

# Dell CloudIQ: A Detailed Review

## A Proactive Monitoring and Analytics Application for the Dell Environment

October 2023

H15691.9

### White Paper

#### Abstract

This white paper details Dell CloudIQ, the cloud-based AIOps proactive monitoring and predictive analytics application for Dell systems. It describes how it uses machine learning and other algorithms, notifications, and recommendations to help you optimize compute, storage, hypercovered infrastructure, data protection, and network health, performance, and capacity.

## Copyright

The information in this publication is provided as is. Dell Inc. makes no representations or warranties of any kind with respect to the information in this publication, and specifically disclaims implied warranties of merchantability or fitness for a particular purpose.

Use, copying, and distribution of any software described in this publication requires an applicable software license.

Copyright © 2016-2023 Dell Inc. or its subsidiaries. All Rights Reserved. Published in the USA [October 2023 H15691.9](#).

Dell Inc. believes the information in this document is accurate as of its publication date. The information is subject to change without notice.

# Contents

Executive summary .....	5
CloudIQ overview .....	10
Home page .....	19
Monitor .....	26
Manage .....	56
Optimize .....	60
Reports .....	62
Cybersecurity .....	69
Storage system details .....	75
Block object details .....	95
File object details .....	100
Storage Group Details (PowerMax/VMAX systems) .....	104
PowerStore appliance details .....	106
PowerScale node details .....	109
PowerScale quota details .....	110
Host details .....	111
Connectrix and PowerSwitch details .....	112
VxRail hyperconverged infrastructure systems details .....	126
Server details .....	130
Data protection details .....	139
Converged Systems details .....	149
VMware details .....	156
Custom Tags .....	159

Contents

<b>CloudIQ administration.....</b>	<b>164</b>
<b>Mobile application .....</b>	<b>178</b>
<b>Appendix A: Enabling CloudIQ at the system .....</b>	<b>181</b>
<b>Appendix B: CloudIQ security .....</b>	<b>188</b>
<b>Appendix C: Data collection frequencies and samples.....</b>	<b>190</b>
<b>Appendix D: Report Browser metrics .....</b>	<b>192</b>

## Executive summary

### Overview

With our busy daily lives, it is important to find easier and faster ways to manage IT infrastructure. With CloudIQ, Dell Technologies seeks to simplify the user experience when it comes to proactively monitoring and providing helpful insights about their Dell environment.

CloudIQ provides a single web-based for monitoring and analyzing Dell's broad portfolio of infrastructure systems which, according to user surveys, yields significant outcomes:

- 2x to 10x faster time to resolution of issues<sup>1</sup>
- 1 workday saved per week on average<sup>1</sup>

This white paper describes the CloudIQ features that are available in a consolidated user interface through any HTML5 browser. Users can also access CloudIQ on their iOS or Android mobile device.

As a Software-as-a-Service solution, CloudIQ delivers frequent, dynamic, nondisruptive content updates for the user. CloudIQ is built in a secure multitenant platform to ensure that each customer tenant is properly isolated and secure from other customers.

### Audience

This white paper is intended for Dell Technologies customers, partners, and employees who are interested in understanding CloudIQ features and how to monitor the following Dell systems:

- APEX Data Storage Services
- Connectrix
- PowerEdge
- PowerFlex
- PowerMax (including VMAX)
- PowerProtect Data Manager
- PowerProtect DD series appliances (including DDVE)
- PowerScale (including Isilon)
- PowerStore
- PowerSwitch
- PowerVault
- SC Series
- Unity XT family (including Dell Unity and Unity XT)
- VxBlock
- VxRail

---

<sup>1</sup> Based on a CloudIQ User Survey, conducted by Dell Technologies, May-June 2021

- XtremIO

Revisions

Date	Part number/ revision	Description
December 2016	—	Initial release
August 2017	—	Updated with additional functionality
June 2019	—	Updated with support for PowerMax/VMAX, SC Series, XtremIO, Connectrix, and VMware
June 2020	H15691	Updated with support for PowerStore, PowerScale, Isilon, PowerVault, and Converged Systems
November 2020	H15691.1	<ul style="list-style-type: none"> <li>• Updated to reference support.dell.com and cloudiq.dell.com</li> <li>• Updated with details on enabling Dell Trusted Advisors and Partners</li> <li>• Updated with Lifecycle Management for Converged Systems</li> </ul>
May 2021	H15691.2	<ul style="list-style-type: none"> <li>• Updated with support for PowerProtect DD and PowerProtect Data Manager</li> <li>• Updated with support for VxRail</li> <li>• Updated with support for custom tags and custom reports</li> </ul>
July 2021	H15691.3	<ul style="list-style-type: none"> <li>• Updated with support for APEX Offerings</li> <li>• Updated with Cybersecurity</li> </ul>
January 2022	H15691.4	<ul style="list-style-type: none"> <li>• Updated with support for PowerFlex, PowerEdge, and PowerSwitch</li> <li>• Updated with support for Webhooks</li> </ul>
January 2022	H15691.5	Updated template
July 2022	H15691.6	Updated with REST API Updated with Virtualization View Updated with VxRail multi-system update Updated with support for Secure Connect Gateway Updated with Cybersecurity support for PowerEdge and templates Updated with support for PowerProtect DD performance Updated with support for PowerSwitch performance Deprecated Hosts from Inventory tab Deprecated Metrics Browser Updated with Report Browser metrics per device type Updated with Connectrix Optics support Converted CloudIQ Advanced role to CloudIQ DevOps

Date	Part number/ revision	Description
January 2023	H15691.7	New navigation menu and consolidated multisystem views Dell Security Advisories in cybersecurity Component level tagging VMware support under Virtualization PowerStore appliance, volume group, and volume details PowerScale node and quota details Powered off VMs in Reclaimable Storage Performance Impacts for PowerScale Subscribed and physical capacity views for APEX Data Storage Services Performance forecasting for Unity Updated Connectivity View PowerProtect DD capacity forecasting and custom reports PowerProtect DD and PowerProtect DM system updates VxRail modified Inventory View and additional performance metrics
July 2023	H15691.8	Updated: <ul style="list-style-type: none"> <li>• Terminology table (CloudIQ Collector and SupportAssist definitions)</li> <li>• Connectrix and PowerSwitch details (Introduction section)</li> <li>• CloudIQ administration (Collectors section)</li> </ul>
October 2023	H15691.9	Port performance metrics for PowerSwitch Performance forecasting for Dell Unity XT and PowerEdge Anomaly charts in custom reporting Support for PowerFlex hosts and alerts PowerEdge maintenance and firmware update actions PowerEdge Dell Security Advisories Home Page customization Single sign-on for CloudIQ Carbon footprint analysis Service Requests VxBlock health score for storage Licenses and entitlements

### We value your feedback

Dell Technologies and the authors of this document welcome your feedback on this document. Contact the Dell Technologies team by [email](#).

**Author:** Derek Barboza

**Contributors:** Susan Sharpe, Frederic Meunier, David Hayward

---

**Note:** For links to other documentation for this topic, see the [Data Storage Essentials Info Hub](#).

---

## Terminology

The following table provides definitions for some of the terms that are used in this document.

**Table 1. Terminology**

Term	Definition
CloudIQ Collector	A small virtual machine distributed as a vApp that enables collection of VMware, Connectrix, and PowerSwitch. The Collector retrieves information from the target objects (vCenter or switches) and sends the collected data back to CloudIQ using Secure Connect Gateway. For VMware, the Collector communicates to vCenter using the VMware API and requires a user with read-only privileges. For Connectrix and PowerSwitch devices, the Collector communicates to the individual switches using REST API and uses a nonprivileged user. A single collector can be used for both VMware, Connectrix, and PowerSwitch.
Secure Remote Services	Legacy application that provided the remote connectivity that enabled Dell storage platforms, Dell Converged and Hyperconverged systems, and the CloudIQ Collector to connect to CloudIQ. Secure Remote Services allowed Dell to securely transfer files, such as logs and dumps, from the systems. There are two types of Secure Remote Services: <b>Integrated</b> and <b>Centralized</b> . Replaced with Secure Connect Gateway.
Integrated Secure Remote Services	Embedded in Unisphere for Unity XT family arrays. It is recommended for Unity XT customers who do not want to use a centralized gateway server. Secure Remote Services communication uses ports 443 and 8443 (HTTPS) and needs unrestricted access to the Global Access Servers (GAS).
Centralized Secure Remote Services	Connects the system to a Secure Remote Services gateway server installed on a customer site. It allows for HA capabilities when multiple Secure Remote Services VE servers are installed. Secure Remote Services Centralized communication uses ports 443 and 9443 (HTTPS) and needs unrestricted access to the Global Access Servers (GAS).
SupportAssist	Provides the remote connectivity that enables SC Series, PowerStore, PowerFlex, and PowerVault systems to connect to CloudIQ and send associated data packets for performance, capacity, and health monitoring. SupportAssist allows Dell to securely transfer files, such as alerts, performance stats, capacity, and configuration information from the systems.
Secure Connect Gateway	New remote connectivity technology replacing Secure Remote Services. Allows Dell devices to securely transfer files such as logs and system telemetry to Dell Support and CloudIQ.
Unisphere	The graphical management interface that is built into Dell storage systems for configuring, provisioning, and managing the systems' features. For Unity XT family, and PowerMax/VMAX, systems, Unisphere connects to CloudIQ using Secure Connect Gateway; for SC Series, it connects using SupportAssist.



Term	Definition
PowerVault Manager	The graphical management interface for PowerVault storage systems. Connectivity to CloudIQ is established in the Settings section of PowerVault Manager using SupportAssist.
PowerStore Manager	The graphical management interface for PowerStore storage systems. Connectivity to CloudIQ is established in the Settings section of PowerStore Manager using SupportAssist
Web UI	The graphical management interface for XtremIO storage arrays. Web UI is part of XMS – XtremIO Management Server, which connects to CloudIQ using Secure Connect Gateway.
DD System Manager	The graphical management interface for PowerProtect DD systems. Connectivity to CloudIQ is established in the Maintenance section of DD System Manager using Secure Connect Gateway.
VxRail Manager	A plug-in for VMware vCenter that enables users to manage VxRail clusters including life-cycle management and the hardware platform. Connectivity to Secure Connect Gateway and CloudIQ is established under the Support tab in VxRail Manager.

## CloudIQ overview

### Introduction

CloudIQ is a cloud-based AIOps application that provides for simple and proactive monitoring and troubleshooting of your Dell IT infrastructure including integration with VMware. It leverages machine learning to proactively monitor and measure the overall health of servers, storage, converged, hyperconverged, data protection, and network devices through intelligent, comprehensive, and predictive analytics. CloudIQ is available at no additional charge for products with a valid ProSupport (or higher) contract. CloudIQ is hosted on Dell Technologies Private Cloud, which is highly available, fault-tolerant, and guarantees a 4-hour Disaster Recovery SLO.

CloudIQ provides each customer an independent, secure portal and ensures that customers will only be able to see their own environment. Each user can only see those systems in CloudIQ which are part of that user's site access as defined in Dell Service Center. Customers register their systems with their Site ID. For SC Series and PowerVault systems, a new site ID is created, named after the system ID, for each system selected to be viewed in CloudIQ.

The discussion below elaborates on the various features and functionality in CloudIQ. Some details will vary by product type. For specific details about the product type and the latest features, consult **Online Help**, which is updated with each new feature added into CloudIQ.

### Key values of CloudIQ

**Reduce Risk** – CloudIQ makes daily IT administration tasks easier by helping you identify potential vulnerabilities before they impact your environment. Leveraging a suite of advanced analytics, CloudIQ helps answer key questions IT Administrators deal with regularly using features such as: Proactive Health Scores, Performance Impact Analysis and Anomaly Detection, and Workload Contention Identification. It also identifies security risks by comparing system configurations to a configurable evaluation test plan.

**Plan Ahead** – CloudIQ helps you stay ahead of business needs with short-term Capacity Full Prediction, Capacity Anomaly Detection, and longer-term Capacity Forecasting. It allows users to leverage subject-matter expertise to identify potential risks before they impact the environment and machine learning to pinpoint deviations for faster resolution.

**Improve Productivity** – CloudIQ helps users improve productivity of your IT resources, staffing, and equipment by:

- Providing a single monitoring interface for Dell infrastructure for data centers and edge locations including VMware visibility, and extending to Dell data protection systems in public clouds
- Customizable reports that can be scheduled and shared
- Enabling Dell and Dell partner Trusted Advisor access for added oversight
- Delivering immediate time-to-value with easy, web-based access and a mobile app
- Integrating with existing IT tools and processes with Webhooks and REST API

### CloudIQ requirements

CloudIQ is available to all customers with the following Dell Technologies systems under a ProSupport or higher contract:

Type of data	Product models	Minimum code version
Connectrix B-Series	Connectrix Brocade	FOS 8.2.1a and later
Connectrix MDS Series	Connectrix Cisco	NX-OS 8.2(2) and later, except for NX-OS v8.3(1)
Converged Infrastructure	Vblock 340, 350, 540, 740 VxBlock 340, 350, 540, 740, 1000	VxBlock Central 2.5 and later VMware 6.5 and later
PowerEdge	C Series, FC Series sleds and chassis, R Series, T Series, XE Series, XR and XR2 Series, MX Modular sleds and chassis, M Modular compute sleds and chassis, VRTX Series sleds and chassis	OpenManage Enterprise 3.7 and later <sup>2, 3</sup>
PowerFlex	PowerFlex software and Ready-Nodes PowerFlex Rack and PowerFlex Appliance	V 3.6.x and later PowerFlex Manager 3.7 and later
PowerMax/VMAX	VMAX 10K, 20K, 40K, 100K, 200K, 400K, 250F, 450F, 850F, 950F PowerMax 2000, 8000, 2500, 8500	Unisphere 9.0.2.10 and later <sup>4</sup>
PowerProtect Data Manager	-	PowerProtect Data Manager 19.0 and later
PowerProtect DD series	DD9900, DD9400, DD6900, DD3300, DD9800, DD9500, DD9300, DD6800, DD6300, DD7200, DD4500, DD4200, Data Domain Virtual Edition (DDVE)	DDOS 7.4.0.5 and later <sup>5</sup>
PowerScale/Isilon	Gen 5 and Gen 6	OneFS 8.2 and later <sup>6</sup>
PowerStore	PowerStore X and PowerStore T	PowerStoreOS 1.0 and later <sup>7</sup>
PowerSwitch	S3048-ON, S4048T, S4112F-ON, S4112T-ON, S4128F-ON, S4128T-ON, S4148F-ON, S4148T-ON, S4148U, S5296F-ON, S5248F-ON, S5232F-ON, S5224F-ON S5212F-ON, S5448F-ON, Z9100, Z9264F-ON, Z9332F-ON, Z9432F-ON	OS10 v10.5.3 and later <sup>8,9</sup>

<sup>2</sup> OpenManage Enterprise 3.9 or higher required for Cybersecurity support and modular chassis support.

<sup>3</sup> OpenManage Enterprise 3.10 or higher with CloudIQ plugin 1.2 or higher required for maintenance and firmware update operations.

<sup>4</sup> Cybersecurity requirements: For host-based Unisphere, v9.2.1 or higher is required. For embedded Unisphere, v9.2.1 or higher and operating system 5978.711.711 or higher are required.

<sup>5</sup> DDOS v7.6 or higher required for performance metrics.

<sup>6</sup> PowerScale 9.4.0.0 or later required for performance impact detection.

<sup>7</sup> Cybersecurity requirements: PowerStoreOS 2.0 or higher.

<sup>8</sup> OS10 v10.5.3.2 or later required for error, utilization, and CPU utilization metrics.

<sup>9</sup> OS10 v10.5.4 or later required for memory utilization metrics.

Type of data	Product models	Minimum code version
PowerVault	PowerVault ME4 PowerVault ME5	Firmware GT280R004 and later for ME4 All versions of ME5
SC Series	SC All Flash and SC Hybrid	7.3.1 and later
Unity XT family	XT, All Flash, Hybrid, and UnityVSA – Professional Edition	Dell Unity OE 4.1 and later
VMware	-	ESXi 5.5 and higher (some metrics available at 6.0+)
VxRail	-	7.0 and later
XtremIO	X1 and X2	XMS 6.2.0 and later

**CloudIQ data collection**

Details on configuring Dell infrastructure, Connectrix, and VMware for CloudIQ can be found in [Appendix A: Enabling CloudIQ at the system](#). After the Dell systems or Connectrix switches have established connection to CloudIQ, data will be collected and available to the user in the CloudIQ user interface. Dell systems are connected through Secure Connect Gateway or SupportAssist. CloudIQ receives Connectrix, VMware, and PowerSwitch data through a local CloudIQ collector that sends the data through Secure Connect Gateway to CloudIQ.

The frequency with which data is updated in CloudIQ varies based on the type of information and the type of system. The following table shows the types of data and the frequency with which CloudIQ updates this information for Unity XT family systems; collection for other systems is comparable:

Type of data	Sample update frequency
Alerts	5 minutes
Performance	5 minutes
Capacity <sup>10</sup>	1 hour
Configuration <sup>2</sup>	1 hour
Data Collection <sup>11</sup>	Daily

CloudIQ maintains up to 2 years of historical data for systems that are being monitored. The details of the data retention are as follows:

**Alerts:** 2 years

**Configuration:** 2 years at hourly intervals

	5 min interval	Hourly interval	Daily interval
System level	100 days	2 years	2 years

<sup>10</sup> Connectrix and VMware collect at 5-minute intervals

<sup>11</sup> Daily “all-in” collection

	5 min interval	Hourly interval	Daily interval
Object level	22 days	90 days	2 years

**CloudIQ features** CloudIQ makes it faster and easier to analyze and identify issues accurately and intelligently, by delivering:

- Centralized monitoring of performance, capacity, system components, configuration, and data protection. CloudIQ also provides details about components of Dell storage systems, IP and SAN switches, servers, converged and hyperconverged systems, and data protection appliances – as well as VMware environments.
- Predictive analytics that enable intelligent planning and optimization of capacity and performance utilization.
- Proactive Health Scores for monitored storage systems, servers, hyperconverged systems, data protection appliances, and network devices. CloudIQ identifies potential issues in the infrastructure and offers practical recommendations based on best practices and risk management.
- Cybersecurity feature that monitors and implements security assessments for Dell systems by comparing configurations to a set of security-related evaluation criteria, notifying users when there are deviations from the configured plan.
- Multi-system update feature implemented for VxRail, allowing users to execute update pre-checks, code downloads, and system updates from CloudIQ.

### Centralized monitoring

CloudIQ allows you to improve your system health by providing instant insight into your Dell IT environment without the maintenance of installed software. The Home Page summarizes key aspects of the environment so that users can quickly see what needs to be addressed and provides hyperlinks to easily open more detailed views. Some examples of these summaries include Proactive Health Scores, Capacity Predictions, Performance Anomaly and Impact Detection, and Reclaimable Storage. These features and others are discussed in detail below.

### Predictive analytics

CloudIQ advanced predictive analytics differentiate it from other monitoring and reporting tools.

#### *Performance anomaly and impact detection*

Using machine learning and analytics, CloudIQ identifies performance anomalies (supported across all storage platforms, networking devices, and PowerEdge servers). It compares current performance metrics with historical values to determine when the current values deviate outside of normal ranges. This feature provides timely information about the risk level of the storage systems with insights into conditions and anomalies affecting performance.

