Dell EMC Unity: Introduction to the Platform

Abstract

This white paper provides an overview of the Dell EMC Unity platform. This includes Dell EMC Unity 300/F, 400/F, 500/F, 600/F, 350F, 450F, 550F, and 650F models, and the available virtual deployments of Dell EMC Unity storage.

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Revisions

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May 2016	Initial release – Unity OE 4.0
December 2016	Updated for Unity OE 4.1
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Executive summary

This white paper provides an overview of the Dell EMC Unity™ platform. This includes Dell EMC Unity 300/F, 400/F, 500/F, 600/F, 350F, 450F, 550F, and 650F models, and the available virtual deployments of Dell EMC Unity storage.

For hardware details on X80/F Dell EMC Unity XT models, refer to the Dell EMC Unity XT: Introduction to the Platform white paper.

For software overview on all Dell EMC Unity family systems, refer to the Dell EMC Unity: Operating Environment (OE) Overview white paper.

Audience

This white paper is intended for IT administrators, storage architects, partners, Dell EMC™ employees, and any other individuals involved in the evaluation, acquisition, management, operation, or design of a Dell EMC networked storage environment using the Dell EMC Unity family of storage systems.

Terminology

- **Dynamic Host Configuration Protocol (DHCP)**: A protocol used to handle the allocation and administration of IP address space from a centralized server to devices on a network.
- **Fibre Channel protocol**: A protocol used to perform Internet Protocol (IP) and Small Computer Systems Interface (SCSI) commands over a Fibre Channel network.
- **File system**: A storage resource that can be accessed through file-sharing protocols such as SMB or NFS.
- **Fully Automated Storage Tiering for Virtual Pools (FAST™ VP)**: A feature that relocates data to the most appropriate disk type depending on activity level to improve performance while reducing cost.
- **FAST Cache**: A feature that allows Flash drives to be configured as a large capacity secondary cache for the pools on the system.
- **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 shared out using a protocol such as iSCSI.
- **Network attached storage (NAS) server**: A file-level storage server used to host file systems. A NAS server is required in order to create file systems that use SMB or NFS shares, as well as VMware NFS datastores and VMware® vSphere® Virtual Volumes™ (File).
- **Network File System (NFS)**: An access protocol that allows data access from Linux®/UNIX hosts located on a network.
- **Pool**: A repository of drives from which storage resources such as LUNs and file systems can be created.
- **REpresentational State Transfer (REST) API**: A lightweight communications architecture style that enables the execution of discrete actions against web services.
- **Server Message Block (SMB)**: A network file sharing protocol, sometimes referred to as CIFS, used by Microsoft® Windows® environments. SMB is used to provide access to files and folders from Windows hosts located on a network.

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- **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 processor (SP)**: A storage node that provides the processing resources for performing storage operations as well as servicing I/O between storage and hosts.
- **Unisphere™**: An HTML5 graphical user interface 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 level while utilizing Storage Policy Based Management (SPBM).

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1   Introduction

In this constantly changing world of increasing complexity and scale, the need for an easy-to-use intelligent storage system has only grown greater. Customers using new applications and solutions require dependable storage and are often tasked with the challenge of doing more with less. The Dell EMC Unity family addresses this challenge by packaging a powerful storage system into a cost- and space-efficient profile. Some Dell EMC Unity highlight features include the following:

