

Dell EMC UnityVSA

A Detailed Review

Abstract

This white paper introduces the architecture, features, and functionality of Dell EMC™ UnityVSA and Unity Cloud Edition.

June 2021

Revisions

Date	Description
May 2016	Initial release - OE 4.0
December 2016	OE 4.1 update
July 2017	OE 4.2 update
March 2018	OE 4.3 update
August 2018	OE 4.4 update
January 2019	OE 4.5 update
August 2019	Unity Cloud Edition HA update
June 2021	OE 5.1 update

Acknowledgments

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Executive Summary

Traditional storage systems consist of a software stack that runs on purpose-built hardware that are sold as a single product. Dell EMC UnityVSA decouples the software stack from the physical hardware. This enables the software stack to be deployed on commodity, off the shelf hardware. Dell EMC UnityVSA increases agility and flexibility by enabling faster deployments while also reducing hardware dependencies, allowing for hardware consolidation, and providing effective use of repurposed arrays.

Audience

This white paper is intended for storage or virtualization architects, administrators, partners, Dell EMC employees and any others involved in evaluating, acquiring, managing, operating, or designing a virtualized environment using Dell EMC UnityVSA.

1 Introduction

Dell EMC UnityVSA (Dell EMC Unity Virtual Storage Appliance) is a unified Software Defined Storage (SDS) solution that runs atop the VMware vSphere® platform. Dell EMC UnityVSA provides a flexible storage option for environments that do not require dedicated storage systems such as test/development or remote office/branch office (ROBO) environments. Users are able to quickly provision a Dell EMC UnityVSA on general purpose server hardware, which can result in reduced infrastructure costs and a quicker rate of deployment.

Both existing and new users can benefit from the Dell EMC UnityVSA. Existing users are able to utilize existing third-party server hardware in their test/development or ROBO environments, while new and curious users can use the Dell EMC UnityVSA to try out newer functionality as well as APIs before purchasing a physical system.

Prior to OE 4.5, Dell EMC UnityVSA is available in Single-SP mode only. In the OE 4.5 release, HA (High Availability) functionality was added, with the introduction of Dell EMC UnityVSA Dual-SP (also known as Dell EMC UnityVSA HA). Dell EMC UnityVSA Dual-SP can continue system operations in the event of an SP failure, which significantly increases the system's applicable use case scenarios as well as enables non-disruptive upgrades (NDU). In the OE 5.1 release, Dell EMC UnityVSA Dual-SP now supports additional hardware scaling options, which includes increased storage capacity as well as an additional 12-core CPU / 96GB memory deployment option. Dell EMC UnityVSA Dual-SP is only available with Professional Edition (PE) licenses in capacity choices of 10TB, 25TB, 50TB and 350TB options.

For the remainder of this document, "Dell EMC UnityVSA Single-SP" will refer to the single node solution of Dell EMC UnityVSA specifically, while "Dell EMC UnityVSA Dual-SP" will refer to the HA (dual-node) solution. The term "Dell EMC UnityVSA" will refer to both product types as they share the same feature set, and both utilize Unisphere for GUI management.

1.1 Terminology

File System – A storage resource that can be accessed through file sharing protocols such as SMB or NFS.

Fully Automated Storage Tiering (FAST VP) – A feature that relocates data to the most appropriate disk type depending on activity level to improve performance while reducing cost.

Internet Small Computer System Interface (iSCSI) – Provides a mechanism for accessing block-level data storage over network connections.

Logical Unit Number (LUN) – A block-level storage device that can be accessed using a protocol such as iSCSI.

Network File System (NFS) – A file access protocol that allows data access typically from Linux/UNIX hosts located on a network.

Server Message Block (SMB) – A file access protocol that allows data access typically from Windows hosts located on a network.

Snapshot – A point-in-time view of data stored on a storage resource. A user can recover files from a snapshot, restore a storage resource from a snapshot, or provide access to a host.

Software Defined Storage – A storage architecture where the software storage stack is decoupled from the physical storage hardware.

Storage Policy Based Management (SPBM) – Using storage policies to dictate where a VM will be stored, as opposed to choosing a datastore manually.

Storage Pool – A repository of disks from which storage resources such as LUNs and file systems can be created.

Storage Processor (SP) – A storage node that provides the processing resources for performing storage operations as well as servicing I/O between storage and hosts.

Thin Provisioning – A storage feature used to allocate storage on an as-needed basis from a larger reserved resource.

Unisphere – An HTML5 graphical user interface that's used to manage Dell EMC Unity systems.

Unisphere Command Line Interface (UEMCLI) – An interface that allows a user to perform tasks on the storage system by typing commands instead of using the graphical user interface.

Virtual Storage Appliance (VSA) – A storage node that runs as a virtual machine instead of on purpose-built hardware.

vSphere API for Array Integration (VAAI) – A VMware API that allows storage-related tasks to be offloaded to the storage system.

vSphere API for Storage Awareness (VASA) – A VMware API that provides additional insight about the storage capabilities in vSphere.

Virtual Volumes (vVols) – A VMware storage framework which allows VM data to be stored on individual Virtual Volumes. This allows for data services to be applied at a VM-granularity and enables Storage Policy Based Management (SPBM).

2 Requirements (Dell EMC UnityVSA Single-SP)

Dell EMC UnityVSA Single-SP can run on any server that supports VMware ESXi and meets the minimum requirements. If local storage is used, a hardware RAID controller on the ESXi host must be used to configure redundant storage for Dell EMC UnityVSA Single-SP. If storage is being provided from a redundant storage system or server SAN, a RAID controller on the ESXi host is not required. A full description of the minimum and recommended requirements for Dell EMC UnityVSA Single-SP is detailed in Table 1.

Note that the UnityVSA SP requirements from Table 1 refer to the UnityVSA Virtual Machine (VM) settings.

Table 1. Server and VM Requirements (Dell EMC UnityVSA Single-SP)

	Minimum requirement	Recommended requirement
ESXi requirements		
ESXi host configuration	ESXi 6.5+	ESXi 6.5+
Hardware processor	Xeon E5 Series Dual Core CPU 64-bit x86 Intel 2GHz+ (SSE4.2 or greater)	Xeon Silver 4110 or higher
Hardware memory	20GB minimum for ESXi 6.5	36GB minimum for ESXi 6.5+
Hardware network	1x 1GbE (management and IO traffic go through the same physical port)	1x 10GbE (management and IO traffic go through the same physical port)
Hardware RAID	RAID Controller: 512MB NV cache and battery backed recommended	RAID Controller: 512MB NV cache and battery backed recommended
Disk	Any disk type as system disks	SSD as system disks
Datastore requirements		
VMware datastore (NFS and VMFS supported)	No particular requirement	Full-SSD datastore
UnityVSA SP requirements		
Virtual processor cores	2 (2GHz+)	2 (2GHz+)
Virtual system memory	12GB	12GB
Virtual network adapters	6 (4 adapters for I/O, 1 for Unisphere, and 1 for system use)	6 (4 adapters for I/O, 1 for Unisphere, and 1 for system use)

3 Requirements (Dell EMC UnityVSA Dual-SP)

Dell EMC UnityVSA Dual-SP has similar requirements as Dell EMC UnityVSA Single-SP on a per SP basis. In terms of VMware requirements, though, a vCenter is mandatory which manages both ESXi hosts that are being deployed on. Dell EMC UnityVSA Dual-SP also requires the configuration of an internal network including main communication between SPs via a common messaging conduit network known as CMI as well as a pair of heartbeat networks which allows for the monitoring of the peer SP health from each SP. The CMI network and the heartbeat networks must be configured on three separate unused VLANs (1 for CMI, and 1 for each heartbeat network) to provide network isolation for each network. In terms of mapping, the CMI network is able to access both configured vmnic ports on each ESXi host, given two vmnic ports are available, while each heartbeat network maps to a separate vmnic port on each ESXi host. For example, if “vmnic1” and “vmnic2” ports on an ESXi host are utilized for Dell EMC UnityVSA Dual-SP, then the CMI network would map to both “vmnic1” and “vmnic2” ports, the first heartbeat network would map to the “vmnic1” port, and the second heartbeat network would map to the “vmnic2” port. There is also a pair of storage heartbeat networks that need to be configured which is configured on top of shared datastores and they act as a redundant heartbeat mechanism in case the primary heartbeat network mechanism fails. The storage heartbeat networks utilize Blockping to verify peer SP connectivity.

The best practice for all of these networks is to have full redundant design such that there is no single point of failure. For example, each heartbeat network should be mapped to separate physical ports on the ESXi hosts, be mapped to separate VLANs from the CMI network VLAN, and be cabled to separate switches. Also, the storage heartbeat networks should come from two separate shared datastores from two separate storage systems. Ultimately, this ensures the failure of one switch failure, or one network VLAN failure, or one cable failure does not affect the other networks availability.

A full description of server requirements for Dell EMC UnityVSA Dual-SP is detailed in Table 2 below. Note that the table requirements below are the highly recommended best practices values and not the minimum values when deploying Dell EMC UnityVSA Dual-SP to ensure full redundancy and to avoid single points of failure. For example, it is possible to deploy Dell EMC UnityVSA Dual-SP on a single ESXi host, but it is not recommended as it exposes the inherent HA nature of the solution.

Table 2. Server and VM Requirements (Dell EMC UnityVSA Dual-SP)

	2-core UnityVSA	12-core UnityVSA
ESXi requirements		
ESXi host configuration	ESXi 6.5+ with both SPs on separate ESXi hosts	ESXi 6.5+ with both SPs on separate ESXi hosts
Hardware processor	Xeon Silver 4110 or higher	Xeon Silver 4110 or higher
Hardware memory	36GB for ESXi 6.5 or later per host	120GB for ESXi 6.5 or later per host
Hardware network	3 x 10 GbE (1 physical port for SP management and IO ports, 2 for inter-SP network)	3 x 10 GbE (1 physical port for SP management and IO ports, 2 for inter-SP network)
Hardware RAID	RAID card 512MB NV cache, battery backed recommended	RAID card 512MB NV cache, battery backed recommended
Disk	No particular disk type	SSD as system disks
Switch requirements		

Hardware switch	10GbE port support	10GbE port support
Datastore requirements		
VMware datastores (NFS and VMFS supported)	One full-SSD shared datastore and a separate full-SSD local swap datastore	One full-SSD shared datastore and a separate full-SSD local swap datastore
UnityVSA individual SP requirements		
Virtual processor cores	2 (2GHz+) for each SP	12 (2GHz+) for each SP
Virtual system memory	12GB for each SP	96GB for each SP
Virtual network adapters	9 for each SP (4 ports for I/O, 1 for Unisphere, 1 for system use, and 3 for internal communication)	9 for each SP (4 ports for I/O, 1 for Unisphere, 1 for system use, and 3 for internal communication)
vCenter	Required	Required
VLANs	3 (1 for Common Messaging Interface (CMI) SP-to-SP communication, 1 for Heartbeat 0, and 1 for Heartbeat 1) VLANs must be unique and not used elsewhere on the network	3 (1 for Common Messaging Interface (CMI) SP-to-SP communication, 1 for Heartbeat 0, and 1 for Heartbeat 1) VLANs must be unique and not used elsewhere on the network

3.1 Heartbeat Mechanism (Dual-SP)

In the event that the CMI network fails for Dell EMC UnityVSA Dual-SP, then a heartbeat mechanism is required to resolve whether the issue is just network connectivity or if the peer SP is lost (i.e. ESXi host went offline). For example, if it happens such that CMI fails, but at least one of the heartbeat networks, whether network heartbeat or storage heartbeat, remains alive and can contact the peer SP, then the heartbeat mechanism knows that the peer is still alive and forces SPA to boot into Service Mode so that all services are then running on SPB. This is because without the CMI network, the SPs cannot send data to each other for things like taking ownership of specific resources or updating read cache data. Therefore, one of the SPs must be forced to go offline to ensure proper system management and storage resource management.

In the unlikely event that the CMI network, primary network heartbeats, and secondary storage heartbeats all fail and cannot ping the peer SP, then one of two cases could have happened. Either one of the SPs actually went offline (power outage, ESXi reboot, VM reboot) or both SPs are still online but all internal networks were disconnected. In the former case, it would result in a graceful failover of resources to the surviving SP, but in the latter case, both SPs would assume the peer is lost and try to take over as the primary SP resulting in a “split-brain” scenario which could lead to data corruption (both SPs writing to the same resources). The latter case is the worst-case scenario which can be mitigated by following the best practice for networking, mentioned above, or could also deploy a Tie Breaker Node to avoid “split-brain” scenarios. More information about the Tie Breaker Node can be found in the Tie Breaker Node section.

UnityVSA Dual-SP uses Layer 2 Ethernet broadcasts to monitor the heartbeats of connected systems. Each heartbeat network (HB0 and HB1) must reside on the same Layer 2 broadcast domain and VLAN and have Layer 2 broadcast traffic enabled.

3.2 Tie Breaker Node (Dual-SP)

Dell EMC UnityVSA Dual-SP has the capability of deploying a Tie Breaker Node (TBN) VM along with two SPs for a more robust solution against possible failure scenarios. The deployment of a TBN is not required, but highly recommended as it avoids “split-brain” scenarios where data corruption could occur if all internal networks (CMI and heartbeats) in between the two SPs become isolated. This is done by changing the failure behavior of the SPs in certain scenarios once TBN is configured. TBN communicates to each SP via the same primary heartbeat network that the SPs utilize and using the same configured VLANs.

In the event where the CMI network fails, at least one heartbeat network remains available (whether primary network heartbeat or storage heartbeat) and TBN communication is valid to both SPs, then the same behavior occurs as without TBN whereby SPA boots into Service Mode so all services are running on SPB. Although in the same above scenario, if SPB happens to not be able to communicate with TBN, but TBN can still communicate with SPA, then SPB is booted into Service Mode and SPA takes over all system services.

In the scenario where all internal networks (CMI and heartbeat networks) go down which would normally result in “split-brain” without TBN, one of three things could occur: Either TBN is still accessible to both SPA and SPB, TBN is only accessible by one SP, or TBN is not accessible by either SP. In the first case, SPA is booted into Service Mode. In the second case, the peer SP that is not accessible by TBN is booted into Service Mode. And in the last case, both SPs are booted into Service Mode. As can be seen, in all scenarios “split-brain” is avoided and even in the worst case scenario where all communication becomes unavailable, the system would rather enter a state of data unavailability than be in a state of potential data corruption.

The TBN also uses Layer 2 Ethernet broadcasts to monitor the heartbeats of connected systems. For the TBN to function, each heartbeat network must reside on the same Layer 2 broadcast domain and VLAN and have Layer 2 broadcast traffic enabled.

3.3 Server Requirements (Tie Breaker Node)

A full description for minimum server requirements for the TBN VM is detailed in Table 3 below. Note that the TBN should be deployed on a separate host than the Dell EMC UnityVSA Dual-SP VMs to keep the VM on a separate fault domain.

Table 3. VM Requirements (Tie Breaker Node)

Virtual processor cores	2x vCPUs
Virtual system memory	2GB RAM
Hardware network	2x 1GbE+ unused vmnic ports for networking to Dell EMC UnityVSA SPs
Hardware RAID	RAID Controller: 512MB NV cache and battery backed (recommended)
VMware ESXi	ESXi 6.5 – 7.0
Hardware switch	vLAN (or VXLAN) support is required (At least 3 VLANs must be available)
Disk space	At least 12GB of disk space

4 Product Offerings

Dell EMC UnityVSA is available in the Professional or Community Edition as shown in Table 4. Community Edition has a free perpetual license that can only be applied to a UnityVSA Single-SP deployment with a maximum of 4TB storage. Meanwhile, the Professional Edition licenses can be applied to both Single-SP and Dual-SP deployments and support various storage capacity, CPU, and memory options. In UnityVSA OE version 5.1, scaling capabilities have been increased allowing the Dual-SP deployment to reach a maximum of 12-cores and 96GB memory per-SP and up to 350TB of storage. Note that all Community and Professional Edition license and deployment options are also available on a Dell EMC Unity Cloud Edition deployment.

