



DELL EMC VMAX UNISPHERE 360

ABSTRACT

Using Unisphere 360 to consolidate the management of VMAX storage system offers many benefits. This management interface offers a single interface where all enrolled Unisphere instances can be monitored and managed.

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EXECUTIVE SUMMARY

Modern enterprise data centers are focused on maximizing existing resources to do more with less. Even with this focus, many storage administrators are still finding themselves managing an extensive conglomerate of storage arrays spread across multiple data centers. Management of this vast storage infrastructure with traditional storage management tools focused on single array or small groups can be very complex and pose challenges. There is a clear need for a tool that provides storage administrators an on premises management solution offering a single view across VMAX storage systems. Developed using HTML5, Unisphere 360 has been designed specifically for the purpose of fulfilling this need when managing multiple data centers with Dell EMC VMAX storage arrays.

AUDIENCE

This white paper is intended for:

- Customers who manage IT, storage architects and administrators involved in the everyday operations and decisions related to data storage management
- Dell EMC staff and partners to assist in content development and understanding of Unisphere 360

UNISPHERE 360

Developed using HTML5 providing the capability to access from any device including tablets and mobile devices delivering instant access to your datacenter. Unisphere 360 consolidates and simplifies management for EMC VMAX storage arrays. Managing a data center with multiple storage systems can be a large scale project on its own. Although Unisphere for VMAX does allow multiple arrays to be managed from the same instance, there is a limit to the maximum number of devices as well as the maximum number of arrays. Prior to Unisphere 360 EMC did not offer an application or tool in that centralizes the management of a large footprint of VMAX arrays into a single user interface. Unisphere 360 does this, supporting up to 200 systems covering VMAX All Flash, VMAX3 and VMAX. Users now have a single window view with access to all Dell EMC VMAX storage arrays where they can manage, monitor and plan at the array level or for the entire data center.

When managing Dell EMC VMAX storage with Unisphere 360 each qualified and enrolled array will be displayed in a separate panel view. Each array panel view will provide the following key metrics, compliance data, and performance health score, capacity health score, IOPS and throughput. The array panels can be sorted by any of the key metrics and will be a direct link to that actual instance of Unisphere for further management and detail.

ENVIRONMENT AND SYSTEM REQUIREMENTS

NETWORK REQUIREMENTS

Ensure the host is in a properly configured IP network and that it can resolve IP addresses and host names (IPV4 and IPV6 are supported).

SUPPORTED MANAGEMENT APPLICATIONS

- Unisphere 8.0 and later
 - 8.2 or later is required for full functionality

SUPPORTED STORAGE PLATFORMS

- Symmetrix VMAX Family (10K, 20K, 40K)
- VMAX3 Family (100K, 200K, 400K)
- VMAX All Flash (250F, 450F, 850F)

Table 1. Client Browser requirements

Browser	Version	Memory	Platform
Internet Explorer	11	600MB	Windows
Firefox	30 or higher		
Chrome	21.0.1180 or higher		
Memory is required for the browser as it runs on the machine from which the console is launched Chrome is not supported in embedded NAS (eNAS) environments			

For the installed browser the following additional software is required:

- Flash player 11.2 (only required for link and launch capability)

Table 2. Server requirements

Operating system	Minimum processor specification	Minimum available memory space	Minimum available disk space
Windows	2 core 1.8 GHz Processor	16GB	240GB
Linux			
It is not recommended to overprovision the CPU or the memory. The resources should be allocated to a dedicated VM for Unisphere 360.			