- **Dual-active architecture**: Dell EMC Unity storage uses both storage processors (SPs) to serve host I/O and run data operations in an active/active manner, thereby efficiently making use of all available hardware resources and optimizing performance, cost, and density in customer data centers.
- **Truly unified offering**: Dell EMC Unity storage delivers a full block and file unified environment in a single 2U enclosure. You can use the same pool to provision and host LUNs, consistency groups, NAS servers, file systems, and Virtual Volumes alike. The Unisphere management interface offers a consistent look and feel whether managing block resources, file resources, or both.
- **A modern, simple interface**: Unisphere, the Dell EMC Unity management interface, is built with the today's data-center administrator in mind. Using browser-native HTML5, Unisphere can be used across a variety of operating systems and web browsers without the need of additional plug-ins. The interface has been designed to mimic the practical flow of an administrator's daily life, organizing provisioning and management functions into easy-to-find categories and sections.
- **Flexible deployment options**: With Dell EMC Unity storage, a deployment offering exists for a range of different use cases and budgets, from the virtual offering of Dell EMC UnityVSA™ to the purpose-built Dell EMC Unity platform. The purpose-built Dell EMC Unity system can be configured as an all-flash system with only solid-state drives, or as a hybrid system with a mix of solid-state and spinning media to deliver the best on both performance and economics.
- **Inline data reduction**: Data reduction technologies play a critical role in environments in which storage administrators are attempting to do more with less. Dell EMC Unity data reduction aids in this effort by attempting to reduce the amount of physical storage needed to save a dataset, which helps reduce the total cost of ownership (TCO) of a Dell EMC Unity storage system. Dell EMC Unity data reduction provides space savings through the use of data deduplication and compression. Data reduction is easy to manage, and once enabled, is intelligently controlled by the storage system.
- **Optional I/O modules**: A diverse variety of connectivity is supported on the purpose-built Dell EMC Unity platform. I/O modules are offered in 12 Gb SAS (for back-end expansion), 16 Gb Fibre Channel (4-port), 10GbE optical (in 2- and 4-port variants), and 10 GbE and 1 GbE BaseT (4-port). I/O modules that support iSCSI and NAS may be used for both simultaneously.
- **Expanded file system**: At its heart, the Dell EMC Unity file system is a 64-bit-based file system architecture that provides increased maximums to keep pace with the modern data center. Provision file systems and VMware NFS datastores in sizes as large as 256 TB and enjoy creating multiple millions of files per directory and subdirectories per directory.
- **Native data protection**: Security and availability of data are critical concerns for many customers, and Dell EMC Unity storage offers multiple solutions to address this need. Unified snapshots provide point-in-time copies of block and file data that can be used for backup and restoration purposes. Asynchronous replication offers an IP-based replication strategy within a system or between two systems. Synchronous block replication benefits FC environments that are close together and require a zero-data loss schema. Data at Rest Encryption (D@RE) ensures user data on the system is protected from physical theft and can stand in the place of drive disposal processes, such as shredding.
- **VMware integration**: Discovery of a VMware environment has never been easier, thanks to Dell EMC Unity VMware Aware Integration (VAI). You can use VAI to retrieve the ESXi™ host and

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vCenter® environment details into Unisphere for efficient management of your virtualization environment. Support for VMware vStorage APIs for Storage Awareness (VASA) and later enables the provisioning and use of VMware® vSphere® Virtual Volumes™ (vVols), a virtualization storage technology delivered by VMware ESXi. Dell EMC Unity supports vVols for both block and file configurations.

- **Multiple management paths**: Configure and manage your Dell EMC Unity system in the way you are most comfortable. The Unisphere GUI is browser-based and provides a graphical view of the system and its resources. Use Unisphere CLI (UEMCLI) over SSH or a Windows host to run CLI commands against the system. Dell EMC Unity storage also has a full REST API library available. Any function possible in Unisphere is also possible using Dell EMC Unity REST API. Developing scripts or integrating management of the Dell EMC Unity system into existing frameworks has never been easier.

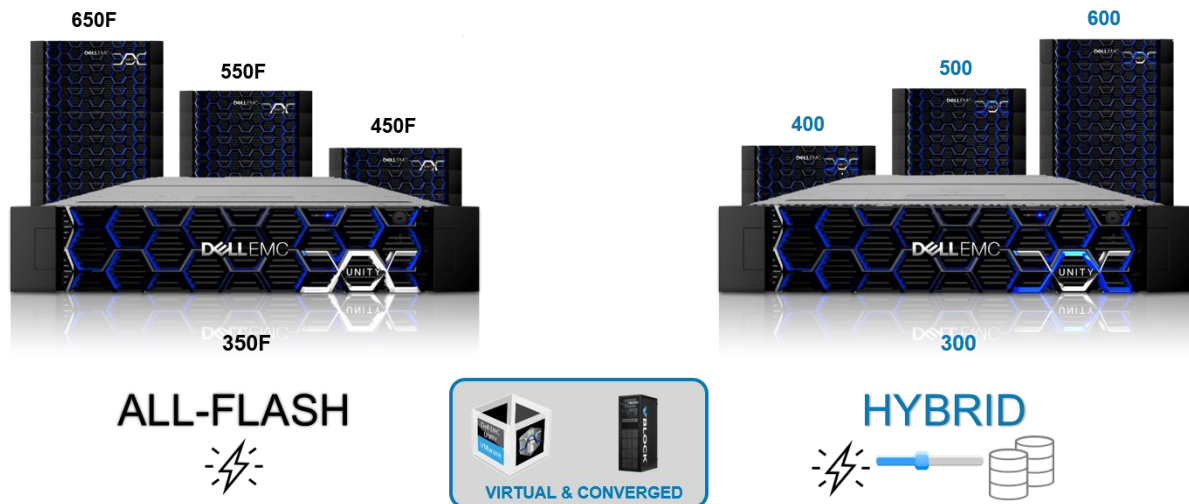**DELL**EMC

2 Dell EMC Unity family overview

Figure 1   Dell EMC Unity family

Dell EMC Unity storage sets the new standards for midrange storage with a powerful combination of simplicity, modern design, affordable price point, and deployment flexibility — perfect for resource-constrained IT professionals in large or small companies. Dell EMC Unity systems are perfect for midsized deployments, remote office/branch office locations, and cost-sensitive mixed-workload environments. They are designed for all-flash, deliver the best value, and are available in purpose-built (all-flash or hybrid), converged deployment (through the Converged Infrastructure Portfolio), and software-defined virtual edition configurations. With all-inclusive software, new differentiated features, internet-enabled management, and a modern design, Dell EMC Unity storage is where powerful meets simplicity.