Besides detecting performance anomalies, CloudIQ goes one step further and identifies performance impacts (supported for APEX Block Data Storage Services, PowerMax or VMAX, PowerStore, VxRail, Unity XT family, PowerScale, and PowerFlex systems). CloudIQ analyzes increases in latency against other metrics such as IOPS and bandwidth

to determine if an increase in latency is caused by a change in workload characteristics or competing resources. In the case where an impact is identified, CloudIQ also identifies the most likely storage objects causing the workload contention. By differentiating between changes in workloads characteristics and workload contention, CloudIQ enables users to narrow the focus of troubleshooting on when actual impacts to performance may have occurred.

**Capacity trending and predictions**






CloudIQ provides historical trending and both short- and longer-term future predictions to provide intelligent insight on how capacity is being used, and what future needs may arise.

- Short-term Capacity Full Prediction: CloudIQ uses a daily analysis of capacity usage to help users avoid short-term data unavailability events by starting to predict, within a quarter, when capacity is expected to reach full.
- Capacity Anomaly Detection: CloudIQ uses an hourly analysis of capacity usage to identify a sudden surge of capacity utilization that could result in data unavailability. This anomaly detection helps to avoid the 2:00am phone call resulting from a sudden capacity utilization spike due to a potentially runaway query or rogue actor in the environment.
- Longer-term Capacity Forecasting: CloudIQ helps users more intelligently project capacity utilization so that they can plan future capacity requirements and budget accordingly.

**Proactive Health Score**

The Proactive Health Score is another key differentiator for CloudIQ, relative to other monitoring and reporting tools. CloudIQ proactively monitors the critical areas of each system to quickly identify potential issues and provide recommended remediation solutions. The Health Score is a number ranging from 100 to 0, with 100 being a perfect Health Score.

The Health Score is based on the five categories shown in the following table. Some examples of how Proactive Health mitigates risk are:

Category		Sample Health Issues
	Components	Physical components with issues: for example, faulty cables and fans
	Configuration	Non-HA host connections
	Capacity	Pools or clusters that are oversubscribed and reaching full capacity
	Performance	Storage groups not meeting there SLO
	Data Protection	Native replication and snapshot schedules not being met

## Cybersecurity

Cybersecurity is a feature in CloudIQ that identifies potential security violations. System configurations are continuously monitored and compared to a user configurable evaluation plan at which point a risk level is assigned to each system. Users can quickly get a visual representation of system security risk by seeing the identified issues and can remediate security violations using the provided recommended remediations.

## Multi-system updates

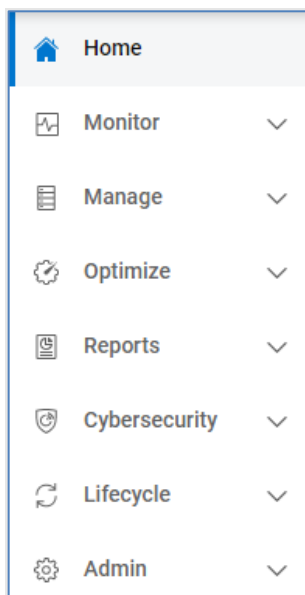
The multi-system update feature pertains to VxRail clusters and PowerEdge servers. Users can initiate VxRail cluster update pre-checks, software downloads, and system updates from the CloudIQ UI. Users can also initiate PowerEdge firmware updates across their server fleet. This feature provides more operational efficiency while maintaining security and consistency.

## CloudIQ UI layout

This section discusses the layout of the user interface.

### Navigation pane

The left navigation bar is designed to provide clear visibility into CloudIQ functionality to streamline access to information. The top-level menu selections are task-oriented, directing the user to the appropriate section of the user interface to access the necessary information.



The navigation bar consists of the following selections:

**Home** – Access the home page that provides high-level summary information and some detailed information about various key aspects of the environment, allowing users to quickly identify potential risks. This information includes the Proactive Health Score, predictions on when pools and clusters will reach full capacity and system performance impacts.

**Monitor** - View the multisystem pages for Storage, Networking, Converged, Hyperconverged, Server, and Data Protection. A pull-down menu allows the user to switch between Health, Inventory, Capacity, and Performance.

- Health – Shows the proactive health scores across the environment.
- Inventory – Shows the system code versions, location, site, and contract status. This category is where VxBlock converged system information is displayed.
- Capacity – Includes the usable, used and free capacity metrics. For switches, capacity is displayed in terms of ports.
- Performance – Shows system level performance KPIs for all systems and switches.

---

**Note:** Items in gray indicate that the selected product type or category is not applicable.

---

The Virtualization View provides users a more traditional VMware tree style navigation similar to what administrators are familiar with in vCenter. The Virtualization view supports VxRail, storage, and PowerEdge based virtual machines.

The Carbon Footprint page provides insights on energy and carbon emissions at the system and workload level. This includes reporting on both year to date and forecast metrics.

The Service Requests page provides a status of all open service requests applicable to the systems monitored by CloudIQ.

There are also views to see aggregated lists of all pools, health issues, and alerts.

**Manage** – View available system updates for storage, networking HCI, and data protection. Perform VxRail update pre-checks, software downloads, cluster updates, and PowerEdge firmware updates.

**Optimize** – Access the Reclaimable Storage listing.

**Reports** – Create and view custom reports. Reports can consist of both tables and line charts. They can be exported on demand or scheduled and emailed to a specified list of recipients.

**Cybersecurity** – View security risk levels, active and resolved security issues, and configure security evaluation policies for cybersecurity-enabled systems. Also view applicable security advisories.

**Lifecycle** – View service contracts and life-cycle milestones for the components in VxBlock Converged Systems. This view includes timelines that display the following milestone dates: General Availability, End of Life, End of Support, End of Renewal, End of Service Life.

**Admin** – Includes links to various administrative tasks.

The Identity Management section allows CloudIQ administrators to set access controls for standard CloudIQ users and initiate the single sign-on process federating CloudIQ with the customer's Identity Provider.



The Settings menu is used to configure access for User Community and Customer Support and email notification settings. The Settings section also allows users to set filters on which systems they want to see in both the CloudIQ user interface and the mobile app.

The Customization section allows users to temporarily pause connectivity health checks for hosts connected to Unity XT family and SC Series systems and capacity health checks for Unity XT file systems. The Integrations section provides access to Webhooks and REST API settings.

The Integrations page allows users with the DevOps role to configure Webhooks and obtain an authorization key to access the CloudIQ REST API.

The Licenses page shows system license and entitlement details including entitlement type and expiration date for PowerFlex systems.

The Connectivity page shows the connectivity status of all CloudIQ capable systems and allows users to onboard SC Series, PowerVault, PowerSwitch, and VxBlock Converged systems.

The Collectors section is where users can download the CloudIQ Collector for VMware and Connectrix and see the status of all installed Collectors.

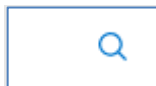
The Jobs page shows the status of VxRail and PowerEdge tasks initiated from CloudIQ.

The HCI Settings page allows users to enable access controls and enter credentials to vCenter for system updates.

The Tags page allows users to manage tags to assign custom meta data to systems and components.

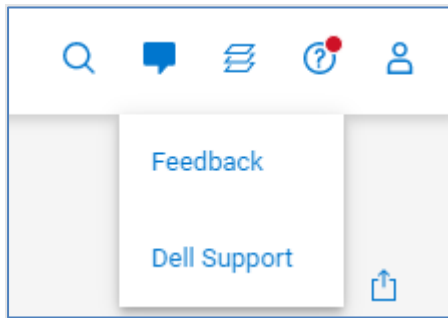
### Global Search

The Global Search feature helps users quickly find Systems, Hosts, Pools, Storage Resource Pools, Storage Groups, LUNs/Volumes, File Systems, Virtual Machines, and MTrees/Storage Units. Users can specify a few keywords and get a summarized list of top matches. From there, users can click an item to access its details or go to an expanded view with all matches.



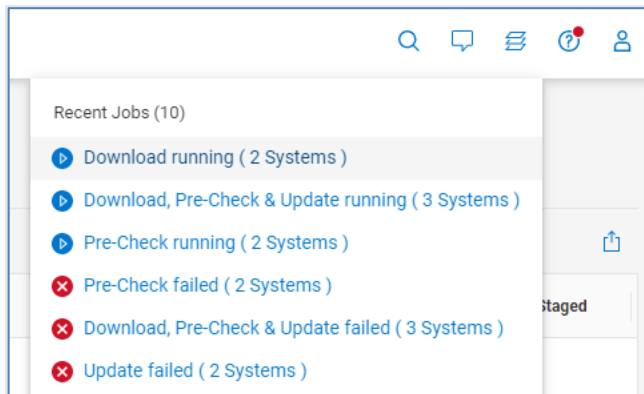
### Feedback and Dell Support

Selecting the comment icon allows the user to submit feedback to the CloudIQ product team or open the Dell Support website.



## Jobs

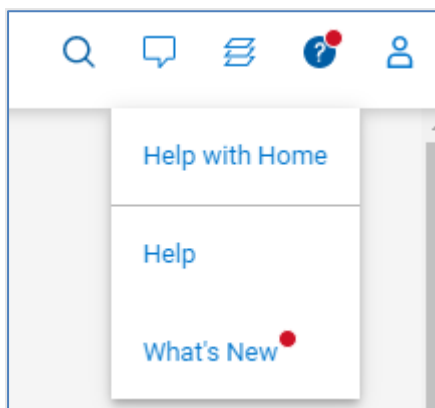
The Jobs icon opens a window showing recent jobs and status and a link to the Jobs page.



## Help and What's New in CloudIQ

CloudIQ is updated frequently to deliver helpful new content to users. Use the CloudIQ Simulator (<https://cloudiq.dell.com/simulator>) to view the latest features which may not be documented in this paper.

New features can be seen by clicking the icon on the top menu bar.



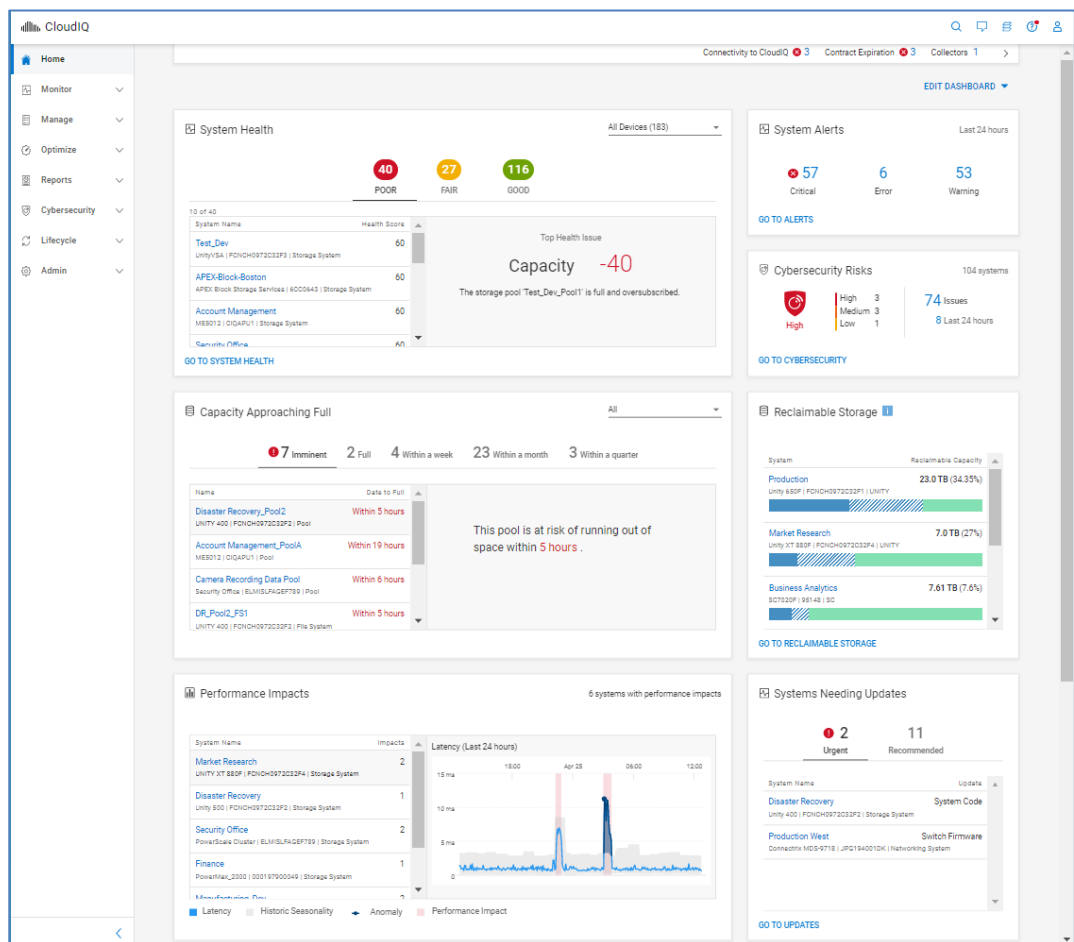
The “What's New in CloudIQ” window will appear showing recent changes and enhancements. Clicking **View All Enhancements** displays a historical list of all the updates. The most recent information is presented first, and users can scroll down the list to see the monthly evolution of CloudIQ since its introduction. This display can be turned off by sliding the **Don't show again until the next update** button.

Selecting the user icon allows the user to switch companies if they have access to multiple sites and sign out of the UI.

## Home page

The **Home** page provides a consolidated view of the Dell environment. This page is the highest-level summary of the environment providing users with a roll-up of the key factors to understand the overall health and operation of the IT infrastructure. The tiles on the home page can be reorganized to each user's preference using the **Edit Dashboard** button. Users can also select **Reset to Default** to revert to the default home page layout.

There are three tiles along the top of the Home page (minimized in image of the Home page below, but shown in a following image).



**Connectivity to CloudIQ** – Shows the connectivity status for all systems registered in CloudIQ and the CloudIQ Collector. Systems are displayed in the following four categories:

- **Install Base Issues:** CloudIQ cannot display due to Install Base configuration issues.
- **Lost Connection:** Systems that have lost connection and are no longer sending data to CloudIQ.

- **Not Set Up:** Systems that are not set up to send data through Secure Connect Gateway to CloudIQ.
- **Connected:** Systems that are successfully sending data to CloudIQ.

Selecting each category redirects the user to the Connectivity Page and displays a filtered list of systems and collectors corresponding to that connectivity status.

**Contract Expiration** – Shows the number of systems with contracts that are:

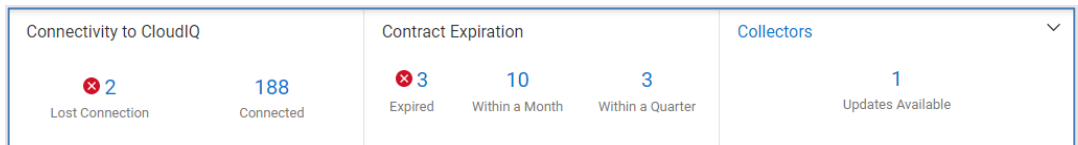
- Expired
- Expire within a month
- Expire within a quarter

The user can select the number to open a window with the list of systems that meets the expiration criteria. Systems whose contracts have expired will be removed from other standard CloudIQ views.

**Collectors** – Displays number of CloudIQ Collectors that have

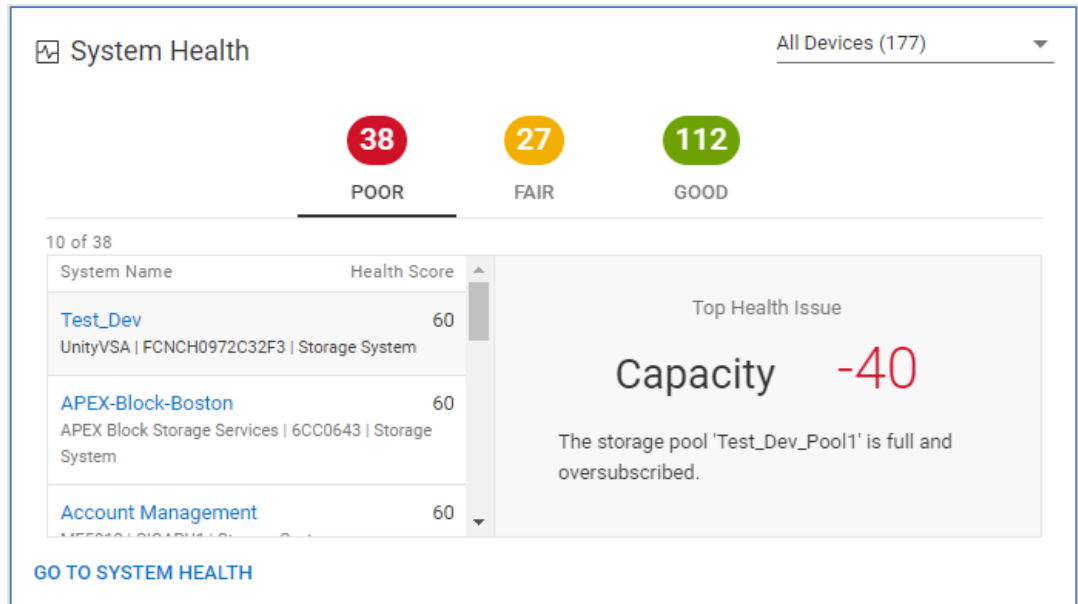
- Issues that need to be resolved
- Available Updates

The user can select the number in each category to view a filtered list of collectors from the Collectors view.



**System Health** – Categorizes all monitored products into three ranges of health scores:

- **Poor:** 0-70
- **Fair:** 71-94
- **Good:** 95-100
- **Unknown:** List of systems whose health score cannot be calculated. This situation could indicate a connection issue.