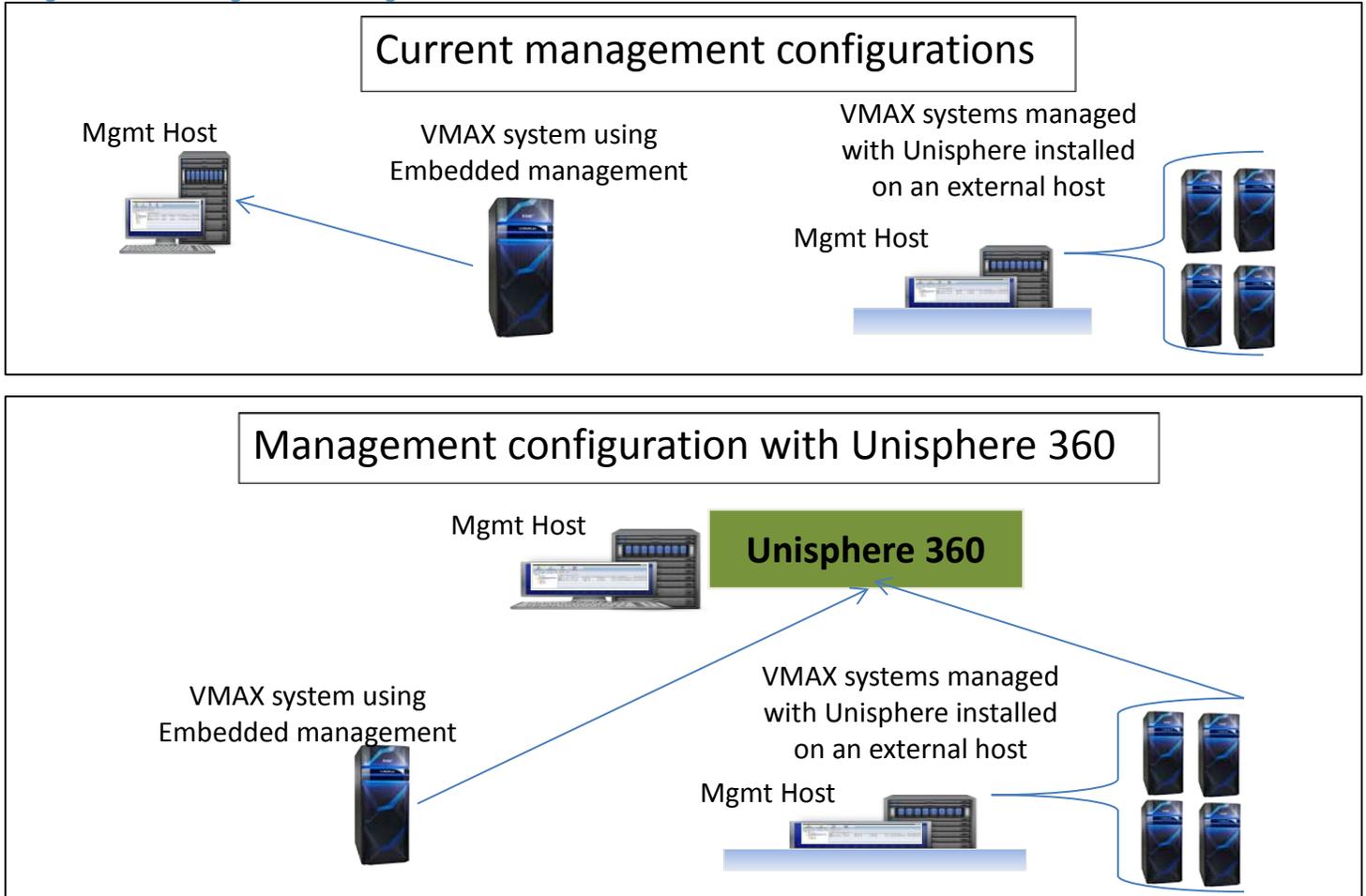
MANAGEMENT CONFIGURATIONS

The standard and most typical deployment of Unisphere is on an external host zoned to a VMAX system on the customer network. Management applications such as Unisphere for VMAX and Solutions Enabler installed on the host/s are used to manage the storage system. VMAX management can also be done using embedded management, a feature that embeds Unisphere locally on the system (VMAX3 Q3 2015 SR and later), reducing the management host footprint. The only component needed is a host console or desktop on the same network as the VMAX storage system. In both scenarios described here and others, a common challenge is presented, managing multiple Unisphere instances. The graphic below is a simple representation of a data center with the basic management application deployments.