Table 4 UnityVSA Product Offerings

	Community	Professional
Features	ALL	
Licensing	Free (Perpetual)	Subscription
Capacity	4TB	10TB, 25TB, 50TB, 350TB
CPU	2-core	2-core / 12-core
Memory	12GB	12GB / 96GB
Storage processors	Single	Single / Dual (note that Single-SP deployment does not support a 350TB storage capacity license)
Support	Community	ProSupport
Use	Non-Production	Production
Cloud Edition	ALL	

4.1 Dell EMC UnityVSA Single-SP Professional Edition

Dell EMC UnityVSA Single-SP Professional Edition is a subscription-based product, which is available at 10TB, 25TB, or 50TB storage capacity with 2-core and 12GB memory. Users can start with the Dell EMC UnityVSA Single-SP Community Edition and then convert to the Dell EMC UnityVSA Single-SP Professional Edition at a later time. Installing the Professional Edition license does not disrupt the existing Dell EMC UnityVSA Single-SP system. Users must purchase a Professional Edition subscription prior to using Dell EMC UnityVSA Single-SP for production use cases. Professional Edition licenses can be purchased for one year at a time. While the subscription is active, users are able to contact support if any issues arise. Licenses are tied to the Dell EMC UnityVSA Single-SP System ID and also have a minimum code requirement.

As a reminder, Dell EMC UnityVSA (both Single-SP and Dual-SP) displays alerts at certain times in Unisphere prior to the license expiration date. Table 5 shows when alerts are generated leading up to the expiration date.

Table 5. Expiration Alerts

Weeks	Days
4 weeks	6 days
3 weeks	5 days
2 weeks	4 days
1 week	3 days
	2 days
	1 day

Prior to the license expiration date, you should contact Dell EMC to renew the subscription and install a new license. If a license expires, Dell EMC UnityVSA continues to operate, and any existing resources are still accessible. However, users are prevented from provisioning any new resources and do not have a valid support contract.

For users who initially purchased a 10TB or 25TB subscription and require additional capacity, the following capacity upgrades are supported:

- 10TB to 25TB upgrade
- 10TB to 50TB upgrade
- 25TB to 50TB upgrade

Capacity upgrades and license renewals can be installed non-disruptively. When a capacity upgrade is installed, the limits on the system also scale accordingly. For example, when upgrading from 10TB to 25TB, the maximum file system and LUN sizes become 25TB. Upgrade licenses only increase the capacity limits of the system and do not extend the subscription expiration date. However, the upgrade licenses are prorated according to the expiration date of the current license. Note that licenses that are expired or are for a smaller capacity than the current license cannot be installed.

4.2 Dell EMC UnityVSA Single-SP Community Edition

Dell EMC UnityVSA Community Edition is a free product that includes all features without any expiration. The Dell EMC UnityVSA software package, videos, and guides can be downloaded through the Dell EMC Unity Community forum. Support is also provided through the Dell EMC Unity Community forum, where inquiries and discussions with other Dell EMC UnityVSA users are encouraged. There is a 4TB storage capacity and 2-core CPU with 12GB memory limit on the Community Edition and it can only be used for non-production use cases.

4.3 Dell EMC UnityVSA Dual-SP Professional Edition

Dell EMC UnityVSA Dual-SP Professional Edition is an annual subscription-based product, which is available at 10TB, 25TB, 50TB, and 350TB storage capacity limits. In Dell EMC UnityVSA OE 5.1, Dual-SP now supports an additional CPU and memory deployment option. The available options are a 2-core and 12GB memory per-SP deployment or a 12-core and 96GB memory per-SP deployment. Users cannot convert from a Single-SP to a Dual-SP deployment. Likewise, users cannot convert from a 2-core / 12GB memory deployment to a 12-core / 96GB memory deployment. Users must purchase a Professional Edition subscription prior to using Dell EMC UnityVSA Dual-SP. Professional Edition licenses can be purchased for one year at a time. While the subscription is active, users have the ability to contact support if any issues arise. Licenses are tied to the Dell EMC UnityVSA Dual-SP System UUID and also have a minimum code requirement of OE 4.5.

Dell EMC UnityVSA Dual-SP provides the same Unisphere alerts as Dell EMC UnityVSA Single-SP for license expiration date and also can convert from a lower capacity to higher capacity license as needed. Same considerations apply.

5 Dell EMC UnityVSA Single-SP Deployment

Dell EMC UnityVSA Single-SP is delivered in the form of an Open Virtualization Appliance (OVA) template and can be deployed on VMware vSphere ESXi 6.5 or later. Dell EMC UnityVSA Single-SP is deployed using the OVF Deployment Wizard in the vSphere client as shown in Figure 1.

Deploy OVF Template

- ✓ 1 Select an OVF template
- ✓ 2 Select a name and folder
- ✓ 3 Select a compute resource
- 4 Review details
- 5 Select storage
- 6 Select networks
- 7 Customize template
- 8 Ready to complete

Review details
Verify the template details.

⚠ The OVF package contains advanced configuration options, which might pose a security risk. Review the advanced configuration options below. Click next to accept the advanced configuration options.

Publisher	DigiCert EV Code Signing CA (Trusted certificate)
Product	UnityVSA
Version	5.1.0
Vendor	Dell EMC Corporation
Description	UnityVSA Appliance (5.1.0)
Download size	2.6 GB
Size on disk	2.6 GB (thin provisioned) 84.0 GB (thick provisioned)
Extra configuration	<pre>time.synchronize.tools.startup = 0 disk.enableUUID = TRUE time.synchronize.restore = 0 time.synchronize.continue = 0 time.synchronize.shrink = 0 smbios.assetTag = UnityVSA200ESX12SA time.synchronize.resume.disk = 0 time.synchronize.tools.enable = 0 time.synchronize.resume.host = 0</pre>

CANCEL
BACK
NEXT

Figure 1. Dell EMC UnityVSA Deployment

The wizard walks through all of the necessary steps to deploy Dell EMC UnityVSA Single-SP including reviewing the license agreement, selecting a host, selecting a datastore, and configuring the network mappings for the data and management ports. If you need to change the network mapping after deployment, the virtual Ethernet adapter to Ethernet port mappings are:

- Network adapter 2 → Management Port
- Network adapter 3 → Ethernet Port 0
- Network adapter 4 → Ethernet Port 1
- Network adapter 5 → Ethernet Port 2
- Network adapter 6 → Ethernet Port 3

Please refer to the Dell EMC UnityVSA Installation Guide for more information about deploying Dell EMC UnityVSA Single-SP.

5.1 Initial Boot

After provisioning is complete, the Dell EMC UnityVSA Single-SP VM can be powered on for the first time. Do not make any changes to the VM, such as changing the virtual hardware configuration (CPU, memory, NICs,

and so on), as this causes Dell EMC UnityVSA Single-SP to boot into service mode to prevent invalid configurations. The time it takes for the initial boot will vary depending on the infrastructure, especially the datastore performance capabilities. This process can take between 20 to 60 minutes. You can monitor the boot status in the Summary tab for the VM. The DNS Name shows “Booting...” while the VM is starting up as shown in Figure 2.

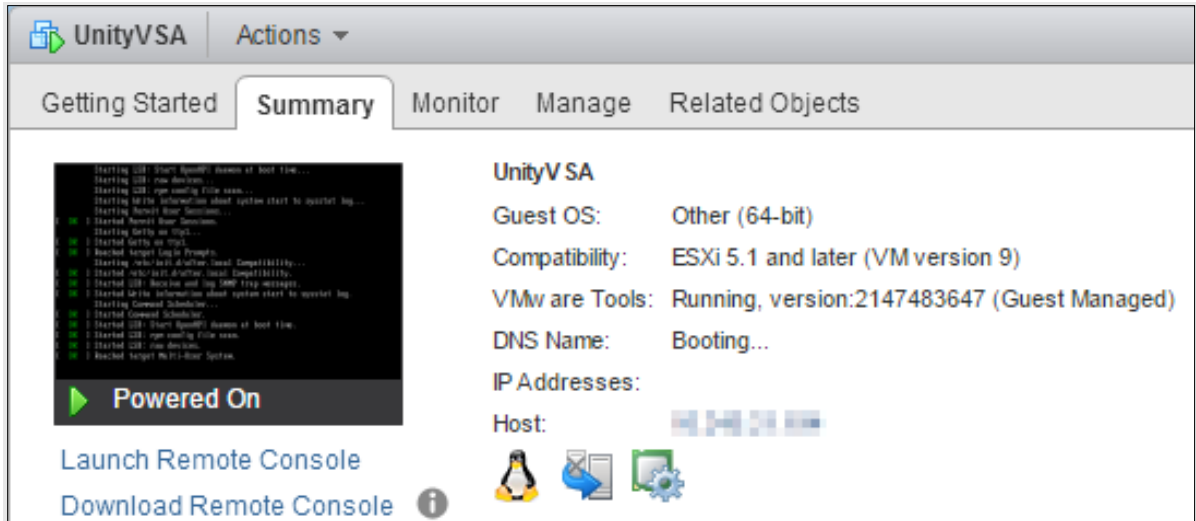


Figure 2. Dell EMC UnityVSA Booting

Once the boot process is complete, the DNS Name is updated to display the system name. If no system name is defined, this defaults to the serial number. If an IP address was already configured during deployment, Unisphere on Dell EMC UnityVSA is now accessible.

5.2 IP Assignment

Dell EMC UnityVSA Single-SP can be deployed using the ESXi host itself, or via a vCenter Server managing the ESXi host. Using vCenter enables the ability to customize the template by configuring the system name, IPv4 management settings, and/or IPv6 management settings as shown in Figure 3.

Deploy OVF Template

Customize template
Customize the deployment properties of this software solution.

✓ 1 Select an OVF template
✓ 2 Select a name and folder
✓ 3 Select a compute resource
✓ 4 Review details
✓ 5 Select storage
✓ 6 Select networks
7 Customize template
8 Ready to complete

✓ All properties have valid values

System Name	1 settings
System Name	User friendly name for the system
IPv4 Management Settings (Leave Blank for Automatic Configuration)	3 settings
IP Address	IPv4 address for the management interface
Subnet Mask	IPv4 netmask for the management interface
Gateway	IPv4 gateway for the management interface
IPv6 Management Settings (Leave Blank for Automatic Configuration)	3 settings
IP Address	IPv6 address for the management interface

CANCEL BACK NEXT

Figure 3. Dell EMC UnityVSA Settings

If Dell EMC UnityVSA Single-SP is deployed without a vCenter server, an IP address cannot be assigned during deployment. In this case, once the system has fully booted, it can be configured using the VMware Console or Windows tools such as Dell EMC Unity Connection Utility or InitCLI:

- VMware Console - Open the console for Dell EMC UnityVSA Single-SP and login with the default credentials: service/service. Once logged in, run:

IPv4: `svc_initial_config -f <Hostname> -4 "<IPv4_Address> <IPv4_Netmask> <IPv4_Gateway>"`

IPv6: `svc_initial_config -f <Hostname> -6 "<IPv6_Address> <IPv6_Prefix_Length> <IPv6_Gateway>"`

- Connection Utility - Use the Auto Discover option to discover the system on the same subnet and configure the system name, IPv4 management settings, and/or IPv6 management settings.
- InitCLI - Run the following commands in a Command Prompt window to discover the system and configure the system name and IPv4 management settings.

Discover: `initcli discover`

IPv4: `initcli configure -id <ID> -ipv4 static -addr <IPv4_Address> -mask <IPv4_Netmask> -gateway <IPv4_Gateway> -name <Hostname>`

5.3 Initial Configuration Wizard

After an IP is assigned, Unisphere can be launched by pointing a browser to the management IP address. You can login to Unisphere using the default credentials: admin/Password123#. When logging in for the first time, the Initial Configuration Wizard appears and guide you to:

- Accept the End User License Agreement (EULA)
- Change the passwords
- Configure DNS and NTP Servers
- Install a license
- Configure Storage Pools
- Configure SMTP Settings
- Enter Dell EMC Support Credentials
- Create NAS Servers and iSCSI Interfaces

During the Unisphere Licenses step of the Initial Configuration Wizard, note the System UUID, as shown in Figure 4.

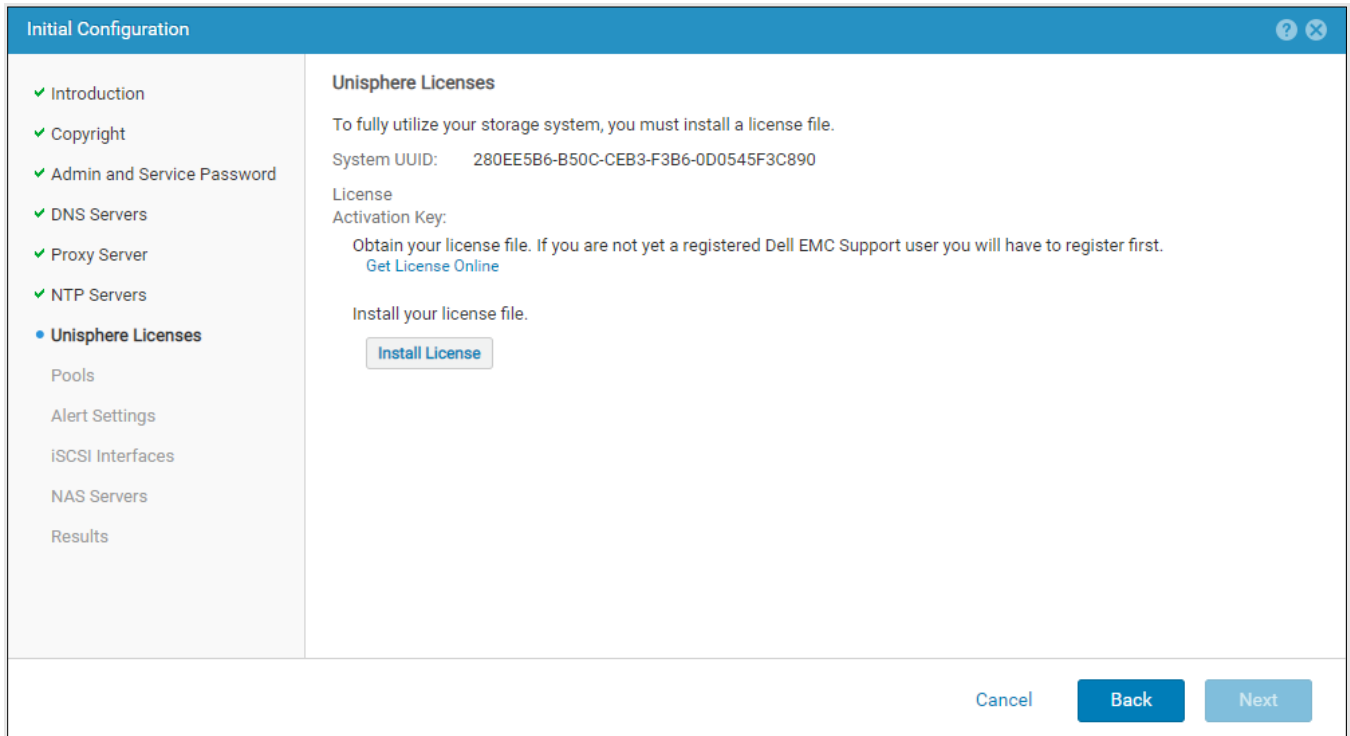


Figure 4. System UUID

The System UUID is required in order to generate a license for Dell EMC UnityVSA Single-SP. If you would like to use Dell EMC UnityVSA Single-SP Community Edition, click the link to the Dell EMC Software License Request Form from the Dell EMC UnityVSA Single-SP download page. On this form, enter the System UUID and click Submit, as shown in Figure 5.

