Dell EMC Unity: Unisphere Overview

Simplified storage management

Abstract

This white paper introduces and describes Dell EMC™ Unisphere™ for the Dell EMC Unity platform. Unisphere is a web-based solution that provides an easy-to-use interface for storage management actions, including creating storage resources, configuring and scheduling protection for stored data, and using advanced features like replication and host I/O limits. All these features are crucial to a company's needs.

June 2021

H15088.8

Revisions

Date	Description
May 2016	Initial release – Unity OE 4.0
December 2016	Updated for Unity OE 4.1
July 2017	Updated for Unity OE 4.2
March 2018	Updated for Unity OE 4.3
August 2018	Updated for Unity OE 4.4
January 2019	Updated for Unity OE 4.5
June 2019	Updated for Unity OE 5.0
June 2021	Updated for Unity OE 5.1

Acknowledgments

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Executive summary

As the world moves forward, technology keeps changing at a rapid rate. With these new technologies, it becomes increasingly more complex to manage storage and sometimes substantial training is required. Dell EMC understands that it is necessary to develop products/technologies that are best-in-class, while at the same time maintaining ease of use and simplicity in the products administrators use daily. This approach especially applies to the Dell EMC Unity Family, which has been designed to serve the needs of both storage administrators who are new to storage and at the same time provide the advanced features and optimized performance that customers require for their data. Unisphere, the application for managing these world class technologies and features on Dell EMC Unity, provides an easy-to-use yet powerful user interface for all features and capabilities of the storage system.

Unisphere enables users to manage their various storage configurations and associated features in an intuitive fashion. Built upon the universally accessible HTML5 architecture, Unisphere ensures a positive product experience by using easy-to-understand language and streamlined workflows. Storage administrators of all technical capabilities can use Unisphere to simplify management while making data centers more efficient and more productive, as well as improving associated business operations.

Audience

This white paper is intended for Dell EMC customers, Dell EMC partners, and Dell EMC employees who are considering using Unisphere to manage their Dell EMC Unity storage systems. It assumes that the reader of this document has some experience as a system or network administrator.

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1 Introduction

This white paper provides an overview of using Unisphere to manage Dell EMC Unity storage systems, describes the various menus available to users of the product, and provides general guidelines for using the available features. The paper will also explain how the interface has been designed to allow users to complete storage-related tasks in an intuitive and simple manner. Step-by-step instructions can be found in the Unisphere Online Help.

1.1 Terminology

Fibre Channel: A transport protocol that provides a mechanism for accessing block-level storage resources.

File System: A file-level storage resource that can be accessed over SMB and/or NFS protocols. A NAS Server must exist on the system prior to creating an SMB, NFS or Multiprotocol File System.

Internet Small Computer System Interface (iSCSI): An IP-based transport protocol that provides a mechanism for accessing raw block-level storage resources over network connections.

LUN: A logical unit of storage provisioned from a pool. A LUN can either be a Thin LUN or a Thick LUN.

NAS Server: A file storage server that can be enabled to support SMB and/or NFS protocols to catalog, organize, and transfer files within designated shares. A NAS Server is required to create file-level storage resources such as SMB, NFS File Systems, or VMware NFS Datastores.

Network File System (NFS): An access protocol that enables users to access files and folders over a computer network. Most usage of NFS involves computers running Linux/UNIX operating systems.

Pool: A collection of drives configured with particular storage attributes. The storage attributes are defined by the type of drives used to provide storage and the type of RAID configured on the drives. Dell EMC Unity supports unified pools that include both block and file storage resources.

Server Message Block (SMB): An access protocol that enables users to access files and folders over a computer network. Most usage of SMB involves computers running Microsoft Windows.

Snapshot: A read-only or writeable point-in-time state of a storage resource's data. Users can recover files from snapshots or restore a storage resource from a snapshot and revert it to the particular point-in-time state.

Storage Processor (SP): A hardware component that provides computing resources for storage operations including the creation, management, and monitoring of storage resources.

Unisphere: The graphical management interface for creating, managing, and monitoring Dell EMC Unity systems storage resources and related features.

Unisphere CLI (UEMCLI): The command-line interface for managing storage systems.

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2 Simplified Management with Unisphere

For most technology products available today, simplicity and ease of use are some of the top priorities for customers considering purchasing the product. For Dell EMC Unity storage systems, Unisphere management addresses these priorities by providing an easy to use and simplified management interface for IT generalists, while at the same time providing advanced features for more adept storage administrators. Unisphere allows administrators to easily configure storage resources from their Dell EMC Unity systems to meet the needs of their applications, hosts, and users, as shown in Figure 1.
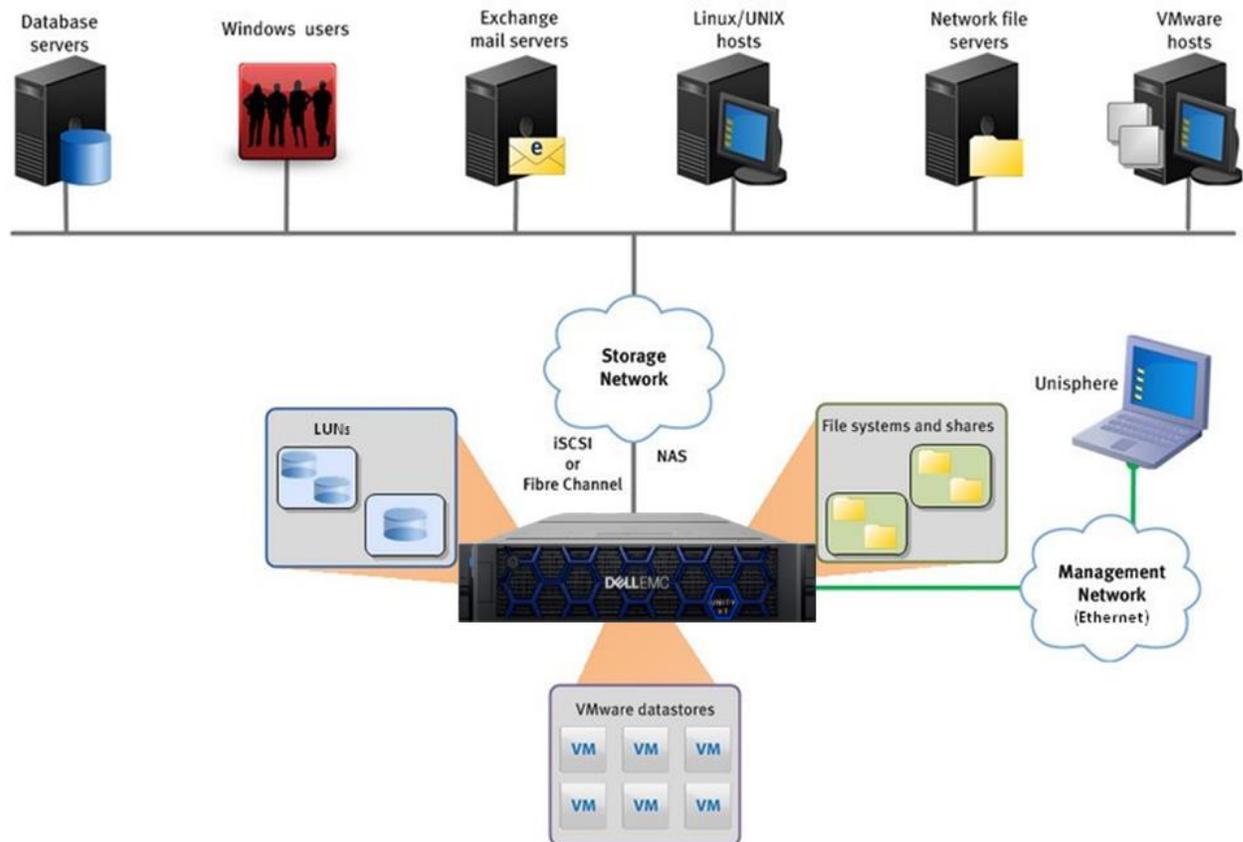
Figure 1   Dell EMC Unity in Diverse Storage Environments

The Unisphere provisioning workflows simplify management by using best practices and recommended default values, which help to optimize system performance and minimize the overall costs of using and maintaining the system. Unisphere can easily identify failed/faulted components through graphical representations of the system and offers a wide range of Dell EMC support options directly from the user interface, to assist troubleshooting.

For information about other management interfaces like the Unisphere CLI or REST API, see the corresponding sections near the end of the paper.

3   Getting started

Once you have your Dell EMC Unity system powered on for the first time, there are several options available to get your system on the network for management. For manual network configuration, here are the options:

Connection Utility: Windows application that is easy to install and offers a friendly interface for network configuration of the system. Available for download on Dell EMC Online Support.

InitCLI: Windows tool that allows flexibility when configuring storage systems. Does not require use of a Java plugin to be run and gives users the ability to discover and configure Unity storage systems with an IPv4 management address. Available for download on Dell EMC Online Support.

Service Command (svc_initial_config): For administrators who like to directly configure systems that are not connected to the network, the user is able to connect to the system over serial over LAN (SOL) and run a service command to configure an IP address for the system.

If the user has a DHCP server on the network, the Dell EMC Unity system will automatically pull the network settings from the DHCP server once the system is ready for IP configuration. The user can then use the DHCP server management interface or Connection Utility to determine the IP given to the system.

Instructions on how to use the Connection Utility to configure a management IP on your Dell EMC Unity system are shown below. For more information about the other network configuration options, please see the *Dell EMC Unity Installation Guide* on Dell EMC Online Support.

3.1   Using the Connection Utility to set a Management IP

After installing the Connection Utility application on a Windows host, the user needs to open the application and choose one of available methods to configure the system as shown in Figure 2:

Auto Discover: Users can use this method when their management host is on the same subnet as the Dell EMC Unity system. This method allows the utility to automatically discover any Dell EMC Unity systems on the network that are either unconfigured (have no management IP) or configured, but have not yet run through the Initial Configuration Wizard in Unisphere. This means users can reconfigure network settings through the Connection Utility, if desired, before logging in through Unisphere.

Manual Configuration: Users can use this method when their system is not on the same network as their management host. This method allows saving a network configuration file to a USB drive and transferring it to a system, which will subsequently process the file and configure the saved network settings.

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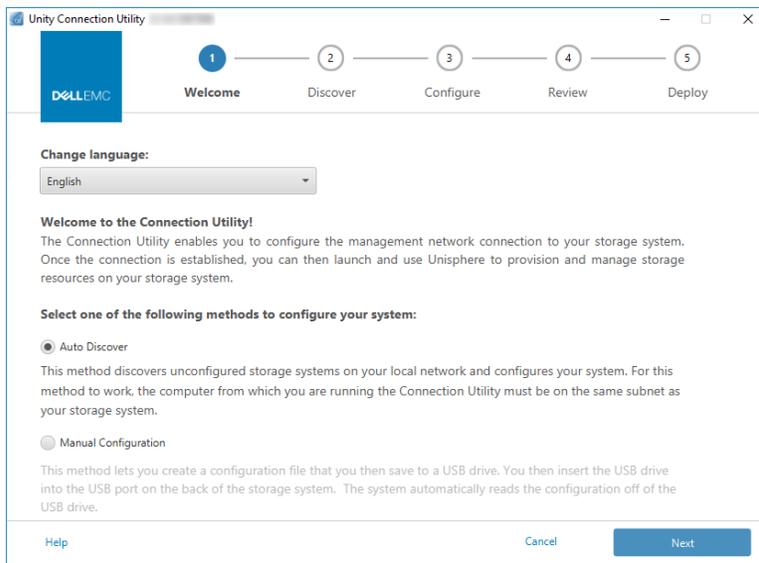
Figure 2   Unity Connection Utility Welcome page

The Connection Utility allows users to configure the following Dell EMC Unity management network settings, as shown in Figure 3:

System Name: User-defined name of the system, which can be used for easy system identification.

Management Address: Network IP address (IPv4 and/or IPv6) that is assigned to the system and used to access Unisphere.

Subnet Mask/Prefix Length: Network mask used to configure which subnet the management IP address belongs to.