Dell EMC Unity systems are designed to be simple and easy to use throughout the product lifecycle, starting from ordering and installation through administration and troubleshooting. For example, for installation, physical Dell EMC Unity systems come with adjustable snap-in rails that can easily be installed in standard data center cabinets. The rails have clips on both ends for easy locking and a secure fit, ensuring users can rack and start using systems quickly.

Once a system is installed in a rack, a physical Dell EMC Unity system requires only six cables (2 x power cables, 2 x management cables, and 2 x data path cables) to be connected before it can be fully utilized as a storage system. This is a significant decrease in the networking footprint which can be attributed to the unified nature of Dell EMC Unity systems. This is in comparison to other storage systems that require a separate physical file server to enable file capabilities and consequently need additional cabling.

For a full workflow on installing a brand-new Dell EMC Unity system in a data center, see the Quick Start Installation video on the Dell EMC Unity Info Hub.

3 Hardware overview

The purpose-built Dell EMC Unity system is offered in multiple physical hardware models in both Hybrid configurations and All Flash configurations. For Hybrid systems, the platform starts with the Dell EMC Unity 300, and scales up to the Dell EMC Unity 880. For All-Flash systems, the platform starts with the Dell EMC Unity 300F and scales up to the Dell EMC Unity 880F. The models share several similarities in form factor and connectivity, but scale differently in processing and memory capabilities. See Table 1, Table 2, and Table 3 for model comparisons.

For software-defined offerings, the Dell EMC Unity family offers a virtual deployment called Dell EMC UnityVSA which can be installed on applicable VMware ESXi hosts. There is also the option of a dual-SP deployment of Dell EMC UnityVSA called Dell EMC UnityVSA HA which provides greater resiliency against disaster. Lastly, there is a cloud-specific deployment called Dell EMC Unity Cloud Edition that customers can leverage for file synchronization and disaster recovery operations in the cloud. More information about these available virtual deployments are in section 4 (Dell EMC UnityVSA) and section 5 (Dell EMC Unity Cloud Edition).

Additionally, the system limits change depending on the Dell EMC Unity model. More information about system limits are in the Dell EMC Unity Simple Support Matrix.

Table 1   Dell EMC Unity X00/F model comparison

Model	Dell EMC Unity 300/300F	Dell EMC Unity 400/400F	Dell EMC Unity 500/500F	Dell EMC Unity 600/600F
Processor (per SP)	Intel® E5-2603 v3 6c/1.6 GHz	Intel E5-2630 v3 8c/2.4 GHz	Intel E5-2660 v3 10c/2.6 GHz	Intel E5-2680 v3 12c/2.5 GHz
Memory	24 GB/SP	48 GB/SP	64 GB/SP	128 GB/SP
Max. drives	150	250	500	1,000
Max. capacity (raw)	2.34 PB	3.9 PB	7.8 PB	9.7 PB

Table 2   Dell EMC Unity X50F model comparison

Model	Dell EMC Unity 350F	Dell EMC Unity 450F	Dell EMC Unity 550F	Dell EMC Unity 650F
Processor (per SP)	Intel E5-2603 v4 6c/1.7 GHz	Intel E5-2630 v4 10c/2.2 GHz	Intel E5-2660 v4 14c/2.0 GHz	Intel E5-2680 v4 14c/2.4 GHz
Memory	48 GB/SP	64 GB/SP	128 GB/SP	256 GB/SP
Max. drives	150	250	500	1,000
Max. capacity (raw)	2.4 PB	4.0 PB	8.0 PB	16.0 PB

Table 3   Dell EMC Unity X80/F model comparison

Model	Dell EMC Unity XT 380 / 380F	Dell EMC Unity XT 480 / 480F	Dell EMC Unity XT 680 / 680F	Dell EMC Unity XT 880 / 880F
Processor (per SP)	Intel E5-2603 v4 6c/1.7 GHz	2 x Intel Xeon® Silver 4108 8c/1.8 GHz	2 x Intel Xeon Silver 4116 12c/2.1 GHz	2 x Intel Xeon Gold 6130 16c/2.1 GHz
Memory	64 GB/SP	96 GB/SP	192 GB/SP	384 GB/SP
Max. drives	500	750	1000	1500
Max. capacity (raw)	2.4 PB	4.0 PB	8.0 PB	16.0 PB

Note: This white paper document focuses specifically on the Dell EMC Unity systems which include the Dell EMC Unity 300/F, 400/F, 500/F, 600/F, 350F, 450F, 550F, and 650F models. For full details of the Dell EMC Unity XT platform, which include models Dell EMC Unity 380/F, 480/F, 680/F, and 880/F, refer to the Dell EMC Unity XT: Introduction to the Platform white paper.