- A single Management host connected to multiple VMAX arrays.
- A single VMAX utilizing embedded management

All the Unisphere instances enrolled are propagated to Unisphere 360 providing a single management interface for multiple Unisphere instances. Storage Admins and users now have the ability to not only manage individual VMAX storage arrays, but also view an aggregate of all of their VMAX storage in the data center.

Figure 1. Management configurations



UNISPHERE 360 BASIC OPERATIONS AND FUNCTIONS

This application provides the storage administrator and users with a holistic view of the data center as well as individual array views. Each view delivers topical information as well as the ability to perform basics functions.

ENROLLMENT

The process to enroll a Unisphere instance in to Unisphere 360 has been simplified. An enrollment wizard simplifies this action and guides the user through a few steps. Adding the host name or IP address, importing and verifying the security certificates, there is an additional option to tag the system with a specified label

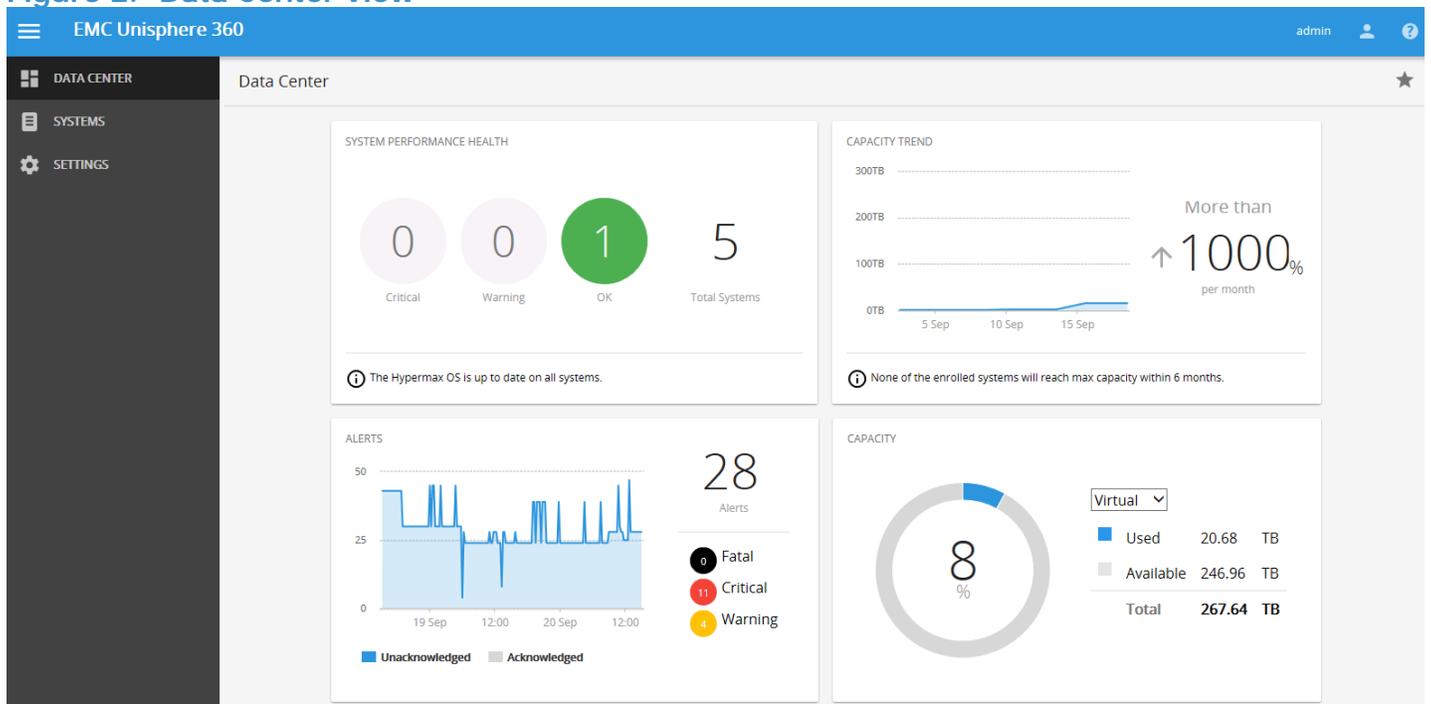
- **SECURITY CERTIFICATE IMPORTING** - Each individual Unisphere instance has layers of security tied to the user log in credentials. The security certificates need to be imported into Unisphere in order for the link and launch function to work. The import of the certificates is included in the enrollment process and verified.
- **SYSTEM TAGGING** - The ability to include multiple Unisphere instances from various locations or regions presented in a way to label each system with a shared identifier. System tagging delivers on this need by giving the user to create custom tags. The ability to add tags can be done during the enrollment process or in any of the views where tagging is available.