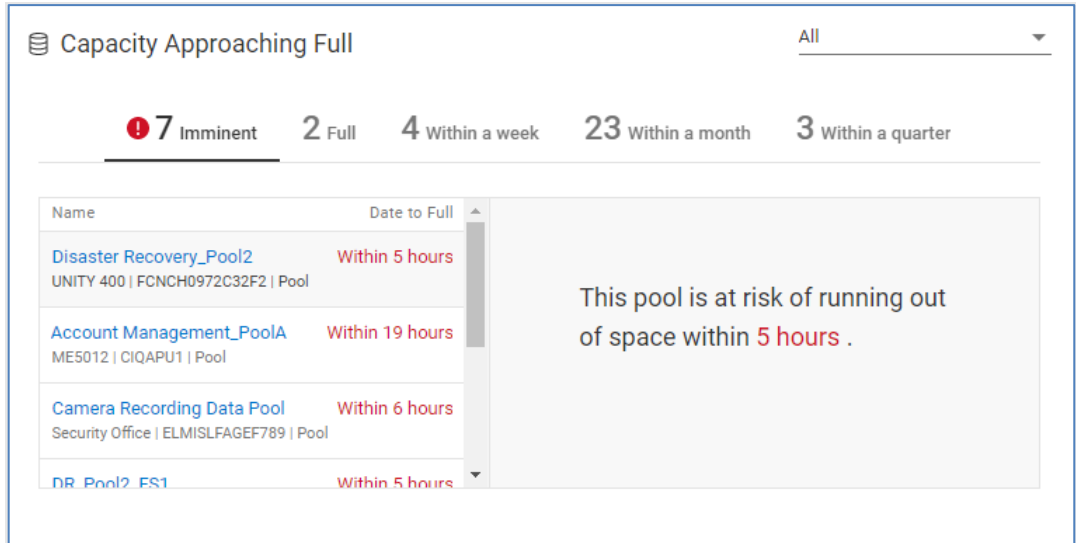


Selecting a range's number along the top of the tile displays the system names and health scores for that range, sorted from low to high. The chart is interactive allowing the user to select a system in the list to display its Top Health Issue in the right pane. This window displays the most impactful issue affecting the health score. Selecting the system name hyperlink directs the user to the Health Score tab of the systems details page. There is also a filter that allows the user to filter this tile on the following product types:

- Storage Systems
- Networking Systems
- HCI Systems
- Data Protection Systems
- Servers

**Capacity Approaching Full** – Leverages predictive analytics to identify the storage pools, clusters, file systems, and subscriptions running out of space. The chart is interactive allowing the user to select each object to display a trend line of the historical capacities. For Unity XT family and PowerVault storage pools, PowerMax storage resource pools, PowerStore, VxRail, PowerScale/Isilon, and XtremIO clusters, Unity XT File Systems, and APEX subscriptions, a forecast capacity chart is also shown. The estimated time range until each pool, cluster, or file system will be full is shown as:

- Imminent (predicted to run out of space within 24 hrs.)
- Full
- Within a week
- Within a month
- Within a quarter

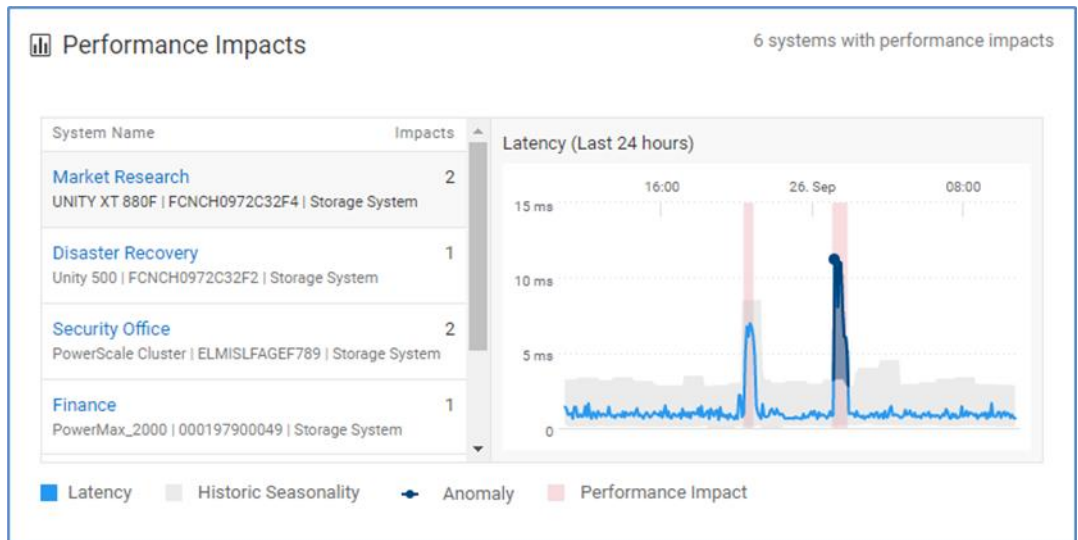


There is a drop-down menu that allows the user to filter the tile based on object type: Appliances, File Systems, Pools, Clusters, or Subscriptions.

The Imminent risk category is supported for Unity XT family, PowerVault, PowerMax/VMAX, PowerScale, and VxRail systems.

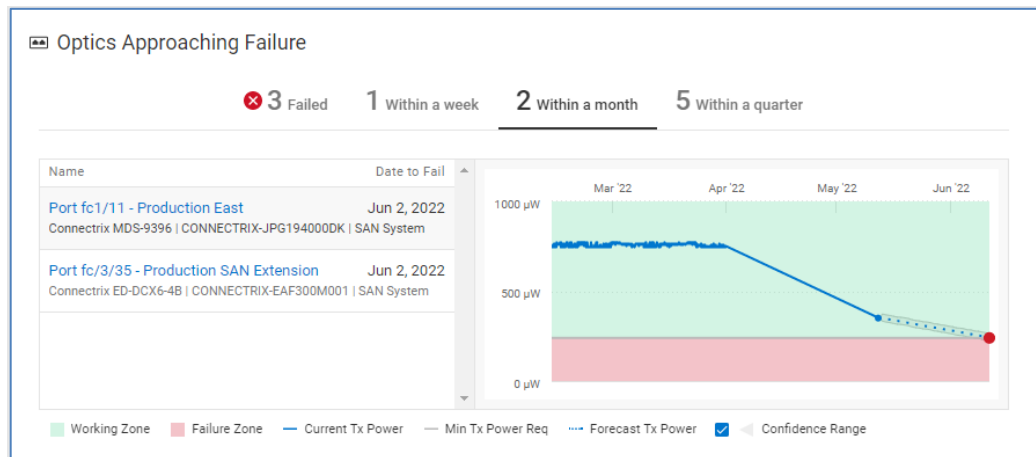
Selecting the object name hyperlink directs the user to the Capacity tab on the object details page. This could be the pool details page, file system details page, or the cluster details page, depending on the object type.

**Performance Impacts** – Currently supported for APEX Block Services, PowerMax, PowerStore, PowerFlex, PowerScale, and Unity XT family systems. Utilizes CloudIQ analytics to identify when there are performance impacts on a system due to a possible workload contention. It will also identify the existence of performance anomalies where the current system workload is outside of expected boundaries based on historical workloads. The chart is interactive allowing the user to select an impacted system and see the block latency of that system over the last 24 hours in the right pane. Both performance impacts and performance anomalies are highlighted in the chart. Selecting the system name hyperlink directs the user to the Performance tab of the system details page where the user can see more detailed performance information for the system.

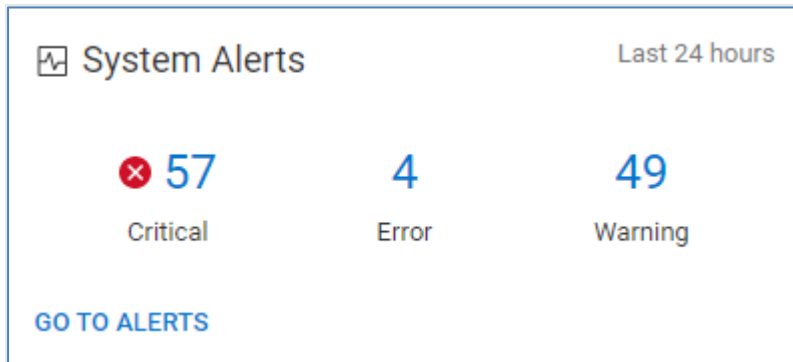


**Optics Approaching Failure** – Uses predictive analytics to provide a list of Connectrix ports with impending optic failures. The measured and predicted Tx power is analyzed and charted along with the working and failure zones. The estimated time to failure is categorized in each of the following time frames:

- Failed
- Within a week
- Within a month
- Within a quarter



**System Alerts** – Summarizes the alerts collected by CloudIQ over the last 24 hours across the Critical, Error, and Warning severity levels. Clicking a number opens a list of alerts in the Alerts window filtered by the selected severity level. Clicking the **GO TO ALERTS** link navigates the user to a filtered list of alerts, across all severity levels, from the last 24 hours.



**Cybersecurity Risks** – Summarizes the active cybersecurity risks in the environment. The overall environment has an assigned risk level. A breakdown of the number of systems per risk level is provided as well as total issues and issues identified in the last 24 hours. Links to the System Risk page and the Cybersecurity Issues page are available.

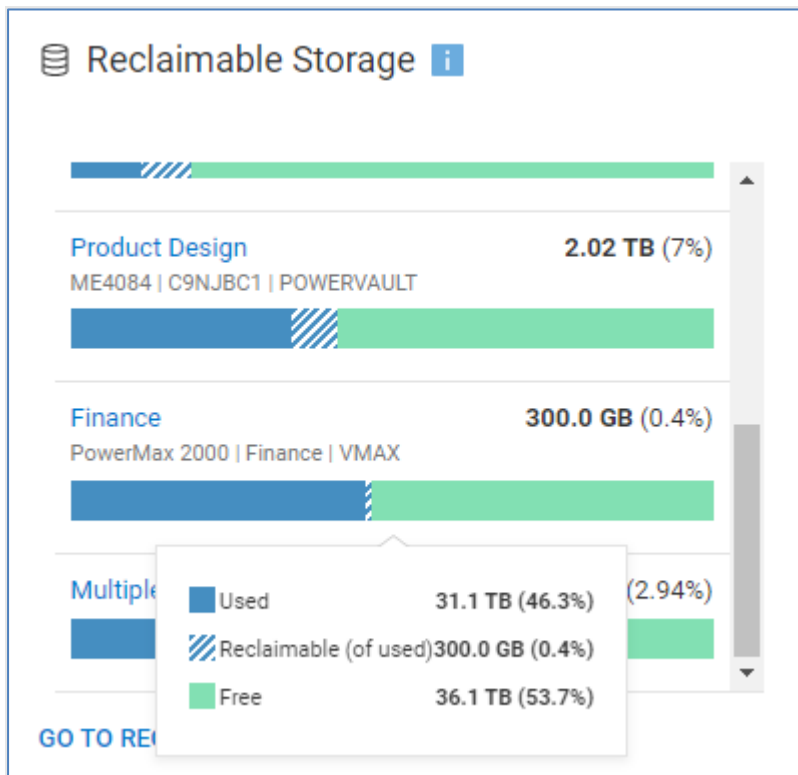


**Entitlement Expiration** – This tile summarizes the licenses and entitlements that are expired, will expire within 30 days, and will expire within 90 days. This content currently supports PowerFlex systems. Clicking on any of the categories directs the user to the Entitlements and Licenses page and displays the entitlements in the selected category.

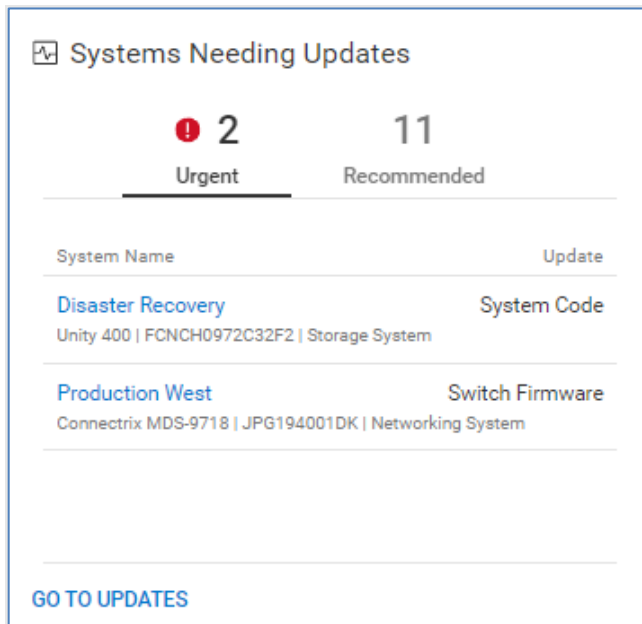


**Reclaimable Storage** – This tile summarizes PowerMax, Unity XT family, SC Series, and PowerVault ME4 systems that have reclaimable storage. Each system with reclaimable storage shows the total amount of used, reclaimable (of used), and free storage. Reclaimable storage includes block and file-based virtual machines that have been shut down for at least the past week. Selecting the system name hyperlink directs the user to the Capacity tab on the system details page.



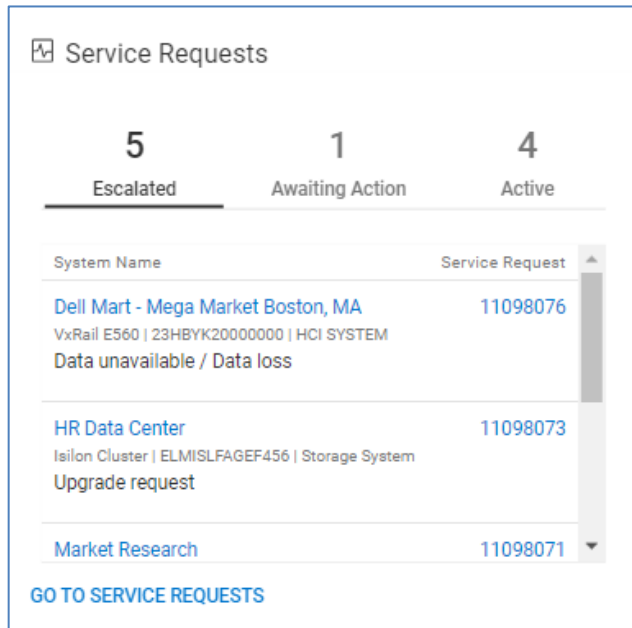


**Systems Needing Updates** – This tile identifies systems that have either Urgent or Recommended system code, firmware, or management software updates available. It shows the system and the type of update. Selecting the “GO TO UPDATES” link opens the System Updates page. This page shows all available code, firmware, and software updates across all systems and includes links to download the updates. Selecting the system name hyperlink directs the user to the Inventory tab on the system details page.



## Service Requests

The Service Requests tile provides a summary of escalated, awaiting action, and active service requests. Links allow users to go directly to the system details page in CloudIQ or review and update the service request on the Dell support page.



## Monitor

### Systems - Health

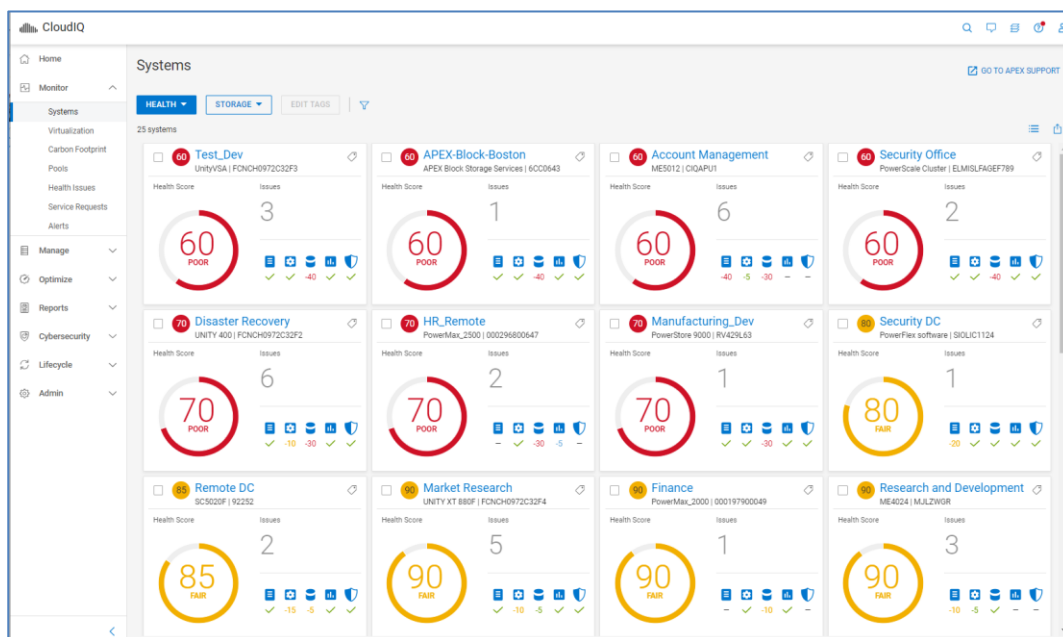
The Systems page is a consolidated multisystem view that can show Health, Inventory, Capacity, and Performance views for each of the supported Dell platforms. The Health page displays the Proactive Health Score for all systems across all products in a consolidated view. There are up to six available platforms to choose: Converged, Data Protection, HCI, Networking, Servers, and Storage. Users can quickly identify the systems at highest risk, including the number of issues in each category that make up the health score.

CloudIQ uses up to five categories to determine the Proactive Health Score presented on the System Health page: **Components** (📄), **Configuration** (⚙️), **Capacity** (📊), **Performance** (📈), and **Data Protection** (🛡️).

---

#### Note:

- PowerMax and VMAX systems do not include health issues in the Components or Data Protection categories. CloudIQ displays a dash (—) for these categories.
  - PowerVault ME4 systems do not include the Performance or Data Protection categories. CloudIQ displays a dash (—) for these categories.
  - VxRail systems do not include the Data Protection category.
  - Connectrix, PowerSwitch, and PowerEdge currently use only the Components category.
  - Converged provides the health score for the storage in the VxBlock system.
-

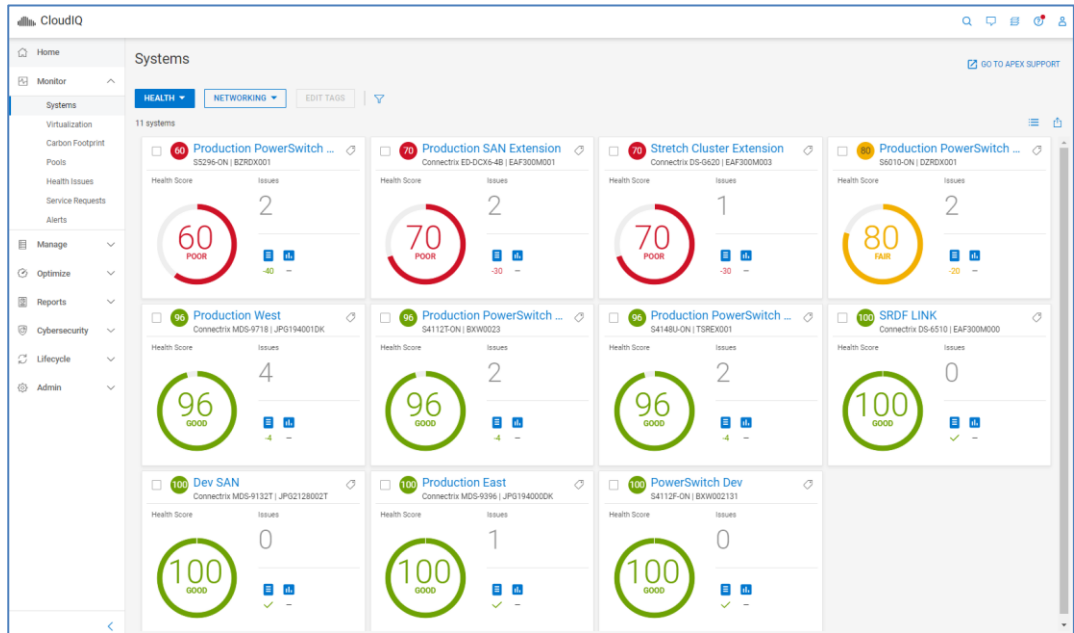


Each system has a health score displayed in the circle (ranging from 100 to 0) which is calculated as 100 minus the issue with the greatest impact. Each of the five categories has either a green check mark, a negative number, or a dash. The green check indicates no issues are present for that category. A negative number represents the deduction for the most impactful issue in the category. A dash indicates that the category is not supported for that system type. This approach is intended to help users focus on the most significant issue for the system, so that they can resolve the issue to improve the health score.