Gateway Address: Router interface on the network used for sending IP packets outside of the local network.
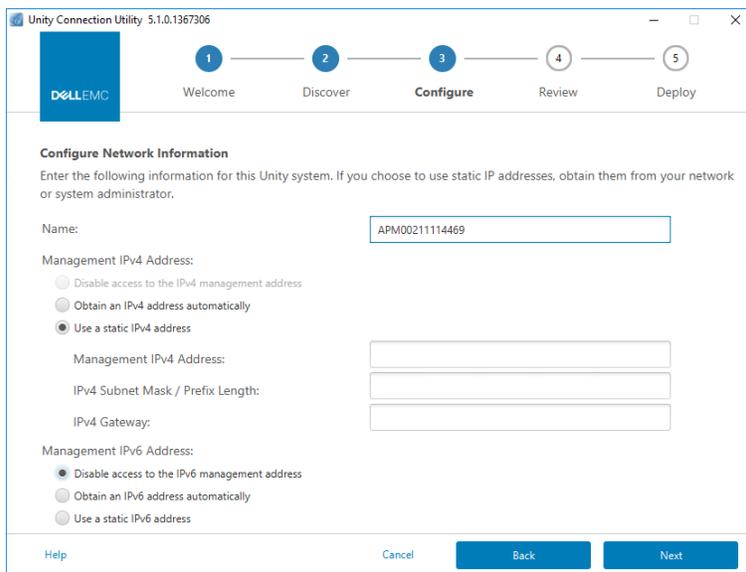
Figure 3   Unity Connection Utility IP Configuration

3.2   Initial Configuration Wizard

Once the management IP of the Dell EMC Unity system is configured, the user will be able to log in to Unisphere. After launching Unisphere and logging in, the Unisphere Initial Configuration Wizard appears, as shown in Figure 4. This wizard allows users to configure the most important and commonly required settings of the system, thereby streamlining the system preparation in order to expedite provisioning and sharing of resources. The Initial Configuration Wizard includes the following settings:

Copyright: To continue in the Initial Configuration Wizard and to be able to use Unisphere, a user needs to accept the End User License Agreement.

Admin and Service Password: Passwords used to access Unisphere and the service CLI of Unisphere, respectively.

DNS Servers: Domain Name Sever, which is the network service that resolves domain names to their corresponding IP addresses.

Proxy Server: The user can supply Proxy Server information to receive information for storage systems that cannot connect to the internet directly.

NTP Servers: Network Time Protocol, which is the time server used to synchronize computer systems to the same clock, which usually maps back to UTC or Coordinated Universal Time. Ensuring accurate system time is important for configuring Active Directory for SMB configurations and for configuring multiprotocol configuration. Note that if the system time is more than 5 minutes different than the configured NTP server, the user will be asked to configure NTP later, since this requires a system reboot.

Unisphere Licenses: License from Dell EMC that enables different features/services of the Dell EMC Unity storage system based on purchase orders through Dell EMC Services. If the user entered the DNS Server information about the DNS Servers step, the License file is automatically installed from Dell EMC. For the license to be automatically installed successfully, the system needs to have internet access.

Pools: Pools are required for configuring any storage resource on the system. This setting might also include the FAST Cache option when the system is a Hybrid system. FAST Cache is widely used in many environments to provide a secondary cache for the system and to optimize overall Flash usage efficiency.

Alert Settings: Alerts provide information to the user about the source of an event. They also tell the user the symptoms, the cause, and what actions that needed to be taken to resolve the issues noted in the alerts. This alert setting is to configure the system to send alert notifications in email or a Simple Network Management Protocol (SNMP) messages.

Dell EMC Support Credentials: Username and password for the registered Dell EMC Online Support account. This is a pre-requisite for using EMC Secure Remote Support (ESRS), and it is useful for quickly accessing the various Dell EMC Support options in the Support section of Unisphere. ESRS enables Dell EMC Support personnel to provide remote troubleshooting support to help accelerate the diagnosis of issues, resulting in faster resolution times. ESRS is also a pre-requisite for using CloudIQ, discussed toward the end of this paper.

iSCSI Interfaces: Allows users to configure iSCSI interfaces for environments that utilize the iSCSI protocol. iSCSI is an IP-based storage protocol used for accessing Block resources (i.e. LUNs, Consistency Groups, and VMware VMFS Datastores).

NAS Servers: Allows users to configure NAS Servers, which is a pre-requisite for creating and accessing File storage resources on the system. NAS Servers require a separate IP to be configured for network access.
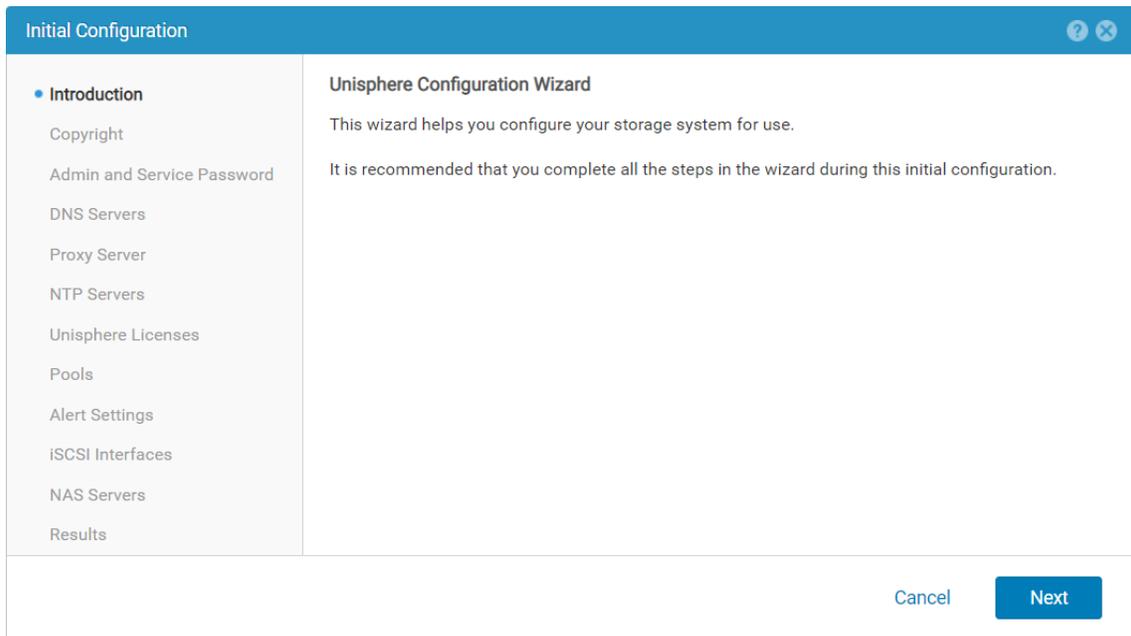
Figure 4   Initial Configuration Wizard

4 Unisphere Graphical Interface

Unisphere provides a positive user experience by utilizing a web interface based on HTML5. This modern interface has been designed with simplicity and ease of use in mind for all storage management needs. The user can collapse the navigation bar to the left-hand side of the user interface for a wider view if desired. This menu includes the resources and system settings that are used on a frequent basis by administrators. The different pages available through the main menu are described in Table 1:

Table 1   Navigation Menu Details

Categories	Sub-Categories	Description
Dashboard	None	View a comprehensive summary of system status
System	System View, Performance, Service	Configure and view system information and activity, and run service tasks
Storage	Pools, Block, File, VMware	Configure and view storage resources
Access	Hosts, VMware, Initiators	View and configure hosts for access to the storage system
Protection & Mobility	Snapshot Schedule, Replication, Interfaces, Import	View and configure snapshot schedules and manage replication and import operations
Events	Alerts, Jobs, Logs	View alert messages, jobs status and logs
Support	None	Access help resources and customer support options
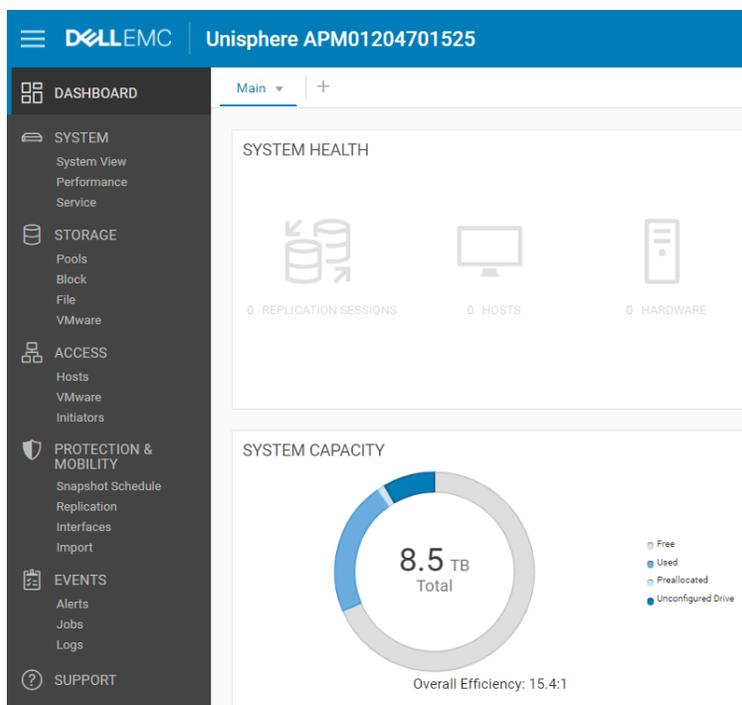
Figure 5   Navigation Menu

The following sections describe the content accessed through the left-hand navigation menu.

4.1 Dashboard

The Dashboard page is the first page the user will see when logging into Unisphere, as shown in Figure 6. The page is a customizable view of status of various system details, including system capacity, system health, storage health, and high-level system performance. Each status is displayed using "view blocks", which users can add, modify, and delete as needed.
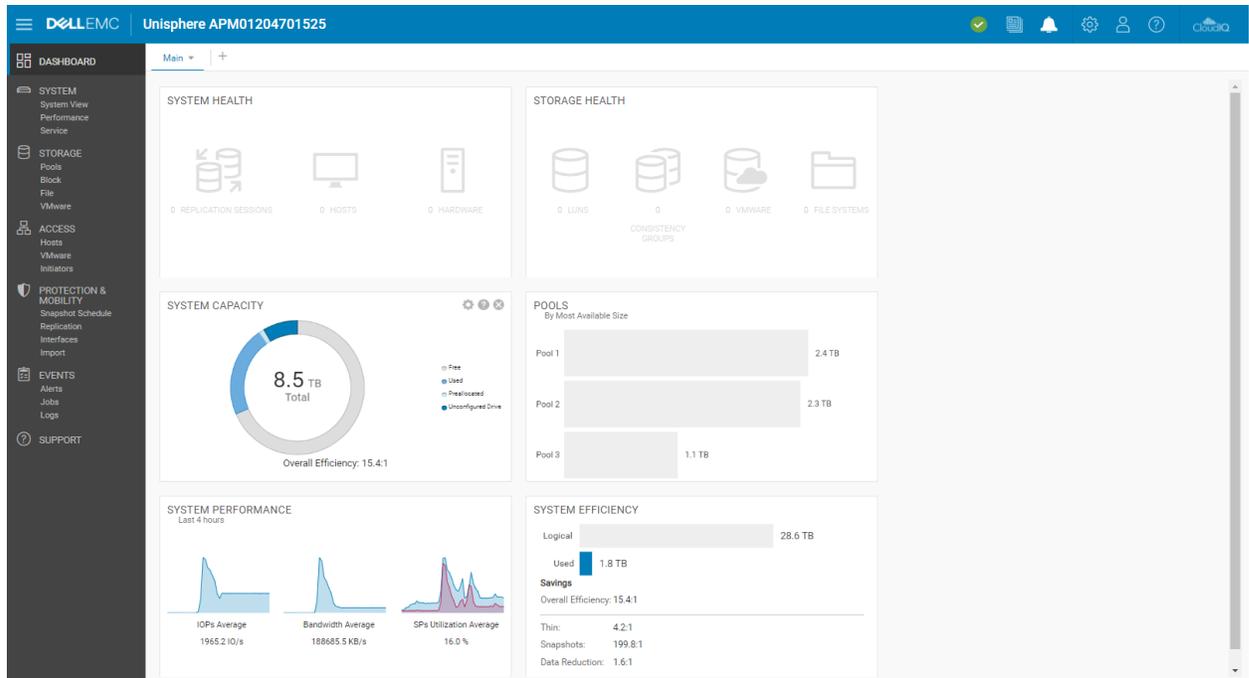
Figure 6   Dashboard Page

Users can also add or remove additional dashboards to save customized views for different purposes. At least one dashboard must be available on the page. The available view blocks for the dashboard and associated descriptions are shown in Table 2.