DATA CENTER VIEW

The Data Center view is the primary landing page. The display offers a four tile layout delivering information at the data center level. The information provided covers system health, data center capacity trend, alerts and capacity.

- **SYSTEM HEALTH** - The upper left tile displays the total number of systems enrolled and their status. There are three categories to determine status; Critical, Warning, and OK. The status display shows how many systems are in the respected state. The image below shows that one system is in a critical state. To drill down and see more detail regarding the state and what system is reporting it, navigate to the Systems view, discussed later in this document.
- **CAPACITY TREND** - The upper right tile displays the overall capacity trend of the data center as related to the enrolled VMAX systems.
- **ALERTS** - The lower left tile displays the alerts that have posted for the enrolled systems.
- **CAPACITY** - The lower right tile provides an overall view of the capacity within the data center. This applies to both virtual capacity and physical capacity.

Figure 2. Data Center view



SYSTEM HEALTH VIEW

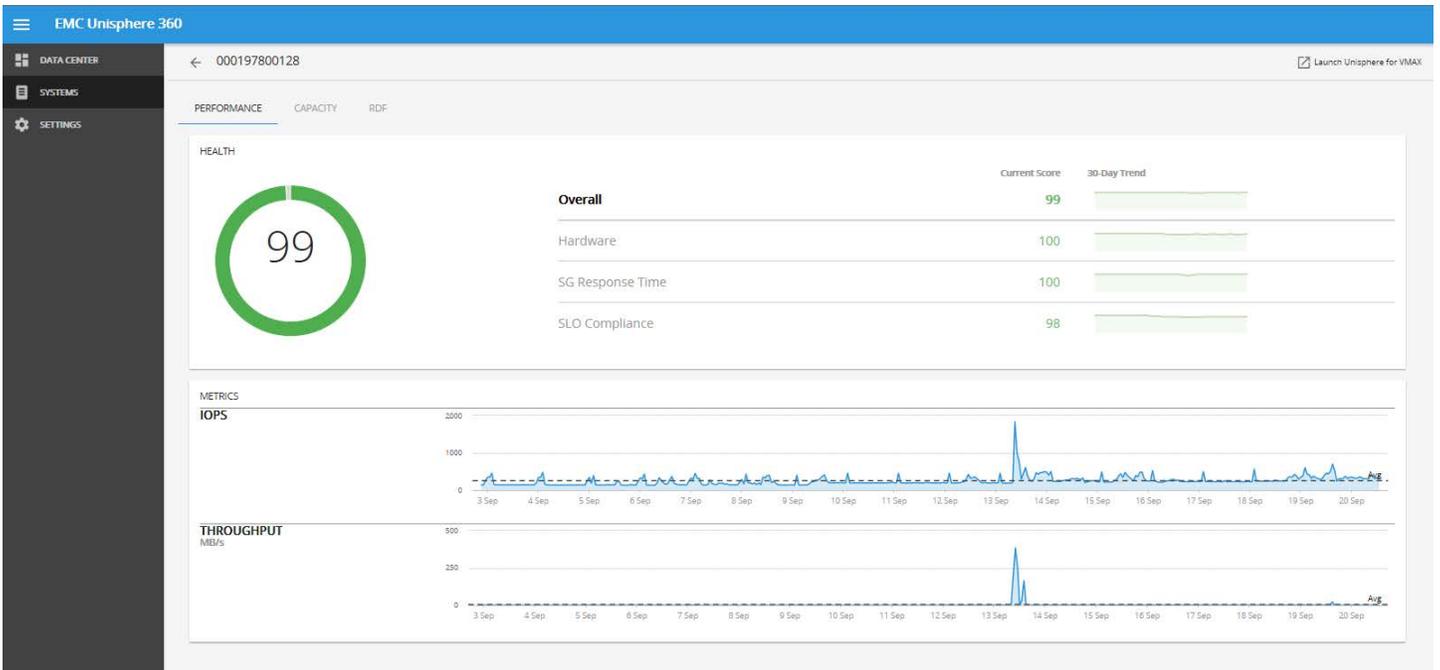
The system view delivers information on an individual array level. This display is available in list or tab format. When selecting an individual system for more detail, the system details view is displayed. This offers a view of comprehensive data for the selected system providing a score on the following metrics:

- **Overall system health** – provides overall system status
- **Component health** – provides hardware component status
- **Service level compliance** – provides compliance status for all related service levels
- **IOPS** – total system I/O per second
- **Throughput** – total system throughput in MB/s

Performance Sub Tab

Displays IOPS, throughput, overall health score for SLO compliance, storage group response times and hardware components.

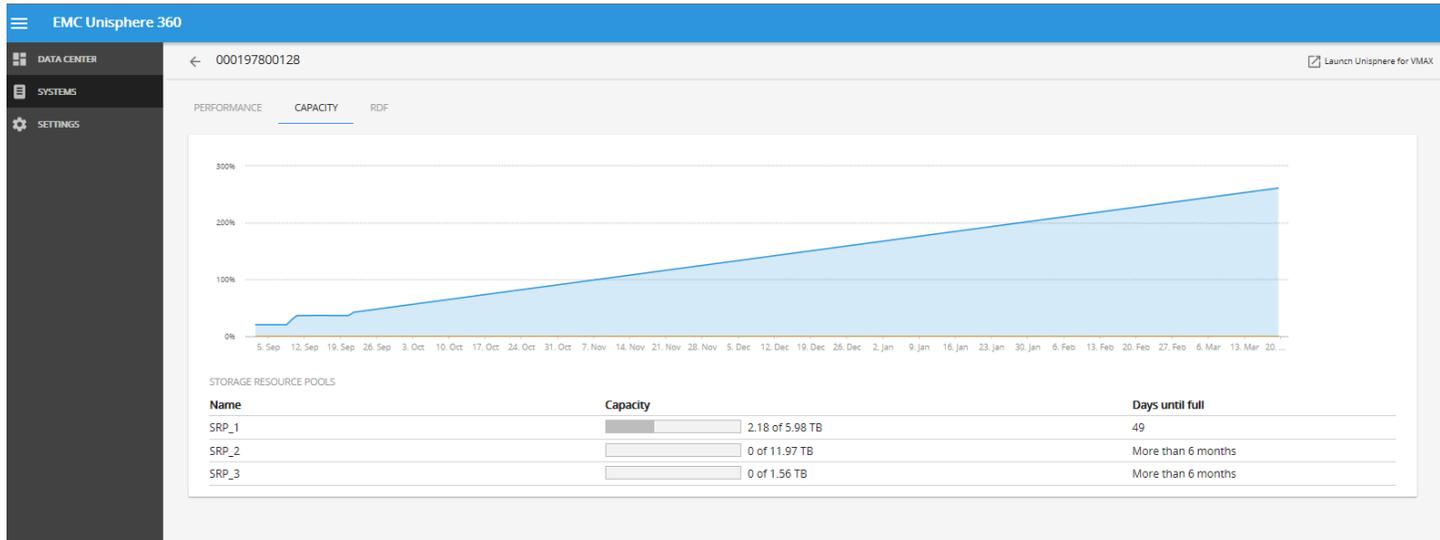
Figure 3. Systems view (performance sub tab)



Capacity Sub Tab

Displays trend charts and tables allowing the ability to track capacity usage monitor trends and plan capacity management.