LET'S GET STARTED

This will be an amazing experience

Enter the System UUID generated upon Software Install

42067DB9	318C	EA72	ED46	D0734CA27CF4
----------	------	------	------	--------------

Product Name

UnityVSA ▼

SUBMIT

Figure 5. License Request Form

This generates a license and sends it to the email address that's associated with your Dell EMC Online Support account. Once the license is received, it can be installed on the same step in the Initial Configuration Wizard. If you need a Professional Edition license, the System UUID is required to order a subscription.

6 Dell EMC UnityVSA Dual-SP Deployment

Dell EMC UnityVSA Dual-SP is delivered in the form of an Open Virtualization Appliance (OVA) template and can be deployed on VMware vSphere ESXi 6.5 or later. Dell EMC UnityVSA Dual-SP is deployed using a Deployment Utility tool, as seen in Figure 6, which can be downloaded from the Dell Technologies software downloads page. The tool utilizes the same OVA file that is used to deploy the single-SP solution of Dell EMC UnityVSA, but automates the internal networking configuration that is required to successfully connect both SP VMs that are deployed.

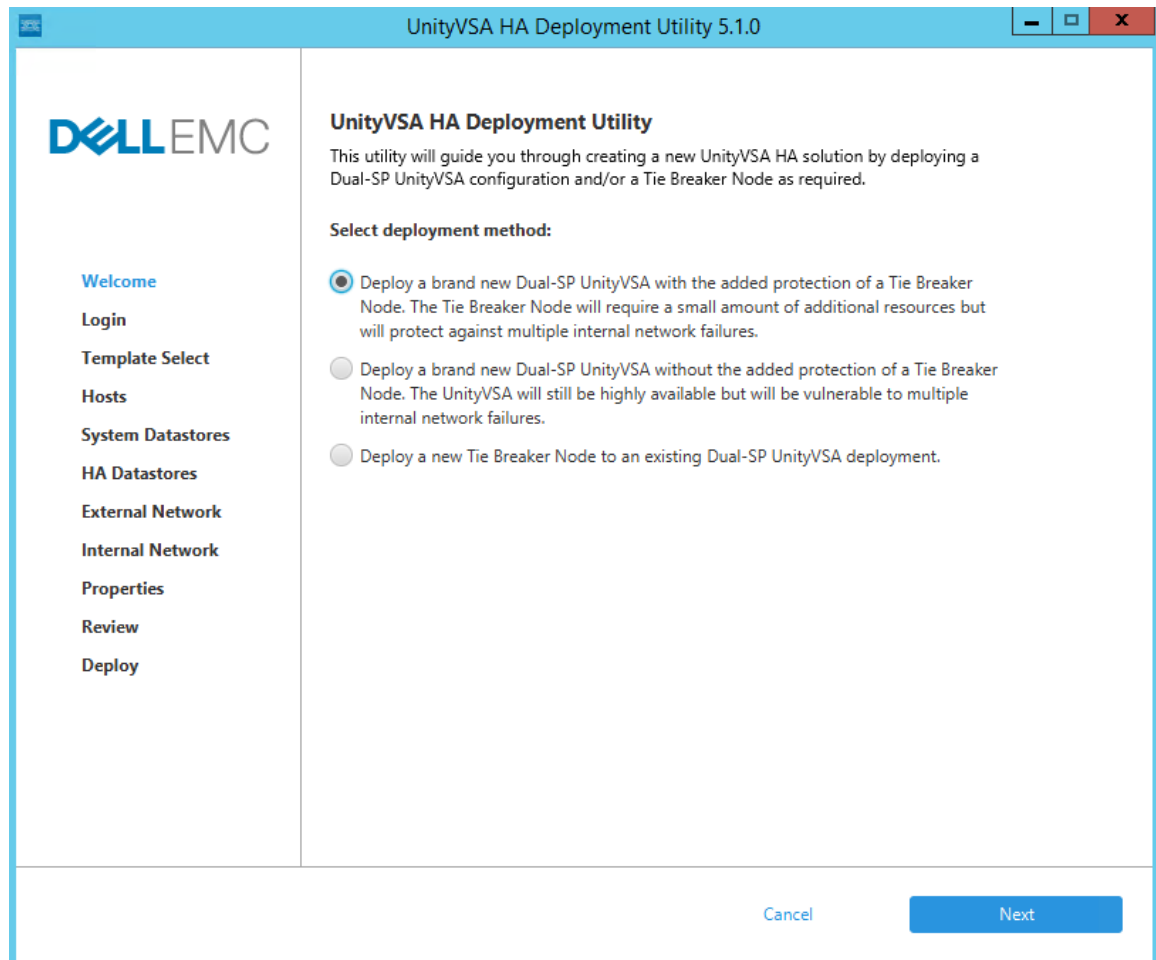


Figure 6. Dell EMC UnityVSA Dual-SP Deployment

The three options for deploying Dell EMC UnityVSA Dual-SP include new Dell EMC UnityVSA Dual-SP with TBN, new Dell EMC UnityVSA Dual-SP without TBN, or just TBN. Note that the Tie Breaker Node is not configured automatically even if deployed with the Dell EMC UnityVSA Dual-SP solution. The TBN must be configured for usage by a system even if deployed with the SPs. TBN configuration can be done via the Initial Configuration Wizard in Unisphere.

The wizard walks through all of the necessary steps to deploy Dell EMC UnityVSA Dual-SP including logging into associated vCenter, choosing a deployment type (2-core or 12-core Dual-SP) selecting hosts for SPA and SPB, selecting system and heartbeat datastores, and configuring the network mappings for the internal networks, and data and management ports. If you need to change the network mapping after deployment, the virtual Ethernet adapter to Ethernet port mappings are:

- Network adapter 2 → Management Port
- Network adapter 3 → Internal Heartbeat Network Port 0
- Network adapter 4 → Internal Heartbeat Network Port 1
- Network adapter 5 → Internal CMI Network
- Network adapter 6 → Ethernet Port 0
- Network adapter 7 → Ethernet Port 1
- Network adapter 8 → Ethernet Port 2
- Network adapter 9 → Ethernet Port 3

Please refer to the Dell EMC UnityVSA Installation Guide for more information about deploying Dell EMC UnityVSA Dual-SP.

6.1 Initial Boot

After provisioning is complete, the Dell EMC UnityVSA Dual-SP VMs can be powered on for the first time if not automatically selected to be powered on in the Deployment Utility tool. Do not make any changes to the VMs, such as changing the virtual hardware configuration (CPU, memory, NICs, and so on), as this causes Dell EMC UnityVSA Dual-SP to boot into service mode to prevent invalid configurations. The time it takes for the initial boot will vary depending on the infrastructure, especially the datastore performance capabilities. This process can take between 20 to 60 minutes. You can monitor the boot status in the Summary tab for each VM. The DNS Name shows “Booting...” while each VM is starting up as shown in Figure 7.

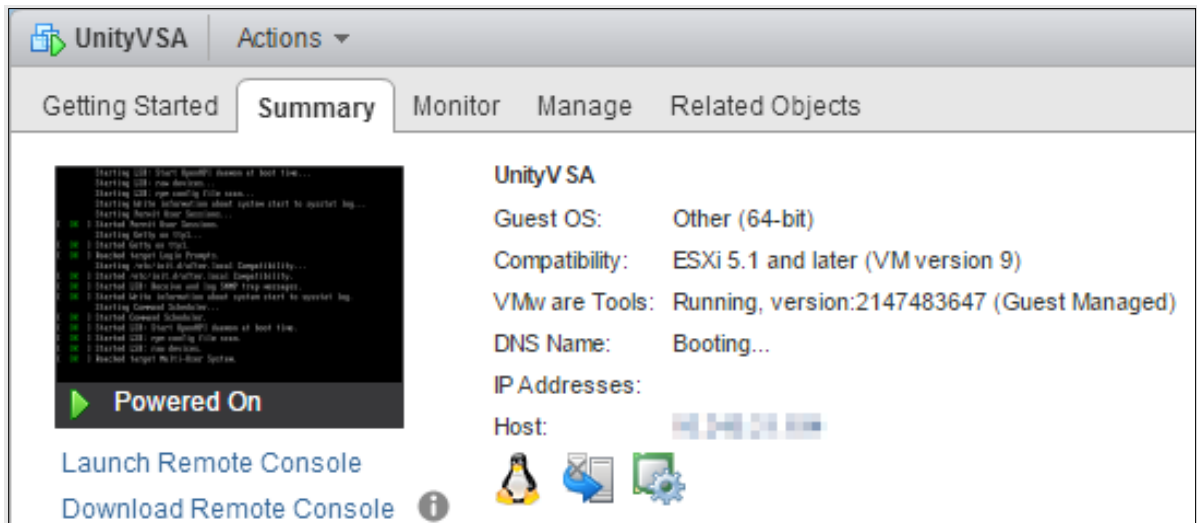


Figure 7. Dell EMC UnityVSA Booting

Once the boot process is complete, the DNS Name is updated to display the system name. If no system name is defined, this defaults to the serial number. If an IP address was already configured during deployment, Unisphere on Dell EMC UnityVSA Dual-SP is now accessible.

Another way to determine if an SP VM is ready is by logging into the Remote Console for the VM and checking whether all services have started successfully as shown in Figure 8.

```

Enforce US Keyboard Layout View Fullscreen Send Ctrl+Alt+Delete
Starting LSB: Firewall... 29/29 started (about 0 seconds left))
[ OK ] Started Getty on tty1.
[ OK ] Reached target Login Prompts.
[ OK ] Started LSB: Script to install OEM Customization motd banner.
[ OK ] Started LSB: Firewall.
[ OK ] Reached target Multi-User System.
Starting Update UTMP about System Runlevel Changes...
Starting the Stack Down target...
[ OK ] Started Update UTMP about System Runlevel Changes.
[ OK ] Created slice Container Framework Smonents cgroup (data and control).
[ OK ] Created slice Container Framework Slice for infrastructure cgroup.
[ OK ] Created slice Container Framework Slice for control components cgroup.
[ OK ] Created slice Container Framework Slice for data components cgroup.
[ OK ] Created slice Container Framework Slice for SAFE components cgroup.
[ OK ] Created slice Container Framework Sdata collection components cgroup.
[ OK ] Created slice Container Framework Sdata collection components cgroup.
[ OK ] Created slice Container Framework S config capture components cgroup.

*****
* Welcome to EMC UnityVSA 12GB - UIRT2117K62NYQ-spa - c4dev_PIE_6700R-5.1.0.0.4.
362
* Serial Number: UIRT2117K62NYQ
* Unisphere IP : Unable to determine IP address
*****
spa login:

```

Figure 8. Remote Console for SP VM (Services Started Successfully)

6.2 IP Assignment

Dell EMC UnityVSA Dual-SP can only be deployed using the Deployment Utility tool which asks the user for management IP (IPv4 and/or IPv6) configuration in the wizard itself as seen in Figure 9.

Figure 9. Dell EMC UnityVSA Dual-SP Settings

If Dell EMC UnityVSA Dual-SP was configured with the wrong IP address during deployment and the license agreement was not accepted yet, it can be reconfigured using the VMware Console or Windows tools such as Dell EMC Unity Connection Utility or InitCLI:

- VMware Console - Open the console for Dell EMC UnityVSA Dual-SP and login with the default credentials: service/service. Once logged in, run:

IPv4: `svc_initial_config -f <Hostname> -4 "<IPv4_Address> <IPv4_Netmask> <IPv4_Gateway>"`

IPv6: `svc_initial_config -f <Hostname> -6 "<IPv6_Address> <IPv6_Prefix_Length> <IPv6_Gateway>"`

- Connection Utility - Use the Auto Discover option to discover the system on the same subnet and configure the system name, IPv4 management settings, and/or IPv6 management settings.
- InitCLI - Run the following commands in a Command Prompt window to discover the system and configure the system name and IPv4 management settings.

Discover: `initcli discover`

IPv4: `initcli configure -id <ID> -ipv4 static -addr <IPv4_Address> -mask <IPv4_Netmask> -gateway <IPv4_Gateway> -name <Hostname>`

6.3 Initial Configuration Wizard

After an IP is assigned, Unisphere can be launched by pointing a browser to the management IP address. You can login to Unisphere using the default credentials: **admin/Password123#**. When logging in for the first time, the Initial Configuration Wizard appears and guides you to:

- Accept the End User License Agreement (EULA)
- Change the passwords
- Configure DNS and NTP Servers
- Install a license
- Configure Storage Pools
- Configure Tie Breaker Node
- Configure SMTP Settings
- Enter Dell EMC Support Credentials
- Create NAS Servers and iSCSI Interfaces

During the Tie Breaker Node step of the Initial Configuration Wizard, the tie breaker node VM can be selected, as shown in Figure 5. Note that the TBN must be configured manually even if the TBN was deployed with the SP VMs via the Deploy Utility. The TBN can also be configured in the **Settings** menu under the **Management** section.

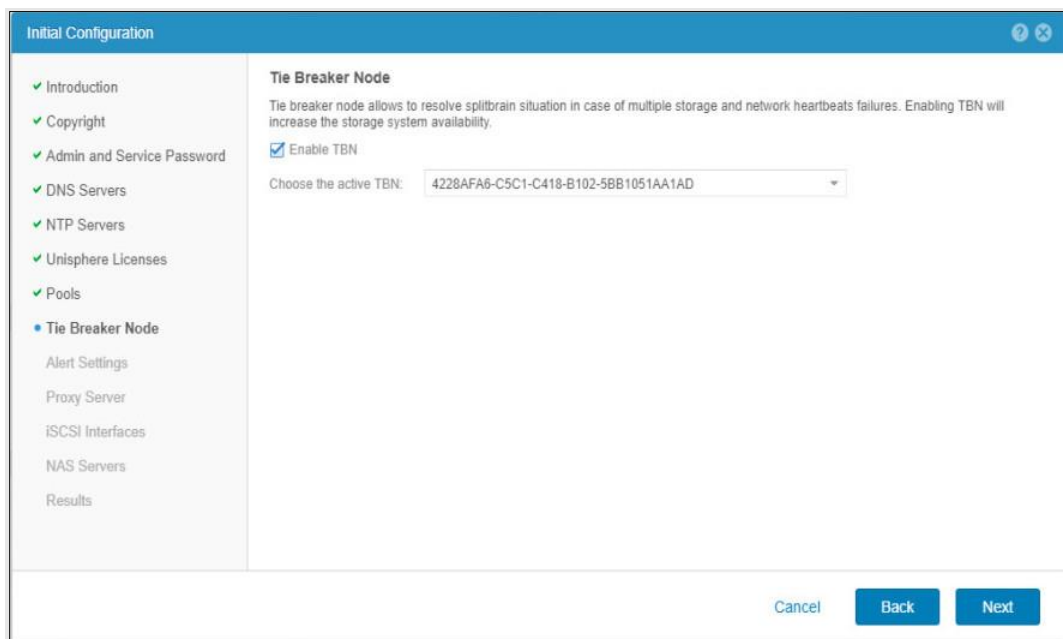


Figure 10. Tie Breaker Node Step (Initial Configuration Wizard)

7 Pool Provisioning

In order to provision storage on Dell EMC UnityVSA, virtual disks must first be added to the appliance. These virtual disks can be provided from RAID-protected server-based storage, storage from a Dell EMC or third-party storage system, or server SAN storage such as ScaleIO. The configuration and speed of the virtual disks can impact the speed of configuration changes and overall performance on Dell EMC UnityVSA. Workloads should be benchmarked accordingly for proper use.

For single-SP deployments, a new virtual disk needs to be added to the single VM, but for dual-SP deployments, the same virtual disk must be added to both SPA and SPB VMs to be successfully utilized by the Dell EMC UnityVSA system. More information about the process of adding virtual disks can be found in the Dell EMC UnityVSA Installation Guide which can be found on Dell EMC Online Support.