The Health Score range is as follows:

- **Good** = 95–100 (Green)
- **Fair** = 71–94 (Yellow)
- **Poor** = 0–70 (Red)

The System Health Score is displayed in the color that corresponds to the range. Blue coloring with a dash instead of a number indicates a system that has recently been added to CloudIQ and does not yet have a calculated health score. Gray coloring with a number indicates a connectivity issue which leads to an uncertain health score. In this case, the user should check the system connectivity.



The **Card** view, shown previously for both Storage and Networking, is the default view for this page. Users can choose the **List** view, by selecting the List View Icon (☰) in the upper right of the window. The list view is shown on the next page for Storage. This view may be more useful for larger environments because it allows for a more condensed view of the information and the ability to sort columns. Users can view and edit custom tags from either the Card view or the List view. Custom tags are covered in detail in the [Custom Tags](#) section.

Users can also export the data from many of the views in CloudIQ to a CSV file by selecting the Export CSV icon (📄) in the upper right of the view. Exporting the data from any of the multisystem views exports the data from the Health, Inventory, Capacity, and Performance pages.

Users can filter the systems in both the Card View and List View by selecting the **Filter** icon (🔍) and entering in various criteria. The available criteria vary based on the view, but examples include System Name, Product Type, Health Score, Custom Tag, Site Name, and Location. The filter settings stay in effect until the user clears the filter or logs out of the UI.

Each view provides the following information:

- **Score** – CloudIQ Proactive Health Score for system
- **Name** – User-defined name of system
- **Model** – Specific model of system
- **Serial number** – Unique serial number or identifier for the system


Selecting an individual system from either the card view or list view navigates the user to the system details page. These pages are discussed for each system type later in this paper.

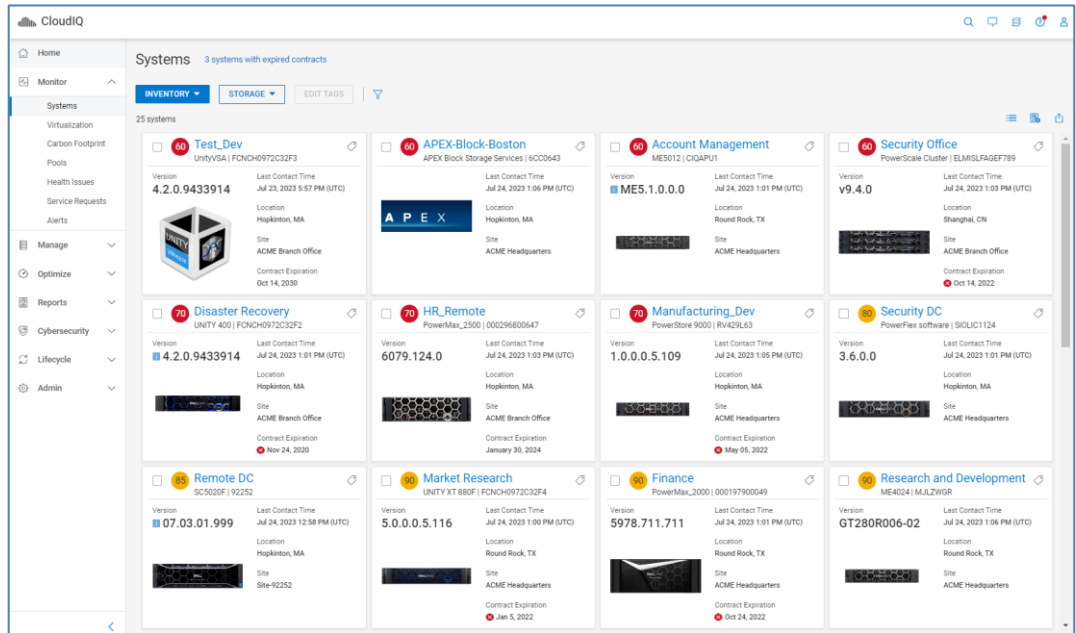
Health	System	Identifier	Model	Components	Configuration	Capacity	Performance	Data Protection	Tags
60	Test_Dev	FCNCH0972...	UnityVSA	✓	✓	-40	✓	✓	DataCenter:MA-HOP-DC3 +3
60	APEX-Block...	6CC0643	APEX Block S...	✓	✓	-40	✓	✓	
60	Account Man...	CGAPU1	ME9012	-40	-5	-30	✓	✓	DataCenter:TX-R9-DC1 (BusinessUnit:Sales) +2
60	Security Office	ELMSLFADE...	PowerScale ...	✓	✓	-40	✓	✓	DataCenter:MA-HOP-DC3 (BusinessUnit:IT) +2
70	Disaster Rec...	FCNCH0972...	UNITY 400	✓	-10	-30	✓	✓	DataCenter:MA-HOP-DC3 +3
70	HR_Remote	000296800547	PowerMax_2...	✓	✓	-30	-5	✓	DataCenter:MA-HOP-DC3 (BusinessUnit:HR) +2
70	Manufactur...	RV429L63	PowerStore 9...	✓	✓	-30	✓	✓	DataCenter:MA-HOP-DC1 +3
80	Security DC	SIOLIC1124	PowerFlex so...	-20	✓	✓	✓	✓	
85	Remote DC	92252	SC5020F	✓	-15	-5	✓	✓	DataCenter:MA-HOP-DC3 +3
90	Market Rese...	FCNCH0972...	UNITY XT 88...	✓	-10	-5	✓	✓	DataCenter:TX-R9-DC1 +3
90	Finance	000197900049	PowerMax_2...	✓	✓	-10	✓	✓	DataCenter:TX-R9-DC1 +3
90	Research an...	MJLZWGR	ME4024	-10	-5	✓	✓	✓	DataCenter:TX-R9-DC1 +3
90	ERP Remote	SI000174657...	X2-T	✓	✓	✓	✓	-6	DataCenter:MA-HOP-DC3 +3
95	Manufactur...	RV429L62	PowerStore 1...	✓	✓	✓	✓	✓	DataCenter:MA-HOP-DC1 +3
95	Finance Data...	ELMSLFADE...	Isilon Cluster	✓	-5	✓	✓	✓	DataCenter:MA-HOP-DC3 +3
100	PowerFlex	RF3M749677	UNITY K5F	✓	✓	✓	✓	✓	DataCenter:TX-R9-DC1 (BusinessUnit:Sales) +7

## Systems - Inventory

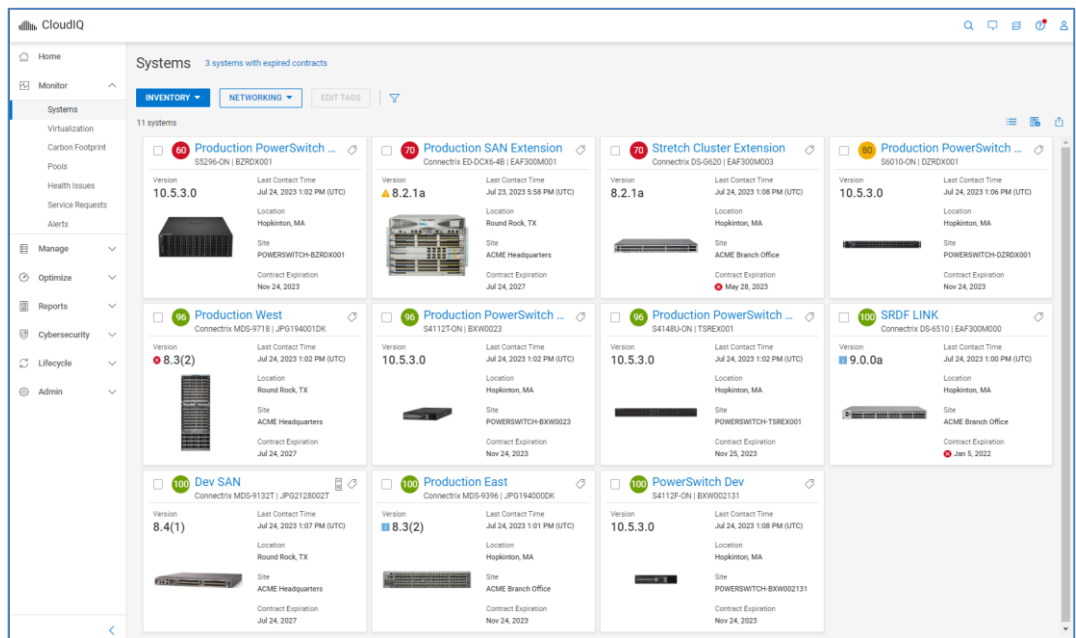
The Inventory page is the multisystem view showing the configuration information for all systems in the environment. There can be up to six types of platforms from which to choose: Converged, Data Protection, HCI, Networking, Servers, and Storage. The information displayed on the Systems pages includes:

- **Version** (vCenter Version for Converged) – Version of installed software
- **Last Contact Time** – The last time that CloudIQ received data from the system
- **Managed by** (Converged only) – Type of AMP managing the Converged System
- **Location** – Location where the system is installed
- **Site** – Site ID with which the system is associated
- **Contract Expiration** (Warranty Expiration for PowerEdge) – Expiration date for the service contract. Contract expiration is not supported for PowerFlex, PowerVault, SC Series, or PowerProtect DM. It is not applicable to APEX Data Storage Services.

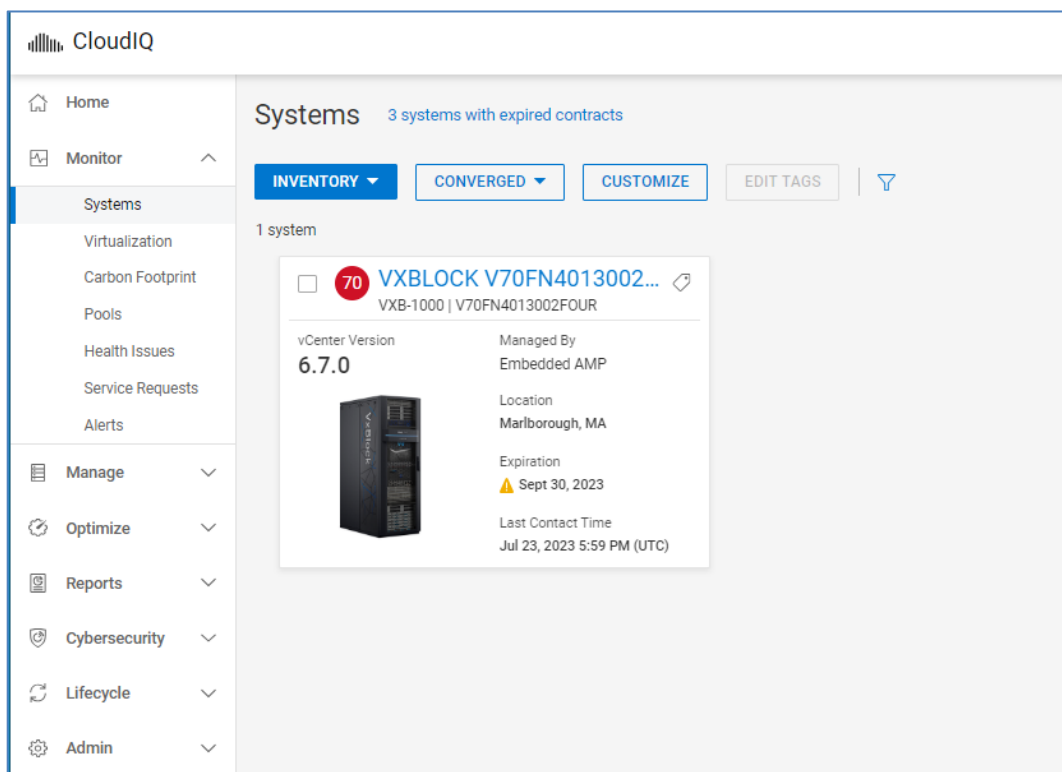
For systems that support the identification of system updates, there will also be an indication when a code update is available. Hovering over the information icon (  ) opens a window showing the update version. Clicking the “Learn More” link from within the window opens a dialog with summary information and links to the Release Notes and the software download. The following shows an example of the Storage page.



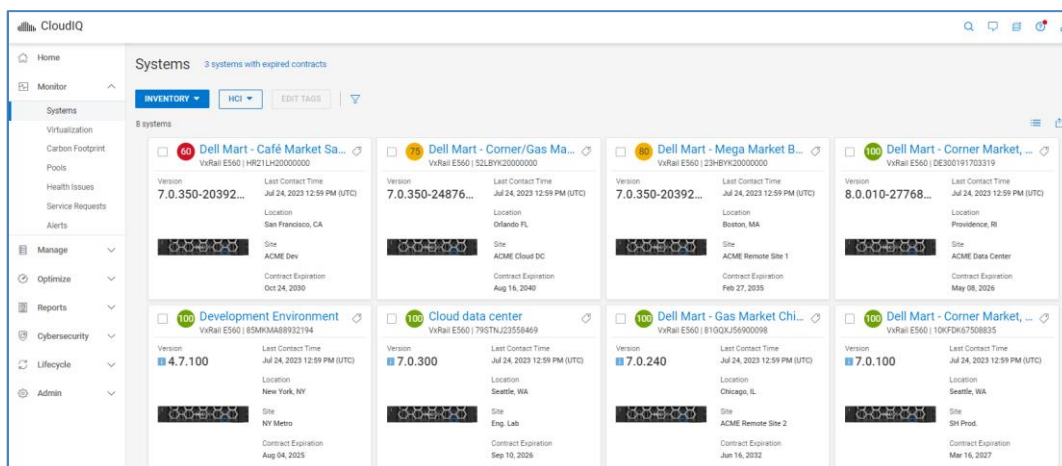
The following example of the Networking page shows similar attributes to those displayed in the Storage page.



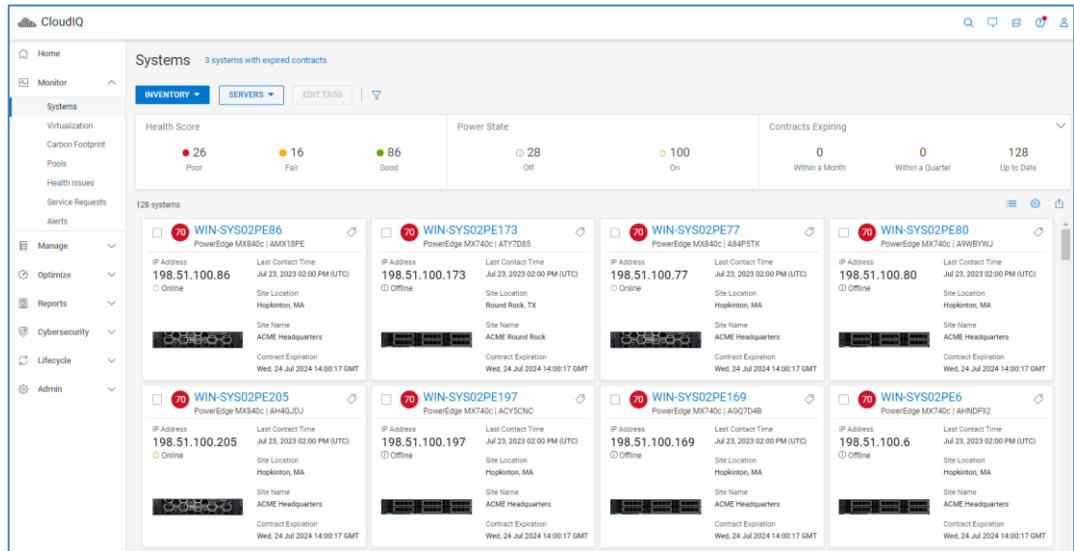
The following is an example of the CONVERGED page. The user can edit the system name in the card to provide a more user-identifiable name and differentiate it when multiple systems are being monitored. Users can also use the Customize button to display different attributes in the card view.



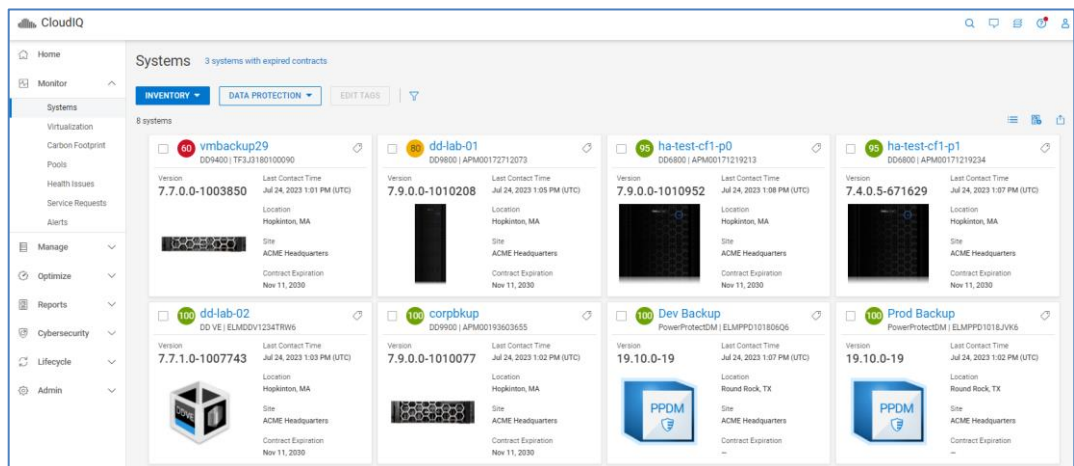
The following example of the HCI page displays the inventory of VxRail systems.



The following shows an example of the SERVERS page. There is a top banner summarizing total number of servers by Health Score, Power State, and Contracts Expiring. This banner is available for servers due to the potentially large number of devices that could be monitored by CloudIQ.



The following example of the Data Protection tab shows both PowerProtect DD systems and PowerProtect Data Manager instances monitored by CloudIQ.



## Systems - Capacity

The System Capacity view for storage displays the system level storage capacity for traditional storage systems, APEX Data Storage Services, VxRail hyperconverged systems, and PowerProtect DD systems. For Connectrix and PowerSwitch, it displays port capacity.