Table 2   Available View Block for the Dashboard

View Blocks	Description
System Health	Shows health status for system objects (e.g. Replication Sessions, Hosts)
Storage Health	Shows health status for storage objects (e.g. LUNs, File Systems, Datastores)
System Capacity	Shows total capacity, free, used, preallocated and unconfigured drive space. Also, shows the Overall Efficiency of the system.
Tier Capacity	Shows the used and free space for each storage tier
Pools	Shows free and used pool capacity in each pool
System Alerts	Shows all alerts for the system (categorized by severity)
System Performance	At a glance view of key performance indicators
System Efficiency	Displays savings information from thin, snapshots, and data reduction

4.2 System View

On the System View page, as shown in Figure 7, the Summary tab displays several important system details, like serial number, system model, Software Version, System time and average Power consumption. This information can be found in the top section. The second section, "SYSTEM HEALTH ISSUES", displays any health related issues including storage resource, port connectivity, and hardware issues that are in a non-ideal state (e.g. faulted). The bottom section called "FRONT END PORT" displays information about the ports that have been configured on the system and what their current status is.
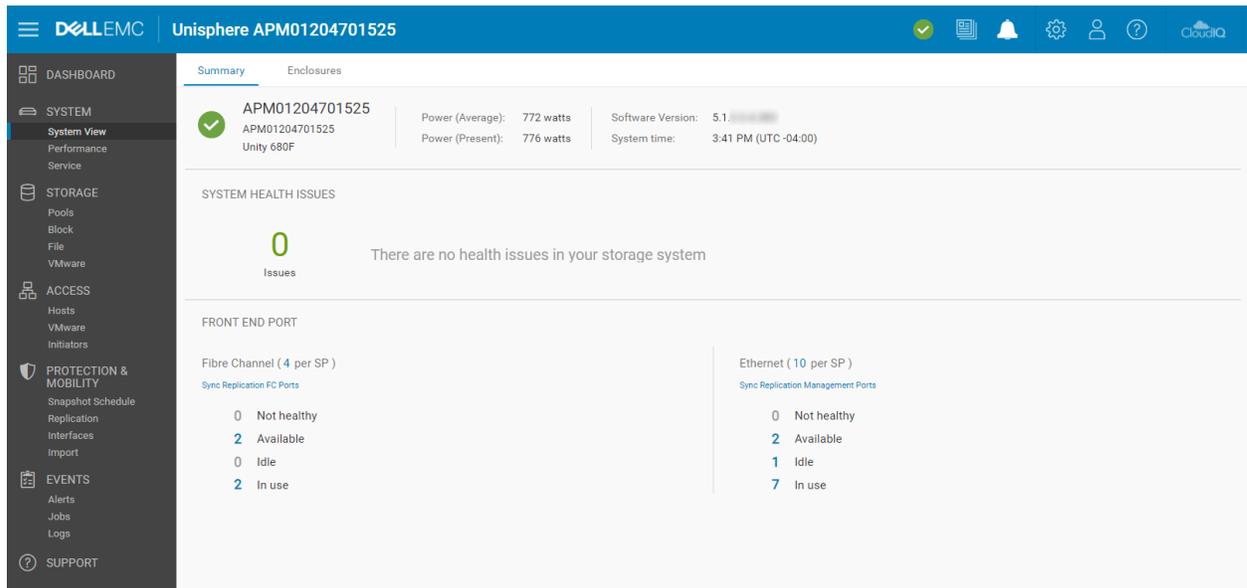
Figure 7   System View Page: Summary Tab

On the Enclosures tab of the System View page, the system shows various views of the physical system in graphical illustrations. As shown in Figure 8, the rear of the system is the default view when going to the page. Users can see that some ports are highlighted green, signifying that a connection for those ports is present and is in a good state. The graphical models are clickable, allowing users to see more information about specific components, which can be helpful in identifying part numbers when trying to order/replace different system parts. When components are faulted, they are highlighted with an amber color to signify that the component needs to be fixed/replaced.
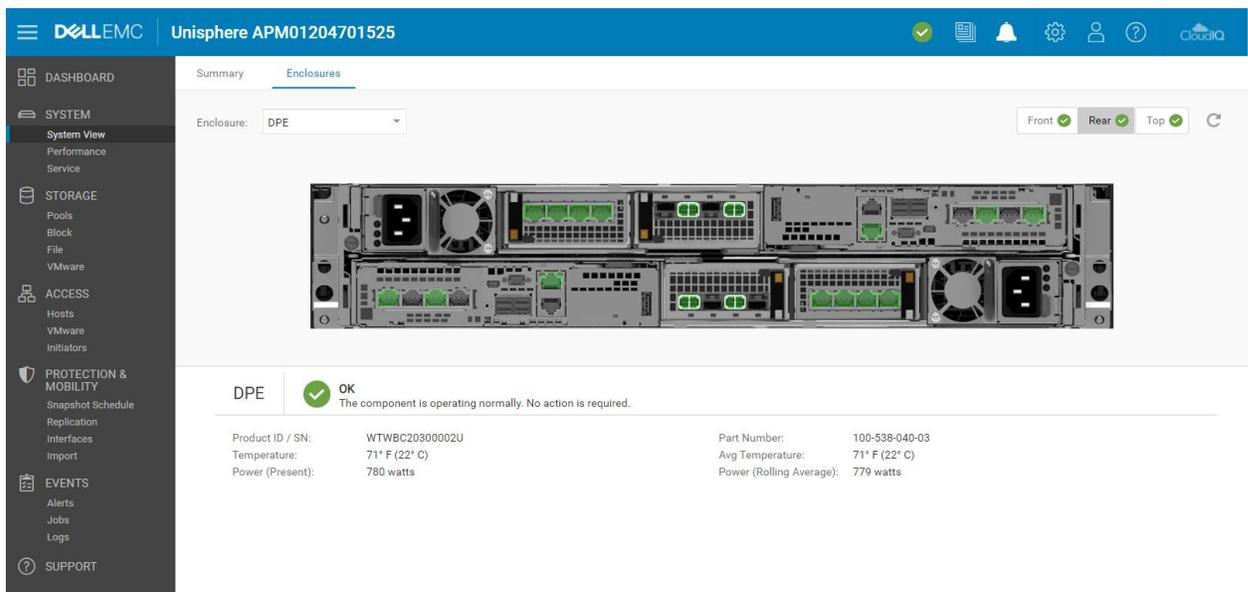
Figure 8   System View: Enclosures Tab

For a Dell EMC UnityVSA system, the System View page also includes both Summary and Enclosures tabs. The Summary tab shows similar information as a physical system, while the Enclosures tab shows only network components, since Dell EMC UnityVSA is a virtual system. Dell EMC UnityVSA includes an additional Virtual tab, which displays the virtual drives on the Dell EMC UnityVSA VM. For more information about Dell EMC UnityVSA, review the *Dell EMC UnityVSA* white paper on Dell EMC Online Support.

As a system provisions and shares out storage resources, the system collects performance statistics about the system, its resources, and network I/O from external hosts. These performance statistics can be viewed from the Performance page on the Performance Dashboard tab by adding and customizing available performance dashboard and metrics charts, as shown in Figure 9. Users have the option to create Historical and Real-time dashboards.
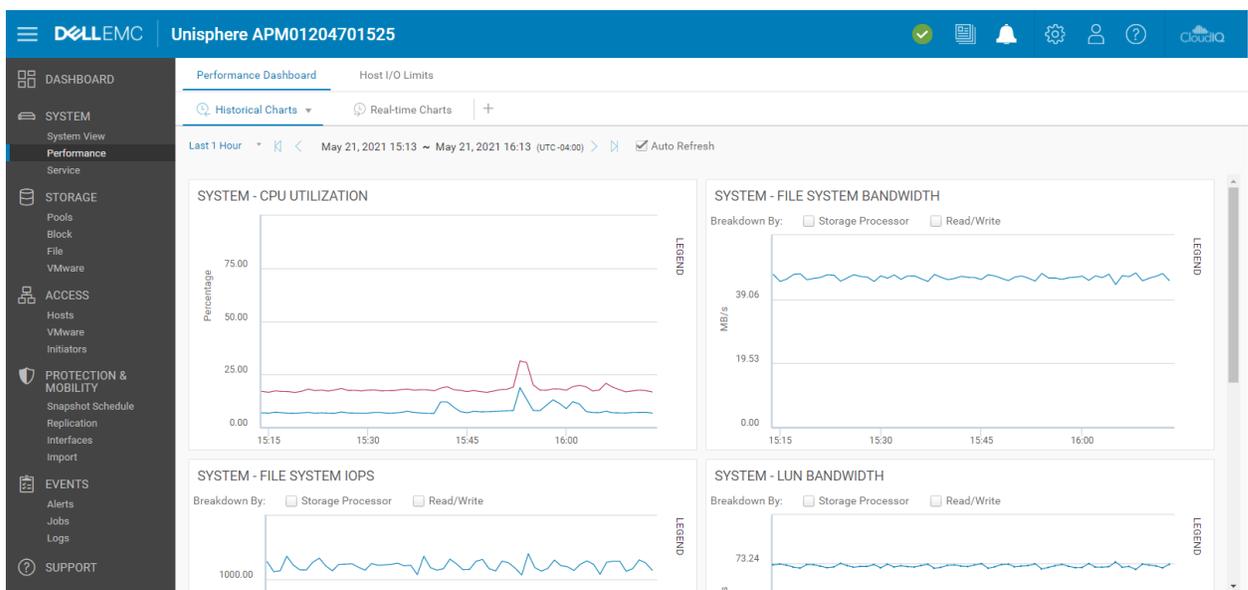
Figure 9   Performance Dashboard – Historical Charts

In terms of chart viewing options, the preset time ranges at the top of the page allow users to focus on a certain time range by selecting the desired time range or going backward or forward in time for troubleshooting potential issues. All charts on the same dashboard display the same time range, as specified by the time range bar. This ensures quick and easy comparisons between different charts. Next to the time range bar are selectable default time ranges as well as a custom option for specific time range viewing.

As metrics data ages, the data gets aggregated into longer sampling intervals for historical referencing up to 90 days. Below are the metric retention periods and associated sampling intervals as shown in Table 3:

Table 3   Sampling intervals and retention periods

Time Range Setting	Sampling Interval
Last 1 Hour	1 Minute
Last 4 Hours	1 Minute
Last 12 Hours	5 Minutes
Last 24 Hours	5 Minutes
Last 7 Days	1 Hour
Last 30 Days	4 Hours
Last 90 Days	4 Hours
Custom	Varies based on the length of the range. if the range is more than one week, the sampling interval is 4 hours.

The second dashboard in the Performance Dashboard page is the "Real-time Charts" dashboard. Real-time metrics display data collected during the current session, over a maximum time range of 15 minutes. The session ends when the user navigates away from the current tab and restarts when the user navigates back to the tab. The Real-Time Dashboard can display up to four real-time metrics charts at a time on a dashboard. The sampling interval for real-time metrics is every 5 seconds.

For more information about Performance Metrics, please see the *Dell EMC Unity: Performance Metrics* white paper on Dell EMC Online Support.

The second tab available on the Performance page is the Host I/O Limits tab, as shown in Figure 10. This tab allows users to configure, modify, delete, and view I/O limits on block resources provisioned on this system. Setting a Host I/O Limit limits the amount of IOPS and/or bandwidth between a given block storage resource and connected hosts/applications. A user might want to use this feature to control the amount of I/O requests from non-essential workloads so that these workloads do not impact other valuable storage resources and affect critical workloads. Another use case might be a service provider wanting to set a maximum level of service based on a customer's subscription. An I/O limit policy can be applied to an individual LUN/VMFS Datastore or to a group of LUNs. The user can also apply a shared policy among multiple resources. A shared policy limits the combined activities of all the resources in the group.
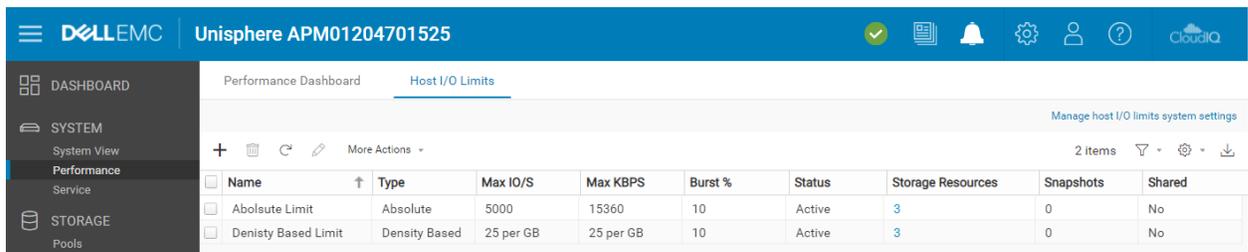
Figure 10   Host I/O Limits