Note that Dell EMC UnityVSA does not support RDM (Raw Device Mappings). It only supports VMDKs that are presented from a datastore. The minimum size of the new virtual disk is 10GB and the maximum size is equal to 62TB as this is the max VMDK disk size that VMware allows. If using a 50TB license, then the max VMDK size would be 50TB. As shown in Figure 11, all virtual disks must use the following settings:

- Disk Provisioning: Thick Provision Eager Zeroed. If the datastore does not have this option (e.g. vSAN) then Thick Provision should be selected.
- Location: Any separate datastore than the SP VM(s). If Dual-SP deployment, the datastore must be accessible by both SPA and SPB VMs.
- Sharing: Multi-Writer (if a Dual-SP deployment)
- Disk Mode: Independent – Persistent (if a Dual-SP deployment)
- Size: Greater than 10GB.

The screenshot shows the 'Edit Settings' dialog for a new virtual disk in UnityVSA. The dialog is titled 'Edit Settings | UnityVSA' and has a close button (X) in the top right corner. The main content is a table of settings for a new hard disk.

Setting	Value
New Hard disk *	1 TB
Maximum Size	19.96 TB
VM storage policy	VVol No Requirements Policy
Location	Store with the virtual machine
Disk Provisioning	Thick Provision
Sharing	Multi-writer
Shares	Normal 1000
Limit - IOPs	Unlimited
Disk Mode	Independent - Persistent
Virtual Device Node	SCSI controller 0 SCSI(0:3) New Hard disk
SCSI controller 0	VMware Paravirtual
SCSI controller 1	VMware Paravirtual
Network adapter 1	Public_PG <input checked="" type="checkbox"/> Connected
Network adapter 2	Public_PG <input checked="" type="checkbox"/> Connected

At the bottom right of the dialog, there are two buttons: 'CANCEL' and 'OK'.

Figure 11. New Virtual Disk

When adding new virtual disks, also take note of the Virtual Device Node ID. This SCSI ID is displayed on the Virtual Disks page in Unisphere. This makes it easier to correlate the virtual disks in Unisphere to the ones in vSphere, especially if there are multiple virtual disks that are the same size. Starting with OE version 5.1, you can add up to 50 additional virtual disks for data use on each Dell EMC UnityVSA.

It's crucial to not remove any virtual disks from the VM that are currently in use. Prior to removing a virtual disk, ensure it's not in use by any pools on Dell EMC UnityVSA. When removing the unused disk, confirm the Virtual Device Node ID matches the SCSI ID displayed in Unisphere to ensure the correct virtual disk is being removed. If a virtual disk is accidentally removed but not deleted, it can be added back to Dell EMC UnityVSA and it will be discovered automatically. However, if a used virtual disk is permanently deleted, the pool will go offline and cause data unavailability.

Resizing a virtual disk that is in use through VMware is also not supported. However, if the virtual disk is not part of a storage pool, you can remove it from Dell EMC UnityVSA and add a new one of the preferred size. Virtual disks that are already part of a storage pool should never be resized because this can result in a failed and unrecoverable storage pool. If you accidentally resize a virtual disk that is not part of a storage pool, you can recover the virtual disk by removing it from Dell EMC UnityVSA and then adding it back to Dell EMC UnityVSA.

If there is a possibility of upgrading the Dell EMC UnityVSA capacity at a later time, it is important to avoid using all 50 virtual disks used for data. This leaves room to add additional virtual disks with more capacity after the upgraded license is installed. Otherwise, storage resources may need to be deleted in order to free

up a virtual disk for expansion. Expanding virtual disks that are already configured in a storage pool is not supported and could result in data unavailable conditions.

Once one or more virtual disks have been added, a storage pool can be created. In Unisphere, navigate to the Pools page and click + to create a new pool. In the Create Pool wizard, tier assignments need to be made for each virtual disk that is used for this pool as shown in Figure 12.

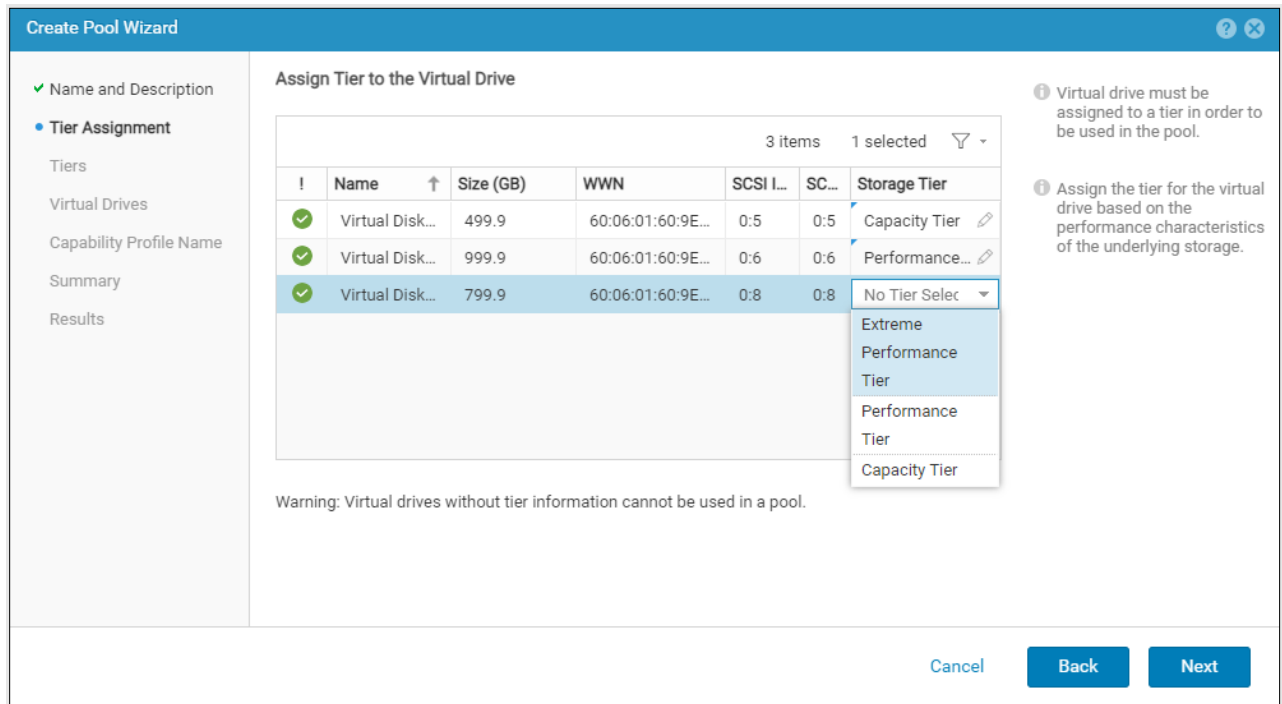


Figure 12. Tier Assignment

This information must be entered manually since the virtualization layer abstracts the virtual disk information from Dell EMC UnityVSA. Typical Dell EMC tier classification denotes Flash drives to be “Extreme Performance”, SAS drives to be “Performance”, and NL-SAS drives to be “Capacity”. Dell EMC recommends adhering to this schema to ensure FAST VP relocates data to the appropriate virtual disks.

Virtual disks do not utilize redundancy technologies seen in physical storage systems, such as hot spares and drive rebuild. Instead, the RAID controller, storage system, or server SAN handles any drive failures that may occur. This enables you to create a storage pool from a single virtual disk.

8 Feature Set

Dell EMC UnityVSA retains the ease-of-use and ease-of-management found in the Dell EMC Unity™ family. It's designed to have a consistent look and feel across the Dell EMC Unity family using HTML5-based Unisphere. Its feature set and data services are designed to be on par with the Dell EMC Unity family. Note that there are some key differences between Dell EMC UnityVSA and physical Dell EMC Unity systems, which are highlighted in this white paper. For a quick reference to the differences in feature sets between Dell EMC UnityVSA and physical Dell EMC Unity systems, see Table 7.

8.1 Unisphere

Unisphere is an HTML5-based graphical web-based management interface that is the primary monitoring and management tool for Dell EMC UnityVSA. It provides tools for creating, configuring, and managing storage resources. Unisphere enables users to monitor storage operations and system status through a detailed graphical reporting service, which can pinpoint issues to specific components of the storage system. Unisphere also enables monitoring of storage system performance through graphs allowing technical users to see a deeper view of system utilization.

The Unisphere management interface for Dell EMC UnityVSA matches much of the same functionality as seen on physical Dell EMC Unity systems but includes virtualization-specific changes to certain pages such as Pools and System Health.

For more information about Unisphere, please see the paper Dell EMC Unity: Unisphere Overview white paper on Dell EMC Online Support.

8.2 System Health

Status and health information about the virtual components of Dell EMC UnityVSA can be found on the System View page. The Summary page behaves the same as a physical Dell EMC Unity system where information including Name, Serial Number, System UUID, Software Version, and System Time are displayed.

On the Enclosures page, a graphical representation of the virtual components is presented instead since there are no hardware components. The virtualized management port and four data ports are displayed here, as shown in Figure 13. Note that the figure is of a Dell EMC UnityVSA Single-SP system. A Dell EMC UnityVSA Dual-SP system would display two SPs on this page.



Figure 13. Enclosures Page

On Dell EMC UnityVSA, there is also the addition of a Virtual page. This page provides details about the Virtual Disks that have been added, such as name, size, WWN, Storage Pool, SCSI ID, and tier, as shown in Figure 14.

		3 items ⚙ 📄						
	!	Name	↑	Total Size (GB)	WWN	Storage Pool	SCSI ID SP A	Storage Tier
<input type="checkbox"/>	✓	Virtual Disk 9		2,047.9	60:06:01:60:C3:2A:38:20:48:54:E8:56:AE:0F:CD:78		0:11	None
<input type="checkbox"/>	✓	Virtual Disk 10		1,023.9	60:06:01:60:C3:2A:38:20:BB:5C:E8:56:01:47:34:47		0:12	None
<input type="checkbox"/>	✓	Virtual Disk 11		499.9	60:06:01:60:C3:2A:38:20:BC:5C:E8:56:DE:F6:4B:3E		0:13	None

Figure 14. Virtual Disks

8.3 FAST VP

Fully Automated Storage Tiering for Virtual Pools (FAST VP) is available for both file and block data. It allows Dell EMC UnityVSA to optimize storage utilization by automatically moving data to appropriate locations within a storage pool according to activity level, as shown in Figure 15.

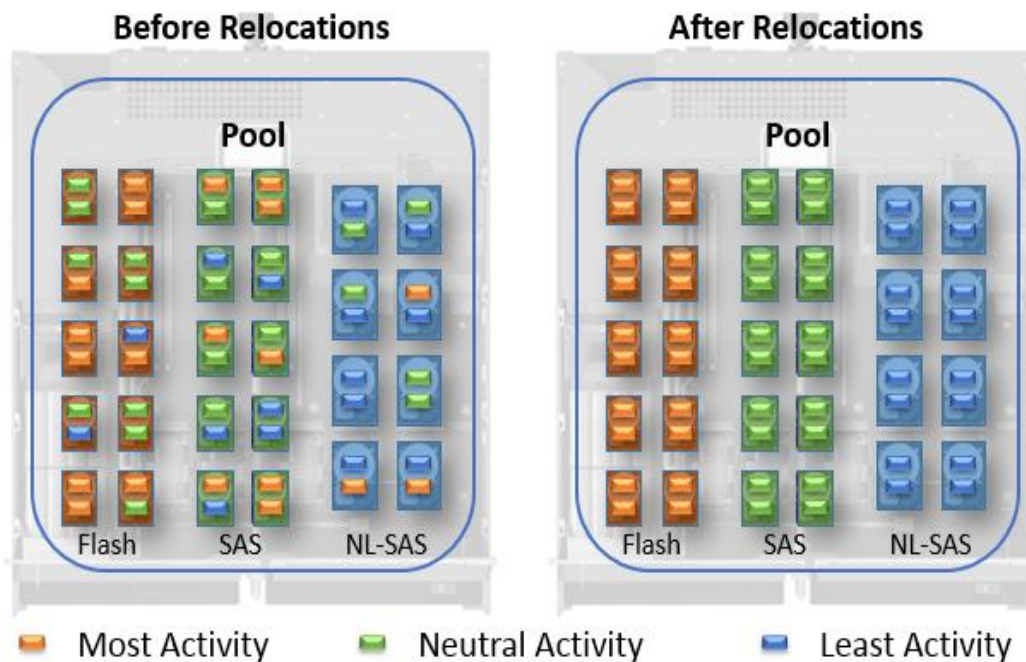


Figure 15. FAST VP

Data is moved in 256MB slices to the appropriate virtual drives, depending on the access patterns of the I/O and the configured tiering policy. The slices with the most activity are moved to the highest tier, while the slices with the least activity is moved to the bottom tier. By ensuring data is being served out of the appropriate disk, efficiency and performance can be significantly increased. For FAST VP to work properly on Dell EMC UnityVSA, it is crucial to accurately define the disk type for each virtual disk during pool creation.

For more information about FAST VP, please see the *Dell EMC Unity: FAST Technology Overview* white paper on Dell EMC Online Support.

8.4 Unified Snapshots

Dell EMC UnityVSA features Unified Snapshots, which leverage pointer-based technology to create point-in-time views of data for both file and block storage resources. This feature leverages Redirect on Write (ROW) technology to redirect new writes to new locations in the storage pool, as shown in Figure 16.

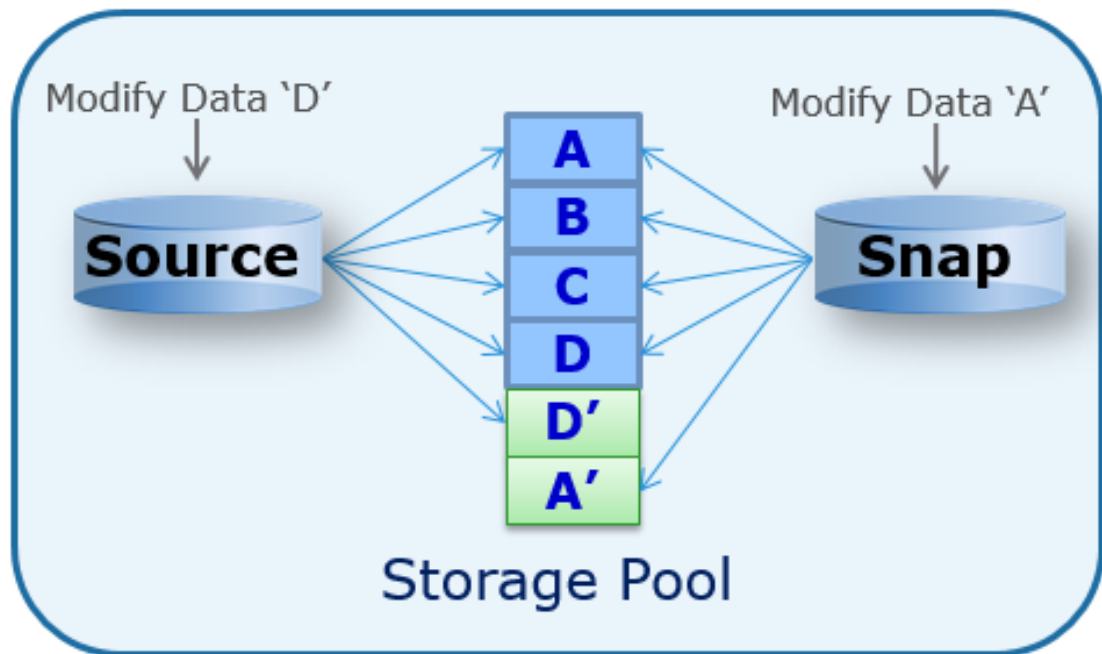


Figure 16. Unified Snapshots

Unified Snapshots are used with file systems, LUNs, and NFS or VMFS datastores. Dell EMC UnityVSA also includes an integrated snapshot scheduler which provides the ability to schedule snapshot creation and deletion.

For more information about Unified Snapshots, please see the *Dell EMC Unity: Snapshots and Thin Clones* white paper on Dell EMC Online Support.