3.1   Drive model comparison

Multiple drive types are supported on the Dell EMC Unity system. All Flash models support flash drives, while Hybrid Dell EMC Unity models support flash, SAS, and NL-SAS drives. All drives operate at 12 Gb/s speeds. SAS and NL-SAS drives utilize a 4 KB drive formatting size, while Flash drives utilize a 520 byte block size. A list of all supported drives can be found on Dell EMC Support.

3.2   Data-in-place conversions

Dell EMC Unity OE version 4.1 introduced the ability to perform offline data-in-place (DIP) conversions which allow users to convert physical Dell EMC Unity systems to any higher models of the same type without losing any data or system configurations. This procedure involves swapping the storage processors in a given system with new storage processors of a higher model while reusing the same I/O modules, SFPs, and power supplies from the replaced storage processors. In OE version 4.1, this process is an offline procedure and is fully customer installable. The estimated time for a full data-in-place conversion is 120 minutes. The target conversion model must be the same type as the source model. For example, a customer can convert from a Dell EMC Unity 300 to a Dell EMC Unity 400 system, but not from a Dell EMC Unity 300 to a Dell EMC Unity 400F system.

In Dell EMC Unity OE version 4.2.1, customers have the ability to perform a DIP conversion online so that system conversion to a higher model can be performed without any system downtime. This process involves swapping each storage processor in sequence rather than at the same time so one processor is always available and can continue to service host I/O during the entirety of the conversion procedure. The overall utilization of the system should be taken into account when an online DIP conversion needs to be performed so that a single SP can handle all data traffic and system processing for the entire system. The same restrictions for conversions remain in place such that the chosen model must be a higher model and of the same type as the source model.

With the Dell EMC Unity OE version 5.0, there is no DIP conversion support from the X00/F or X50F models to the X80/F platform. Replication can be used to replicate data onto Dell EMC Unity XT models from other Dell EMC Unity systems and then run a planned failover to start production on the destination system.

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For more information about Dell EMC Unity data-in-place Conversions, see the Dell EMC Unity Data-in-Place Conversions Guide.

3.3   Disk processor enclosure

The Dell EMC Unity disk processor enclosure (DPE) comes in two different variants:

- 25-drive 2U DPE using 2.5-inch drives
- 12-drive 2U DPE using 3.5-inch drives (hybrid configuration only)

As noted, both DPE configurations occupy 2U of space in a standard storage cabinet. The following figures show the front of each DPE: the 25-drive 2U DPE (Figure 2) and the 12-drive 2U DPE (Figure 3). For hybrid configurations, SAS Flash 2, and SAS drives are supported in both DPE types; NL-SAS drives are only supported in the 12-drive 2U DPE; SAS Flash 3 and SAS Flash 4 drives are only available in 2.5-inch form factor.

Figure 2   25-Drive 2U DPE

Figure 3   12-Drive 2U DPE

The front of the DPEs have LEDs for both the enclosure and drives to indicate status and faults. The 2.5-inch drives have separate LEDs for power and fault statuses, while the 3.5-inch drives have a single LED to display both power and fault statuses.

The first four drives of the DPE are known as system drives, and contain data used by the operating environment. While they can be used in pools to hold user data, the entire formatted capacity of the system drives is not available since space is reserved for the system. These drives should not be moved within the DPE or relocated to another enclosure and should be replaced immediately in the event of a fault. A system drive cannot be used as a hot spare for a non-system drive. For this reason, the minimum number of drives in a system is 5, with system drives configured in a RAID 1/0 (1+1 or 2+2) configuration with a non-system-drive hot spare.

The back of the DPE is identical for both the 25-drive and 12-drive versions (Figure 4). The back of the DPE reveals the storage processor enclosures (SPEs) and their on-board connectivity. Each SP has 2 x 12 Gb SAS ports used for connecting additional storage, and each SAS port has a 4-lane configuration. For front-end connectivity, the SPs have 2 x 10 GbE BaseT ports which can auto-negotiate between 10 Gb/1 Gb/ 100 Mb, as well as 2 x converged network adapter (CNA) ports. These CNA ports can be configured to serve 16/8/4 Gb Fibre Channel using either multi-mode or single-mode FC SFPs, 10 GbE optical using SFP+

connectors or TwinAx cables in active or passive mode, or 1 GbE Ethernet using RJ45 SFPs. For optical connections, the CNAs feature full iSCSI offload which relieves the storage processor from handling TCP/IP network stack operations. For management and service, each SP has a dedicated 1 GbE BaseT management port and a dedicated 1 GbE BaseT service port; both ports can operate at 1 Gb/100 Mb/10 Mb speeds. In Dell EMC Unity OE version 5.1, management port settings can be customized to match the environment by manually changing MTU, port speed and/or duplex settings. The range of these settings include MTU of 1280-9000, port speeds of 1Gbps, 100Mbps, or 10Mbps, and advertised duplex of full, half, or auto. These settings can be changed using the **svc_network** service command.