4.3   Service

The Service page, as shown in Figure 11, can be used to troubleshoot and initiate different service tasks to repair the storage system and associated Storage Processors. It contains quick links for setting up and viewing support services like EMC Secure Remote Services (ESRS). ESRS is generally recommended as it will help Dell EMC customer support staff contact the necessary personnel and quickly resolve any issues. A user must first establish a Dell EMC Online Support account to set up ESRS on the storage system, register a storage system, download system licenses, or obtain updated software. This process will automatically retrieve a user's support contract information.
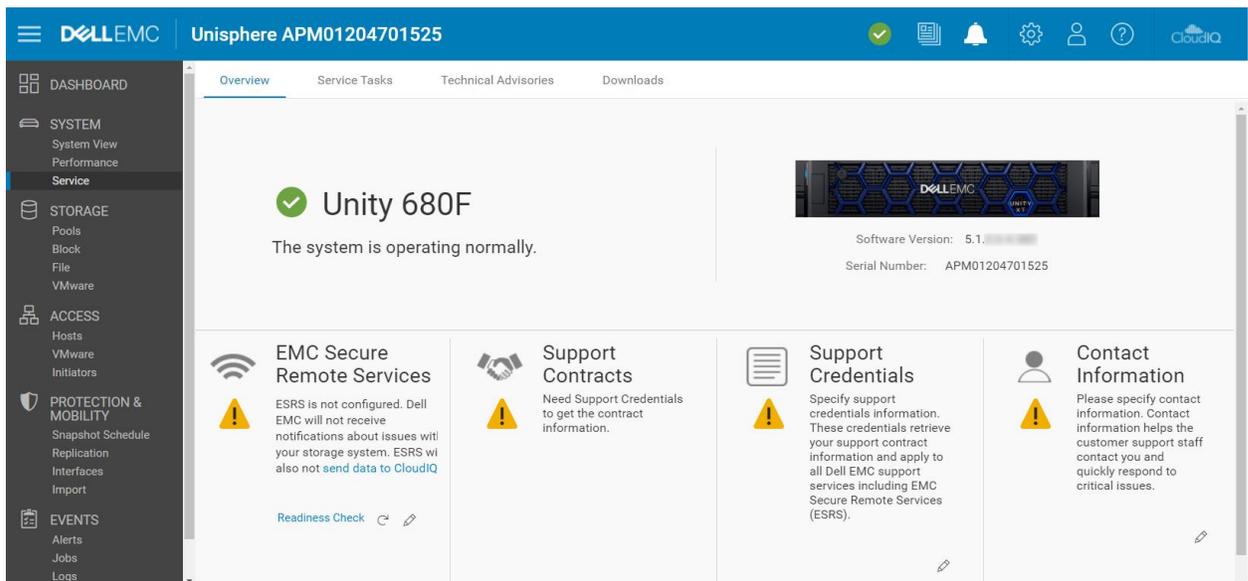
Figure 11   Service Page

The **Service Tasks** tab provides tools to service the storage system, including repair and troubleshooting. A user can use this page to collect system and configuration information to provide it to customer support and troubleshoot issues. The service password is required to access the various service task operations.

The **Technical Advisories** tab displays up-to-date information about advisories specific to the system by referencing knowledge base articles.

The **Downloads** tab was added with Dell EMC Unity OE version 4.2. There are two sections:

- **Performance Archive File**: Users can download performance archive files to send to customer support for troubleshooting purposes. Users can download individual archive files or select a specific interval of time for which multiple files will be downloaded.

- **Core Dump**: Users can download the Core Dump files to send to support for troubleshooting and issue resolution. Users will need to enter their service credentials to download these files.

4.4 Pools

The Pools page is the first storage resource page listed on the left-hand main navigation menu. A pool is a set of drives that provide specific storage characteristics for the resources that use them. Creating a pool is a pre-requisite for provisioning storage resources. The page, as shown in Figure 12, allows users to create, modify, view, expand, and delete pools. If there are multiple drives types on the system, users can configure multiple tiers for the pool. In physical systems (for Hybrid systems only), each tier can be associated with a different RAID type. If FAST Cache is configured on the system prior to running the pool configuration wizard, a user can configure the pool to utilize FAST Cache to ensure the most active data is served from Flash media.

Figure 12   Pools Page

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

4.5 Block

Once a pool is created on the storage system, users can start to create storage resources. On the Block page, as shown in Figure 13, users can create block storage resources such as LUNs, Consistency Groups, and Thin Clones. Users can also configure iSCSI Interfaces, for accessing block resources. Alternatively, block resources can be accessed through Fibre Channel by configuring zones on the connected FC switch.
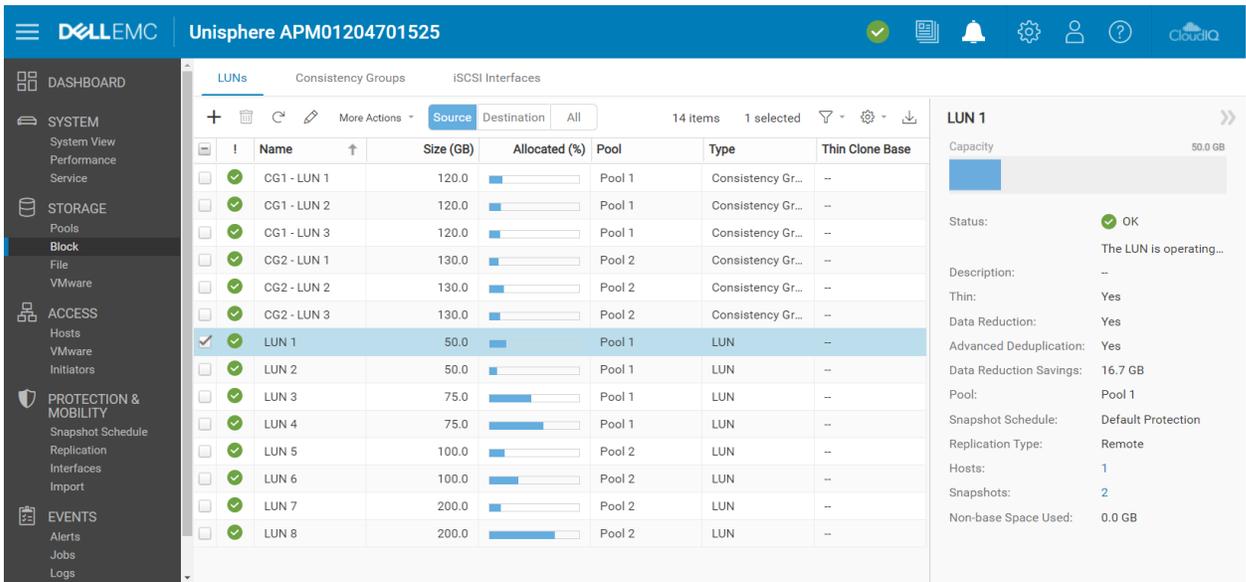
Figure 13   Block Page

A LUN can be configured to give host access to one or multiple hosts. Types of host access include LUN, Snapshot, or LUN and Snapshot access. Consistency groups can be used for application crash consistency among related LUNs (up to 75) when using data protection features like Snapshots and Replication.

Standalone Thin/Thick LUNs are created using the **Create LUNs** Wizard. Figure 14 below shows the **Create LUNs** Wizard. Multiple LUNs can be created at the same time, and Data Reduction can be enabled on the LUNs. To create a LUN or multiple LUNs with Data Reduction enabled, the user needs to check the **Data Reduction** checkbox on the Configure step.
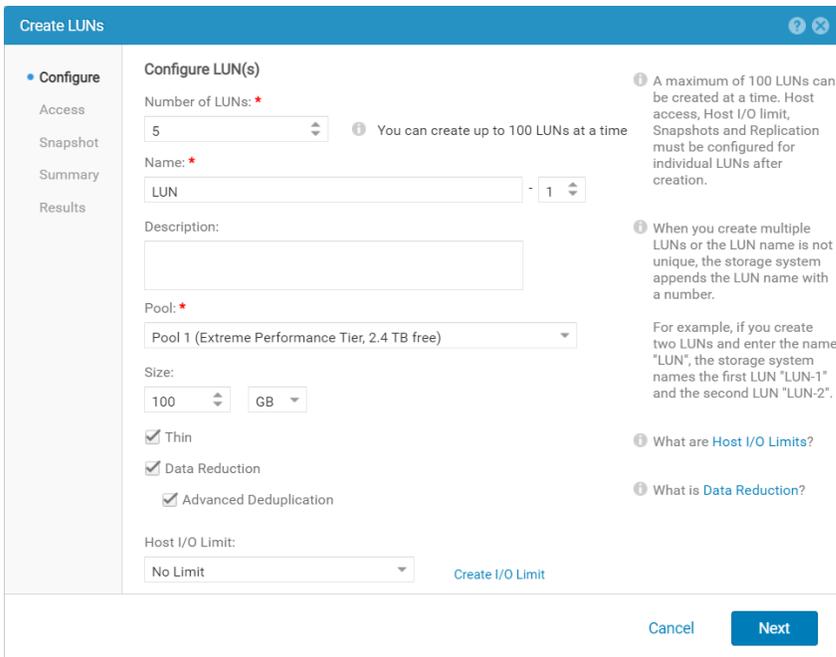
Figure 14   Create LUNs Wizard – Configure Step

In the Dell EMC Unity OE version 4.2 release or later, the user has the option to create Thick LUNs from Unisphere. Users tend to create a Thick LUN for space reservation and when they do not need to enable

Data Reduction or utilize other advanced software features. The **Thin** checkbox is selected by default. To create a Thick LUN, the user needs to uncheck the Thin box. Removing the checkbox also disables the Data Reduction option. For more information about Data Reduction, please see the *Dell EMC Unity: Data Reduction* white paper on Dell EMC Online Support.

Additionally, with Dell EMC Unity OE version 4.4 or later, Unisphere allows the user to set a custom Host LUN ID during creation of a LUNs and VMware VMFS Datastores, as shown in Figure 15. The valid range for the Host LUN ID is from 0 to 16381. Keep in mind that some Operating Systems do not recognize Host LUN IDs higher than 255. Once the resource is created, the user can modify the Host LUN IDs from the block resource's properties page under the Access tab or host's properties page.
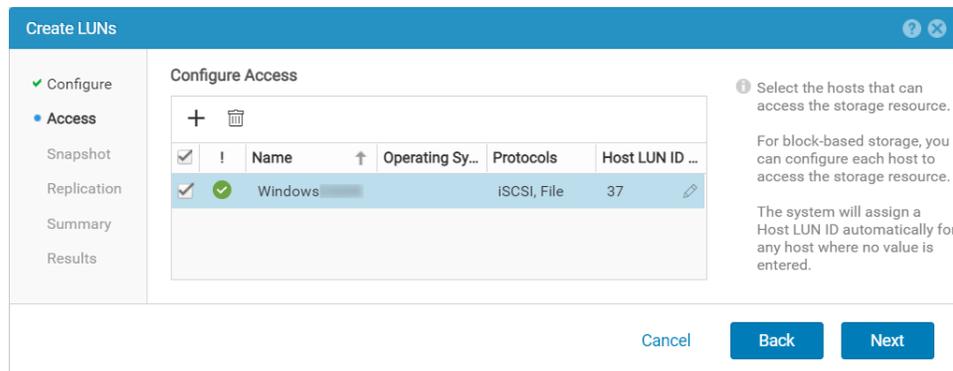
Figure 15   Create LUNs Wizard – Access Step

4.6   File

File storage resources can be created on the File page, as shown in Figure 16. File systems can be accessed through network protocols, such as SMB and NFS. NAS Servers must be configured before creating file systems. NAS Servers are configured with network interfaces, which allow an access point to file systems configured on that server. Once a file system is provisioned, users can then access the resource through configured file shares, which are mountable access points. Multiple shares can be configured for a single file system, but all shares will draw from the same total quantity of storage allocated for the storage resource. Users can also create Tenants from the File page if needed. File storage resources can be a thin or thick resource just like block storage resources.

For more information about Dell EMC Unity File Systems and associated file features, please see the *Dell EMC Unity: NAS Capabilities* white paper on Dell EMC Online Support.
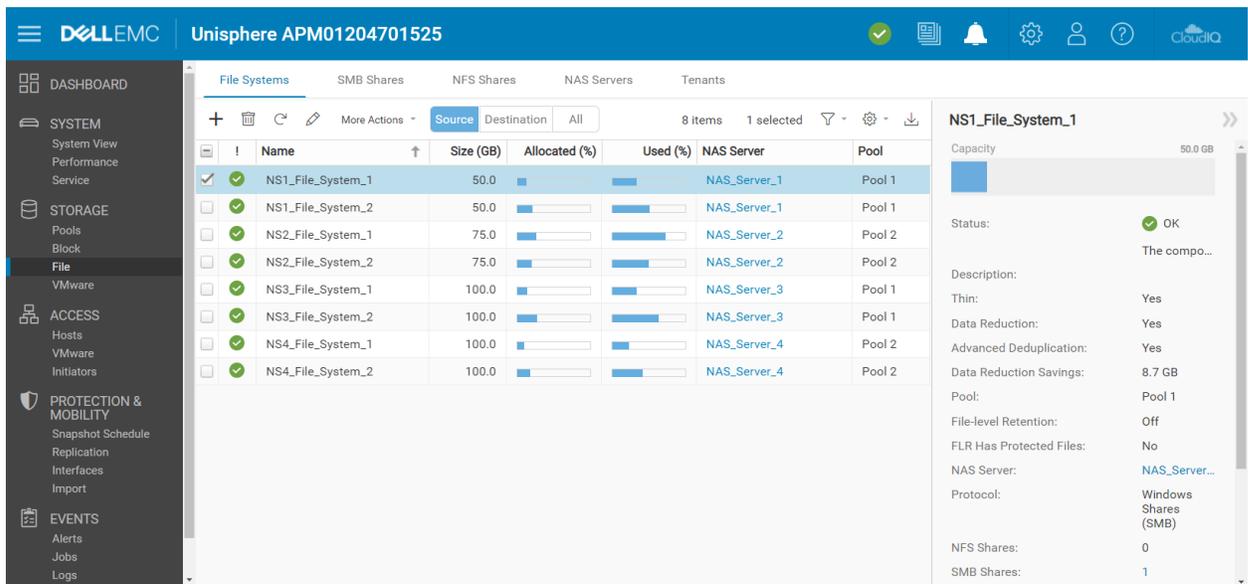
Figure 16   File Systems Page

4.7   VMware (Storage)

The VMware page under the Storage category in the left-hand navigation menu, as shown in Figure 17, provides the ability to create and manage VMware-related resources like NFS, VMFS, and vVol Datastores. A VMware Datastore is a storage resource that provides storage for one or more VMware hosts. For the Dell EMC Unity platform, four types of VMware Datastores are available: File (NFS), Block (VMFS), vVol (File), and vVol (Block) Datastores. Unisphere allows users to provision storage for a VMware traditional Datastore and configure access to a relevant ESXi host, which results in the automatic configuration of Datastores on the ESXi host. Modifying or deleting the Datastore in Unisphere automatically updates the ESXi host as well.