8.5 Thin Clones

Starting with Dell EMC Unity OE version 4.2, Thin Clones are supported. A Thin Clone is a read/write copy of a Block level storage resource (LUN, LUN within Consistency Group or VMware VMFS Datastores) and are provisioned from read-only unattached snapshots. However, they are treated as primary resources so data services can be applied to Thin Clones in the same manner as LUNs. Thin Clones share the same blocks as their parent block level storage resources. Any changed data on the Thin Clone does not affect the base resource and vice versa. Also, any changes to the Thin Clone do not affect the snapshot source it was provisioned from. Users are able to create, view, modify, refresh and delete Thin Clones from the Unisphere GUI, UEMCLI and REST API.

For more information about Thin Clones on the Dell EMC Unity platform, please refer to the white paper titled *Dell EMC Unity: Snapshots and Thin Clones* available on Dell EMC Online Support.

8.6 Asynchronous Unified Replication

Asynchronous Unified Replication is available natively on Dell EMC UnityVSA. This allows file and block resources to be replicated between Dell EMC UnityVSA systems, between Dell EMC UnityVSA and physical Dell EMC Unity systems, and also locally back to the same Dell EMC UnityVSA system. The synchronization of data is automatically performed according to user-configured intervals, which can be between 5 minutes to 24 hours, or can be initiated manually. Different resources can also be replicated to different destinations, as shown in Figure 17.

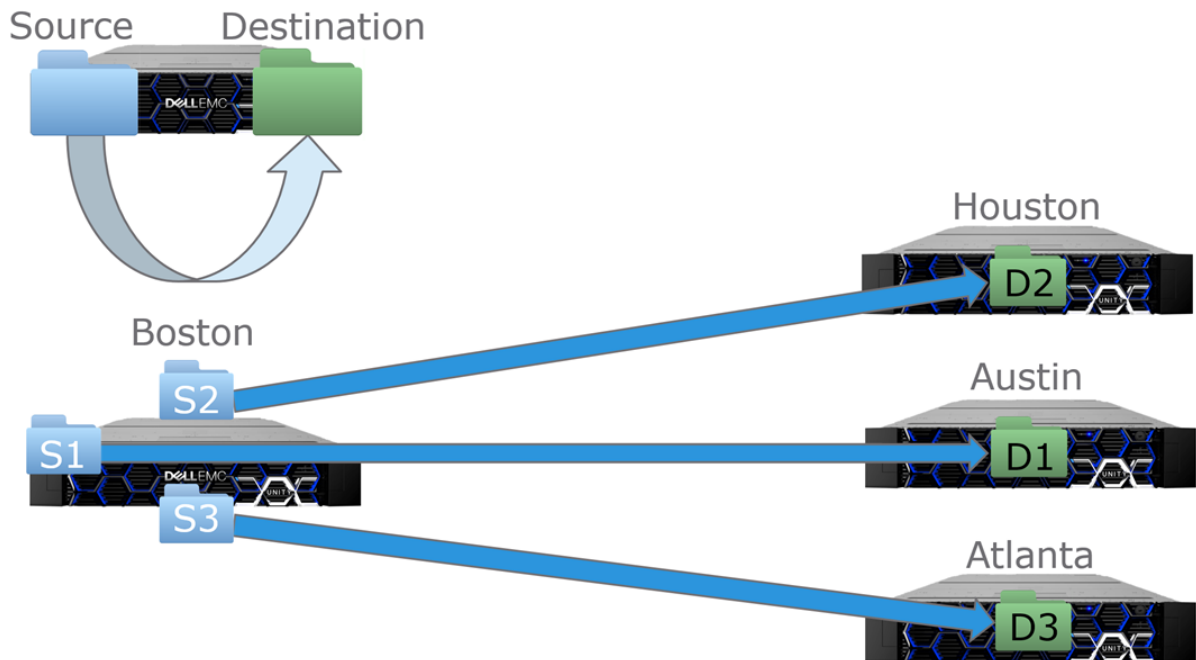


Figure 17. Unified Asynchronous Replication

Asynchronous unified replication can be used for file systems, LUNs, and NFS or VMFS datastores.

Dell EMC Unity provides the ability to perform operations such as failover, failback, pause, and resume on individual NAS Servers and file systems. For example, in order to initiate a failover, you must first failover the NAS Server and then failover the individual file systems afterwards to enable access on the destination system. Dell EMC Unity OE version 4.2 introduces an enhancement that enables group operations. The group operation automatically fails over all of the associated file systems if a failover is initiated on the NAS Server. Group operations can be used for failover, failover with sync, failback, pause, and resume. These operations remain available at the individual file system level, but any operation applied at the NAS Server level is a group operation. All other replication related operations such as create, sync, delete, and modify remain available only as individual operations.

For more information about Asynchronous Unified Replication, please see the *Dell EMC Unity: Replication Technologies* white paper on Dell EMC Online Support.

8.7 Snapshot Shipping

Dell EMC Unity OE version 4.2 introduces the ability to replicate file and block snapshots along with the primary storage resource. Some benefits include the ability to configure a different retention policy on the

destination for compliance purposes, improving cost efficiency by freeing up capacity from snapshots on the source system, and improvising resiliency by storing snapshots in a different fault domain.

This feature requires both the source and destination system to be running Dell EMC Unity OE version 4.2 or later. Also, an asynchronous replication session must be created on the primary storage resource. This feature can be enabled during creation of the replication session or at any time afterwards.

This feature works with both manually initiated and snapshots taken by the integrated snapshot scheduler. A replicated snapshot retains the same properties and attributes as the source snapshot. This includes the name, description, creation time, taken by, and so on. For file snapshots, only read-only snapshots are eligible for replication. Read/write snapshots that are used for shares and exports cannot be replicated.

For more information about Snapshot Shipping, reference the Dell EMC Unity: Replication Technologies and Dell EMC Unity: Snapshots and Thin Clones white papers on Dell EMC Online Support.

8.8 LUNs and Consistency Groups

Dell EMC UnityVSA provides hosts with access to LUNs through the iSCSI protocol. After a host connects to a provisioned LUN, it can use the LUN as if it were a local storage device. In terms of management, Unisphere allows users to create, view, manage, and delete LUNs. Finally, a LUN's capacity can be increased, but not decreased.

Consistency Groups are logical containers which allow users to organize LUNs into crash consistent groups. For example, assume a database application requires one LUN for the database and a separate LUN for log files. The disks can be managed as a single entity in Unisphere by adding the LUNs to a Consistency Group. This allows for operations, such as replication or snapshots, to be performed on all the LUNs in the Consistency Group at the same time.

8.9 Host I/O Limits

Host I/O limits is a feature which allows the user to control the amount of throughput and bandwidth consumed by block resources. This feature can be applied to LUNs, VMFS datastores, or attached snapshots. Users can configure the maximum IOPS, maximum bandwidth, or both depending on which limit is reached first. The user can also choose if a limit applies to each resource individually, or if a group of resources must share the configured limit.

In Dell EMC UnityOE version 4.1, density-based Host I/O Limits can be created which limits host activity based on the size of the block resource. For example, a density based I/O limit of 100 IOPS/GB for a 200GB LUN would result in an overall limit of 20,000 IOPS for the entire LUN. If sometime later the 200GB LUN was expanded to be a 250GB LUN, the I/O limit would automatically update to 25,000 IOPS for the LUN, saving the administrator managerial tasks and time. Like absolute I/O limits, density based I/O limits can also be shared among multiple resources.

Another feature in Dell EMC UnityOE version 4.1 is burst policies for Host I/O Limits. This option is available for any Host I/O Limit policy and allows host activity/traffic to exceed the base policy limit by a user-specified percentage. The user specifies parameters of amount (percentage), duration, and frequency of the I/O limit burst allowance

8.10 Dell EMC Unity File System

Dell EMC UnityVSA includes a 64-bit file system architecture that delivers great scalability, availability, performance, and space efficiency. Dell EMC Unity allows a user to shrink and extend file systems. During these operations, Dell EMC UnityVSA continues to service IO since they are performed transparently to the client. Shrink operations automatically reclaim freed space back to the pool. Also, the maximum capacity for the file system on Dell EMC UnityVSA is 50TB and scales according to the licensed capacity. The file system is leveraged for SMB, NFS, and multiprotocol file systems as well as NFS datastores.

Starting with Dell EMC UnityOE version 4.1, file systems can be configured with a minimum allocation size. This enables the storage administrator to control the guaranteed space allocation for a file system. When the minimum allocation size is configured during the creation of a new file system, the size specified is allocated immediately at creation. Note that starting with Dell EMC Unity OE version 4.2, newly created file systems no longer have the option to configure the minimum allocation size. However, Unisphere provides the ability to create thick file systems if space reservation is required. Note that there is no way to convert from thin to thick or thick to thin after a file system is created.

For more information about the file system, please see the Dell EMC Unity: NAS Capabilities white paper on Dell EMC Online Support.

8.11 NAS Servers

NAS Servers host file systems on the Dell EMC UnityVSA storage system. NAS Servers utilize virtual interfaces to enable host connectivity to SMB, NFS, and Multiprotocol file systems, as well as VMware NFS Datastores and VMware Virtual Volumes. Depending on what is enabled on the NAS Server, SMB file systems and NFS file systems can be created either separately or in a multiprotocol configuration.

On a NAS server, interfaces can be configured to enable communication between the NAS Server, client, and external services. In addition, starting with Dell EMC UnityOE version 4.1, static routes can also be configured to determine where to forward a packet so that it can reach its destination. Static routes can either be a host or network route. A host route is the most specific type of route, which is only used when traffic is sent to a specific IP address. A network route is less specific and is used when sending traffic to a specific subnet. The system uses the most specific route available. If no host or network routes are defined, the default route is used (if configured).

Packet Reflect, also available starting in Dell EMC UnityOE version 4.1, is a feature that ensures outbound (reply) packets are sent back to the same host or router as the inbound (request) packet. This enables the NAS Server to bypass routing and ARP table lookups when replying to a packet, so no routing configuration is required.

In Dell EMC UnityOE version 4.1, for multi-protocol NAS Servers, users are able to use local files to resolve UNIX user identities for their Unix Directory Service (UDS) configuration. This is useful in cases where an external NIS or LDAP server is not available for UDS configuration, but multi-protocol is still needed thereby providing an easy alternative. Local files can be used to resolve UNIX user records in multiple ways including by passwd, group, hosts, netgroup, and/or home directories.

Starting with Dell EMC UnityOE version 4.2, several NAS enhancements are added including:

- **NAS Server Mobility** – This provides the ability to change the SP owner on existing NAS Server after they are created. This is automatically applied to all of a NAS Server's associated file systems, enabling this feature to be used for load balancing purposes or to resolve network issues.

- NAS Server Parameters – This enables parameters to be configured at a NAS Server level. This enables a higher level of granularity and also allows parameters to be automatically replicated as part of NAS Server replication.
- SMB 3.1.1 Support - SMB 3.1.1 provides improved security and encryption traffic performance for SMB3 by changing the encryption algorithm from AES-CCM-128 to AES-GCM-128. This change improves performance under certain conditions such as large file transfers. In addition, this improves security against man-in-the-middle attacks.
- NFSv4 and Kerberos Support for NFS Datastores – This provides the ability to use NFSv4 or Secure NFS for VMware NFS datastores. Previously, these protocols options were only available for traditional file systems.

For more information about NAS Servers and related features, see the white paper titled *Dell EMC Unity: NAS Capabilities* white paper available on Dell EMC Online Support.

8.12 Common Event Enabler (CEE)

Dell EMC UnityVSA allows users to connect to a Common Anti-Virus Agent (CAVA) which can be used to identify and eliminate known viruses before they infect files on a system. CAVA is enabled via the Dell EMC Common Event Enabler (CEE) framework which is available for download and install for Windows or Linux environments. CAVA is for CIFS/SMB protocol and does not support NFS protocol.

Starting in Dell EMC UnityOE version 4.1, Dell EMC UnityVSA is able to connect to a Common Event Publishing Agent (CEPA) using the existing CEE framework. CEPA is a mechanism that allows applications to receive file event notifications (i.e. receive notifications when a file is created, opened, edited, renamed, etc.). CEPA is available for CIFS/SMB protocol and is configurable in a NAS Server's properties.

For more information about CEE, CAVA, and CEPA, see the technical papers titled *Using the Common Event Enabler for Windows* and *Using the Common Event Enabler for Linux* on Dell EMC Online Support.

8.13 Quotas

File system quotas provides administrators with a way to prevent users from consuming more storage than they should. Soft and hard quotas can be applied to users or to a specific directory. Soft quotas can be temporarily exceeded until the grace period has expired while the hard quota limit can never be crossed. User and tree quotas can also be used in conjunction with each other to limit individual users to a certain capacity and the directory to a different capacity.

For more information about quotas, please see the *Dell EMC Unity: NAS Capabilities* white paper on Dell EMC Online Support.

8.14 Import

Dell EMC UnityOE version 4.1 provides the ability to natively import data from an existing VNX1 or VNX2 storage system to a Dell EMC Unity system allowing for greater ease of use and simplicity for customers looking to refresh their storage platforms. For Block data import, Dell EMC UnityVSA utilizes the existing SAN Copy capabilities on the VNX series to copy over LUNs, Consistency Groups, and VMFS Datastores with a simple setup and workflow.

Dell EMC UnityVSA also has the ability to relocate local block resources to different pools on the system. This gives users the option to balance resources across pools in case certain pools are being over/under-utilized.

For File data, users can import VDMs from VNX1 or VNX2 systems to NAS Servers on Dell EMC UnityVSA storage systems. Dell EMC Unity OE version 4.1 introduces Native File Import for NFSv3 and Dell EMC Unity OE version 4.2 introduces Native File Import for SMB. This feature provides a native option for file migration to Dell EMC Unity from a VNX1 or VNX2 system. In OE version 5.1, Multi-protocol file import is also supported.

For more information about migration technologies, please see the *Dell EMC Unity: Migration Technologies* white paper on Dell EMC Online Support.

8.15 Cloud Tiering Appliance (CTA)

Cloud Tiering Appliance (CTA) enables the ability to tier data from Dell EMC UnityVSA to another location based on user-configured policies. An example of this includes moving any files that are larger than 50MB and hasn't been accessed in 30 days to the cloud. After a file is moved off the primary storage, an 8KB stub is left which points to the actual location of the data. Any requests to read the data that has been moved can be passed through or recalled from the cloud. From the end user point of view, this process is completely seamless since the stub resembles the actual file and the data continues to be accessible on demand.

Starting with Dell EMC UnityOE version 4.1 and CTA v11, CTA is available on Dell EMC UnityVSA. When using CTA with Dell EMC UnityVSA as the source, the following cloud repositories are supported: Dell EMC Elastic Cloud Storage (ECS), Microsoft Azure, Amazon S3, and IBM Cloud Object Storage (COS). To utilize CTA, Dell EMC UnityVSA must be running Dell EMC UnityOE version 4.1 or later. When tiering to a cloud repository, CTA can also leverage compression and/or encryption.

Using CTA helps customers achieve many benefits including reducing capital expenses by reclaiming capacity on primary storage, lowering operating expenses by reducing number of administrative tasks, and improved performance by reducing backup times. An illustration of the benefits of CTA can be seen in Figure 18.

