:b4
!
                [VNX5600-P2]
zone name B200M3-CH1-BL2-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:0c
!
                [VDI2-B]
   member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH1-BL3-FC1 vsan 1
    member pwwn 20:00:00:25:b5:03:00:0b
1
                [VDI3-B]
   member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH1-BL4-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:0a
                [VDI4-B]
!
   member pwwn 21:00:00:24:ff:50:ab:b4
1
                [VNX5600-P2]
zone name B200M3-CH2-BL1-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:19
                [VDI5-B]
1
    member pwwn 21:00:00:24:ff:50:ab:b4
1
                [VNX5600-P2]
zone name B200M3-CH2-BL2-FC1 vsan 1
    member pwwn 20:00:00:25:b5:03:00:18
!
                [VDI6-B]
    member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
!
zone name B200M3-CH2-BL3-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:17
l
                [VDI7-B]
   member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH2-BL4-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:16
!
                [VDI8-B]
   member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH2-BL5-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:14
!
                [CH2-BL5]
   member pwwn 21:00:00:24:ff:50:ab:b4
!
                [VNX5600-P2]
```

```
zone name B200M3-CH1-BL5-FC1 vsan 1
    member pwwn 20:00:00:25:b5:03:00:15
                [CH1-BL5]
1
    member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
!
zone name SP-CH2-BL1 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:02
                [SP-CH2-BL1 vHBA2]
1
    member pwwn 50:06:01:62:08:64:2f:88
!
                [vnx5600 SPA 20]
    member pwwn 50:06:01:6a:08:64:2f:88
1
                [vnx5600_SPB_21]
zone name SP-Shared-4 ZONE B vsan 1
   member pwwn 20:00:00:25:b5:f2:20:00
                [SP-Shared-4 vHBA2]
!
   member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600_SPA_20]
1
   member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600_SPB_21]
1
zone name SP-Shared-1 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:02
                [SP-CH2-BL1_vHBA2]
1
   member pwwn 50:06:01:62:08:64:2f:88
!
                [vnx5600 SPA 20]
    member pwwn 50:06:01:6a:08:64:2f:88
1
                [vnx5600_SPB_21]
zone name SP-Shared-2 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:04
                [SP-Shared-2 vHBA2]
ï
    member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600 SPA 20]
1
   member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600 SPB 21]
1
zone name B200M3-CH1-BL6-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:13
1
                [CH1-BL6]
   member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH1-BL7-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:12
                [CH1-BL7]
!
   member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name B200M3-CH2-BL6-FC1 vsan 1
   member pwwn 20:00:00:25:b5:03:00:11
                [CH2-BL6]
1
   member pwwn 21:00:00:24:ff:50:ab:b4
```