A NAS Server with NFS enabled is a pre-requisite to creating VMware NFS Datastores and a NAS Server with NFS and vVols enabled is a pre-requisite for accessing vVol (File) Datastores. For vVol-specific operations, users can use the VMware page to configure Capability Profiles, view Protocol Endpoints, and view Virtual Volumes. The Datastore Shares tab includes NFS shares that VMware NFS Datastores and their associated hosts have access to. Also, in Dell EMC Unity system OE version 4.5 and later, VMFS 6 Datastores can be created in the GUI. For more information about vVol technology and other virtualization technologies, see the *Dell EMC Unity: Virtualization Integration* white paper on Dell EMC Online Support.
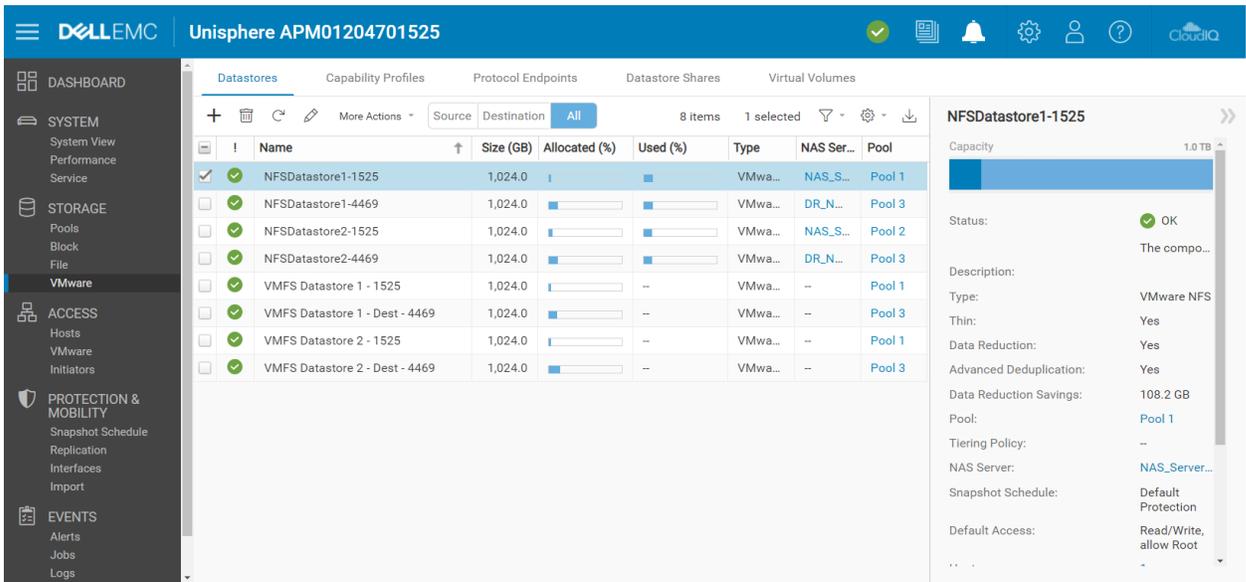
Figure 17   VMware (Storage) Page

4.8   Hosts

Under the **Access** category in the main navigation menu, users can configure hosts (Windows or Linux/UNIX) for storage access. VMware hosts can be configured on the VMware (Hosts) page. Before a network host can access block storage, the user must define a configuration for the host and associate it with a storage resource. Access to NFS Shares can be restricted to certain hosts. SMB file systems can automatically be accessed by authorized users once provisioned. Users can use the Hosts page, as shown in Figure 18, to configure host configurations. This can be done on an individual host-by-host basis or through subnet and netgroup configurations that allow access to multiple hosts or network segments. For block resources, before the user starts to configure a host, the user should ensure that initiator interfaces are configured, and initiator registration is completed. Once a host configuration is completed, users can go to the properties of a storage resource and specify the hosts from which they want the resource to be accessed.
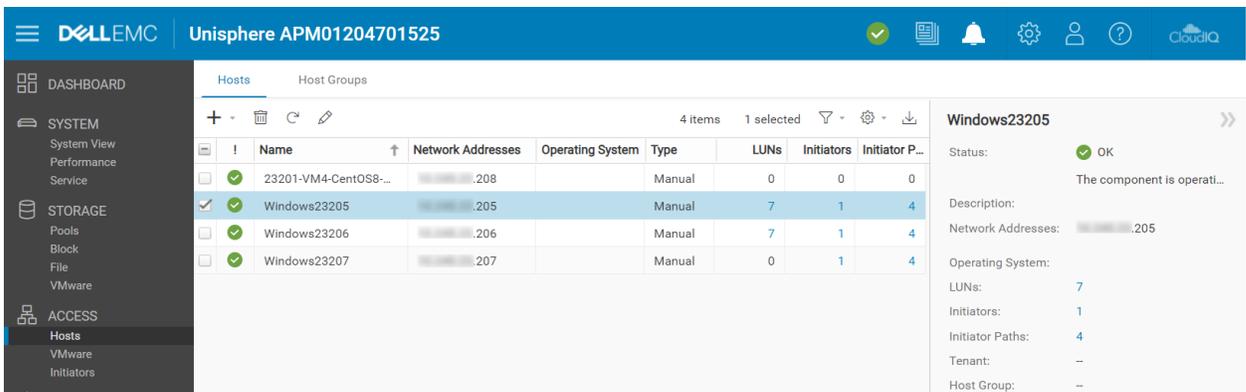
Figure 18   Hosts Page

In Dell EMC Unity OE version 4.4 or later, Unisphere prevents the user from deleting a block resource that has host access assigned to it. To delete the host-accessible block resource, the user first needs to remove host access before the block resource can be deleted.

To remove host access from multiple resources, the user can select the multiple resources and click the **More Actions > Modify Host Access** action, as shown in Figure 19.
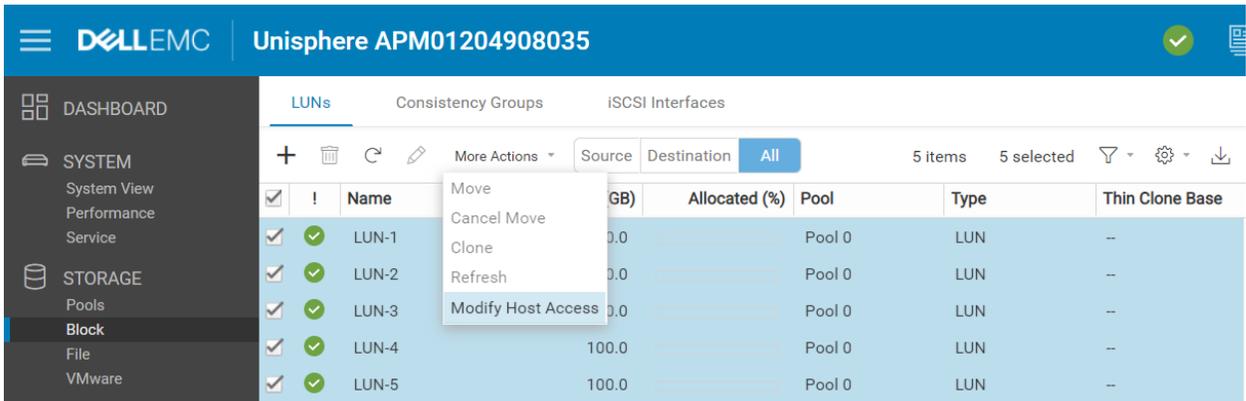
Figure 19   Modify Host Access Action

In Dell EMC Unity OE version 5.0, the user can assign multiple LUNs to multiple Hosts at the same time. In addition, a Merge operation is also available. Merge provides access to the list of hosts to the desired LUNs that are selected. For example, if some LUNs use Host1 and Host2, and others use Host5 and Host6, the **Modify Host Access** window will list all the hosts (Host1, Host2, Host5, and Host6) after the merge operation completes.

In Dell EMC Unity OE version 5.1 users can logically group hosts and block resources within a host group. Host groups can be created and managed from the Host Groups tab, as shown in Figure 20 below, and help to streamline host/resource access operations. A host group can be one of two types, General and ESX, which is persistent for the life of the group. A General type host group allows one or more non-ESXi hosts and LUNs to be grouped together. ESX host groups allow VMware ESXi hosts to be grouped with LUNs and/or VMFS datastores.

When a host is added to a host group, the host automatically is mapped to all resources assigned to the group. When adding a host to the group a merge option is also available, which maps all block resources assigned to the host to the host group and all hosts in it. If merge is not used, the resource attached to the host will be displayed within the host group, but access is restricted and remains unchanged. When a resource is added to the group, it is automatically mapped to all hosts within the group. Configuring host access using the resource creation wizard or on an existing resource remains unchanged.
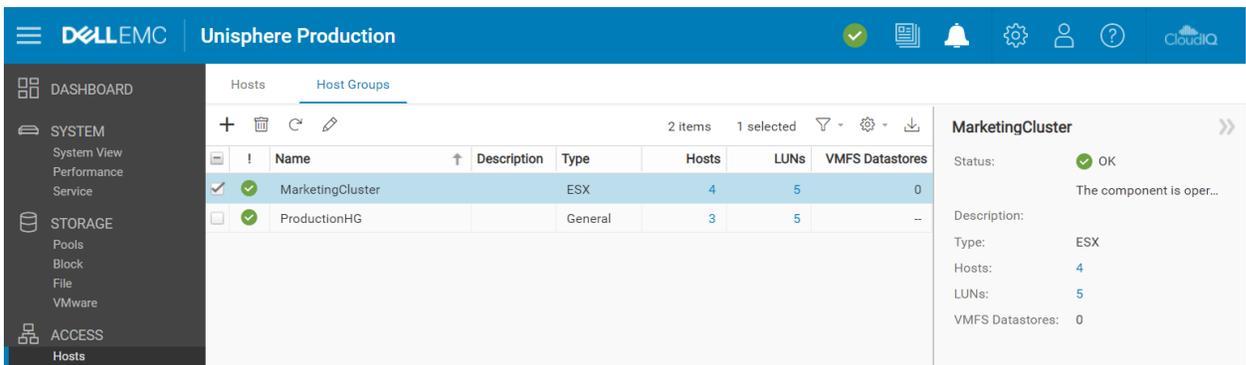
Figure 20   Host Groups

4.9 VMware (Access)

The VMware host access page is specifically for VMware ESXi hosts and their associated vCenter servers. Unisphere provides VMware discovery capabilities through the VMware page, as shown in Figure 21. These discovery capabilities collect virtual machine and datastore storage details from vSphere and display them in the context of the storage system. The vCenters tab allows users to add a vCenter and associated ESXi hosts in a single workflow, while the ESXi hosts tab allows users to add standalone ESXi hosts as needed. The Virtual Machines tab and Virtual Drives tab display imported information about virtual machines and their VMDKs from any added ESXi host.