Figure 4. Systems view (capacity sub tab)



The score associated with each metric is calculated using specific performance metrics (see tables 3 and 4 below). System details view delivers performance and capacity information in separate tabs.

Health scores are calculated using a number of performance metrics. The statistics are collected every 15 minutes and are kept for 48 hours. Health scores are calculated using storage group response times and service level compliance (VMAX3 only). Listed below are key performance metrics that are also used to calculate the software health score and the health score for the hardware components. (see table 1 and table 2 below for key performance indicators used).

The Health Score is calculated as follows:

- Individual instance health scores are based on one metric.
- If there is a critical alert for that instance on that metric, the health score immediately drops to 0.
- If there is a warning alert for that instance on that metric, the health score drops to 50.
- Otherwise, (for metrics where higher/lower is bad) we calculate the amount of time the metric was above/below the critical threshold and also how long it was between thresholds. Then we deduct from 100 the percentage of time the metric was above/below the critical threshold (with a multiplier of 1), and also the percentage of time it was between thresholds with a multiplier of 0.5.

Table 3. Hardware health score metrics

Hardware Health Score	
Category	Metrics
FE Ports	% Busy
FE Directors	% Busy
FE Directors	% Queue Depth Utilization
BE Ports	% Busy
BE Directors	% Busy
RDF Ports	% Busy
RDF Directors	% Busy
DX Ports	% Busy
DX Directors	% Busy
IM Directors	% Busy
EDS Directos	% Busy
Boards	Utilization
Cache / Cache Partitions	% WP Utilization
Disk / Disk Groups	% Busy