```
!
                 [VNX5600-P2]
zone name B200M3-CH2-BL7-FC1 vsan 1
    member pwwn 20:00:00:25:b5:03:00:10
                [CH2-BL7]
!
    member pwwn 21:00:00:24:ff:50:ab:b4
                [VNX5600-P2]
1
zone name SP-Shared-3_ZONE_B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:06
                [SP-Shared-3_vHBA2]
!
    member pwwn 50:06:01:62:08:64:2f:88
1
                [vnx5600 SPA 20]
    member pwwn 50:06:01:6a:08:64:2f:88
1
                [vnx5600_SPB_21]
zone name SP-Shared-5_ZONE_B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:08
l
                [SP-Shared-5 vHBA2]
    member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600 SPA 20]
1
    member pwwn 50:06:01:6a:08:64:2f:88
!
                [vnx5600 SPB 21]
zone name SP-Shared-6 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:0a
                [SP-Shared-6 vHBA2]
1
    member pwwn 50:06:01:62:08:64:2f:88
!
                [vnx5600 SPA 20]
    member pwwn 50:06:01:6a:08:64:2f:88
l
                [vnx5600_SPB_21]
zone name SP-Shared-7 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:0c
                [SP-Shared-7 vHBA2]
!
    member pwwn 50:06:01:62:08:64:2f:88
l
                [vnx5600 SPA 20]
    member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600 SPB 21]
1
zone name SP-FarmIso-T1-2 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:0e
                [SP-FarmIso-T1-2 vHBA2]
1
    member pwwn 50:06:01:62:08:64:2f:88
!
                [vnx5600_SPA_20]
    member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600 SPB 21]
!
zone name SP-FarmIso-T1-1_ZONE_B vsan 1
   member pwwn 20:00:00:25:b5:f2:20:10
!
                [SP-FarmIso-T1-1 vHBA2]
    member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600 SPA 20]
1
    member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600_SPB_21]
1
```

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```
zone name SP-FarmIso-T1-3 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:12
                [SP-FarmIso-T1-3 vHBA2]
1
   member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600 SPA 20]
!
    member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600 SPB 21]
!
[K
zone name SP-FarmIso-T2-1 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:14
!
                [SP-FarmIso-T2-1 vHBA2]
    member pwwn 50:06:01:62:08:64:2f:88
1
                [vnx5600_SPA_20]
    member pwwn 50:06:01:6a:08:64:2f:88
1
                [vnx5600_SPB_21]
zone name SP-FarmIso-T2-2 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:16
                [SP-FarmIso-T2-2 vHBA2]
1
   member pwwn 50:06:01:62:08:64:2f:88
!
                [vnx5600_SPA_20]
    member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600 SPB 21]
!
zone name SP-FarmIso-T2-3_ZONE_B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:18
!
                [SP-FarmIso-T2-3 vHBA2]
    member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600 SPA 20]
!
    member pwwn 50:06:01:6a:08:64:2f:88
1
                 [vnx5600 SPB 21]
zone name SP-FarmIso-T2-4 ZONE B vsan 1
    member pwwn 20:00:00:25:b5:f2:20:1a
                [SP-FarmIso-T2-4 vHBA2]
!
    member pwwn 50:06:01:62:08:64:2f:88
                [vnx5600 SPA 20]
1
    member pwwn 50:06:01:6a:08:64:2f:88
                [vnx5600 SPB 21]
!
zone name B200M4-CH1-BL7-FC1 vsan 1
    member pwwn 20:00:00:25:b5:00:00:2f
1
                [B200M4-CH1-BL7]
    member pwwn 21:00:00:24:ff:57:fa:c1
                [VNX560024TB-P1]
ï
zone name B200M4-CH1-BL6-FC1 vsan 1
    member pwwn 20:00:00:25:b5:03:00:13
                [CH1-BL6]
1
    member pwwn 21:00:00:24:ff:57:fa:c1
                [VNX560024TB-P1]
ï
zoneset name UCS-VNX5600-B vsan 1
    member B200M3-CH1-BL8-FC1
```

```
member B200M3-CH2-BL8-FC1
member B200M3-CH1-BL1-FC1
member B200M3-CH1-BL2-FC1
member B200M3-CH1-BL3-FC1
member B200M3-CH1-BL4-FC1
member B200M3-CH2-BL1-FC1
member B200M3-CH2-BL2-FC1
member B200M3-CH2-BL3-FC1
member B200M3-CH2-BL4-FC1
member B200M3-CH2-BL5-FC1
member B200M3-CH1-BL5-FC1
member SP-CH2-BL1 ZONE B
member SP-Shared-4 ZONE B
member SP-Shared-1 ZONE B
member SP-Shared-2 ZONE B
member B200M3-CH1-BL6-FC1
member B200M3-CH1-BL7-FC1
member B200M3-CH2-BL6-FC1
member B200M3-CH2-BL7-FC1
member SP-Shared-3 ZONE B
member SP-Shared-5 ZONE B
member SP-Shared-6 ZONE B
member SP-Shared-7 ZONE B
member SP-FarmIso-T1-2 ZONE B
member SP-FarmIso-T1-1 ZONE B
member SP-FarmIso-T1-3_ZONE_B
member SP-FarmIso-T2-1 ZONE B
member SP-FarmIso-T2-2 ZONE B
member SP-FarmIso-T2-3 ZONE B
member SP-FarmIso-T2-4 ZONE B
member B200M4-CH1-BL7-FC1
member B200M4-CH1-BL6-FC1
```

zoneset activate name UCS-VNX5600-B vsan 1

N5KB-EXC-HyperV# exit

I