For a detailed description and location of each port on each storage processor, see the Dell EMC Unity Family Hardware Information Guide.

Figure 4   DPE back view

3.3.1   Storage processor

The purpose-built Dell EMC Unity platform is powered by an Intel® Xeon® processor utilizing the Intel Haswell or Broadwell architecture, depending on the system model. The core count varies between 6 to 14 cores per SP. Each purpose-built Dell EMC Unity system contains two SPs, which are used for high availability and load-balancing purposes.

3.3.2   M.2 SSD

An M.2 SSD device is located inside each SP and serves as a backup device in the event of an SP failure (Figure 5). In the event of an SP failure, the memory contents of the SP cache are written to the M.2 SSD device so it can be recovered once the SP is restored. If the M.2 SSD device itself encounters a failure, cache data can be recovered from the peer SP. The M.2 SSD device also holds the boot image that is used to run the operating environment.

Figure 5   M.2 SSD Device

3.3.3   Cooling modules

Cooling modules or fan packs (Figure 6) are used to provide cool airflow to the SP interior. There are five counter-rotating cooling modules in an SP. An SP can tolerate a single cooling module fault; in which case the

surviving fans increase their speed to compensate for the faulted module. If a second cooling module faults, the SP gracefully saves cache content and shuts down to prevent overheating.
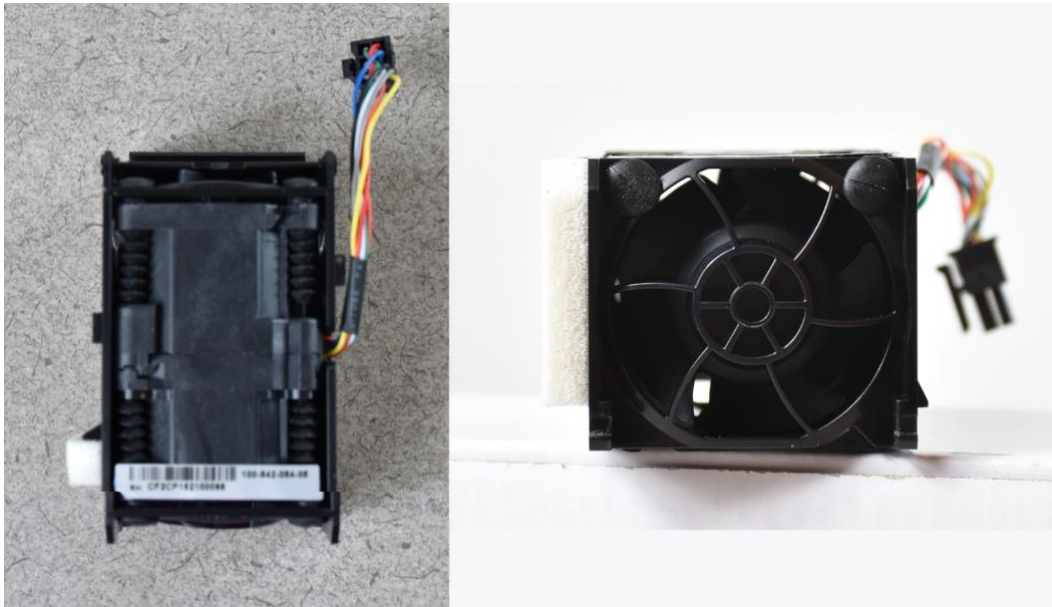
Figure 6   Cooling module

3.3.4   Battery backup unit

The battery backup unit (BBU) provides power to the SP in the event that cabinet power is lost. The BBU (Figure 7) is designed to power the SP long enough for the system to store SP write cache content to the M.2 SSD device before powering down. The BBU includes sensors which communicate its charge and health status to the SP. In the event the BBU is discharged, the SP disables write cache until the BBU has recharged. In the event the BBU has faulted or cannot sustain enough charge, an alert is generated.