The information for traditional storage systems includes:

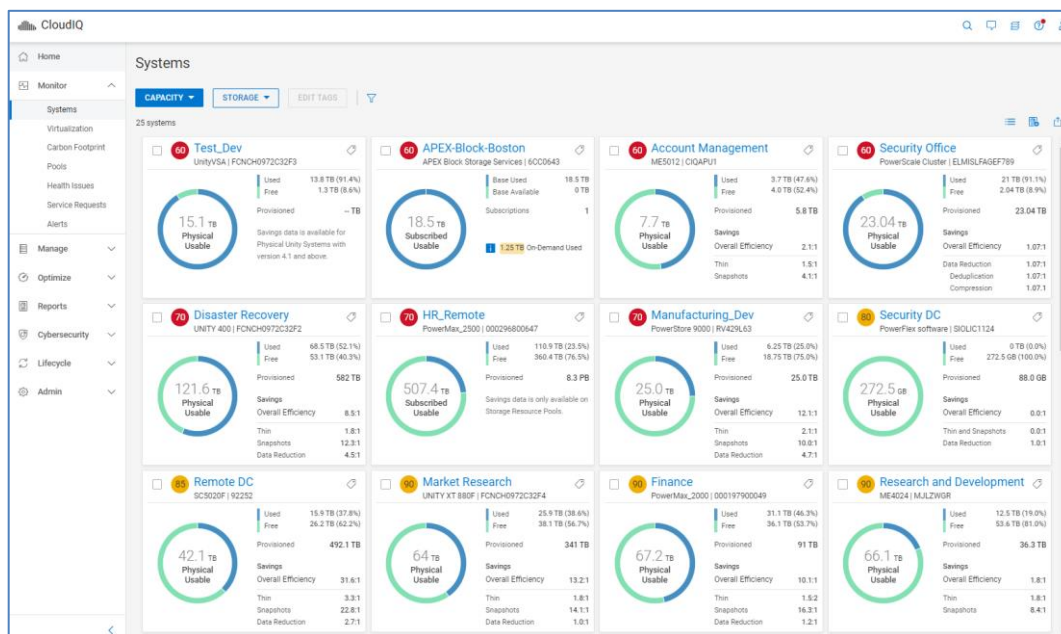
- **Usable** – Total disk capacity, which is the sum of Used and Free space
- **Used** – Disk capacity that is allocated to an object, such as a LUN, Volume, or file system
- **Free** – Disk capacity provisioned to a storage pool but not yet allocated to an object, such as a LUN, Volume, or file system
- **Provisioned** – Total capacity visible to hosts attached to this system
- **Overall Efficiency** – System-level storage efficiency ratio, based on the following combined savings ratios:



- **Thin** – Ratio of thin provisioned objects on the system (Unity XT family, PowerStore, SC Series, VMAX/PowerMax, PowerVault ME4)
- **Snapshots** – Ratio of snapshots on the system (Unity XT family, PowerStore, SC Series, VMAX/PowerMax, PowerVault ME4)
- **Thin and Copy** – Ratio of thin provisioned objects (XtremIO volumes, including snapshots)
- **Data Reduction** – Ratio of data that has data reduction applied, using compression or deduplication. (Not supported for PowerVault ME4)
- **Deduplication** – Ratio gained by savings from deduplication (PowerScale/Isilon only)

The information for APEX Data Storage Services includes:

- **Subscribed Usable** – Total of usable base capacity
- **Base Used** – Amount of host written data consuming base capacity
- **Base Available** – Remaining available space from the base capacity
- **Subscriptions** – Number of subscriptions for a given cluster
- **On-Demand Used** – Amount of used capacity above the base capacity

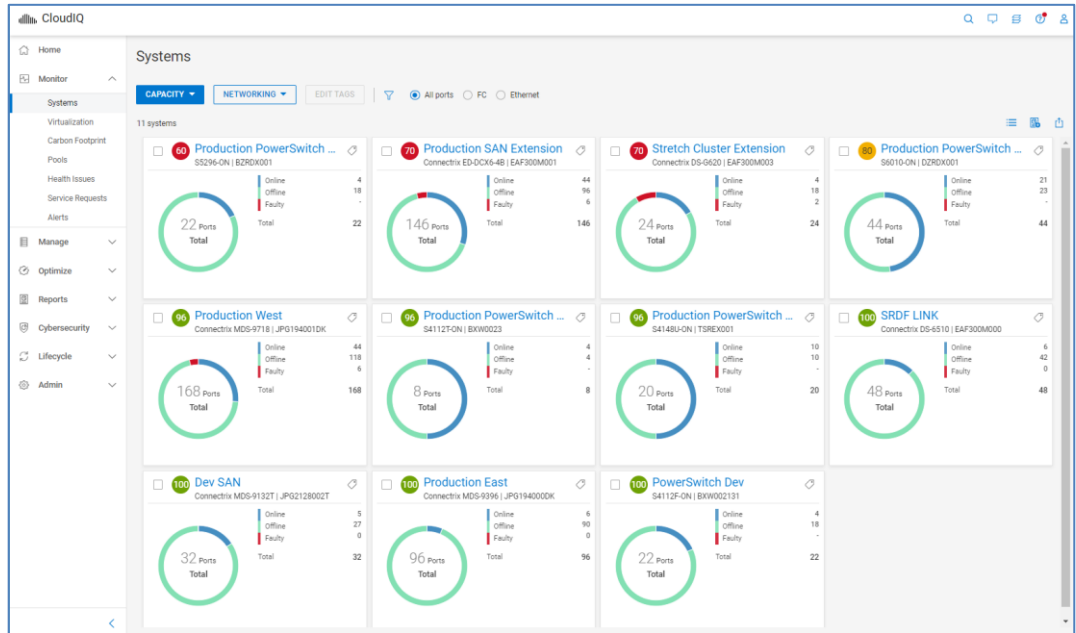


**Note:** For Unity XT family systems running version 4.3 and higher and SC Series running version 7.3 and higher, Data Reduction includes Compression or Deduplication.

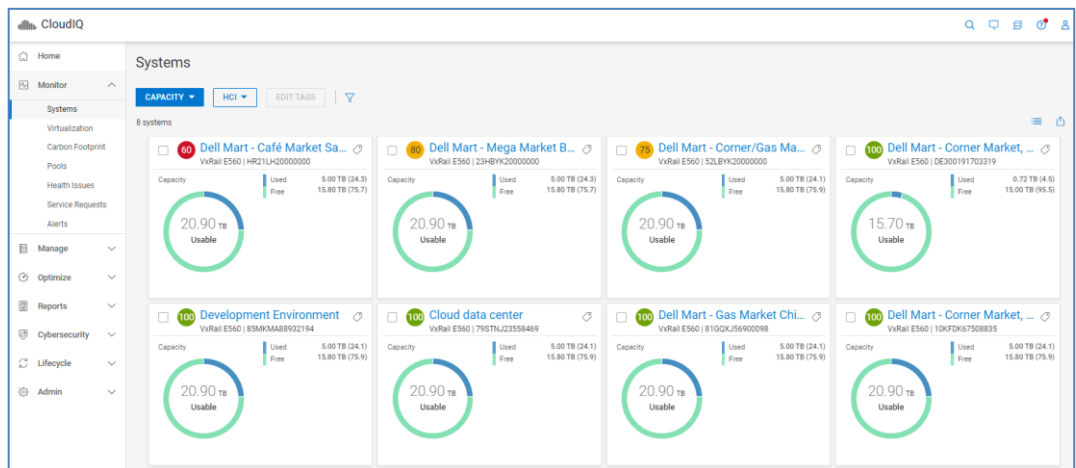
For switches, the user can filter the view to show All ports, FC ports, or Ethernet ports. For each selection, the displayed information includes:

- **Total Ports** – Total number of ports (All ports, FC ports, or Ethernet ports depending on previous selection)
- **Online** – Number of ports in an online state

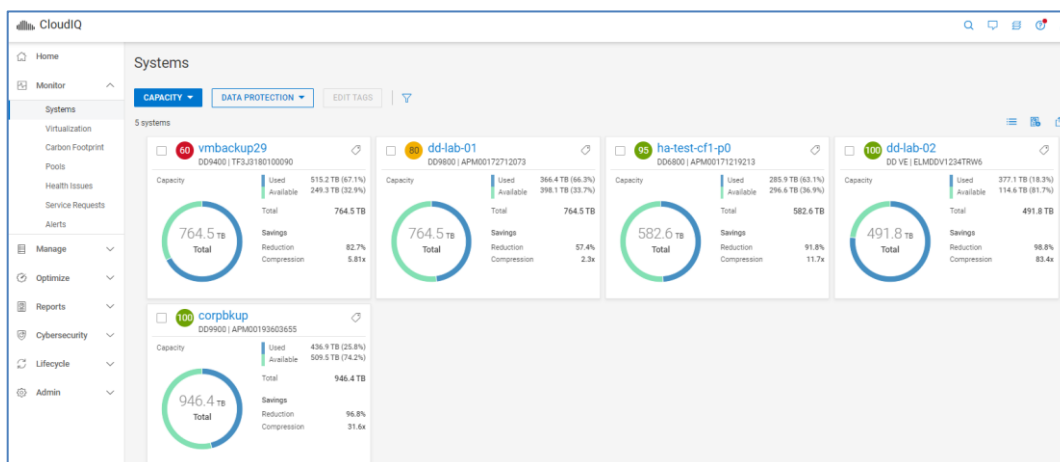
- **Offline** – Number of ports in an offline state
- **Faulty** – Number of ports with one or more faults



For VxRail systems, CloudIQ displays Usable and a breakdown of Used and Free capacity.



The Data Protection view summarizes the capacity for DD systems. Total storage is broken down to Used and Available. Savings due to Reduction and Compression is also provided for each system.



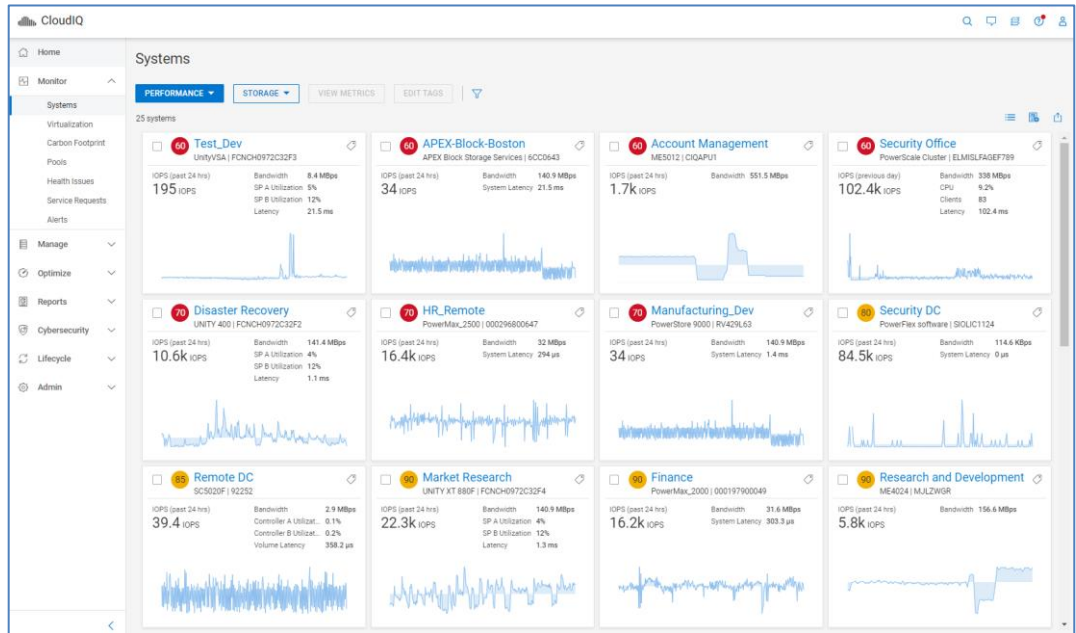
## Systems - Performance

The System Performance view displays system-level performance metrics across all systems.

The information displayed for storage systems includes:

- **IOPS** – Average I/O requests per second over the last 24-hour period.
- **Bandwidth** – System bandwidth showing average host bytes per second over the last 24-hour period.
- **Utilization (Card View Only)** – Average percent of time the Storage Processors (Unity XT family) or Controllers (SC and XtremIO) are busy over the last 24-hour period.
- **Latency** – The average time required for a packet to travel from the host to the objects over the last 24-hour period. For PowerMax and VMAX, displays the response time for read and write I/O requests for the system.
- **Clients (Card View Only)** – Number of clients connected to the PowerScale cluster.

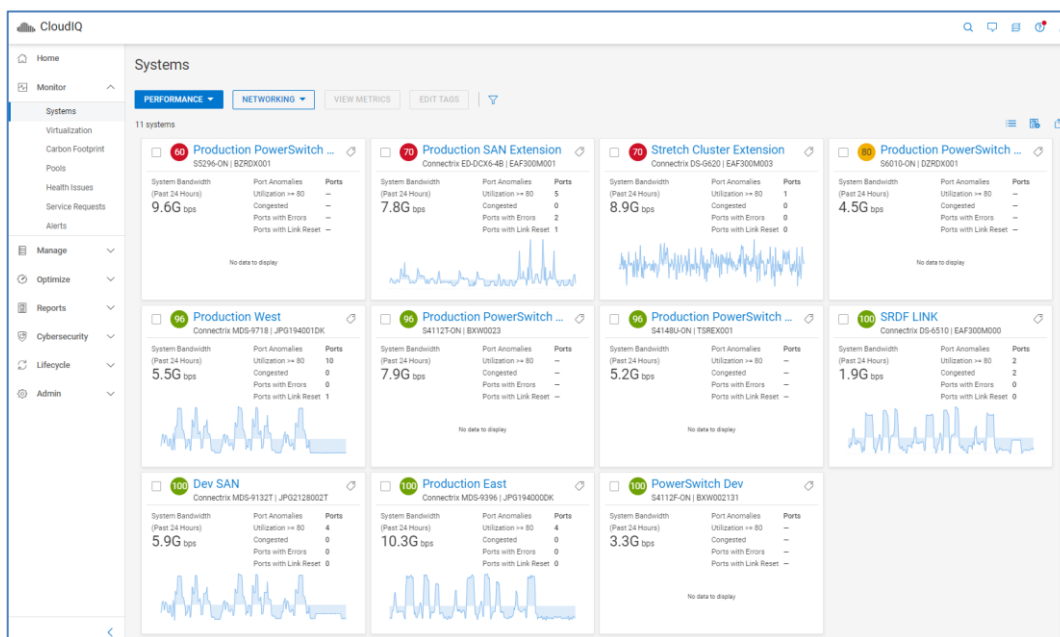
**Performance Trend graph** – Chart showing IOPS over the past 24 hours with a data point on every update (varies slightly per product type).



The System Performance information displayed for switches includes:

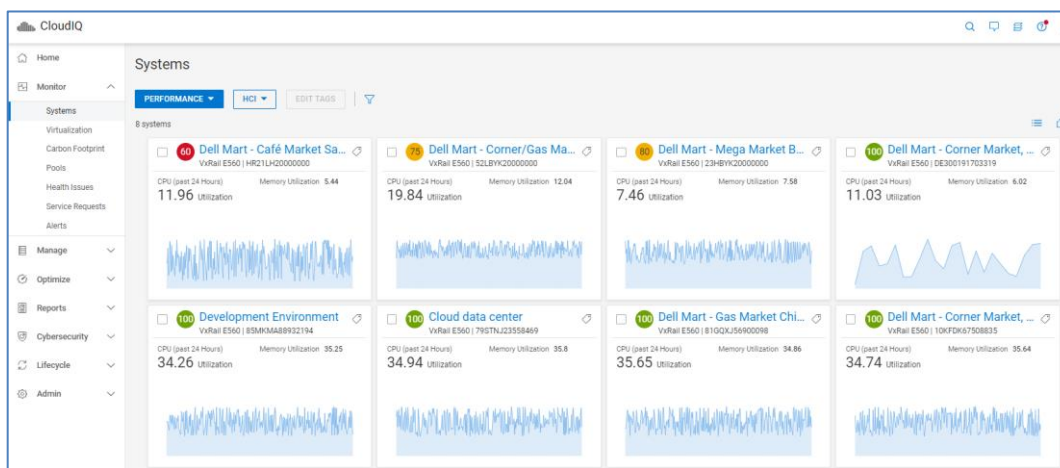
- **System Bandwidth** – Average bandwidth for the switch over the last 24-hour period.<sup>12</sup>
- **Utilization >= 80%** – Number of ports with utilization greater than or equal to 80%<sup>4</sup>
- **Congested** – (Connectrix only) Number of ports with congestion
- **Errors** – Number of ports with errors<sup>1</sup>
- **Link Reset** – (Connectrix only) Number of ports with link resets

<sup>12</sup> PowerSwitch OS10 v10.5.3.2 or later required



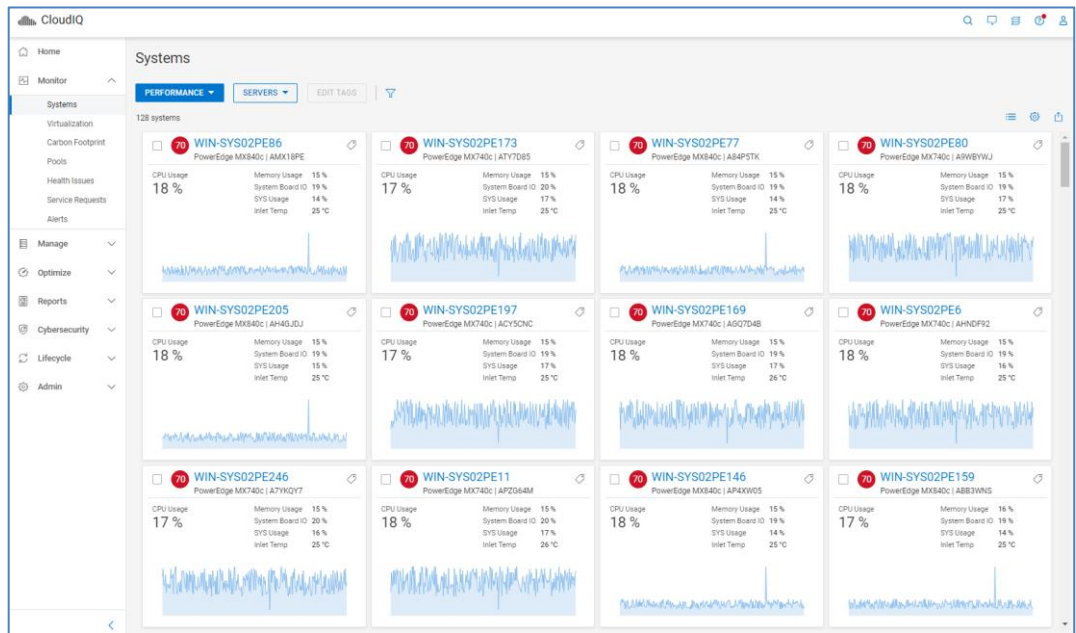
**Note:** The 24-hour bandwidth chart is displayed for Connectrix only.

VxRail systems display a 24-hour chart of CPU utilization and the 24-hour average for CPU and Memory Utilization.