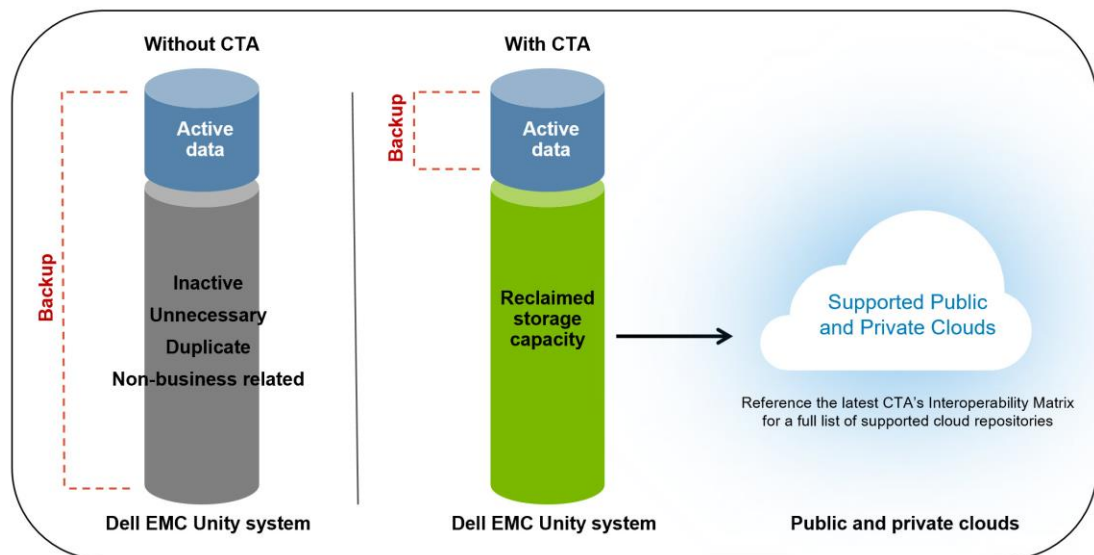


Figure 18. Cloud Tiering Appliance

Starting with Dell EMC Unity OE version 4.2 and CTA version 12, support for tiering of block snapshots to the cloud is available. This provides the ability to archive and restore block snapshots to and from the cloud. This works with both LUNs and Consistency Groups and leverages iSCSI connectivity between CTA and the Dell

EMC Unity system. Similar to file tiering, tiering of block snapshots is also based on policies and schedules created by the administrator. Once a snapshot is archived to the cloud, it can be deleted off the Dell EMC Unity system to free up storage. Snapshots can also be restored from the cloud on to a new storage resource on the Dell EMC Unity system.

For more information about CTA support with Dell EMC Unity, see the *Dell EMC Unity: NAS Capabilities and Dell EMC Unity Cloud Tiering Appliance (CTA)* white paper on Dell EMC Online Support.

8.16 Virtualization Integration

Dell EMC UnityVSA has tight integration with virtualization technologies. Unisphere includes a VMware page where you can import and display the VMware vSphere environment details. This includes information about the VMware vCenter, ESXi hosts, Virtual Machines, and Virtual Disks. This process also registers the VMware hosts on Dell EMC UnityVSA so they can be granted access to LUNs and VMFS, NFS, or vVol datastores. Starting in OE 5.1, Dell EMC UnityVSA supports vSphere 7.0, which allows a Dell EMC UnityVSA to be deployed into a vCenter 7.0 cluster or on a VMware ESXi 7.0 host. Users can also register a vCenter 7.0 cluster and/or VMware ESXi 7.0 hosts within Unisphere.

Unisphere allows for creation of VMFS and NFS datastores. When a datastore is created and access is provided to an ESXi host, it is automatically rescanned and made available as a datastore in vSphere. These datastores can take advantage of the same data services that are available to LUNs and File Systems, such as snapshots and replication. Also, when creating an NFS datastore, the allocation unit (AU) size or application can be selected. This eliminates the overhead and performance impact of unnecessarily granular mappings.

Dell EMC UnityVSA also supports vStorage API for Array Integration (VAAI) and vStorage API for Storage Awareness (VASA). VAAI improves ESXi host resource (CPU, memory, network, and so on) utilization by offloading storage-related tasks to Dell EMC UnityVSA. For example, an operation such as provisioning full clones from a template VM can be offloaded to Dell EMC UnityVSA. Dell EMC UnityVSA processes these requests internally, performs the write operations, and returns an update to the ESXi host once the requests are complete.

VASA is a VMware-defined and vendor neutral API that enables vSphere to determine the capabilities of a storage system. The API requests basic storage information from Dell EMC UnityVSA, which is used for monitoring and reporting storage details to the user. For example, if a datastore has Flash and Thin capabilities, this information is displayed and also used to determine whether or not a defined policy is compliant. Dell EMC UnityVSA has a native VASA provider which supports both the VASA 1.0, and 2.0 protocols, so no external plugins or add-ons are required.

For more information about Virtualization Integration, please see the Dell EMC Unity: Virtualization Integration white paper on Dell EMC Online Support.

8.17 VMware vSphere Virtual Volumes (vVols)

VMware vSphere Virtual Volumes™ (vVols) is a storage framework introduced in VMware vSphere 6. vVols enable VM-granular data services and Storage Policy Based Management (SPBM). In traditional storage environments, LUNs formatted with VMFS or NFS mount points are used as datastores for virtual machines. Data services were applied at the LUN or file system level, which means all virtual machines that reside on that particular datastore were also affected.

vVols enables storing VM data on individual virtual volumes, which reside on a vVol datastore. Data services, such as snapshots and clones, can be applied at a VM-level granularity and are offloaded to Dell EMC UnityVSA. Also, policies and profiles can be leveraged to ensure VMs are stored on compliant storage. Any VMs that become noncompliant result in an alert to the administrator.

When creating Capability Profiles on Dell EMC UnityVSA, characteristics that are not available on Dell EMC UnityVSA cannot be used. For example, RAID Type and FAST Cache are not available on Dell EMC UnityVSA so they are omitted. Due to this, the calculations for Service Levels on Dell EMC UnityVSA are different compared to physical Dell EMC Unity systems. Table 6 shows the available Service Levels for Dell EMC UnityVSA.

Table 6. Service Levels

Type	Gold	Silver	Bronze
Single Tier Pool	Extreme Performance	Performance	Capacity
Two Tier Pool	Extreme Performance Performance	Performance Capacity	Extreme Performance Capacity
Three Tier Pool		Extreme Performance Performance Capacity	

Starting with Dell EMC Unity OE version 4.2, Host I/O Limits are expanded to support vVols. vVols support either an absolute based limit or a density-based Host I/O limit, defined by IOPS or IOPS per GB respectively. Host I/O Limits are supported on data vVols specifically. Host I/O Limits cannot be applied to config, swap, or memory vVols. While the implementation of Host I/O Limits is the same for vVols and Block resources, the management of vVol Host I/O Limits is done entirely through vSphere. Host I/O Limits can be created in vSphere as a rule for a Storage Policy and then assigned at either the VM or vVol level. Unisphere can be used to monitor the vVol, with the capability to display any I/O Limits associated with the vVol as well as real time performance metrics

For more information about vVols, please see the *Dell EMC Unity: Virtualization Integration* white paper on Dell EMC Online Support.

8.18 CloudIQ

CloudIQ is a cloud-based SaaS (Software as a Service) storage system monitoring solution provided by Dell EMC. This free service requires the configuration of SRS (Secure Remote Services) and the user must allow the storage system to send data to CloudIQ. CloudIQ can provide a holistic view of multiple systems regardless if they are on the same network or in different locations allowing for a potential global view of datacenter environments as it relates to storage. CloudIQ, as seen in Figure 19, monitors not only the health of systems and storage resources configured, but as well as performance metric data in near real-time. CloudIQ supports both All-Flash and Hybrid Dell EMC Unity systems as well as Dell EMC UnityVSA Professional Editions.

In addition to an aggregated dashboard view across Dell EMC Unity systems in a customer's environment, CloudIQ provides the benefit of displaying a proactive health score for each system which automatically identifies potential issues along with recommended remedies to help identify needed administrative tasks. Other benefits of utilizing CloudIQ include reducing total cost of ownership (TCO) by faster remediation of issues, minimizing risk by identifying potential vulnerabilities, and higher uptime by optimizing performance and capacity usage of monitored systems.

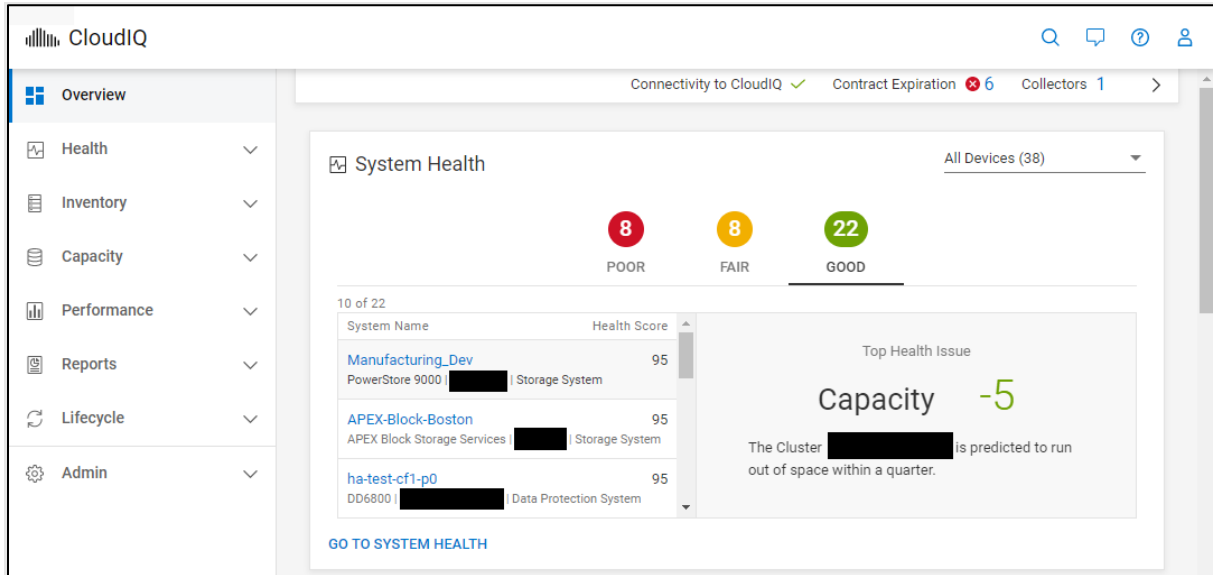


Figure 19. CloudIQ Dashboard Page

For more information about CloudIQ, see the white paper titled *CloudIQ* white paper on Dell EMC Online Support.

8.19 Unisphere Central

Unisphere Central is an application that enables administrators to monitor multiple Dell EMC UnityVSA, Dell EMC Unity, VNX, VNXe, and CLARiiON systems from a single interface. It collects information such as system state, alerts, capacity, and performance information and displays it in its HTML5 interface. It also features single sign on, system configuration cloning, and predictive pool capacity monitoring.

For more information about Unisphere Central, please see the *Dell EMC: Unisphere Central* white paper on Dell EMC Online Support.

8.20 Secure Remote Services

Secure Remote Services (SRS) gateway provides remote dial-in/dial-out connectivity to Dell EMC UnityVSA. This allows the system to dial home and automatically open Service Requests (SRs) for any issues that may arise. It also allows Dell EMC to securely transfer files, such as logs and configuration information, off the system for troubleshooting purposes. The gateway allows you to connect multiple Dell EMC devices such as Dell EMC UnityVSA, Dell EMC Unity, VNX, VNXe, CLARiiON, Celerra, and more while maintaining just a single connection to Dell EMC. When configuring Dell EMC UnityVSA on the SRS gateway, the License Activation Key should be used instead of the Serial Number (prefixed with VIRT) or System UUID. The License Activation Key is required for SRS since this is tied to the Dell EMC UnityVSA license.

For more information about SRS, please see the *Dell EMC Unity: Operating Environment* white paper on Dell EMC Online Support.

8.21 REST API

Representational State Transfer (REST) is a management API that allows clients to interact with Dell EMC UnityVSA using standard HTTP mechanisms and semantics. Operations that can be performed in Unisphere or UEMCLI can also be performed using REST API. Application developers can access REST API with any programming or scripting language capable of making HTTP requests, without requiring a separate client.

For more information about REST API, please see the *Dell EMC Unity: Operating Environment* white paper on Dell EMC Online Support.

9 Comparison

9.1 Features

Although Dell EMC UnityVSA is designed for small-scale deployments, its feature set is comparable to physical Dell EMC Unity systems. They also share the same management interfaces and design. Table 7 compares the feature set between a Dell EMC Unity and Dell EMC UnityVSA system.

Table 7. Feature Set

Feature	Dell EMC Unity	Dell EMC UnityVSA
CloudIQ	✓	✓*
FAST VP	✓	✓
Host I/O Limits	✓	✓
iSCSI	✓	✓
Migration (Import)	✓	✓
Multiprotocol	✓	✓
NFS	✓	✓
Quotas	✓	✓
REST API	✓	✓
SMB	✓	✓
Thin Provisioning	✓	✓
Dell EMC Unity File System	✓	✓
Unified Asynchronous Replication	✓	✓
Unified Snapshots	✓	✓
Unisphere Central	✓	✓
Unisphere HTML5 GUI	✓	✓
vVols	✓	✓
Compression/Data Reduction	✓	
Data at Rest Encryption	✓	
Data in place conversion	✓	
FAST Cache	✓	
Fibre Channel	✓	
RecoverPoint	✓	
Synchronous Replication	✓	

*CloudIQ support is not available for Dell EMC UnityVSA Community Edition

Note that the following features are not available on Dell EMC UnityVSA:

- Compression/Data Reduction – Dell EMC UnityVSA does not have control over caching mechanisms to utilize compression or data reduction.
- Data-in-Place (DIP) Conversions – Dell EMC UnityVSA does not have physical components to convert to a higher performing model so DIP is not available. This includes converting from a 2-core to 12-core deployment as well as converting from a Single-SP to a Dual-SP deployment.
- Data at Rest Encryption – Encryption is not available on Dell EMC UnityVSA since there is no SAS Controller. A server-based encryption solution or SEDs (Self-Encrypting Drives) can be leveraged if encryption is required.
- FAST Cache – Due to the virtualized nature of Dell EMC UnityVSA, the disk information is abstracted from the VM so FAST Cache cannot be used.
- Fibre Channel – Dell EMC UnityVSA only supports iSCSI for block connectivity.
- Multi-Tenancy – Dell EMC UnityVSA does not support network isolation for file tenants.
- RecoverPoint – RecoverPoint is only available physical Dell EMC Unity systems.
- Synchronous Replication – Synchronous Replication requires Fibre Channel, which is unavailable on Dell EMC UnityVSA.

Note that the following features are different on Dell EMC UnityVSA compared to physical Dell EMC Dell EMC Unity systems:

- Secure Remote Services (SRS) – Dell EMC UnityVSA only supports the SRS gateway and does not support integrated SRS.
- Link Aggregation – The virtual ports on Dell EMC UnityVSA cannot be used for link aggregation but the physical ports on the ESXi host can use link aggregation.
- Non-Disruptive Software Upgrades – Code upgrades on Dell EMC UnityVSA Single-SP require a reboot, which means the system must be taken offline temporarily in order to complete the upgrade. Dell EMC UnityVSA Dual-SP Deployment upgrades are non-disruptive.
- Quick Start Mode – This feature is designed to automatically configure pools in situations where FAST VP and FAST Cache are not licensed. Since users must select the appropriate tier for each virtual disk and FAST VP is included in the base license on Dell EMC UnityVSA, this cannot be used on Dell EMC UnityVSA.
- Unisphere CLI/REST API – Some commands, such as those related to disks and storage pools, will be different in syntax for the Dell EMC UnityVSA than a physical Dell EMC Unity system. Features that are not available on the Dell EMC UnityVSA will not be accessible via Unisphere CLI and REST API.
- Write Cache – Dell EMC UnityVSA does not have write cache since the contents may be lost if the VM is shut down unexpectedly.

9.2 Specifications

A high-level comparison of the specifications of the highest capacity Dell EMC UnityVSA Dual-SP Professional Edition (12-core, 96GB memory, and 350TB) and the smallest physical Dell EMC Unity system, Dell EMC Unity XT 380F, is shown in Table 8. Dell EMC UnityVSA software system limits are the same when comparing Single-SP deployments and Dual-SP deployments.