Figure 7   Battery backup unit

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3.3.5 Baffle

The baffle (Figure 8) directs airflow within the SP. Cool air drawn in from the cooling modules is directed to the processor and DIMMs for effective thermal management.
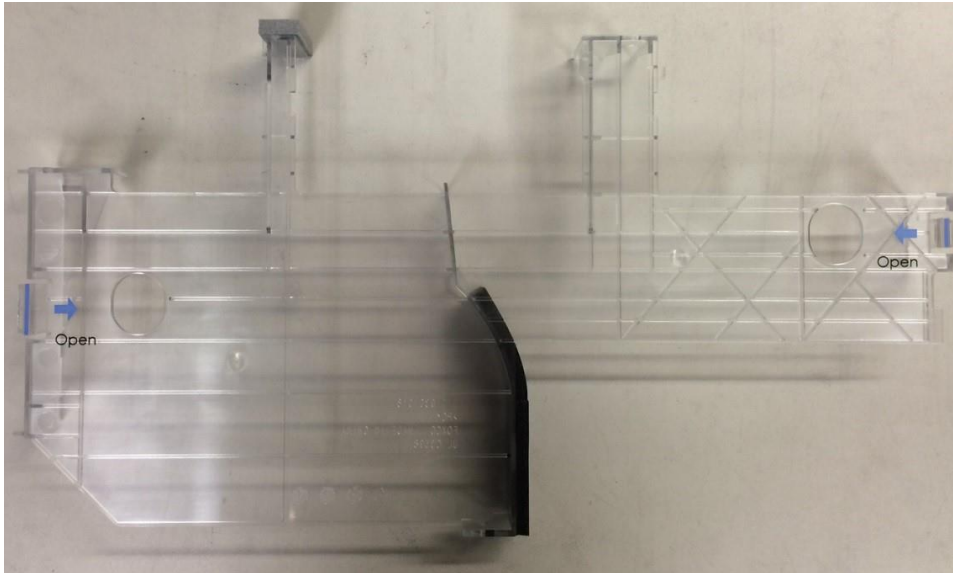

Figure 8   Baffle

3.3.6 DIMMs

There are four DIMM slots on an SP. These are filled with up to four DIMMs depending on the Dell EMC Unity model. An example DIMM is represented in Figure 9. DIMMs are between 8 GB and 64 GB in size and use error-correcting code (ECC) to protect against data corruption. If a DIMM is faulted, the system boots into service mode so the faulted DIMM can be replaced.

Figure 9   DIMM

3.3.7 I/O module

Each SP can support up to two I/O modules. I/O modules provide increased connectivity. For the two SPs in a DPE, the I/O modules configured must match between SPs. Fibre Channel over Ethernet (FCoE) and Fibre Channel over IP (FCIP) are not supported on the Dell EMC Unity platform.

The Dell EMC Unity platform supports six I/O modules:

- 12 Gb SAS (Dell EMC Unity 500/F, 550F, 600/F, 650F)
- 16 Gb Fibre Channel (4-port)
- 10 GbE BaseT (4-port)
- 1 GbE BaseT (4-port)

- 10 GbE optical (4-port)
- 10 GbE optical (2-port) with iSCSI offload

The Dell EMC Unity XT platform supports different options for I/O modules. See to the *Dell EMC Unity XT: Introduction to the Platform* white paper available on Dell EMC Support for more details.

The 12 Gb SAS (4-port) I/O module is used to provide additional backend connectivity to DAEs. Each SAS port supports up to 10 DAEs and up to a maximum of 250 drives. This module is required when using x8 SAS lane connections for the 80-drive DAE.
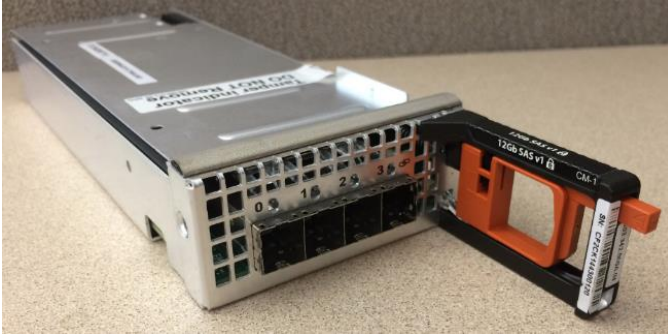

Figure 10   12 Gb SAS I/O module

The 16 Gb Fibre Channel (4-port) I/O module offers front-end connectivity at 16 Gb/s speeds and can auto-negotiate to 8 Gb/s and 4 Gb/s speeds depending on the SFPs installed. There are ordering options for single-mode SFPs and multi-mode SFPs configurations depending on the use case in a data center environment. Single-mode SFPs only operate at 16 Gb speeds and are not compatible with multi-mode connections. Single-mode connections are usually used for long-distance synchronous replication use cases to remote sites, while multi-mode is typically used for transmitting data over shorter distances in local-area SAN networks and connections within buildings.