PowerEdge servers show the following performance metrics:

- **CPU Usage** – Percentage of CPU consumed by the server
- **Memory Usage** – Percentage of RAM the server uses based on what is allocated
- **System Board IO**
- **SYS Usage**
- **Inlet Temp** – Temperature reading in Celsius

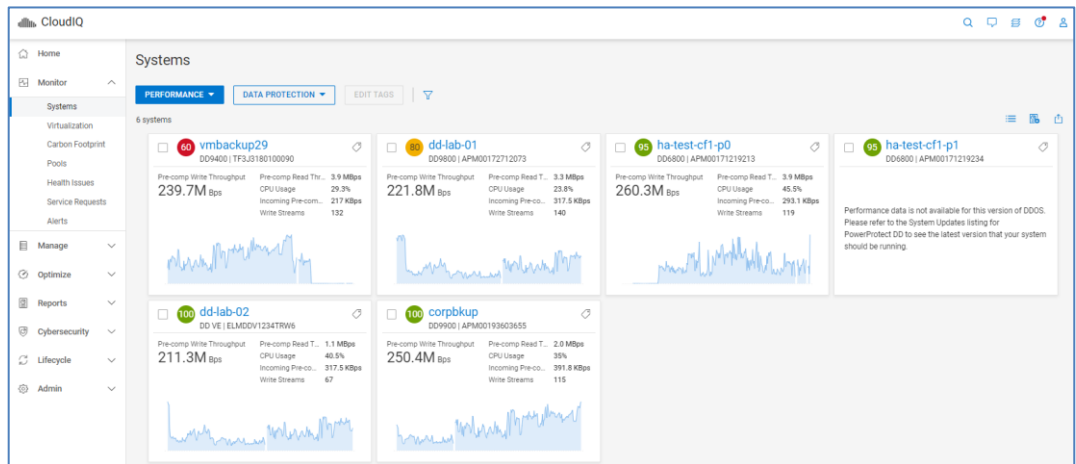


PowerProtect DD systems show the 24-hour averages for the following metrics:

- Pre-compressed Write throughput
- Pre-compressed Read throughput

CPU Usage

- Incoming Pre-compressed Replication
- Write Streams



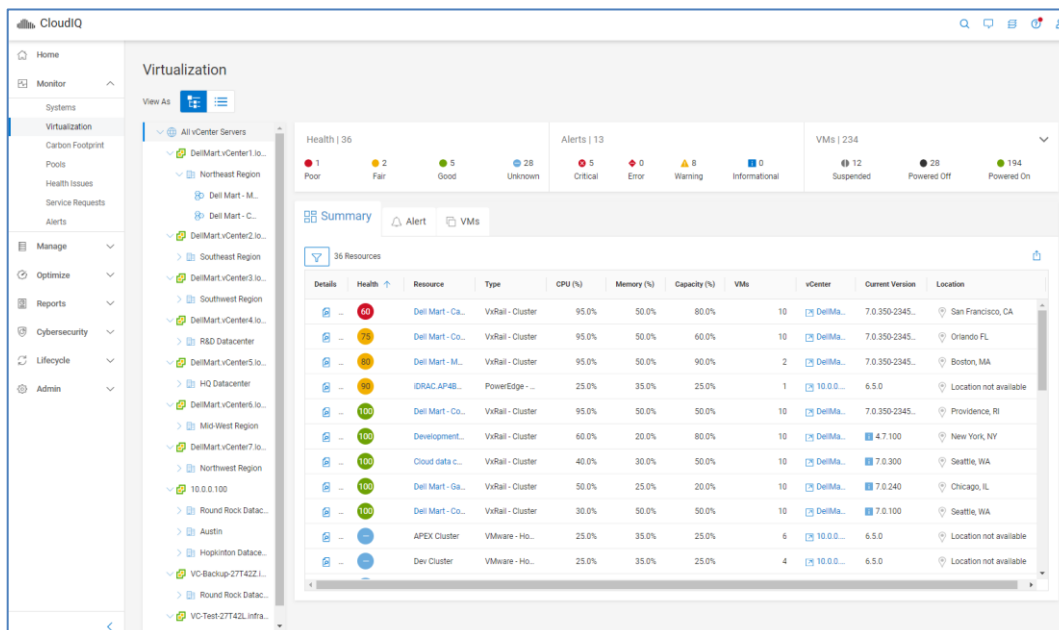
## Virtualization

The Virtualization view allows users to view VMware related information in a hierarchical navigation model similar to vCenter. It is supported for VxRail clusters and storage-based VMs collected from the CloudIQ Collector.

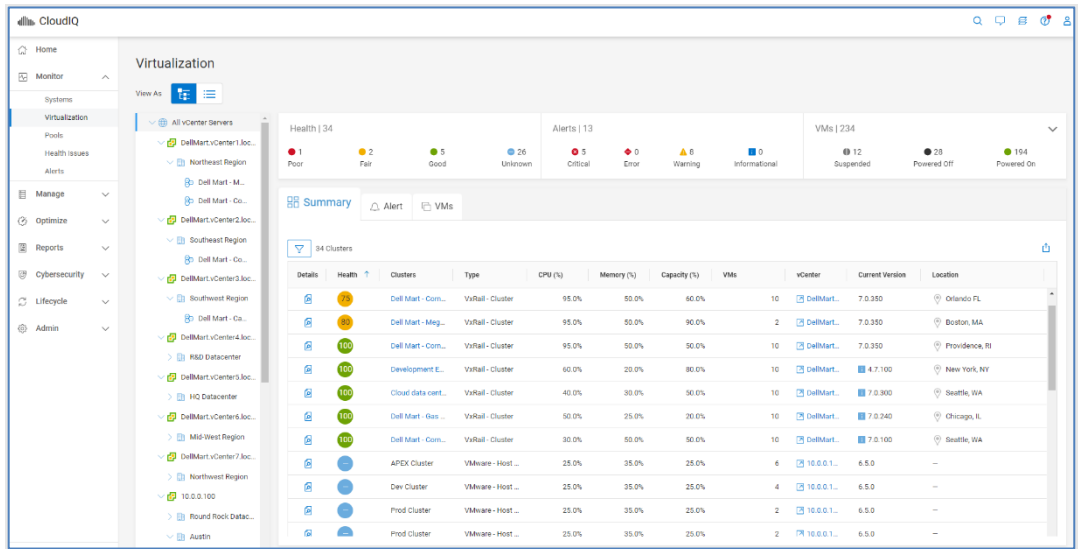
The left side of the screen shows the vCenter servers, the VMware datacenters, and the VxRail clusters or ESXi clusters. The top-right side provides a banner with a summary of clusters in each health category, a summary of alerts by severity, and a summary of VM

status. ESXi clusters show up with a health of Unknown. The Alerts summary is only applicable to VxRail Clusters. The summary is based on the selected object in the left tree. For example, if **All vCenter Servers** is selected, the banner shows all the clusters, alerts, and VMs in the environment. If an individual vCenter is selected, the banner summarizes only those clusters, alerts, and VMs in that vCenter.

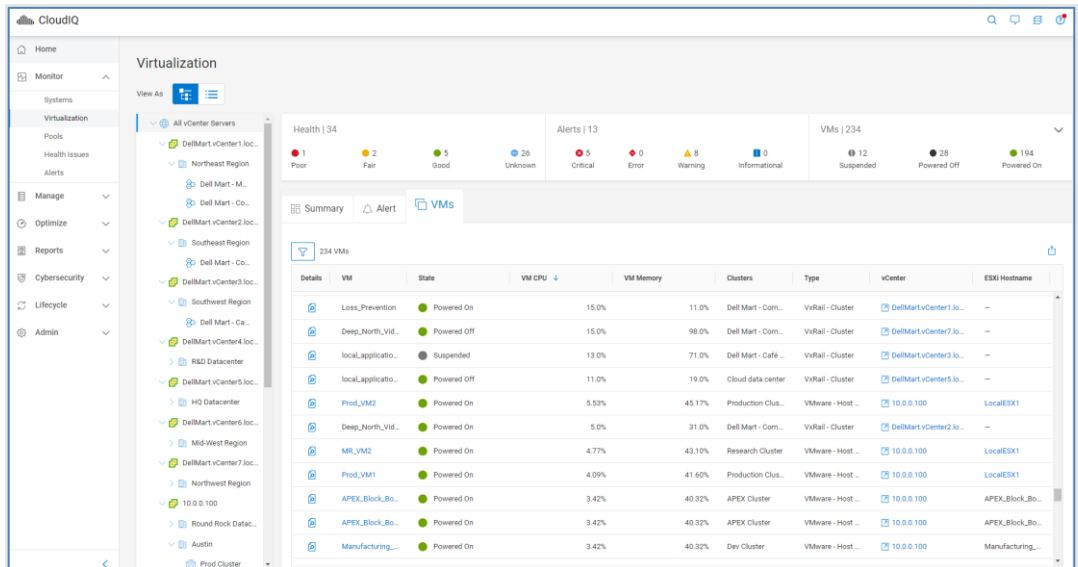
The bottom-right side has three tabs: Summary, Alerts, and VMs. The Summary tab shown provides the health score (VxRail clusters) along with CPU, Memory, and Capacity metrics, the number of VMs on each cluster, current version, location (VxRail clusters), and a link to launch vCenter. The details icon opens a window with more details for the cluster and health issue details for VxRail clusters.



The Alert tab lists the associated alert information including the description and timestamp. The Details icon opens the alert details window which includes the recommended action.



The VMs tab lists the virtual machines with their state, CPU and Memory metrics, associated cluster, cluster type, vCenter, and ESXi server. The Details icon opens the VM details window which shows more specific capacity, CPU, and Memory metrics. For storage based VMs, the storage path is provided showing datastore, type, storage object, and storage system.



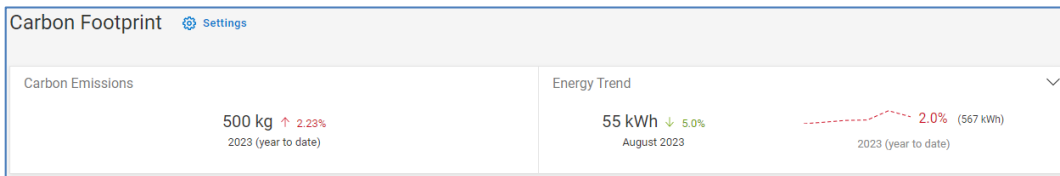
**Carbon Footprint**

The **Carbon Footprint** page provides summary, system, and workload level metrics for carbon emissions and energy usage. Sustainability has become a key topic in data center infrastructure considerations as companies strive to reach new environmental goals. CloudIQ’s carbon emissions feature gives users insights to make the best sustainability decisions for workload consolidation, IT footprint reduction, and energy efficient technology refresh.

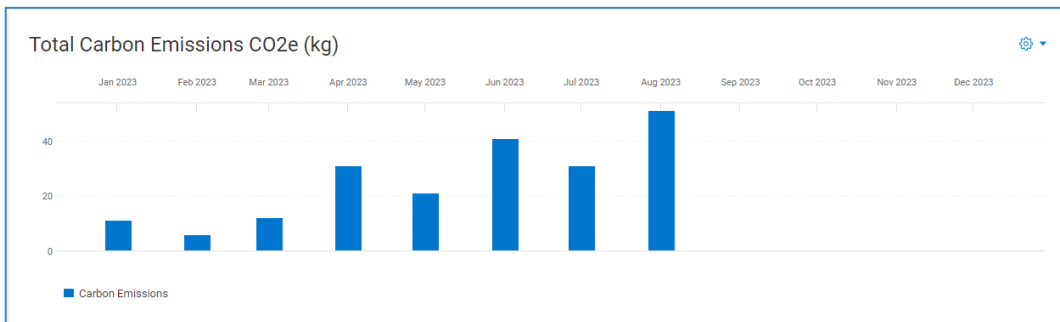
Initial products supported include PowerEdge, VxRail, Connectrix, and Unity XT. The top banner provides totals of carbon emissions and energy usage for all systems. Carbon emissions calculations are based on location specific emission factors provided by the International Energy Agency (IEA) and industry average Power Utilization Effectiveness



(PUE) values. CloudIQ administrators can override these default values by clicking the Settings button.



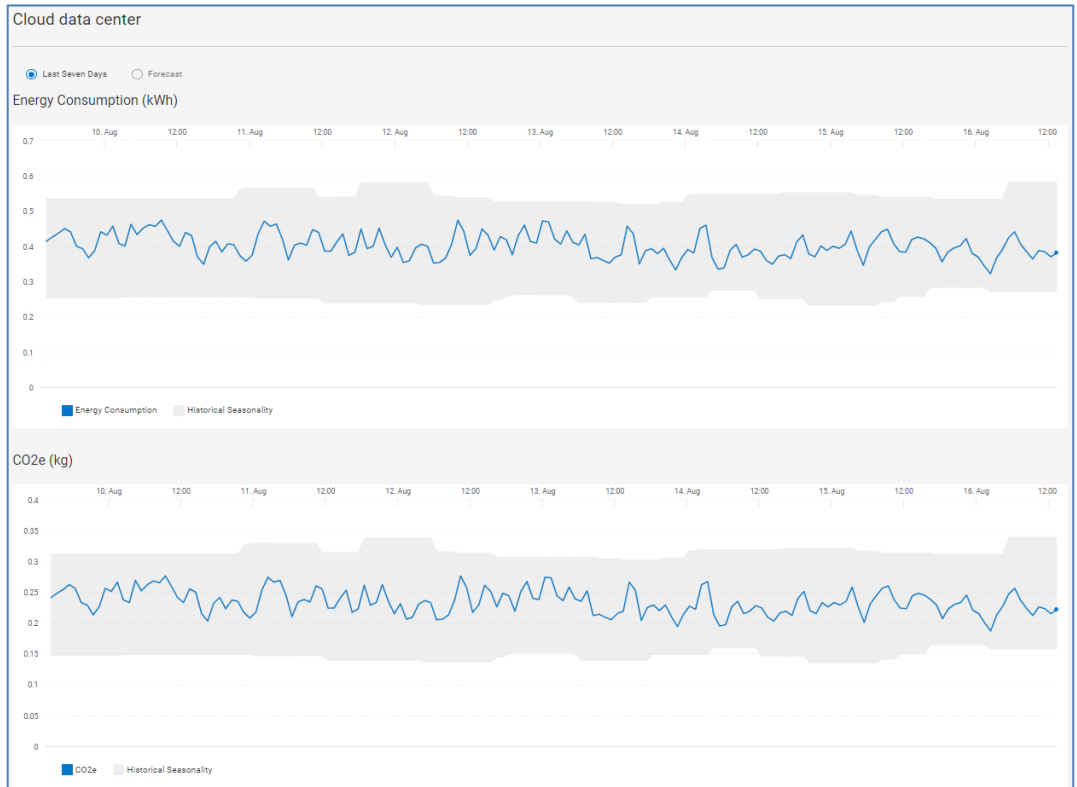
The Total Carbon Emissions chart provides a one-year trend of total carbon emissions based on monthly values. The chart can be displayed as a bar chart or a line chart.



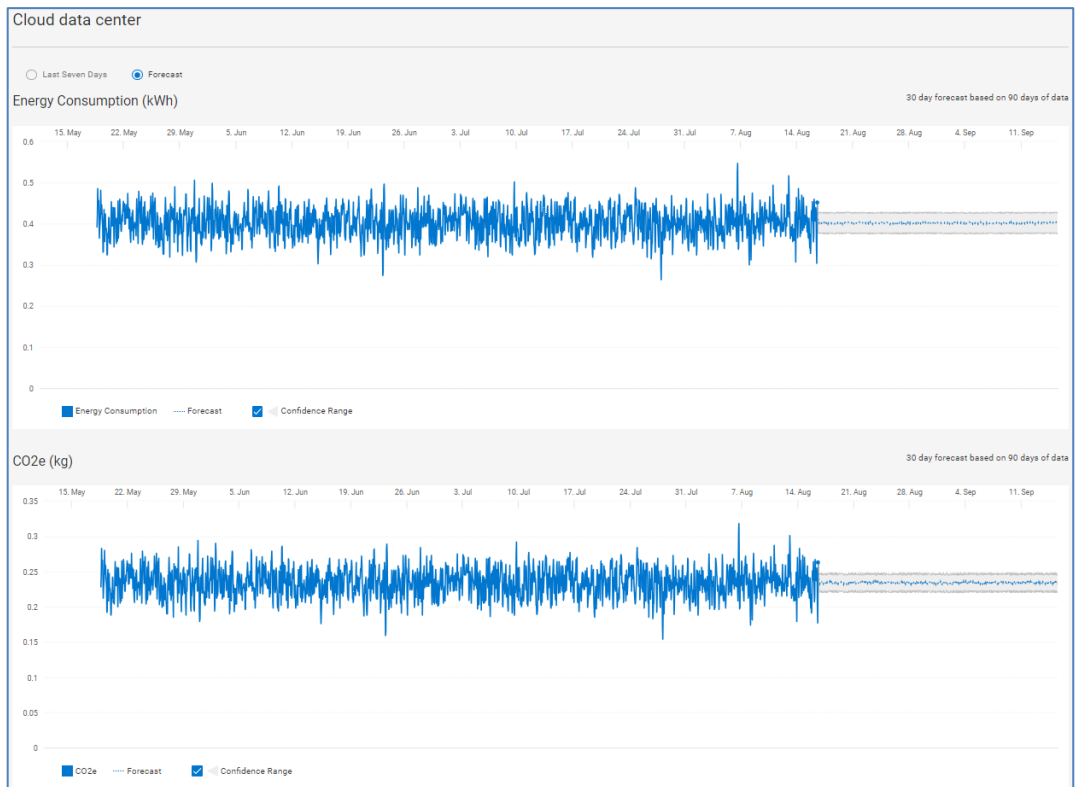
The bottom of the page is a table that lists each system, including its location, year-to-date energy usage, energy forecast, year-to-date carbon emissions usage, carbon emissions forecast, and daily power consumption. The System used capacity percentage indicates which systems have available capacity for additional workloads. The filter lets users display systems based on product type, custom tags, site, and location.

Details	Name ↑	Product	Site Name	Location	Country	YTD Energy (kWh)	Energy Forecast	YTD CO2e (kg)	CO2e Forecast (k)	Power Consumption...	Used Ca	Tags
	Cloud data c...	Virtail Cluster	Eng. Lab	Seattl...	US	1,516,667	2,275.0	882	1,323.0	2543.0	24.1	DataCenter(MA-HOP-DC1)
	Dell Mart - Ca...	Virtail Cluster	ACME Dev	San F...	USA	2,222	3,333.0	1,291,333	1,937.0	2345.0	24.3	DataCenter(MA-HOP-DC1)
	Dell Mart - Co...	Virtail Cluster	ACME Data C...	Provi...	US	1,516,667	2,275.0	882	1,323.0	3542.0	4.5	DataCenter(MA-HOP-DC3)
	Dell Mart - Co...	Virtail Cluster	SH Prod	Seattl...	US	1,516,667	2,275.0	882	1,323.0	4253.0	24.1	DataCenter(MA-HOP-DC1)
	Dell Mart - Co...	Virtail Cluster	ACME Cloud ...	Oriat...	US	1,516,667	2,275.0	882	1,323.0	4252.0	24.1	DataCenter(MA-HOP-DC1)
	Dell Mart - Ga...	Virtail Cluster	ACME Remot...	Chica...	US	1,516,667	2,275.0	882	1,323.0	4332.0	24.1	DataCenter(MA-HOP-DC1)
	Dell Mart - M...	Virtail Cluster	ACME Remot...	Bost...	US	1,516,667	2,275.0	882	1,323.0	3245.0	24.3	DataCenter(MA-HOP-DC1)
	Dev SAN	Connectra	ACME Headq...	Rioun...	US	1,516,667	2,275.0	882	1,323.0	432.0	96.8	
	Development...	Virtail Cluster	NY Metro	New ...	US	1,516,667	2,275.0	882	1,323.0	3324.0	24.1	DataCenter(MA-HOP-DC1)
	Disaster Rec...	Unity	ACME Branc...	Hopki...	USA	23,444,667	35,167.0	13,631,333	20,447.0	654.0	52.1	DataCenter(MA-HOP-DC1)
	IDRACA2FD...	PowerEdge	ACME Headq...	Hopki...	US	1,516,667	2,275.0	882	1,323.0	543.0	96.8	DataCenter(MA-HOP-DC1)
	IDRACA3NY...	PowerEdge	ACME Headq...	Hopki...	US	1,516,667	2,275.0	882	1,323.0	345.0	96.8	DataCenter(MA-HOP-DC1)

Clicking the details icon for a system displays seven-day charts for energy consumption and carbon emissions. The actual value is shown along with the historic seasonality (the expected range) that highlights any anomalies or changes in patterns.