For more information about VMware access and integration capabilities, please see the *Dell EMC Unity: Virtualization Integration* white paper on Dell EMC Online Support.
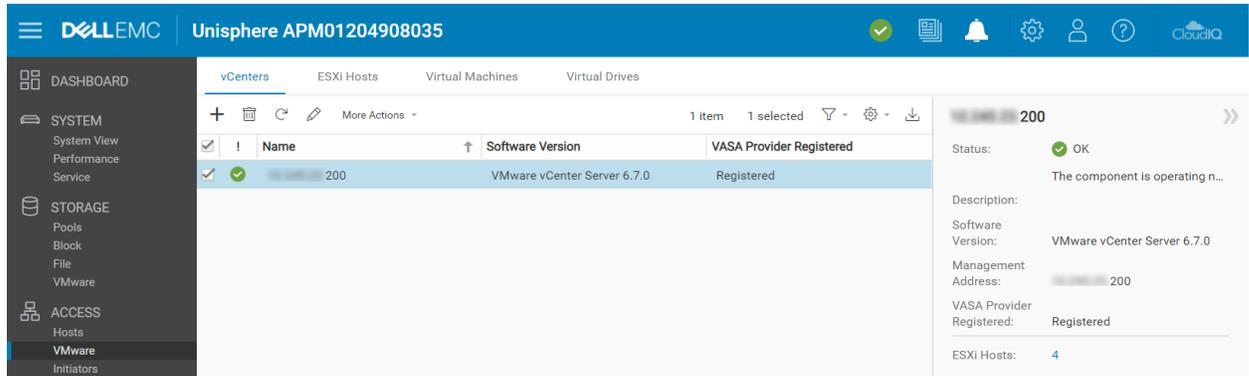
Figure 21　VMware (Access) Page

4.10 Initiators

To ensure that hosts can access block storage resources, the user must register initiators between the storage system and configured hosts. On the Initiators page, as shown in Figure 22, users can manually register one or more Fibre Channel or iSCSI initiators. Initiators are endpoints from which Fibre Channel and iSCSI sessions originate, where each initiator is uniquely identified by its World-Wide Name (WWN) or iSCSI Qualified Name (IQN). The link between a host initiator and a target port on the storage system is called the initiator path. Each initiator can be associated with multiple initiator paths. The Initiator Paths tab shows all data paths that are currently available to the initiators connected to the system either by FC or iSCSI. For iSCSI paths to show up, iSCSI interfaces must be configured on the Block Page. These initiators can then be discovered and registered by hosts using the iSCSI initiator tool. For Fibre Channel paths, FC zoning on the appropriate switch is needed for the initiator paths to be seen as available by the system. Once the paths are available, users can configure their connected hosts on the Hosts Page.
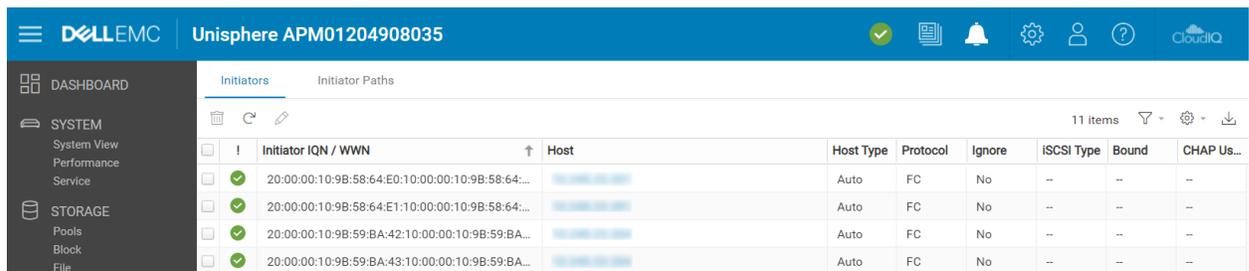
Figure 22　Initiators Page

With the release of Dell EMC Unity OE version 4.3, Initiators can now have advanced settings customized through Unisphere. To access these settings, select an Initiator and then click the pencil icon to bring up the Edit Initiator window. Clicking Advanced at the bottom to reveal the Initiator Source Type, Fail-over Mode, Unit Serial Number, and LunZ Enabled settings, as shown in Figure 23. For more information about configuring Host Initiator Parameters, please reference the Online Help through Unisphere.

Figure 23   Edit Initiator – Advanced

4.11   Snapshot Schedule

Dell EMC Unity provides the ability to take point-in-time snapshots for all storage resources (block or file) to meet protection and recovery requirements in the event of corruption or accidental deletion. The Snapshot Schedule page, as shown in Figure 24, enables users to set the system to periodically take snapshots of storage resources automatically. Automating these administrative tasks takes away some of the management aspects of data protection. After enabling a snapshot schedule for a resource, each snapshot taken is time-stamped with the date and time when it was created, and it contains a point-in-time image of the data in the storage resource. The default snapshot schedules available on the system are:

Default protection: A snapshot is taken at 08:00 (UTC) every day, and the snapshot is retained for 2 days

Protection with shorter retention: A snapshot is taken at 08:00 (UTC) every day, and the snapshot is retained for 1 day

Protection with longer retention: A snapshot is taken at 08:00 (UTC) every day, and the snapshot is retained for 7 days

Note that times are displayed in a user's local time in a 12-hour format and that default snapshot schedules cannot be modified; but custom snapshot schedules can be configured by selecting the intervals, times, and days for the system to take snapshots on a regular basis.

With the Dell EMC Unity OE version 4.4 or later, user defined Snapshot Schedules can be replicated using the Synchronous Replication connection established between two physical systems. Reference the new **Sync Replicated** column in the Snapshot Schedule page, as shown in Figure 24. Applying a replicated Snapshot Schedule is only allowed in synchronously replicated file resources.

In Dell EMC OE version 5.1, the Schedule Time Zone option can be set to correct snapshot schedule timing issues due to seasonal time changes in certain regions of the world. This feature automatically adjusts the timing of snapshot schedules as seasonal time changes occur to ensure that snapshots are created at the correct time. The Schedule Time Zone option applies to system defined and user created snapshot

schedules. This option can be found in Settings > Management > Schedule Time Zone. A link to this page is also available within the Create Schedule page.

For more information about the snapshot technology available on Dell EMC Unity systems and the Schedule Time Zone option, please see the *Dell EMC Unity: Snapshots and Thin Clones* and *Dell EMC Unity: MetroSync* white papers on Dell EMC Online Support.
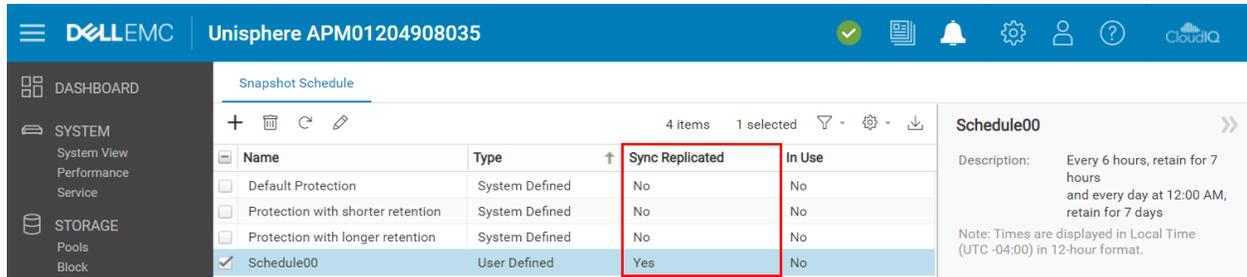
Figure 24   Snapshot Schedule Page

4.12   Replication

Another data protection feature available on the Dell EMC Unity platform is data replication. Data replication enables the user's data center to avoid disruptions in business operations by duplicating storage data to a remote or local system resource. It provides an enhanced level of redundancy in case the main storage system fails, and minimizes the downtime-associated costs of a system failure. The Replication page, as shown in Figure 25, displays all configured replication sessions available on the system where users can run replication tasks like failover, failback, pause, resume, and delete, as needed. Synchronous block and file replication to other physical Dell EMC Unity systems is also supported for physical deployments of Dell EMC Unity. Under the Protection & Mobility category on the Interfaces page, users can configure replication interfaces for replication data paths. Once the replication interfaces are configured, users can subsequently go to the Connections tab on the Replication page to configure a system-to-system replication connection, which is required to configure replication sessions for storage resources.

In Dell EMC Unity OE versions 5.1 and later, Source, Destination, and All filtering buttons on the replication sessions page and various storage resource pages help the user easily identify replication source and destination resources/sessions without adding columns to the view. When All is selected, all resources/sessions on the current page are displayed. When Source is selected on a resource page, all resources that are the source of a replication session are displayed. Resources that are not replicated are also shown when Source is selected. When Source is selected on the replication sessions page, only replication session originating on the system are shown. When Destination is selected on a resource page, only resources that are the destination images of a replication session are shown. While on the sessions page, Destination will only show the sessions replicating to the current system. Also, sessions that are part of local replication are displayed regardless of which view is selected. Figure 25 shows the Source, Destination, and All filtering buttons.

Figure 25   Replication Page

In Dell EMC OE version 5.1 and later asynchronous replication traffic can be throttled to reduce the rate at which data is replicated to a destination system. Asynchronous replication throttling is configured at the replication connection level, which allows each remote system connection to be controlled independently of each other. Also, only outbound replication traffic to a remote system is throttled. This not only allows different throttles to and from a remote system over the replication connections, but also allows replication traffic to be throttled from a system running OE 5.1 and later to a system running an earlier release. The Schedule Time Zone option can also be set to correct asynchronous replication bandwidth throttling timing issues due to seasonal time changes in certain regions of the world.

For non-native replication technologies (i.e. replication service from standalone devices), RecoverPoint is supported on Dell EMC Unity systems for block resources. For more information about available replication technologies and replication operations, reference the *Dell EMC Unity: Replication Technologies* white paper on Dell EMC Online Support.

With the Dell EMC Unity OE version 4.4 or later, the Dell EMC Unity NAS Servers and its file resources can be synchronously replicated between two physical Dell EMC Unity systems, as shown in the properties page for a NAS Server in Figure 26. Synchronously replicated file resources can also be asynchronously replicated to a 3rd-site for backup purposes. For more details for native Synchronous file replication, also known as MetroSync for Dell EMC Unity, reference the *Dell EMC Unity: MetroSync* white paper on Dell EMC Online Support.

Figure 26   NAS Server Properties – Replication tab

4.13   Protection and Mobility Interfaces

Users can create interfaces that can be used for Import and Replication sessions from the Interfaces page. Protection and Mobility interfaces can be shared between replication and import sessions. If an interface is

shared between replication and import, the user must pause the session and then remove all import sessions to change the interface and remove both replication and import sessions before deleting all interfaces. A user can create, edit and delete interfaces from the Interfaces page in Unisphere as shown in Figure 27.

Figure 27   Create Interfaces Page

4.14   Import

The Import page allows the user to import VNX1/VNX2 Block and File resources to Dell EMC Unity. The Import page, as shown in Figure 28, gives the user the workflow needed to setup an import session including setting up interfaces, system connections, and finally configuring import sessions. With existing import sessions, the user can apply different actions including Pause, Resume, Cutover, Cancel, Commit and Download a Summary Report. In the Connections tab, the user can setup a system connection, Discover Import Objects, and Verify and Update a system connection as needed. After the prerequisites are met, the Create Import Session Wizard guides the user through the configuration needed to start importing storage resources to Dell EMC Unity. For more information, review the *Dell EMC Unity: Migration Technologies* white paper on Dell EMC Online Support.

Figure 28   Import Page

Dell EMC Unity version OE 4.4 or later includes SAN Copy Pull as a part of the code. SAN Copy Pull is a migration tool which migrates data from block storage resources, either standalone LUNs/Volume or VMFS Datastores, found on supported systems to Dell EMC Unity. All the configuration, creation, and management

of SAN Copy Pull sessions is only available through UEMCLI or REST API. For more information, review the *Dell EMC Unity: Migration Technologies* white paper on Dell EMC Online Support.

4.15 Alerts

The Alerts page, as shown in Figure 29, displays all system-generated alerts along with associated message information. Alerts are usually events that require attention from the user in some manner. Some alerts indicate that there is a problem or issue with the system, while others provide specific information, depending on the system status. For example, an alert might indicate that a drive has faulted, or a specific pool is out of space, which means some type of action would be needed to remedy the event. Alerts provide the user with information about the source of an event, the symptoms and cause, and actions to resolve it. Sometimes they include a Knowledge Base (KB) article link. If an alert is known or no longer relevant to the environment, the Alerts page provides a way to acknowledge alerts for book-keeping purposes as well as the ability to delete alerts as needed. Users can also configure Unisphere to send alert notifications to a specified email or SNMP trap using the Settings menu.

With Dell EMC Unity OE 5.0, all Alerts are assigned an alert State. The alert State can be used to determine which alerts are current, and which has been resolved. There are four States for alerts:

Updating: The current State of the alert is being updated (this State only can be seen when upgrading to OE 5.0 or later).

Inactive: The alert condition has been resolved.

Active_Auto: The alert is still Active and will be marked Inactive automatically once the condition is cleared.