Figure 11   16 Gb Fibre Channel I/O module

The other available I/O modules are used for front-end host access and support both iSCSI and NAS protocols. The 10 GbE BaseT (4-port) I/O module at 10 Gb/s speeds and can auto-negotiate to 1 Gb/s and 100 Mb/s speeds, while the 1 GbE BaseT (4-port) I/O module can auto-negotiate to 100 Mb/s and 10 Mb/s speeds. The ports on an individual Ethernet I/O module, as well as the on-board Ethernet ports, support link aggregation, fail-safe networking (FSN), and VLAN tagging. As of Dell EMC Unity OE 4.2.1, link aggregation can be configured across all available Ethernet ports as needed.

Figure 12   10 GbE BaseT I/O module

Figure 13   1 GbE BaseT I/O module

The 10 GbE optical I/O modules run at a fixed speed of 10 Gb/s. The 2-port 10 GbE optical I/O module offers a full iSCSI offload engine, while the 4-port 10 GbE optical I/O module offers four ports of connectivity. The optical I/O module ports support SFP+ and TwinAx (active or passive mode) connections.

Figure 14   10 GbE optical I/O module (2-port)

Figure 15   10 GbE optical I/O module (4-port)

3.3.8 Power supply

There are two power supply modules in a DPE, one per SP. A single power supply can power the entire DPE. Power supplies can be replaced without having to remove the SP or shut down the system. Power supplies are offered for both AC and DC power, and are NEBS-compliant. DC power options are only available for Dell EMC Unity Hybrid models.

Figure 16   Power supply

3.4 Disk array enclosure

The purpose-built Dell EMC Unity systems have three different disk array enclosure (DAE) configuration options:

- 25-drive 2U DAE using 2.5-inch drives
- 15-drive 3U DAE using 3.5-inch drives
- 80-drive 3U DAE using 2.5-inch drives

3.4.1 25-drive, 2.5-inch 2U DAE

The 25-drive, 2.5-inch 2U DAE holds up to 25 x 2.5-inch drives (Figure 17). The back of the DAE includes LEDs to indicate power and fault status. There are also LEDs to indicate bus and enclosure IDs.

Figure 17   25-drive 2.5-inch 2U DAE (front)

The 25-drive 2.5-inch 2U DAE can be powered by AC or DC and is attached to the DPE with mini-SAS HD connectors (Figure 18).

Figure 18   25-drive 2.5-inch 2U DAE (back)

3.4.2   15-drive, 3.5-inch 3U DAE

The 15-drive 3.5-inch 3U DAE is available for Dell EMC Unity Hybrid systems, can be powered by AC or DC power, and is attached to the DPE with mini-SAS HD connectors (Figure 19).

Figure 19   15-drive 3.5-inch 3U DAE (front)

The back of the DAE includes LEDs to indicate power and fault status (Figure 20). There are also LEDs to indicate bus and enclosure IDs.

Figure 20   15-drive 3.5-inch 3U DAE (back)

3.4.3   80-drive, 2.5-inch 3U DAE

The 80-drive 2.5-inch 3U DAE is available for Dell EMC Unity Hybrid and All Flash systems, can be powered with AC power, and is attached to the DPE with mini-SAS HD connectors (Figure 21). A high-bandwidth x8 lane SAS connectivity option to the DPE is also available for models that support the 4-port 12 Gb SAS I/O

module, which include the Dell EMC Unity 500/F, 550F, 600/F, and 650F. For supported drive types or sizes on the 80-drive DAE, see the *Dell EMC Unity Drive Support Matrix* on Dell EMC Support.

In terms of operating power, the 80-drive DAE operates from 200 to 240 V AC at 47 to 63 Hz with a maximum power consumption of 1,611 VA (1,564 W). For a full listing of power requirements and related hardware information, see the *Dell EMC Unity Family Hardware Information Guide* on Dell EMC Support.

Figure 21   80-drive 2.5-inch 3U DAE

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4 Dell EMC UnityVSA

Dell EMC Unity storage is offered in a virtual storage appliance version known as Dell EMC UnityVSA. Dell EMC UnityVSA is a software-defined storage (SDS) solution that runs atop the VMware ESXi server platform. Dell EMC UnityVSA provides a flexible storage option for environments that do not require purpose-built storage hardware such as test/development or remote office/branch office (ROBO) environments. Users can quickly provision a Dell EMC UnityVSA system on general-purpose server hardware, which can result in reduced infrastructure costs and a quicker rate of deployment.

In Dell EMC Unity OE version 4.5, a High Availability (HA), version of the UnityVSA was introduced, also known as UnityVSA Dual-SP. UnityVSA Dual-SP is an enhanced version of the single-SP UnityVSA solution. This is accomplished by adding HA functionality whereby Dell EMC UnityVSA Dual-SP can recover from an SP or host failure which significantly increases the system's applicable use case scenarios as well as enables non-disruptive upgrades (NDU). Dell EMC UnityVSA Dual-SP is only available with Professional Edition (PE) licenses. In OE version 5.1, Professional Edition licenses come in capacity choices of 10TB, 25TB, 50TB, or 350TB options. Additionally, the UnityVSA Dual-SP can be deployed as a 2-core CPU / 12GB memory per-SP or a 12-core CPU / 96GB memory per-SP system.