Clicking the Forecast button shows trend and forecast data for each of these charts.



## Pools

The **Pools** page provides an aggregated listing of storage pools including PowerMax storage resource pools. The Issues column displays the number of health issues associated with any pool or storage object in that pool or a green check mark for items with no associated issues. Issues can be calculated for Unity XT family, SC Series, PowerScale/Isilon, and PowerVault. The pool name and system name are hyperlinks to the details for the item.

The Pools listing represents the raw storage on the system that is available to be provisioned as either block storage or file storage. This listing provides the Total Size (TB), Used and Subscription percentages, and Free (TB) storage within the pool that has not been provisioned for storage objects. The Time to Full range is also shown. Time to Full is based on the storage consumption measurements. The longer the pool is configured, the more accurate the prediction of Time to Full. This Time to Full measurement identifies pools that are at greatest risk of running out of storage space, and that require attention.

Issues	Name	System	Model	Total Size (TB)	Used (%)	Subscription (%)	Time To Full	Free (TB)
1	Account Management_PoolA	Account Management	MES012	1.0	94.8	130	Imminent	0.05
✓	Account Management_PoolB	Account Management	MES012	6.7	41.6	67.2	Within a quarter	3.9
✓	Business Analytics_Pool1	Business Analytics	SC7020F	85.2	18.7	65.5	Greater than quarter	63.3
✓	Cache Pool	Finance Data Center	Isilon Cluster	192 TB	82.4	100.0%	Learning	33.8 TB
1	Cache Pool1	APEX File-Austin	APEX File Storage Services	192 TB	82.4	100.0%	Learning	33.8 TB
1	Cache Pool2	APEX File-Austin	APEX File Storage Services	192 TB	71.0	100.0%	Learning	113.4 TB
1	Camera Recording Data Pool	Security Office	PowerScale Cluster	23.04 TB	91.1	100.0%	Within a day	0.46 TB
✓	Disaster Recovery_Pool1	Disaster Recovery	UNITY 400	24.7	45.3	145.5	Unpredictable	13.6
1	Disaster Recovery_Pool2	Disaster Recovery	UNITY 400	13.7	54.7	145.5	Imminent	6.2
✓	Disaster Recovery_Pool3	Disaster Recovery	UNITY 400	82.5	54.5	145.5	Within a month	37.5
—	Finance_SRP1	Finance	PowerMax_2000	90.0	88.0	90.0	Within a month	10.9
—	Finance_SRP2	Finance	PowerMax_2000	40.8	51.0	99.3	Greater than quarter	20.0
—	HR_Remote_SRP1 (FBA)	HR_Remote	PowerMax_2300	61.5 TB	9.0	44	Greater than quarter	55.9 TB

### Pool details – Properties

The information in the **Properties** tab for a pool varies depending on array type. It provides various pool attributes and any health issues associated with the pool. Expanding the issue will provide a suggested resolution. Where supported, there is a hyperlink in the upper right of the window to launch the associated element manager. The bottom of the Pool details page has different tabs of information depending on array type.

The following series of screenshots show the information for each array type.

Unity XT family and SC Series:

- Storage
- Virtual Machines
- Drives

Disaster Recovery > Disaster Recovery\_Pool2 LAUNCH UNISPHERE

Properties | Capacity | Performance

FAST Cache: -  
FAST VP Scheduler: On  
Type: Traditional

Total Issues: 1 **Capacity** 1 Issue

about 9 hours ago The storage pool 'DisasterRecovery\_Pool2' is oversubscribed and predicted to run out of space within 5 hours.

Components: -30  
Configuration: -  
Capacity: 1  
Performance: -  
Data Protection: -

STORAGE | VIRTUAL MACHINES | DRIVES

4 Storage Objects

Issues	Name ↑	Type	Size (GB)	Used (G...	Allocated (GB)	Thin Enabled	Data Reduction	Consistency Gr...	Host I/O Limit	NAS Server	Time to Fu
1	DR_Pool2_FS1	File System	6000	1320	1650	Yes	1.1:1 (5% or 256.0 MB)	-	-	NAS_Server_3	Imminent
1	DR_Pool2_FS2	File System	6000	1320	1650	Yes	1.1:1 (5% or 256.0 MB)	-	-	NAS_Server_3	Within a w
✓	DR_Pool2_LUN1	LUN	4000	-	1100	Yes	1.1:1 (5% or 256.0 MB)	ProdApp2CG	10K IOPS	-	-
✓	DR_Pool2_LUN2	LUN	4000	-	1100	Yes	1.1:1 (5% or 256.0 MB)	ProdApp2CG	10K IOPS	-	-

PowerVault:

- Storage
- Drives

Research and Development > Research and Development\_PoolB LAUNCH POWERVAULT UI

Properties | Capacity | Performance

Type: Virtual

Total Issues: 1 **Configuration** 1 Issue

2 days ago Pool 'B': A virtual disk group is missing one or more disks.

Components: -  
Configuration: 1  
Capacity: -  
Performance: -  
Data Protection: -

STORAGE | DRIVES

4 Storage Objects

Name ↑	Type	Size (GB)	Allocated (GB)
Research_Volume3	Standard	1500.0	760.0
Research_Volume4	Standard	2750.0	1230.7
Research_Volume7	Base	2500.0	2098.0
Research_Volume8	Base	1000.0	123.2

PowerScale, Isilon, and APEX File Storage Services:

- Nodes

Finance Data Center > Main Pool

Properties Capacity

Tier -  
Node Count 8  
Protection Scheme -  
L3 Cache Disabled

Total Issues 1

Capacity 1 Issue

about 9 hours ago Node pool Camera Recording Data Pool (node pool ID: 1) is at or over capacity.

Components ✓  
Configuration ✓  
Capacity 1  
Performance ✓  
Data Protection ✓

NODES

8 Nodes

Issues	Name ↑	Type	Model	Size (GB)	Used (GB)	Serial Number
✓	Node 1	Node	H500	18.6	0.7	SV200-004EIH-OZL8
✓	Node 2	Node	H500	18.6	0.7	SV200-004EIH-OZL8
✓	Node 3	Node	H500	18.6	0.7	SV200-004EIH-OZL8
✓	Node 4	Node	H500	18.6	0.7	SV200-004EIH-OZL8

PowerMax:

- No tabs

Finance > Finance\_SRP1 LAUNCH UNISPHERE

Inventory Capacity Performance

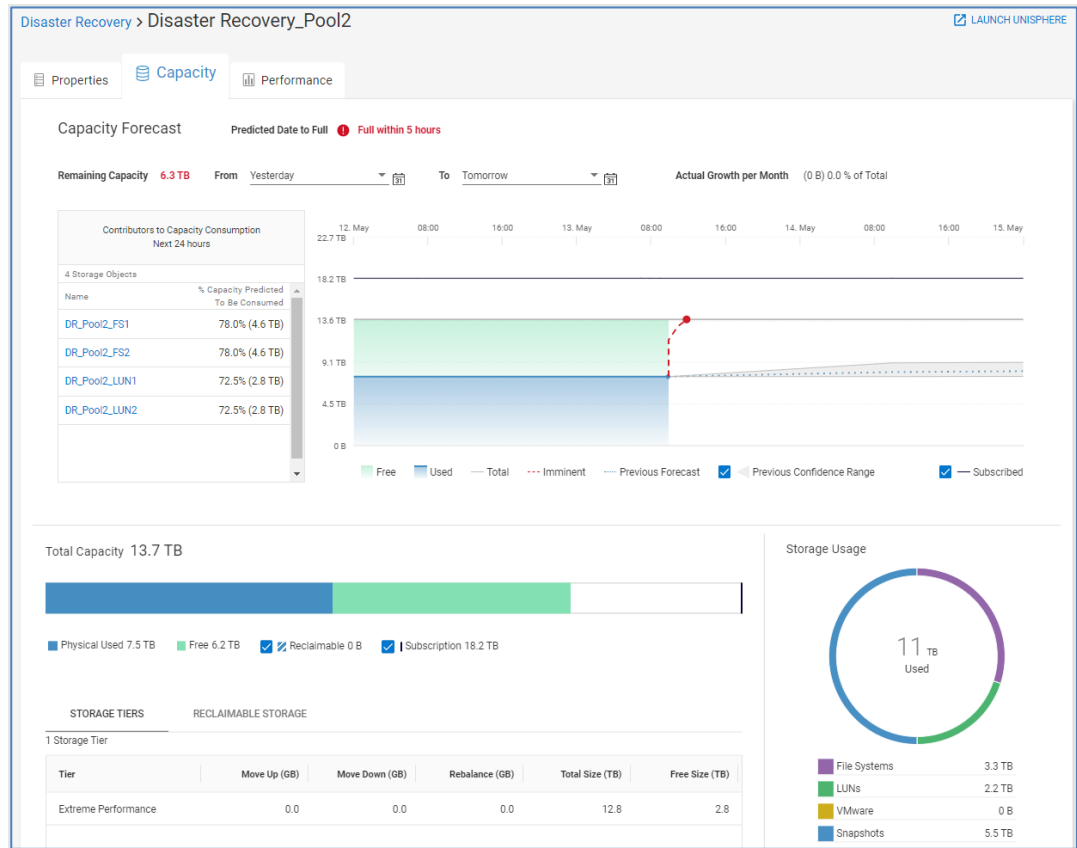
Compression Enabled Reserved Capacity 12 Description

### Pool details – Capacity

The **Capacity** tab for a pool varies based on array type.

#### *Unity XT family, PowerScale, Isilon, PowerVault*

The graph along the top displays the historical pool capacity data and the Predicted Date to Full date (Unity XT family, PowerVault, and PowerScale/Isilon). The graph shows Free, Used, Total, Forecast Used, Confidence Range, and Subscribed. The Confidence Range represents the confidence level in predicting the date to full; the wider the range, the lower the confidence level. When an imminent full condition exists, the graph also shows the Previous Forecast and Previous Confidence Range. It also shows the top storage objects predicted to contribute to capacity consumption over the next 24 hours as shown below. If the pool is in a Learning, Full, or Unpredictable state, only the historical trend graph is displayed.



The beginning of the chart is based on the selection in the “From:” field. By default, the setting is set to “3 months ago.” For pools at imminent risk, the “From:” field is set to yesterday. The following times are available from the pull-down:

- Yesterday
- 1 week ago
- 1 month ago
- 3 months ago (default)
- 6 months ago
- 1 year ago
- 2 years ago
- Custom

The end of the chart is based on the selection in the “To:” field. By default, the setting is set to “Predicted Full.” The following times are available in the pull-down:

- Today (Only historical data is shown)
- Tomorrow
- 1 week from today
- 1 month from today
- 3 months from today

- 6 months from today
- Predicted Full (default)
- Custom

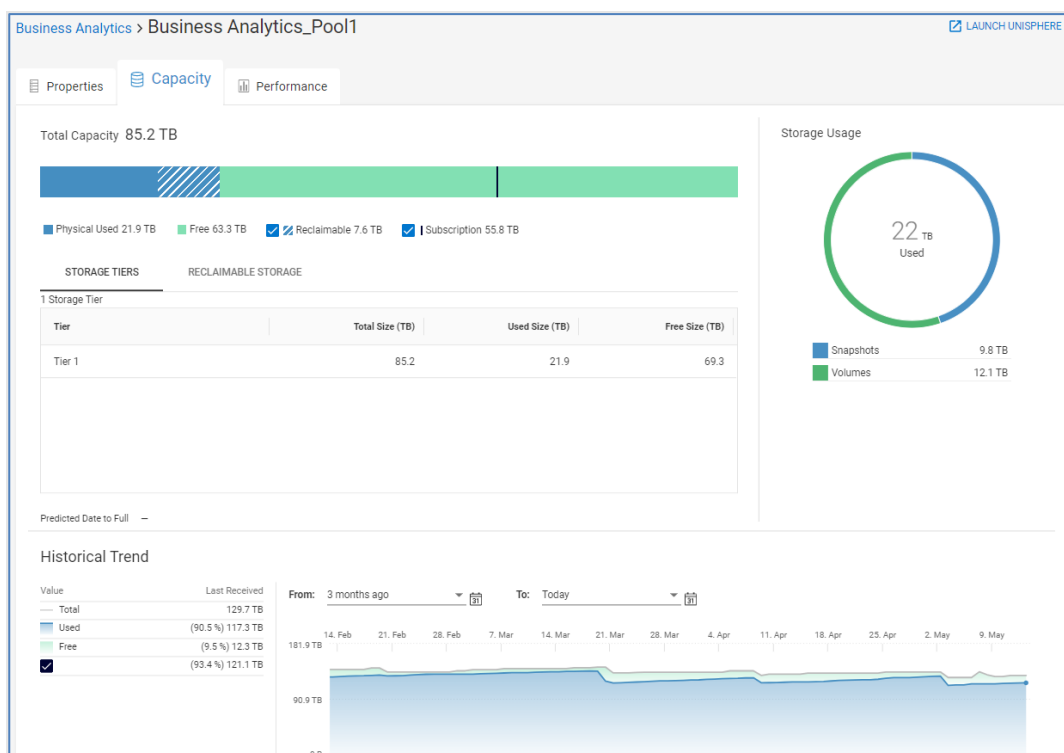
The **Subscribed** checkbox enables the user to view or hide the pool subscription data on the graph.

The **Confidence Range** checkbox enables the user to view or hide the upper and lower confidence range forecasts.

The bottom of the Pools Capacity tab provides details for the pool capacity, showing Used, Free, Reclaimable, and Subscribed. The Storage Usage ring shows how the used storage is configured.

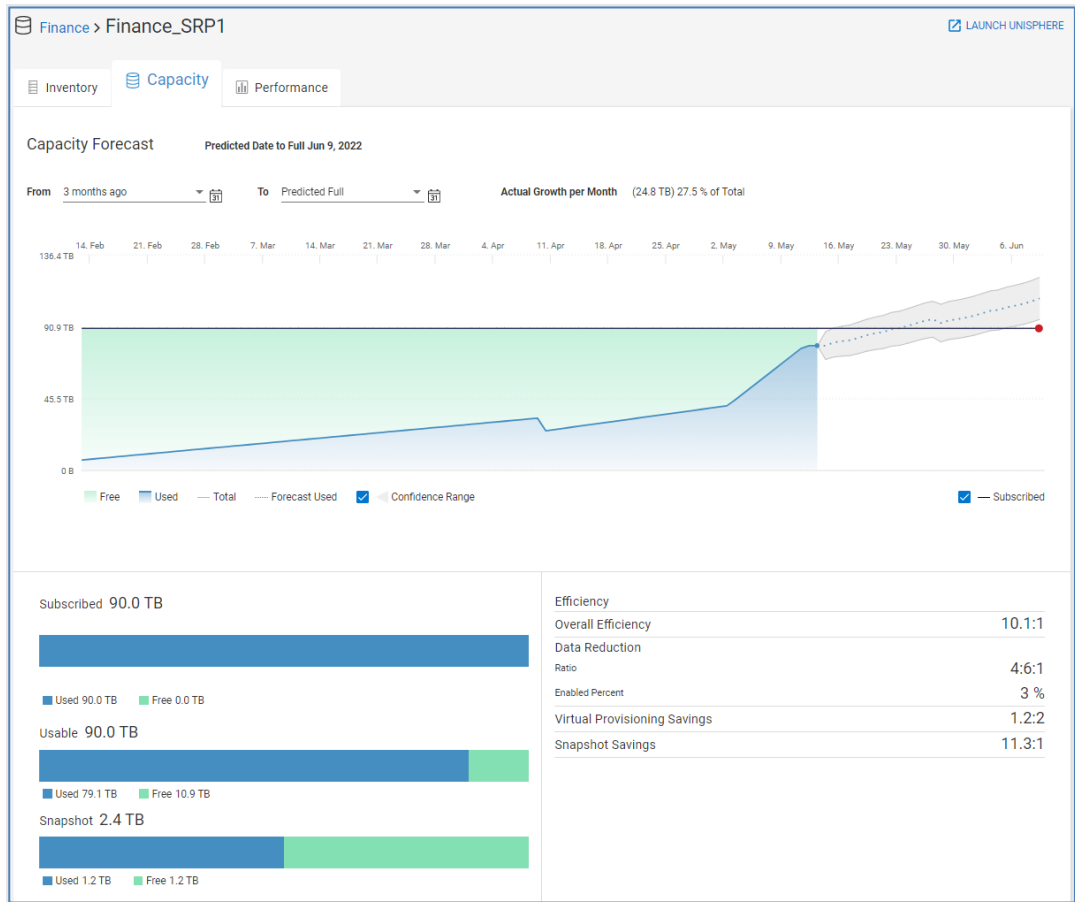
### SC Series

For SC Series, the historical trend of Total, Used, Free, and Subscribed storage is provided along with a Predicted Date to Full. However, the chart does not display forecasting data.



### PowerMax and VMAX3

For PowerMax and VMAX3 arrays, the Capacity tab displays a capacity forecast chart for storage resource pools. The bottom half of the page shows Used and Free storage in bar charts for Subscribed, Snapshot, and Usable space. It also displays the Overall Efficiency ratio. This ratio is calculated as the sum of all TDEVs plus snapshot sizes (based on 128 K track size) divided by the physical used storage (based on the compressed track size). Data Reduction ratio and enabled percentage, Virtual Provisioning savings, and Snapshot savings are also displayed.



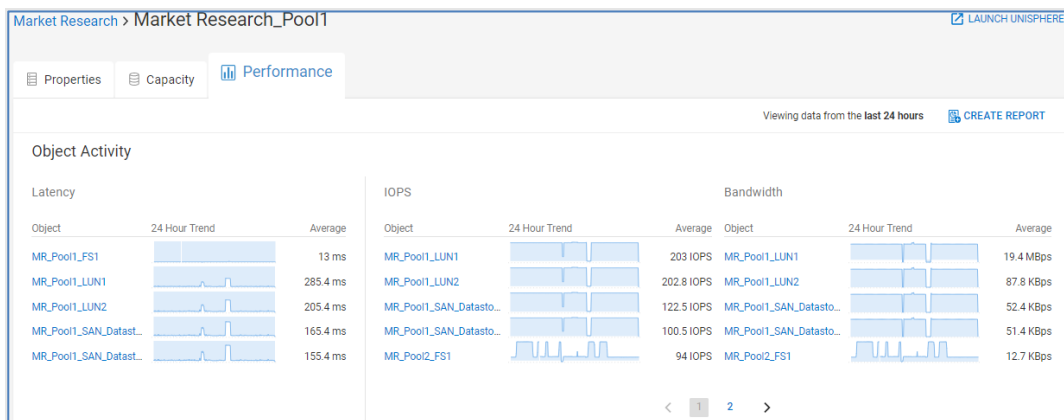
### Pool details – Performance

The **Performance** tab for pools is available for Unity XT family, SC Series, PowerMax/VMAX, and PowerVault systems. The information under the Performance tab differs slightly for each supported array type.