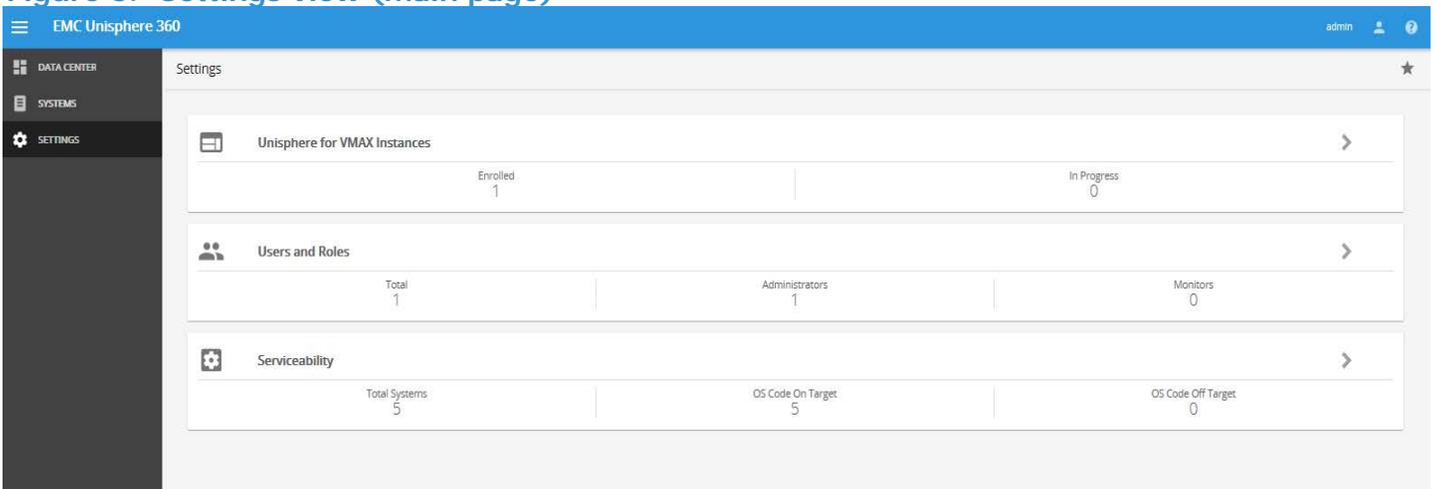
Table 4. Software health score metrics

Software Health score	
Category	Metrics
Storage Groups	Overall response time (ms)
Storage Groups	Read response time (ms)
Storage Groups	Write response time (ms)
Databases	Overall response time (ms)
Databases	Read response time (ms)
Databases	Write response time (ms)

SETTINGS

The settings section is only visible to users with administrator log in credentials. It is used to manage functions such as enrolling or removing systems, adding or removing users and changing user roles. There are three sub sections: Unisphere instances, Users and Roles and Serviceability. Each of the sub sections within the Settings main page can be opened to view more detail and perform actions as needed. The Unisphere for VMAX instances provides a count of enrolled systems. When opening the Unisphere for VMAX instances section users (admin role only) can enroll or remove systems. The User and Roles function is used to manage the users and their assigned login role. The serviceability section displays code level information of all enrolled systems. The display includes current running code and its relation to the current target code.

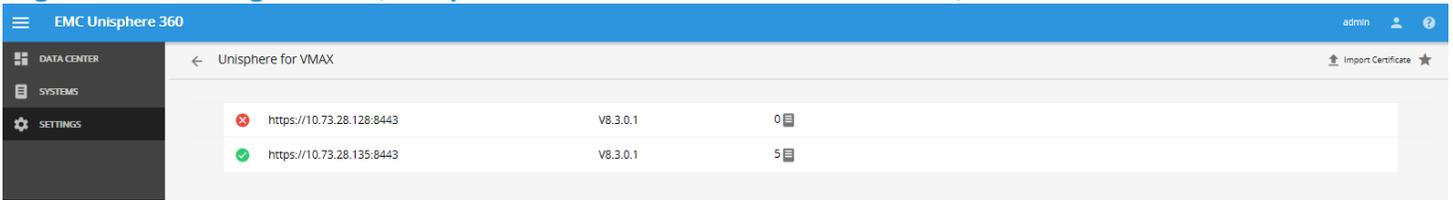
Figure 5. Settings view (main page)



Unisphere for VMAX instances

Lists all enrolled systems and provides the user the option to enroll additional systems or remove existing systems.

Figure 6. Settings view (Unisphere for Vmax instances window)



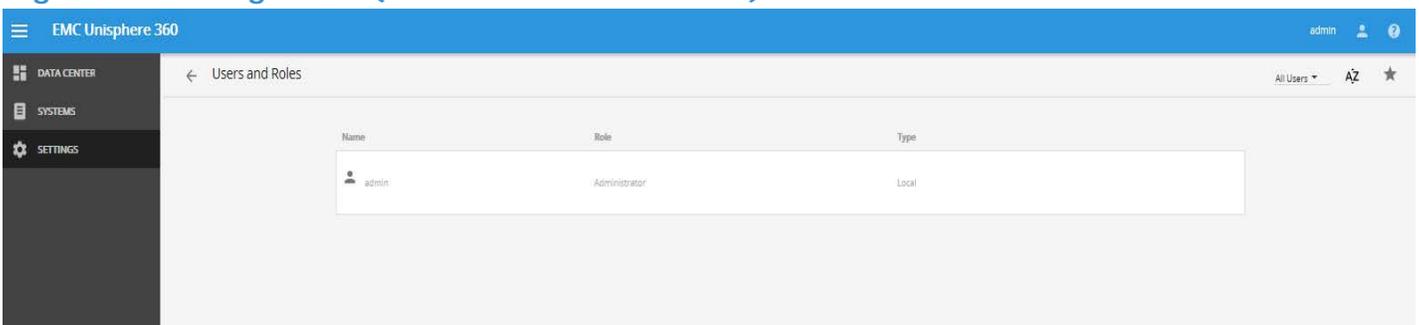
Users and Roles

Lists all users and their assigned roles. There are two user roles, Administrator and Monitor. A filter option is available to refine the displayed list by assigned role.