4.1 Overview

Dell EMC UnityVSA retains the ease-of-use and ease-of-management found in the purpose-built Dell EMC Unity product. Its feature set and data services are designed to be on par with the rest of the Dell EMC Unity family. There are some main differences in functionality support, which stem from the virtual nature of the Dell EMC UnityVSA deployment.

4.2 UnityVSA hardware requirements

Dell EMC UnityVSA can run on any server that supports VMware ESXi and meets minimum hardware requirements. If local storage is used, a hardware RAID controller on the ESXi server is recommended be used to configure redundant storage for Dell EMC UnityVSA. If storage is being provided from a redundant storage system or server SAN, a RAID controller on the ESXi server is not required. A full description of the minimum server requirements for a single UnityVSA instance is detailed in Table 4.

Table 4   Dell EMC UnityVSA single-SP server and VM requirements

	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)

Dell EMC UnityVSA HA has similar physical requirements as Dell EMC UnityVSA single-SP on a per-SP basis. In terms of VMware requirements, a vCenter is mandatory in addition to the configuration of internal networks. To comply with best practices, Dell EMC UnityVSA HA requires a separate ESXi host for each SP that is deployed. The white paper Dell EMC UnityVSA provides further detail on the best practices and the exact VMware requirements. A full description of server requirements for a single SP of the Dell EMC UnityVSA HA are outlined in Table 5.

Table 5   Dell EMC UnityVSA HA hardware requirements

	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

For more information about the Dell EMC UnityVSA and Dell EMC UnityVSA HA, refer to the white paper *Dell EMC UnityVSA* on Dell EMC Support.

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5 Dell EMC Unity Cloud Edition

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

Dell EMC Unity Cloud Edition addresses these requirements with support for VMware Cloud (VMC) on Amazon® Web Services (AWS). Dell EMC Unity Cloud Edition can be easily deployed in a VMware Cloud software-defined data center (SDDC) to provide native file services such as NFS and SMB. Dell EMC Cloud Edition also enables disaster recovery between on-premise-deployed Dell EMC Unity systems and VMware-Cloud-based appliances.

Dell EMC Unity Cloud Edition is a virtualized storage appliance that has a rich feature set, comparable to the rest of the Dell EMC Unity family. Because of its ease of use and quick deployment time, this makes Dell EMC Unity Cloud Edition the ideal candidate for test/development environments or production deployments into VMC on AWS.

Dell EMC Unity Cloud Edition supports the same deployment options as Dell EMC UnityVSA. In OE version 5.1 this includes the increased capacity limit of up to 350TB as well as the 2-core / 12GB memory and 12-core / 96GB memory Dual-SP deployment options.

For more information about Dell EMC Unity Cloud Edition and its benefits, see the paper Dell EMC Unity Cloud Edition with VMware Cloud on AWS.

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6 Conclusion

The Dell EMC Unity product family sets a new standard for storage by delivering compelling simplicity, a modern design, and enterprise features at an affordable price and compact footprint. Dell EMC Unity storage meets the needs of resource-constrained IT professionals in both large and small companies. The purpose-built Dell EMC Unity system is offered in All Flash and Hybrid models, providing flexibility for differing use cases and budgets. The converged offering through the Converged Infrastructure Portfolio delivers industry-leading converged infrastructure powered by Dell EMC Unity storage. The Dell EMC UnityVSA and Dell EMC Unity Cloud Edition offer dynamic deployment models that allow you to start for free and grow as business needs evolve.

The Dell EMC Unity system was designed with ease-of-use at the forefront. The modern design of the management interfaces is built with best practices in mind, making it easy to provision storage intelligently without having to micromanage every detail. A software feature set built with the same mindset allows for automation and set-it-and-forget-it style upkeep. An IT generalist can set up, configure, and manage a Dell EMC Unity system without needing to become a storage expert. A strong support ecosystem offers a variety of media for learning and troubleshooting, backed by the quality support model of the Dell EMC brand. Lastly, users looking to refresh their existing Dell EMC infrastructure can use the intuitive native-migration capabilities of the Dell EMC Unity platform.

With simplified ordering, all-inclusive software, new differentiated features, internet-enabled management, and a modern design, Dell EMC Unity is where powerful meets simplicity.

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A   Technical support and resources

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 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 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: Performance Metrics
- Dell EMC Unity: Replication Technologies
- Dell EMC Unity: Snapshots and Thin Clones
- Dell EMC Unity: Operating Environment (OE) Overview
- Dell EMC Unity: Unisphere Overview
- Dell EMC Unity: Virtualization Integration
- Dell EMC UnityVSA
- 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

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