Table 8. Specifications

Category	Dell EMC Unity TX 380F	Dell EMC UnityVSA (350TB)
Maximum Drives	500 (Dual SP)	50 vDisks (Dual-SP)
CPUs per SP	6 cores @ 1.7GHz	12 cores @ 2GHz+
Total System Memory	128GB	192GB
Max. FE ports per SP	12	4
Supported Protocols	SMB, NFS, iSCSI, FC	SMB, NFS, iSCSI
Supported Drive Types	Flash, NL-SAS, SAS	vDisk
Max. Drive/vDisk Size	15.36TB	62TB (VMware limit)
Max. Total Capacity	2.4PB	350TB
Max. Pool LUNs Per System	1000	64
Max. Pools Per System	20	16
Max. NAS Servers	90	16
Max. File Systems	1000	64
Max. Snapshots Per System	8000	128
Max. Replication Sessions	1000	32

10 Serviceability

Dell EMC UnityVSA has been designed to be easy to deploy and use by storage administrators, virtualization managers, IT generalists, and more. Occasionally, there may be instances where Dell EMC UnityVSA is unable to function adequately, potentially due to issues with the virtual and/or physical environments. When opening a support case for Dell EMC UnityVSA, the following information should be included to expedite the troubleshooting process.

10.1 Returning to Normal Mode When in Service Mode

A Dell EMC UnityVSA SP could boot into Service Mode for various reasons including issues with system software or lost communication to peer SP for dual-SP deployments. In any case, a Dell EMC UnityVSA SP can be brought back to Normal Mode once the underlying issue has been resolved (i.e. restored network connections to peer SP). This can be done by following the below procedure:

1. Open VMware console to corresponding Dell EMC UnityVSA SP VM.
2. Login as service user.
3. Clear boot counters by running the following command: `svc_rescue_state -c`
4. Reboot SP VM by running the following command: `svc_shutdown -r`

If the SP VM is in a healthy state and underlying issues have been resolved, the SP VM will return to Normal Mode to continue system operations. A similar process can be initiated from the Unisphere management interface as well via the “Service Tasks” page for each corresponding SP, as applicable.

10.2 Collect Service Information (Dell EMC UnityVSA)

The Collect Service Information script can be executed on the Service page to gather a data collect. This script collects information about the system such as logs and configuration data which is useful for troubleshooting purposes. When this is run on Dell EMC UnityVSA, additional VSA-specific data is also collected automatically.

10.3 Collect Service Information (Tie Breaker Node)

For Tie Breaker Node in Dual-SP deployments, service collect information is only available via the TBN VM itself and not available through regular “Collect Service Information” via Dell EMC UnityVSA system management interfaces. To collect service information for a TBN VM, the following process should be followed:

1. Open a VMware Console window for the TBN VM.
2. Login with service user account.
3. Default username and password: service/service.
4. Configure a network IP for the TBN VM by using “`svc_tbn_network`” command.
5. Run a data collect operation for the TBN VM by using the “`svc_tbn_dc`” command.
6. Use WinSCP or similar program with SCP capabilities to copy the .tar data collect file from the TBN VM to your local computer.
7. After finishing copying the data collect file, can turn off the network interface by using the “`svc_tbn_network`” command.

The default TBN password can be changed by using the “`svc_tbn_password`” command. Also, the TBN VM can be rebooted from the console by running the “`svc_tbn_shutdown`” command.

Below is a table of available TBN service command scripts that can be utilized and their associated descriptions:

Table 9. Tie Breaker Node Service Commands

Command	Help (Condensed)
svc_tbn_dc	Usage: svc_tbn_dc [-v --version] [-h --help] This script is a user to collect trace in TBN VM.
svc_tbn_network	Usage: svc_tbn_network -v --version svc_tbn_network -h --help svc_tbn_network -a <IP address> -n <NETMASK_OR_PL> -g <gateway> svc_tbn_network -d --dhcp4 svc_tbn_network -o This script allows a user to configure a network IP for the TBN VM.
svc_tbn_passwd	Usage: svc_tbn_passwd [-v --version] [-h --help] This script allows a user to change password of service user.
svc_tbn_shutdown	Usage: svc_tbn_shutdown [-v --version] [-h --help] {-r --reboot} This script provides shutdown facilities.

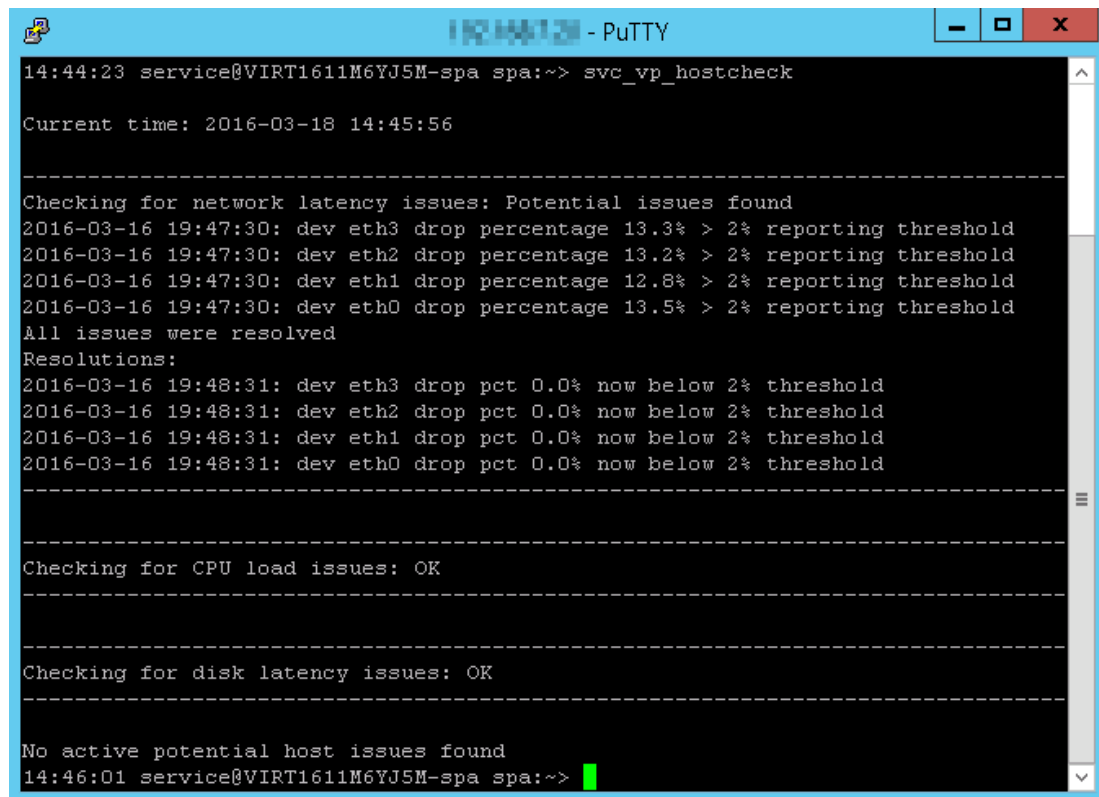
10.4 Service Host Check

In order to assist the user with identifying possible defects in the environment, the service host check script can be used. This script checks for the following issues:

- CPU over-subscription
- Network latency
- Dropped network packets
- Network errors
- Disk latency

The output of the script and its log is automatically included in the data collect. This information can be used to analyze disk and CPU data in more depth.

Users can also run the script manually to provide insight about possible host issues affecting Dell EMC UnityVSA. In order to run this script, users must first gain access to the command line interface of Dell EMC UnityVSA. This can be done by opening the VM console or by enabling SSH and connecting with an SSH client. Login with the service account and then run the `svc_vp_hostcheck` command, as shown in Figure 20.



```

14:44:23 service@VIRT1611M6YJ5M-spa spa:~> svc_vp_hostcheck

Current time: 2016-03-18 14:45:56

-----
Checking for network latency issues: Potential issues found
2016-03-16 19:47:30: dev eth3 drop percentage 13.3% > 2% reporting threshold
2016-03-16 19:47:30: dev eth2 drop percentage 13.2% > 2% reporting threshold
2016-03-16 19:47:30: dev eth1 drop percentage 12.8% > 2% reporting threshold
2016-03-16 19:47:30: dev eth0 drop percentage 13.5% > 2% reporting threshold
All issues were resolved
Resolutions:
2016-03-16 19:48:31: dev eth3 drop pct 0.0% now below 2% threshold
2016-03-16 19:48:31: dev eth2 drop pct 0.0% now below 2% threshold
2016-03-16 19:48:31: dev eth1 drop pct 0.0% now below 2% threshold
2016-03-16 19:48:31: dev eth0 drop pct 0.0% now below 2% threshold
-----

Checking for CPU load issues: OK

-----

Checking for disk latency issues: OK

-----

No active potential host issues found
14:46:01 service@VIRT1611M6YJ5M-spa spa:~>

```

Figure 20. Service Host Check

10.5 VMware System Logs

The VMware System Logs provide additional information about the configuration and environment that's used to host Dell EMC UnityVSA. This information is also very useful for troubleshooting purposes. The process to collect these logs depends on the version of vSphere so please refer to the VMware Knowledgebase for the latest information.

10.6 Storage Logs

If Dell EMC UnityVSA is consuming storage from a Dell EMC storage system on the backend, the logs from the storage system should also be included. Please include the names of the storage resources that are used for Dell EMC UnityVSA. The process to collect these logs depends on the storage system so please refer to the appropriate documentation for more information.

10.7 Administrator Password Reset

In case the admin password is forgotten, there is a method to reset it back to the default. This procedure requires a reboot of Dell EMC UnityVSA SP, which results in an outage if using a single-SP solution, so a

maintenance window should be scheduled. Note that this procedure also applies to Dell EMC UnityVSA HA and only requires one SP to be rebooted. Follow these steps to reset the password:

1. Open the VMware console for Dell EMC UnityVSA SP VM (Either SP for dual-SP solution will work).
2. Login as the service user.
3. Run the following command to reboot Dell EMC UnityVSA SP: `svc_shutdown -r`.
4. Wait a few minutes for Dell EMC UnityVSA SP to shut down.
5. When “EMC Boot” is displayed, as shown in Figure 21, press Tab within three seconds to interrupt the boot process.

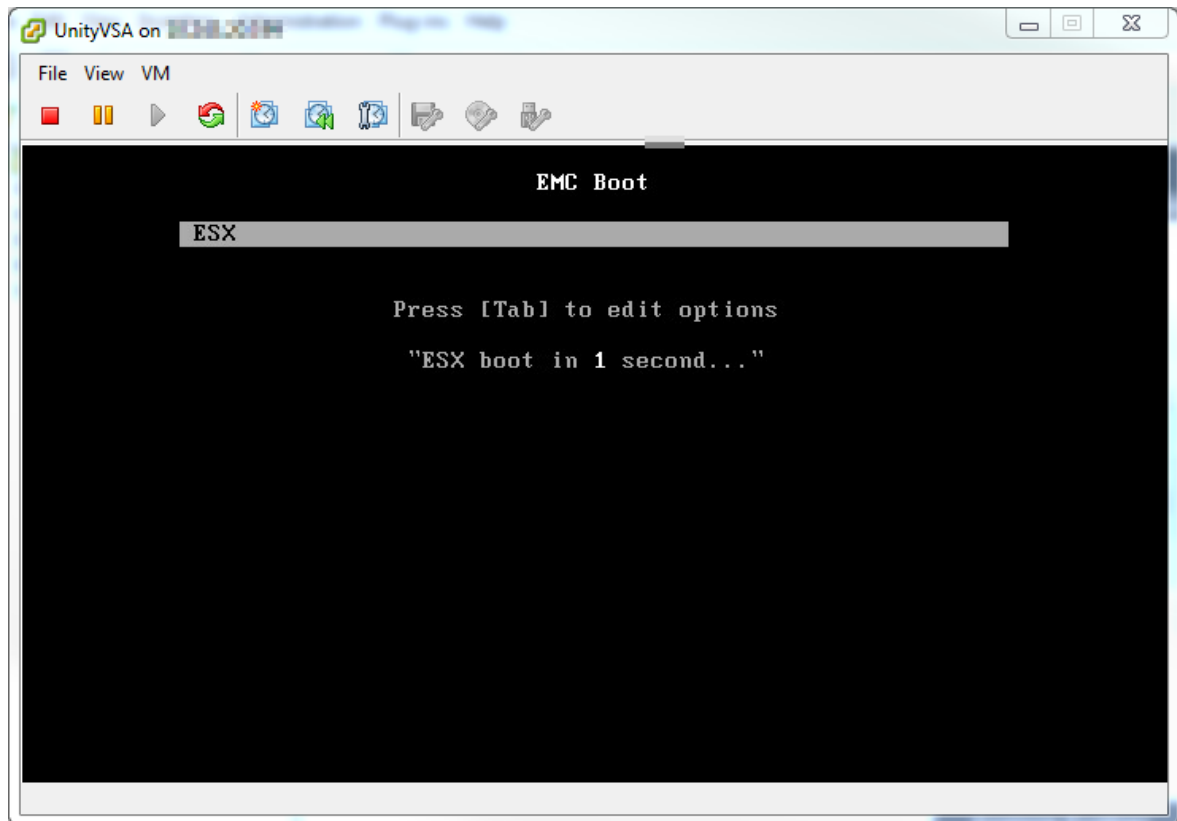


Figure 21. Boot

6. Once the kernel parameters are displayed, append `"unityvsa_reset_admin_password"` to the end, as shown in Figure 22, and press Enter.

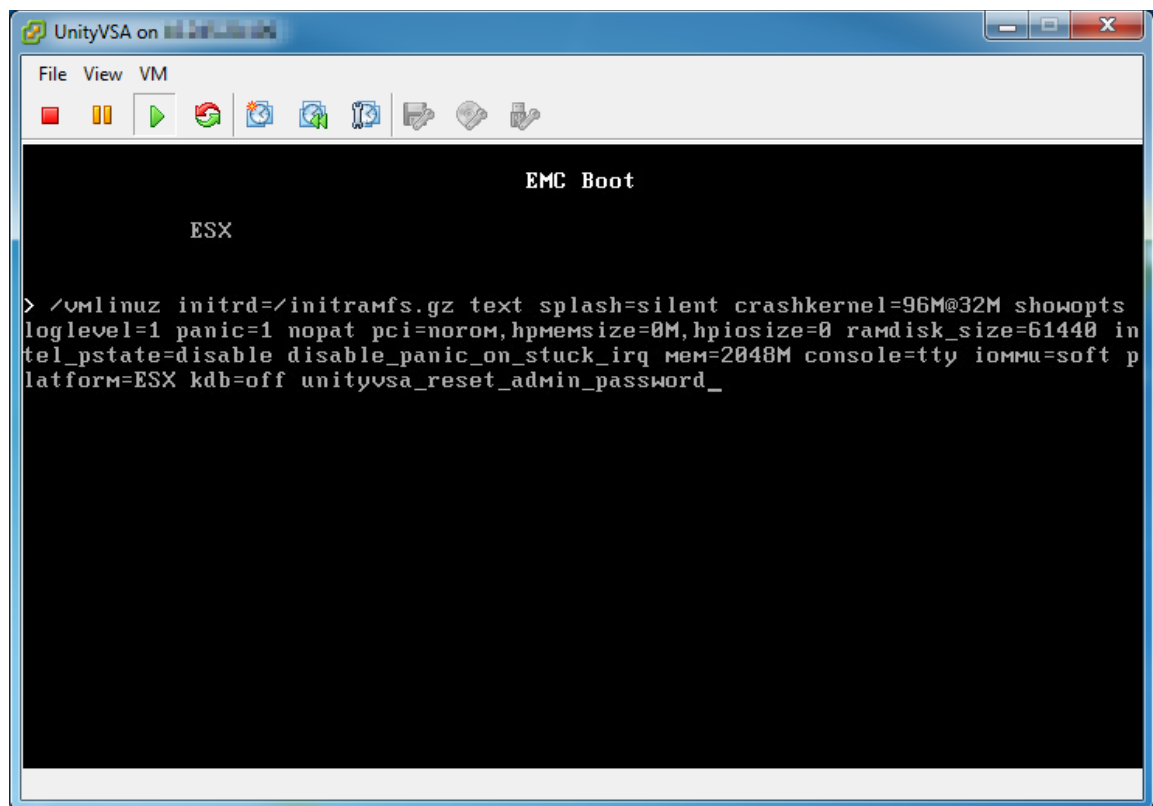


Figure 22. Kernel Parameters

7. Wait for Dell EMC UnityVSA to boot up.
8. Once the VM has fully booted, login to Unisphere using the default credentials: admin/Password123#.
9. You will be prompted to change the password to something other than the default, as shown in Figure 23.