Table 5. User and Role functions

Role	Full management	Add/remove users	Add/remove systems	Link and launch
Administrator	Yes	Yes	Yes	Yes
Monitor	No	No	No	Yes

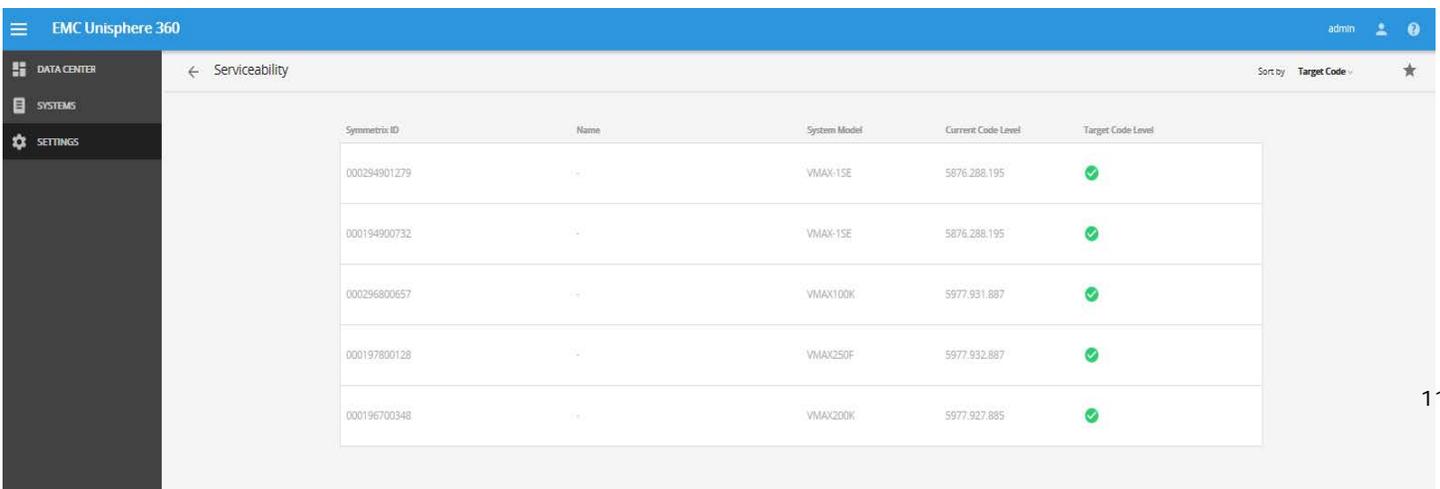
Figure 7. Settings view (Users and Roles window)



Serviceability

This view shows all enrolled systems displaying the running code, systems not running on current target code will be marked with a red X icon. For VMAX All Flash and VMAX3 arrays this will be relative to Dell EMC HYPERMAX OS for all previous VMAX generations this will refer to ENGINUITY CODE.

Figure 8. Settings view (serviceability window)



SUMMARY

Unisphere 360 is a new management application that allows users to consolidate the management of VMAX storage. The application provides the ability to view the entire VMAX footprint in a single window that provides helpful and important information. Not just a consolidated viewing window, Unisphere 360 does provide management functionality as well. The management functions are provided at both the individual system level as well as the datacenter level. Having the ability to set and track alerts and report on individual systems as well as the data center in one application allows Storage admins reduce the workload it takes to manage large scale data center environments.

REFERENCE DOCUMENTATION

EMC Unisphere 360 for VMAX Online Help

EMC Unisphere 360 for VMAX Installation Guide

EMC Unisphere 360 for VMAX Release Notes