Active_Manual: The alert is still Active, and a user will need to deactivate the alert to mark the alert Inactive once the condition is investigated or cleared.
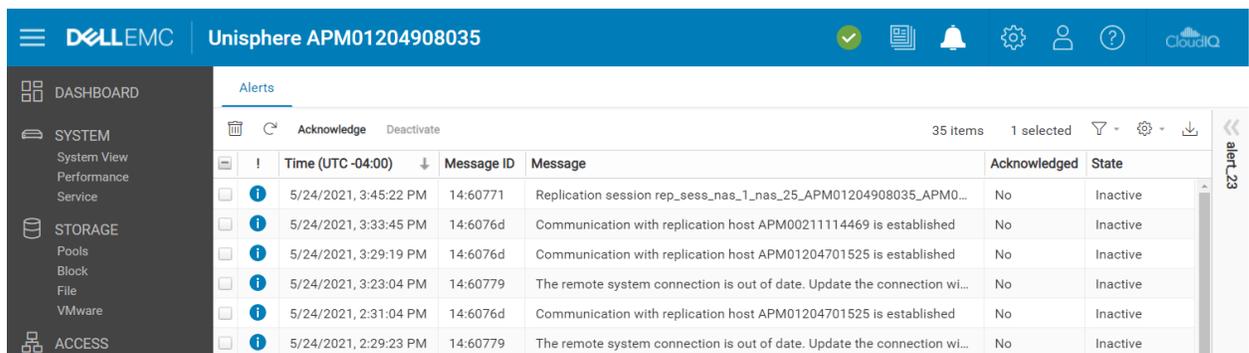
Figure 29   Alerts Page

Each alert is associated with a severity level; definitions are shown below in Table 4:

Table 4   Alert Severity Levels

Icon	Label	Indicates
ℹ	Information	An event has occurred that does not impact system functions. No action is required.
⚠	Warning	An error has occurred that you should be aware of, but it does not have a significant impact on the system. For example, a component is working, but its performance may not be optimal.

Icon	Label	Indicates
◆	Error	An error has occurred that has a minor impact on the system and should be remedied, but it does not have to be fixed immediately. For example, a component is failing and some or all its functions may be degraded or not working.
✖	Critical	An error has occurred that has a significant impact on the system, and it should be remedied immediately. For example, a component is missing or has failed, and recovery may not be possible.

4.16   Jobs

As task operations are run on the system, the system records the operations through the Jobs page in Unisphere, Figure 30 shows the Jobs page in Unisphere with all the entries. Most operations for storage systems are automatically run as background jobs, allowing users to start other tasks without waiting for a certain job to complete first. At any given point, users can view the full list of running, queued, completed, or failed jobs from the Jobs page. To get more information about a job, users can select the job and click the details icon to see related tasks/descriptions for the specific job. Unisphere also provides users the ability to cancel running jobs as needed. Note that this only stops subsequent related job tasks from running and does not revert the jobs that have already completed. Job listings can be deleted from the list, so they are no longer shown. Deleting a job from the list does not revert the actions that were completed.
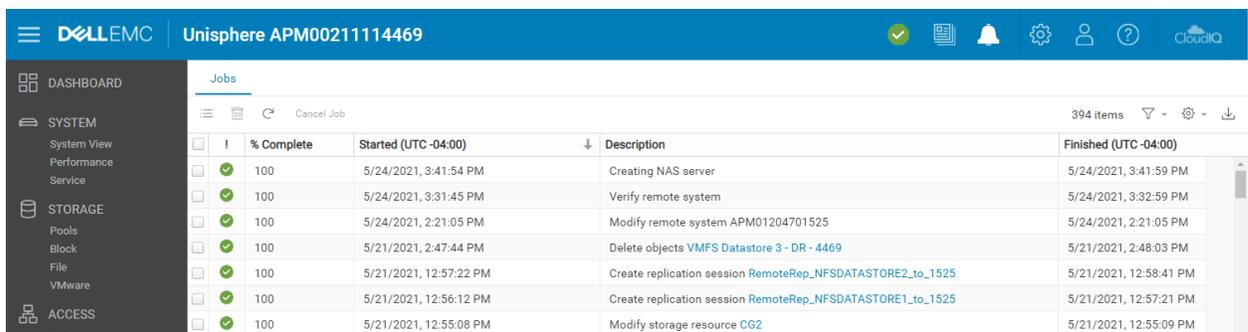
Figure 30   Jobs Page

4.17   Logs

The Logs page, as displayed in Figure 31, has an aggregated listing of all the logs of the system since it has been powered on. Logs report and monitor on different system events. All the events are collected and written to the log. Also, a user can configure the system to send log information to a remote host. A user must specify the network address of a host that will receive the log information. The remote host must be accessible from the storage system, and security for the log information must be provided through network access controls or the system security at the remote host. A port protocol must be specified to transfer log information, which is either UDP or TCP. In the Logs page, there is information provided for each event:

- Severity level indicated by an icon
- Date and time the event occurred
- Source of the event software component that recorded the event
- User who created the event
- Event ID that is a unique identifier for each type of event
- Source Storage Processor

- Log category
- Message text that describes the event

Figure 31   Logs

4.18   Support

The Support page, as shown in Figure 32, provides links to resources for learning about and getting assistance with the user's storage system. Options include watching how-to videos, accessing online training modules, downloading the latest product software, searching and participating in the online community, and much more. If a Dell EMC support account is configured on the system, the links automatically advance users to the corresponding page, instead of having to input support credentials each time. Users can also use the Support page to open service requests, start a chat session with live Dell EMC Support personnel, or even go to an ordering page to order replacement parts through the Dell EMC store for faulted components.

In addition, the Dell EMC Community Network website includes product-specific communities that include relevant discussions, links to documentation and videos, events, and more. The community not only provides the user more information about the products, but also guides users through specific issues they might be experiencing.

Figure 32   Support Page

4.19   Additional System Status Messages/Settings

With the Dell EMC Unity OE version 4.3 release or later, the system displays the current system name in the top menu bar and in the browser tab as the page name, as shown in Figure 33. This helps to easily identify at a quick glance the system which is being currently managed.

Figure 33   System Name

There are additional status messages and settings in the top right of the GUI, as shown in Figure 34. Each of these icons provide different information to the administrator of the system and are always available. Below is more information about each icon.

Figure 34   Additional System Statuses/Settings

4.19.1   System State

The first icon available in the top menu bar, as shown in Figure 35, shows the overall state of the system (i.e. OK, Warning, Error, or Critical). When clicked, the icon shows some high-level important system information like the current software version and system time. A link to view system details is also available in the window, which leads to the System View page when clicked.
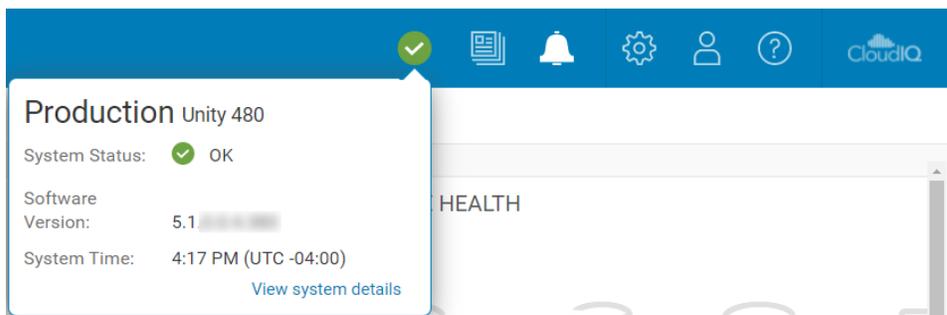
Figure 35   System Status

4.19.2   Running Jobs

As jobs are started on the system, users may want to check on the status of their running jobs without having to navigate to the Jobs page. This can be done by clicking on the Jobs icon, as shown in Figure 36, which shows all active jobs and their current percentage completed.
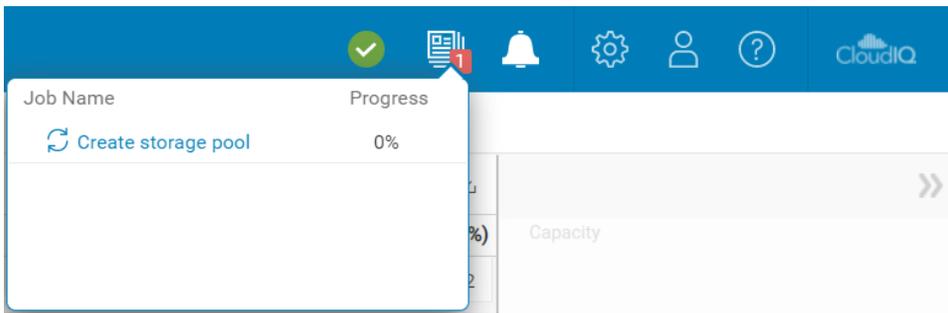
Figure 36   Active Jobs

4.19.3   Quick Access Alerts

Unisphere provides users a way to quickly see recent alerts on the system through the Alerts icon in the top menu bar, as shown in Figure 37. A link in the dialog leads to the Alerts page, which lists all alerts associated with the storage system. Here, users can get additional details about the alerts and information about how to remedy the associated issues.
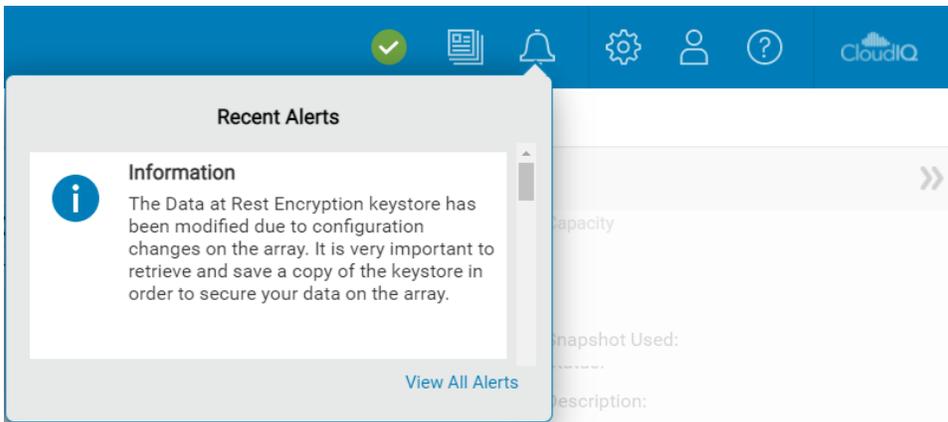
Figure 37   Recent Alerts

4.19.4   System Settings

The gear icon in the top menu bar leads to the Settings menu when clicked. The Settings menu, as shown in Figure 38, allows administrators to set/configure many settings that are important to the system, but are less frequently used. The menu includes the ability to upgrade system software, configure support credentials, configure user directory services for Unisphere management, and install system licenses. Table 5 shows all available settings in the Settings menu. There is a link at the bottom of the menu that reopens the Initial Configuration Wizard if a user had accidentally closed the wizard during initial deployment or wants to run through the wizard again.
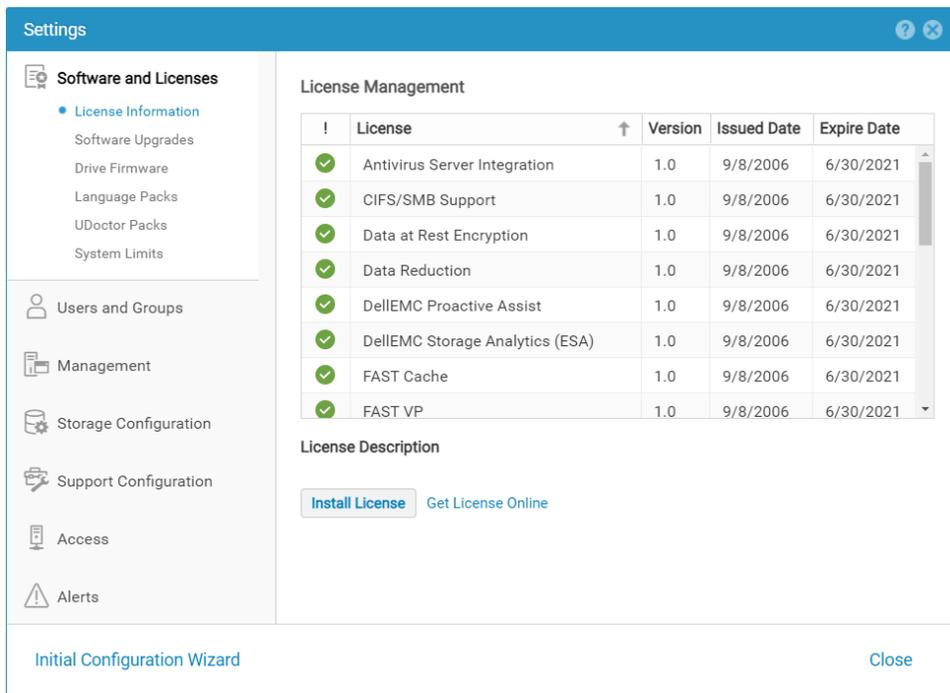
Figure 38   Settings Menu