Admin and Service Password ✕

Admin Password

Username: admin

Password: *

Confirm Password: *

Set service password the same as admin password

Service Password

Username: service

Password: *

Confirm Password: *

Cancel OK

Figure 23. Password Reset

11 Interoperability

11.1 VMware

VMware administrators should monitor Dell EMC UnityVSA for alerts as they would for any other VM.

VMware features are designed to be used with standard VMs so special considerations must be taken when applying some of these features to Dell EMC UnityVSA.

- Supported

VMware High Availability (HA) - VMware HA is highly recommended to restart Dell EMC UnityVSA in case of host failure. Note if deploying Dell EMC UnityVSA dual-SP, it is highly recommended to set the anti-affinity rule between the two SP VMs before configuring VMware HA. This is to ensure the SP VMs remain on separate hosts and retain the HA nature of the solution.

Cold Migration – Cold migration can be used to migrate Dell EMC UnityVSA VMs while the VM(s) are offline. If you want to relocate one of the UnityVSA dual-SP virtual disks, the following procedure should be followed:

1. Power off both SPs.
2. Remove all shared disks from the SPA VM, but do not delete the associated VMDK files. The shared disks include: Hard disk 2, 4, 5 and all disks serving as virtual drives for capacity allocation.
3. Migrate the SPB VM to the destination host/datastores as applicable.
4. Then migrate the SPA VM to the destination host as applicable.
5. Reattach the shared disks to the SPA VM. Note that the first 3 shared disks that are serving as system disks and heartbeat datastores (30GB, 2MB and 2MB respectively) should be assigned to the same SCSI bus IDs (SCSI 0:1, 0:3, and 0:4 respectively) as those on the SPB VM.
6. Power on both SPs.

- Not Recommended

Distributed Resource Scheduler (DRS) - Migrating Dell EMC UnityVSA while the VM is online may cause latency issues.

Nested Virtualization - Do not run Dell EMC UnityVSA inside a virtualized ESXi VM as this may cause degraded performance.

- Not Supported

Fault Tolerance (FT) - Fault Tolerance should not be used due to the increased latency.

VM Replication - Dell EMC UnityVSA cannot be replicated and failed over.

VM Snapshots - Taking or reverting Dell EMC UnityVSA to snapshots is not supported.

VM Backup - Dell EMC UnityVSA cannot be backed up and restored.

VM Suspend - Dell EMC UnityVSA cannot be suspended and resumed but it can be powered off instead.

Storage vMotion - Storage vMotion cannot be used to migrate Dell EMC UnityVSA virtual disks while the VM(s) are online. Alternatively, cold migration is supported for virtual disks while the VM(s) are offline.

vMotion - vMotion cannot be used if Dell EMC UnityVSA SPs are online, but cold migration can be used to migrate Dell EMC UnityVSA VM(s) to another host as long as the VM(s) are offline.

11.2 Dell EMC Unity Cloud Edition with VMware Cloud on AWS

As customers select a cloud-operating model to support their applications, they look for the elasticity and scalability of public clouds and enterprise file capabilities such as tiering, quotas, and snapshots. Customers are also looking to leverage the cloud for file synchronization and disaster recovery operations.

Dell EMC Unity Cloud Edition addresses these requirements with support and certification for VMware Cloud (VMC) on Amazon Web Services (AWS). Dell EMC Unity Cloud Edition can be easily deployed in a VMware Cloud SDDC (Software-Defined Data Center) to provide native file services such as NFS, SMB, FTP, and SFTP. Dell EMC Unity Cloud Edition also enables disaster recovery between on premise deployed Dell EMC Unity family systems and VMware Cloud-based appliances.

Dell EMC Unity Cloud Edition supports both the Single-SP and Dual-SP deployment solutions in VMC. The Single-SP solution, running OE 4.5 or later, can be deployed directly into VMC using the VMC vSphere Web Client. The dual-SP solution, running OE 5.0.1 or later, is deployed using a deployment utility which runs on Windows 64-bit systems, as shown in Figure 24.

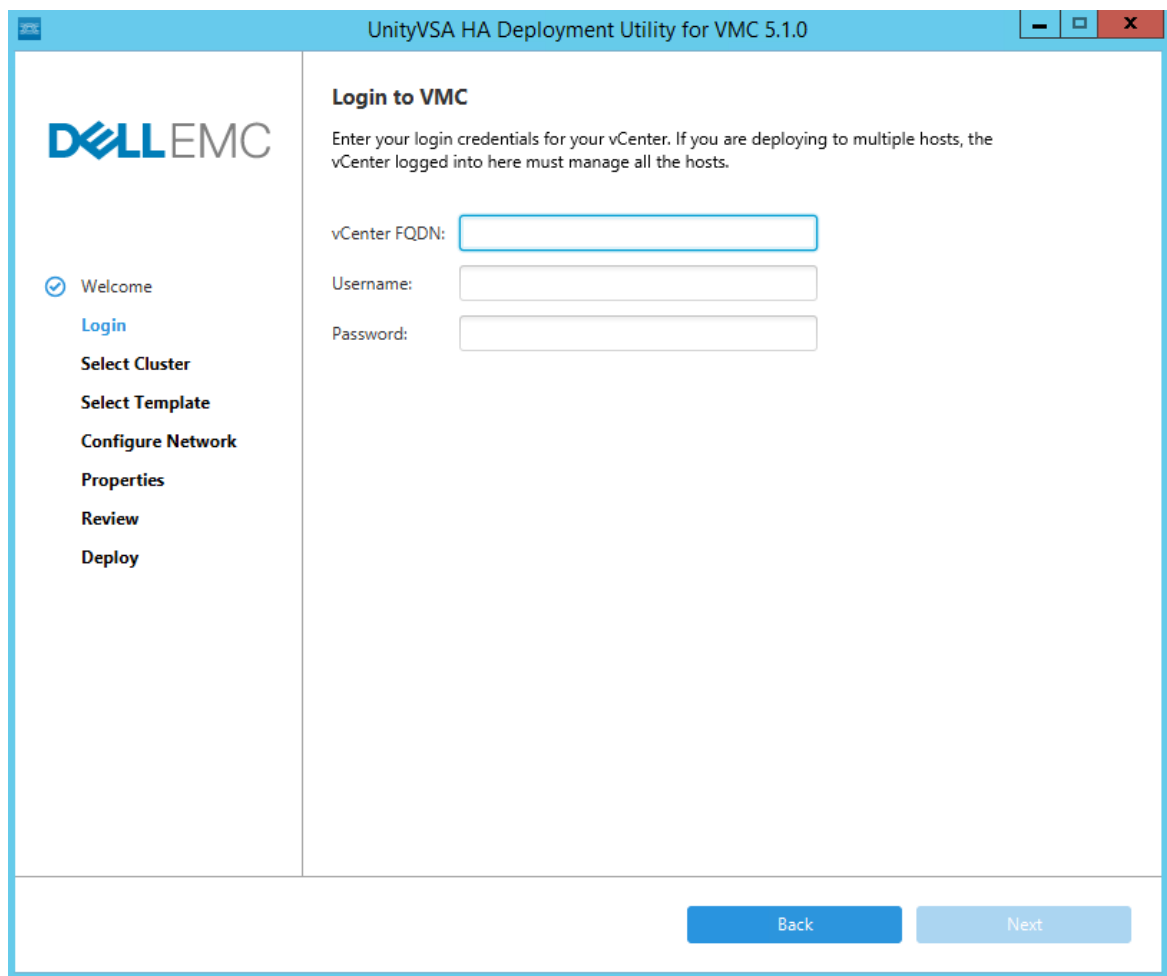


Figure 24. Dell EMC Unity Cloud Edition HA Deployment Utility

Dell EMC Unity Cloud Edition (Single-SP) and Dell EMC Unity Cloud Edition HA (Dual-SP) provides the enterprise file capabilities of the Dell EMC Unity family within a VMware Cloud SDDC. Enterprise Capabilities such as snapshots, quotas, and tiering are delivered with a common experience. With Dell EMC Unity Cloud Edition, file services are consumed within each Customer SDDC, so there is no need for an external file

appliance or file service. Existing customers can now leverage Unity Cloud Edition as part of their hybrid-cloud strategy leveraging the flexibility of VMware Cloud.

Since Dell EMC Unity Cloud Edition and the Cloud Tiering appliance (CTA) are designed for VMware ESXi, they are well suited to run within the VMware Cloud on AWS. Administrators can log into their cloud vCenter instance and deploy the appliances just as they would with their local or on-premises environment. This allows for very flexible usage of Dell EMC Unity Cloud Edition to augment a local array to provide file services to applications in the cloud, for DR, or to allow the CTA direct communications with Amazon S3 storage.

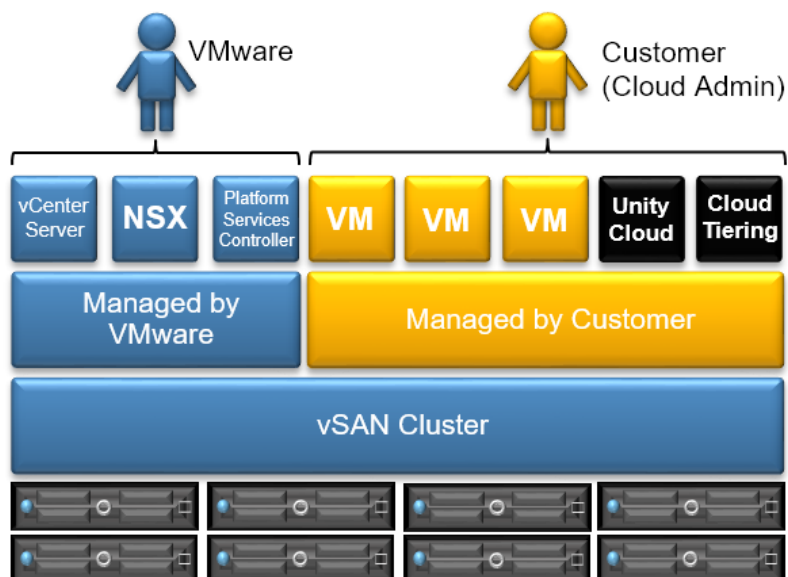


Figure 25. Unity Cloud Edition and Cloud Tiering Appliance on VMware Cloud

Dell EMC Unity Cloud Edition is available on the VMware Solution Exchange and VMware Cloud Marketplace. For more information about Dell EMC Unity Cloud Edition and Dell EMC Unity Cloud Edition HA, reference the Dell EMC Unity Cloud Edition with VMware Cloud on AWS white paper, available on Dell EMC Online Support.

11.3 Dell EMC UnityVSA with vSAN

Dell EMC UnityVSA is certified to be VMware Ready for vSAN. Dell EMC UnityVSA Single-SP can be leveraged in conjunction with vSAN to provide rich file services over SMB, NFS, FTP, and SFTP. Other features such as snapshots, replication, quotas, shrink/extend, multiprotocol, storage tiering, cloud tiering, migration, and more are also available. Dell EMC UnityVSA Single-SP systems running on vSAN feature interoperability with other Dell EMC systems for replication, migration, and disaster recovery use cases. Dell EMC UnityVSA Dual-SP is not currently supported on vSAN deployments.

Dell EMC UnityVSA is available on the VMware Solution Exchange marketplace. For more information about how to deploy Dell EMC UnityVSA with VxRail, please reference the *Dell EMC UnityVSA Installation Guide*.



Figure 26. Dell EMC UnityVSA - VMware Ready for vSAN

11.4 Dell EMC UnityVSA with VxRail

Dell EMC UnityVSA Single-SP offers support for deployment on Dell EMC VxRail Appliances. Combining these solutions offer a fully featured software-defined storage solution as well as a fully integrated Hyper Converged Infrastructure developed and tested by Dell EMC and VMware.

The following versions are supported for running Dell EMC UnityVSA Single-SP and VxRail:

- Dell EMC UnityVSA Single-SP:

Dell EMC Unity OE Version 4.2+

- Dell EMC VxRail:

Dell EMC VxRail Version 4.0+

When deploying and configuring the network for the Dell EMC UnityVSA Single-SP on a VxRail Appliance, it is recommended to deploy the Dell EMC UnityVSA Single-SP on the same network that is used by the client VMs that are residing on the VxRail appliance.

When Dell EMC UnityVSA Single-SP is configured on a vSAN datastore, the overall IO throughput is limited by the I/O capabilities of the vSphere/vSAN cluster that is being used. The I/O capabilities of a vSAN cluster scales almost linearly as nodes are added to the cluster and as disk groups are added to the hosts. Likewise, the cluster throughput can be limited by the choice of network ports that are configured. The recommendation is to use NICs with 10Gb ports instead of NICs with 1Gb ports.



Figure 27. Dell EMC VxRail

For more information about how to deploy Dell EMC UnityVSA Single-SP with VxRail, please reference the *Dell EMC UnityVSA Installation Guide*.

12 Conclusion

Dell EMC UnityVSA is a software-defined storage solution that enables increased flexibility and agility by enabling easy deployments and reduced dependencies on hardware. It enables the Dell EMC Unity family to be deployed on general purpose hardware platforms. In test/development and remote office/branch office environments, Dell EMC UnityVSA can be utilized to quickly deliver both block and file resources over iSCSI, SMB, and NFS. The rich feature set included in the base license including Unified Snapshots, Asynchronous Unified Replication, FAST VP, vVols, NAS capabilities, and more provides additional value.

A Technical support and resources

[Dell.com/support](https://dell.com/support) is focused on meeting customer needs with proven services and support.

[Storage technical documents and videos](#) provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1 Related resources

The following documents can be found on Dell EMC Online Support:

- Dell EMC Unity: Best Practices Guide
- Dell EMC Unity: Cloud Tiering Appliance (CTA)
- Dell EMC Unity: Compression
- Dell EMC Unity: Compression for File
- Dell EMC Unity: Data at Rest Encryption
- Dell EMC Unity: Data Integrity
- Dell EMC Unity: Data Reduction
- Dell EMC Unity: DR Access and Testing
- Dell EMC Unity: Dynamic Pools
- Dell EMC Unity: FAST Technology Overview
- Dell EMC Unity: File-Level Retention (FLR)
- Dell EMC Unity: High Availability
- Dell EMC Unity: Introduction to the Platform
- Dell EMC Unity XT: Introduction to the Platform
- Dell EMC Unity: NAS Capabilities
- Dell EMC Unity: MetroSync
- Dell EMC Unity: MetroSync and Home Directories
- Dell EMC Unity: MetroSync and VMware vSphere NFS Datastores
- Dell EMC Unity: Migration Technologies
- Dell EMC Unity: OpenStack Best Practices for Ocata Release
- Dell EMC Unity: Operating Environment (OE) Overview
- Dell EMC Unity: Performance Metrics
- Dell EMC Unity: Replication Technologies
- Dell EMC Unity: Snapshots and Thin Clones
- Dell EMC Unity: Unisphere Overview
- Dell EMC Unity: Virtualization Integration
- Dell EMC Unity Cloud Edition with VMware Cloud on AWS
- Dell EMC Unity Data Reduction Analysis
- Dell EMC Unity: Migrating to Dell EMC Unity with SAN Copy
- Dell EMC Unity Storage with Microsoft Hyper-V
- Dell EMC Unity Storage with Microsoft SQL Server
- Dell EMC Unity Storage with Microsoft Exchange Server
- Dell EMC Unity Storage with VMware vSphere
- Dell EMC Unity Storage with Oracle Databases
- Dell EMC Unity 350F Storage with VMware Horizon View VDI
- Dell EMC Unity: 3,000 VMware Horizon Linked Clone VDI Users
- Dell EMC Storage with VMware Cloud Foundation