Table 5   Settings Menu Options

Categories	Settings	General Description
Software and Licenses	License Information, Software Updates, Drive Firmware, Language Packs, UDoctor Packs, System Limits	Update system software/firmware, install licenses, install language packs and view system limits
Users and Groups	User Management, Directory Services	Create, modify, delete user accounts for system management access and configure LDAP server(s)
Management	System Time and NTP, Schedule Time Zone, DNS Server, Unisphere Central, Unisphere IPs, Remote Logging, Failback Policy, Performance, Encryption	Configure various system related settings
Storage Configuration	For Hybrid Systems: FAST Cache, FAST Cache Drives, FAST VP, Drives For All Flash Systems: Drives	Configure FAST technology related settings and view unconfigured drives
Support Configuration	Proxy Server, Dell EMC Support Credentials, Contact Information, EMC Secure Remote Services, CloudIQ	Add Dell EMC Support account information, add contact information and configure ESRS/CloudIQ
Access	CHAP, Ethernet, High Availability, Fibre Channel, Routing, VLANS, iSNS Configuration	Configure additional security for login (iSCSI), view IO port status/information, view MTU and speed, configure link aggregation, view/edit configured network routes, view Fibre Channel ports, and enable iSNS

Categories	Settings	General Description
Alerts	General, Email and SMTP, SNMP	Add emails or SNMP trap destinations to send system alerts to, change language preferences, and enable threshold alerts

4.19.5 LDAP Enhancements

With Dell EMC Unity OE version 4.4 or later, when configuring the Directory Services under Users and Groups, as shown in the figure below, the user can select the **Auto Discover** checkbox to automatically lookup the LDAP servers through the DNS. Additionally, the system can have multiple LDAP servers configured and supports Forest Level Authentication. With Forest Level Authentication, the system can authenticate LDAP users at the forest level of the domain. For example, if a domain has finance.dell.com and eng.dell.com as trees, by providing in the Domain Name dell.com and specifying port 3268 for LDAP or port 3269 for LDAP Secure (LDAPS) the users under both trees can authenticate. For more information about how to configure LDAP and LDAPS, reference the *Dell EMC Unity Security Configuration Guide* on Dell EMC Online Support.
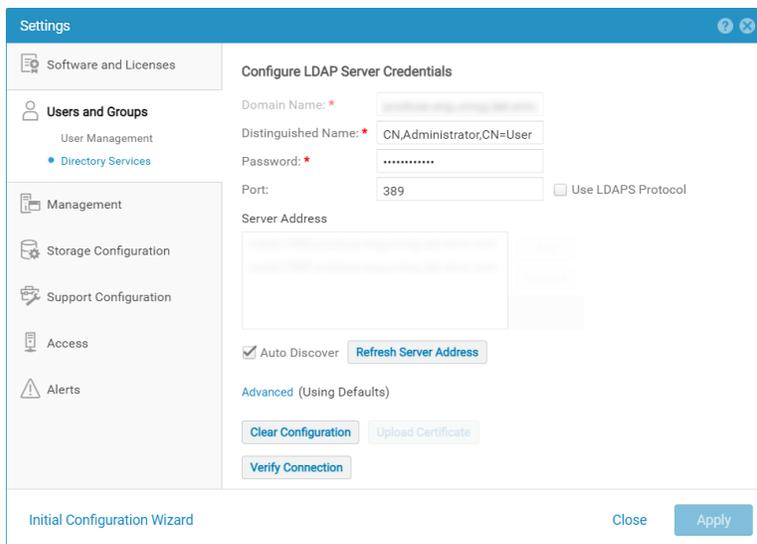
Figure 39   Directory Services – LDAP configuration

4.19.6 Logged in User Options

The user icon next to the Settings menu, as shown in Figure 40, includes various options, including changing user language preferences, changing the password of the logged in user, as well as a log out option.
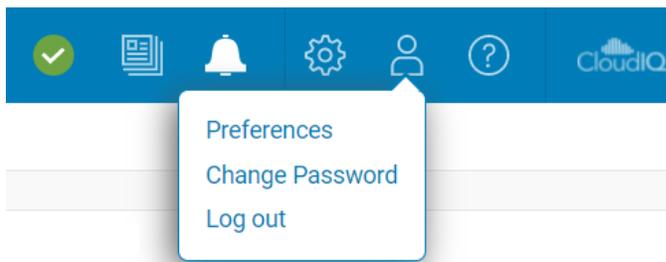
Figure 40   Additional User Options

4.19.7   Unisphere Online Help

The next icon available in the top menu bar is the Unisphere provides context-sensitive help, as shown in Figure 41. The options for the corresponding dialog dynamically change based on the current page/wizard in Unisphere. For example, if the user is on the Dashboard page, the online help icon displays an option to go directly to Online Help for the Dashboard page, as shown in Figure 42. This helps users find the exact information they need when trying to learn more about the system, instead of having to search through the various pages in the Online Help.
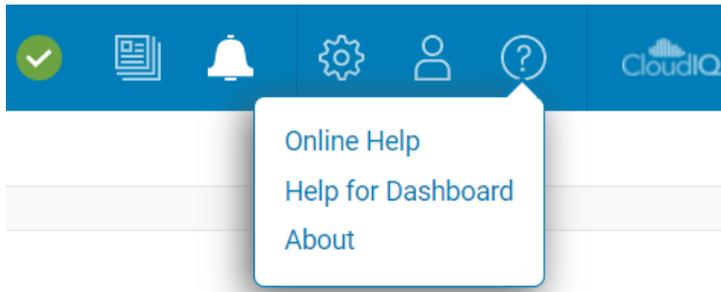
Figure 41   Unisphere Online Help Options
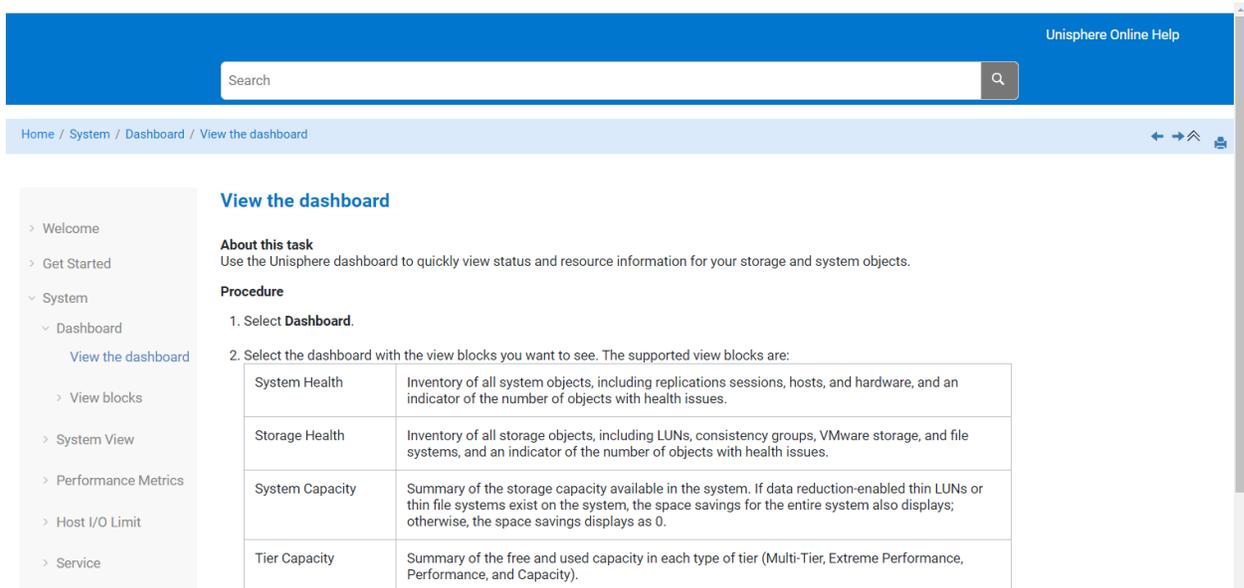
Figure 42   Unisphere Online Help

4.19.8   Launch CloudIQ

With Dell EMC Unity OE version 4.1, the CloudIQ icon was added in the far top right corner of Unisphere. Clicking this icon launches the CloudIQ GUI (http://cloudiq.dell.com). Note that in order to see the system in CloudIQ, a user must set up ESRS and allow data to be sent to CloudIQ from the Settings page, as shown in Figure 43.

D&LL Technologies
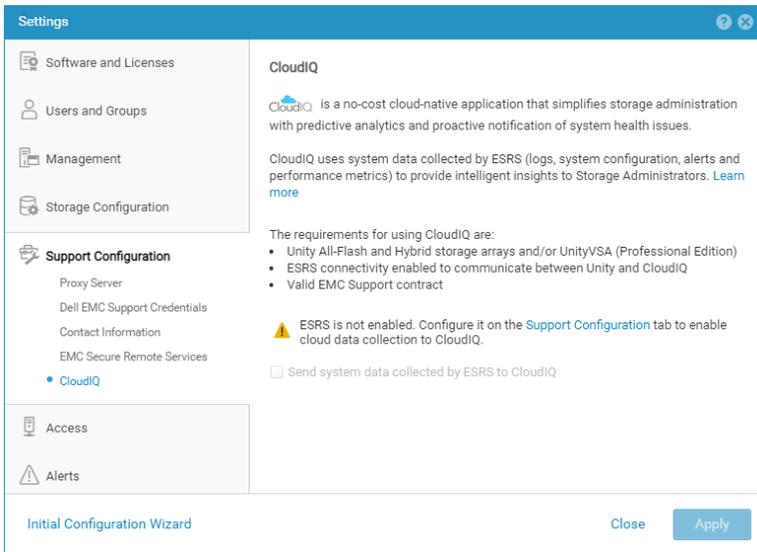
Figure 43   CloudIQ Configuration

5 Unisphere CLI

For most IT generalists, managing Dell EMC Unity systems through the Unisphere GUI interface is comprehensive enough to use for their daily administrative tasks. For more advanced users, who create scripts for automated routine tasks or enjoy using command-line interfaces, the Unisphere CLI can be used. The Unisphere CLI can be used for the same tasks that can be done in Unisphere, such as configuring and managing storage resources, protecting data, managing users, viewing performance metrics, and other similar tasks.

With the release of Dell EMC Unity OE version 4.3, CLI will now accept references to all objects by their friendly name in addition to their ID. This improves usability and allows for easier scripting and management of multiple or net-new systems. To use the Unisphere CLI, users can install the Unisphere CLI on their host and run CLI commands to their Dell EMC Unity system from the native command prompt.

For more information about using the Unisphere CLI, refer to the *Unisphere Command Line Interface User Guide* on Dell EMC Online Support.

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6 REST API

The REST API is an application programming interface that utilizes familiar HTTP operations like GET, POST, and DELETE. The REST architecture includes certain constraints that ensure that different implementations of REST conform to the same guiding principles, thereby allowing developers the ease of application development when working with different REST API deployments. REST APIs have become more popular and more widely used in datacenters where administrators are looking to standardize their management needs across all their appliances, regardless of vendor.

The Dell EMC Unity platform includes full REST API support, which provides another way to manage Dell EMC Unity systems and automate various tasks. Dell EMC Unity's REST API is fully functional such that all management tasks that a user can perform in the Unisphere GUI, can also be performed using the REST API. Dell EMC Unity's REST API formats all communication in JSON notation. Users can send REST API requests using their favorite scripting languages, like Perl and PHP, to manage Dell EMC Unity systems in their environment. This provides flexibility in management and opens possibilities for more complex operations.

Once a system is up and running, users can navigate to the following web addresses to get access to the REST API documentation:

REST API Programmer's Guide – https://<Management_IP>/apidocs/programmers-guide/index.html

REST API Reference Guide – https://<Management_IP>/apidocs/index.html

<Management_IP> is the management IP of your system

Here is some more information about the two documents available for the REST API:

The Unisphere Management REST API Programmer's Guide introduces the user to REST API and displays some high-level examples of using the API. Besides being available on the system, this guide is also available from the Info Hub referenced in the Dell EMC Community Forum for Dell EMC Unity.

The Unisphere Management REST API Reference Guide describes all available REST API resource types, attributes, and operations.

For more information about using REST API for Dell EMC Unity systems or to ask questions about it, visit the Developer section of the Dell EMC Community Forum for Dell EMC Unity.

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7 Conclusion

Unisphere manifests the core design goal of the Dell EMC Unity Family of simplifying storage management. Utilizing the modern HTML5 architecture and an easy-to-navigate user interface, Unisphere ensures a quality experience for storage administrators, while leveraging best practices for their storage management needs. Even for IT generalists with little storage-specific experience, Unisphere provides an intuitive interface to easily get the job done without requiring extensive specialized knowledge. From the simple provisioning of block LUNs to using advanced features like local and remote replication, Unisphere is a powerful and easy-to-use tool that enables users to fully use the Dell EMC Unity storage system's potential.

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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 references 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: Performance Metrics
- Dell EMC Unity: Snapshots and Thin Clones
- Dell EMC Unity: Operating Environment (OE) Overview
- Dell EMC Unity: Replication Technologies
- 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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