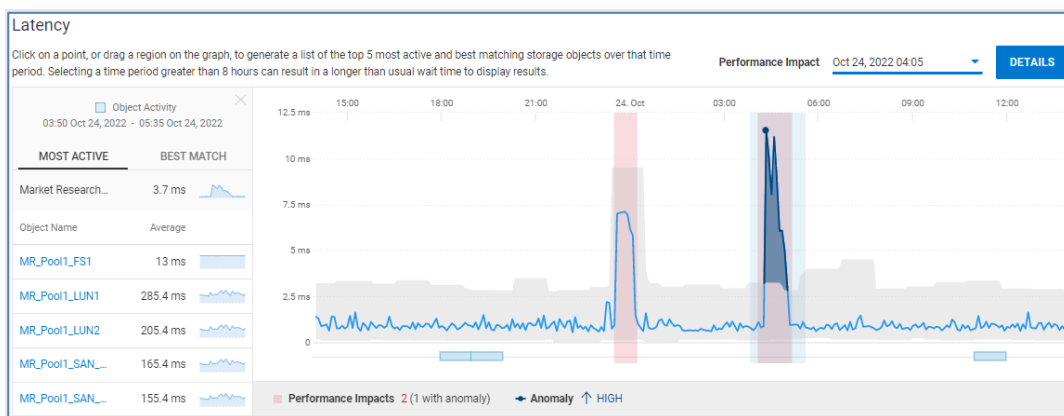
#### Unity XT

For Unity XT pools, the top of the page displays 24-hour trend lines and a 24-hour average for Latency, IOPS, and Bandwidth for both block objects and file systems. CloudIQ presents the top five objects associated to the pool. The user can scroll to see additional objects.

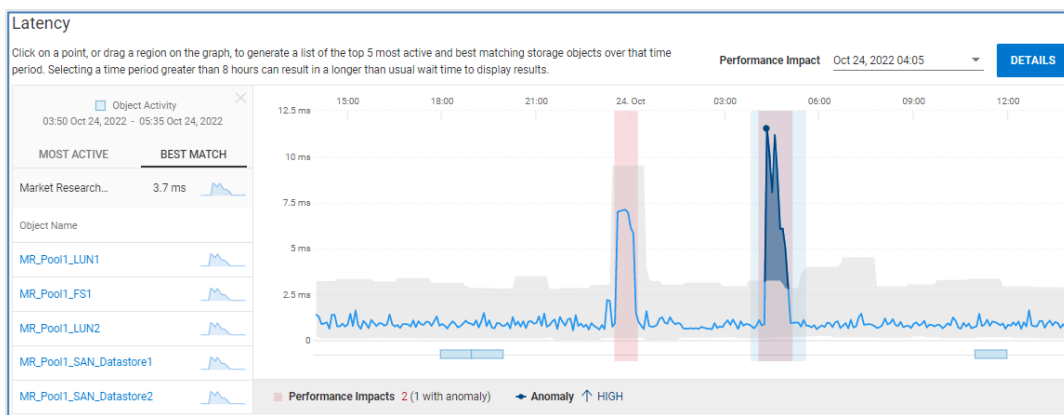




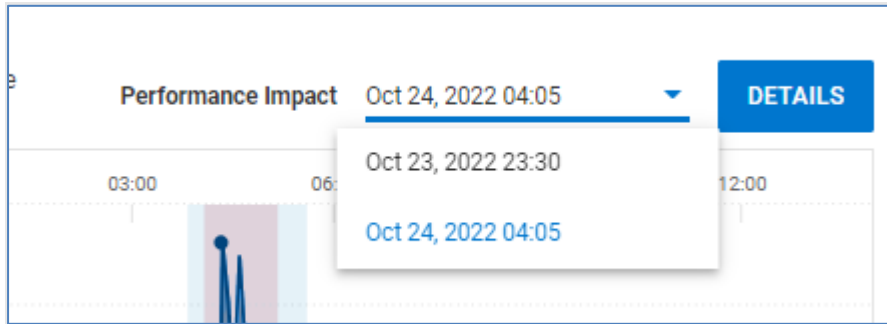
Scrolling down this view provides the user with detailed performance graphs for Latency, IOPS, Bandwidth, and Backend IOPS (one chart per tier). CloudIQ identifies and highlights not only performance anomalies on the Latency chart, but also performance impacts. Performance anomalies are highlighted in dark blue while performance impacts are highlighted in pink. Highlighting an area on the Latency, IOPS or Bandwidth performance graphs identifies up to the top five most active objects contributing to that metric over the highlighted period.



When the user selects Best Match on the left side of the chart, CloudIQ identifies up to five objects that have the highest correlation to the selected period. Best Match is available on the Block Latency, IOPS, and Bandwidth performance charts.



When there are performance impacts detected by CloudIQ, the user can view details of them by selecting the Details button in the upper right of the chart. If there are multiple performance impacts displayed on the chart, the user can select which impact to investigate by selecting the drop-down menu next to the date.

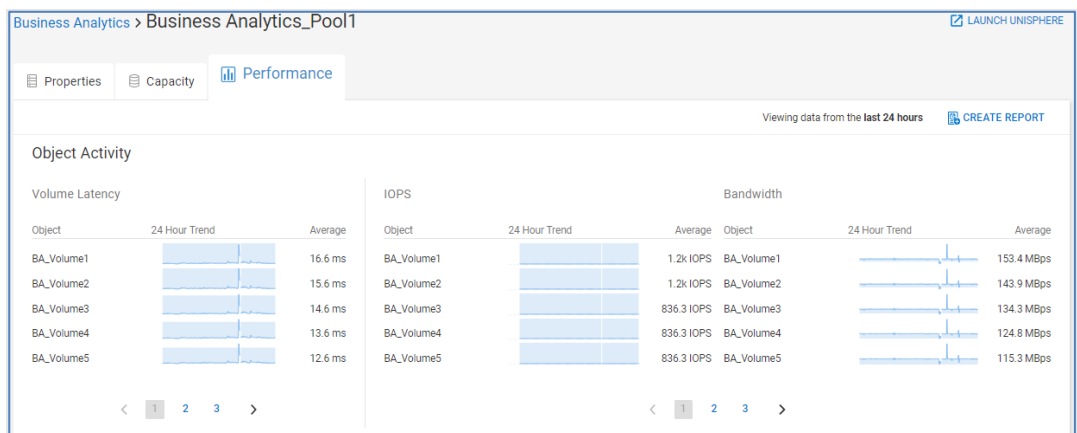


The following shows the results of the details of a performance impact. The right side of the chart shows the time of the selected performance impact and identifies the most likely causes (competing workloads) for the impact and if there is any resource contention.

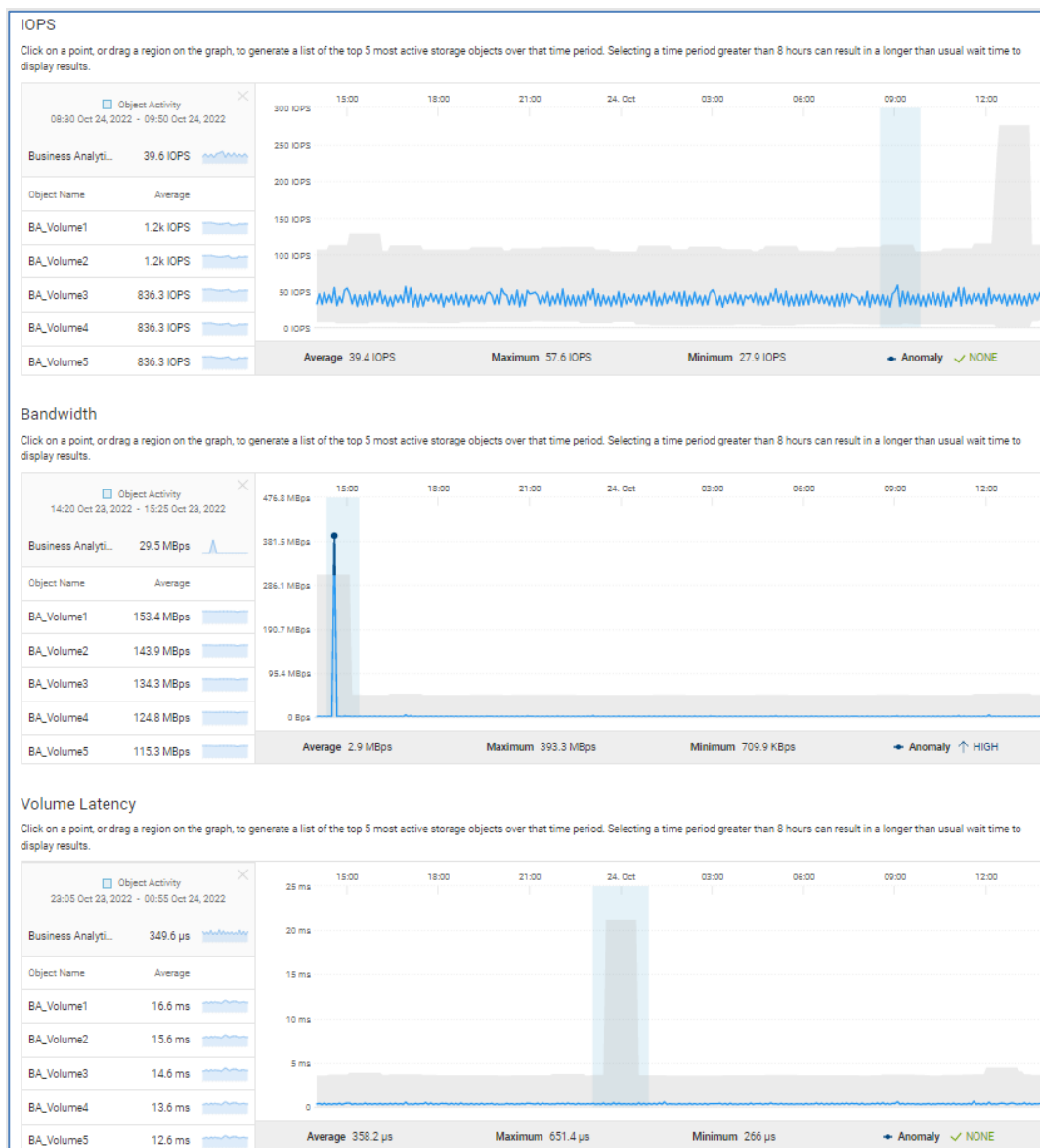


### SC Series

Similar to the Unity XT family, the top half of the Performance tab for SC Series pools displays 24-hour trend lines and a 24-hour average for Latency, IOPS, and Bandwidth.

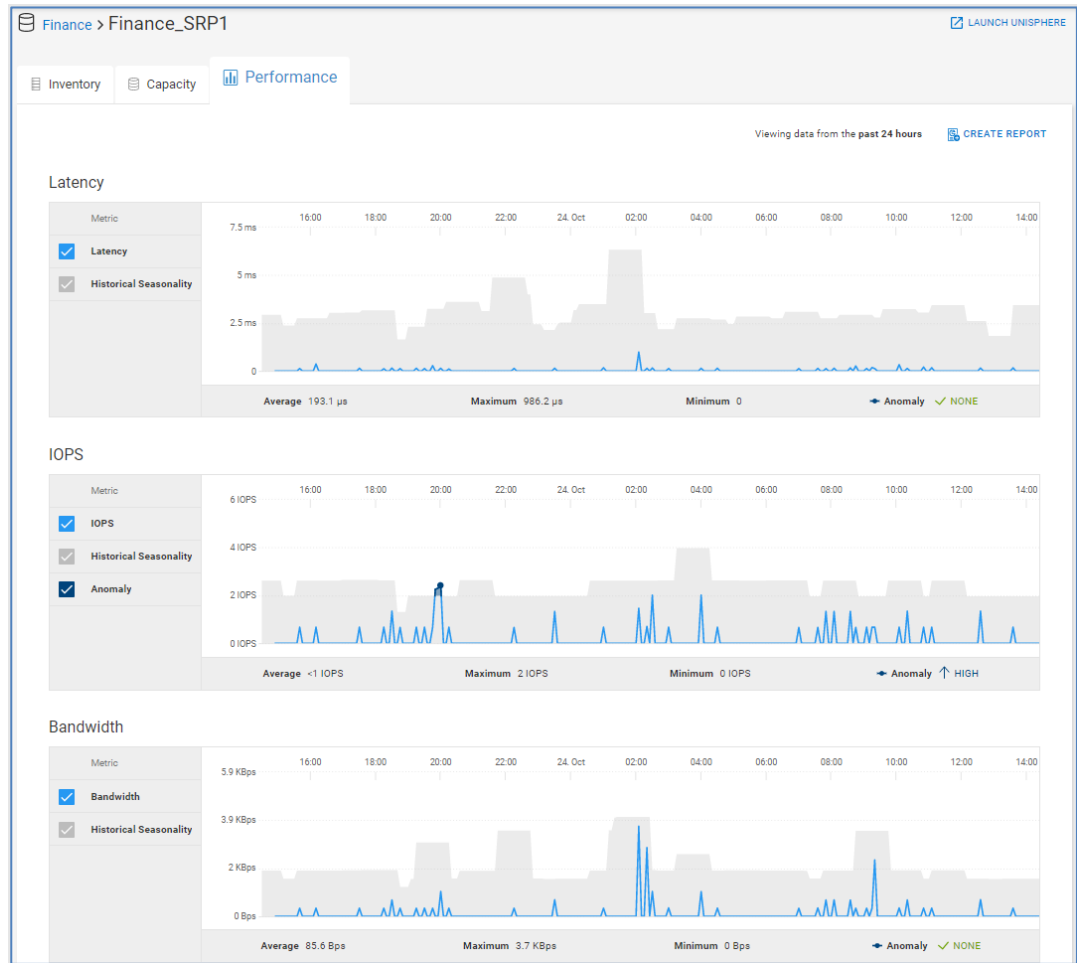


Scrolling down provides displays 24-hour performance graphs for IOPS, Bandwidth, and Volume Latency. CloudIQ identifies and highlights performance anomalies on each performance chart for SC Series pools. Highlighting an area in any of these graphs identifies the top volumes contributing to that metric during the highlighted period.



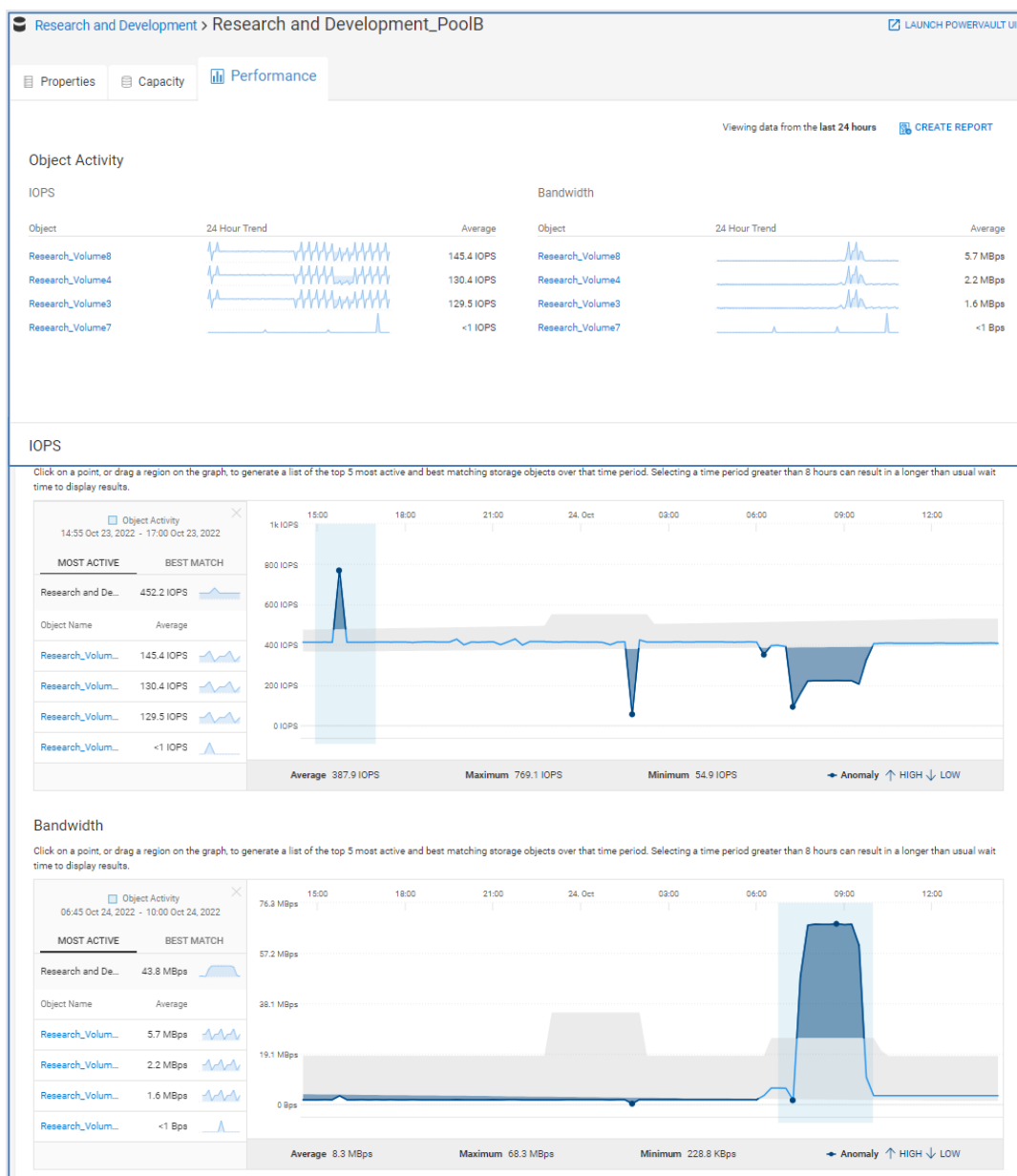
### PowerMax

The Performance tab for PowerMax Storage Resource Pools provides 24-hour charts for Latency, IOPS, Bandwidth, %Read, IO Size, and Queue Length. CloudIQ highlights performance anomalies for each chart in the SRP Performance tab. The pool performance charts for PowerMax are not selectable.



### PowerVault

The Performance tab for PowerVault pools also displays top object activity on the top half of the page and 24-hour charts at the bottom of the page. Metrics displayed include IOPS and Bandwidth. Selecting an area in the IOPS and Bandwidth charts displays the top volumes contributing to that metric during that time period under the Most Active tab. The Best Match tab shows up to five objects with the highest correlation to the selected period.



**Note:** The Performance tab is not yet supported for PowerScale/Isilon pools.

## Health Issues

The Health Issues page displays a comprehensive view of all current health issues across the environment grouped by system. Expanding the system shows all health issues on the system. The Details icon opens a details window that includes the recommended remediation.

The user can click the Filter icon to show a subset of systems based on the system name or product type. When the user starts typing the name of the system, a prepopulated list of system names is displayed that contains the entered text.

## Monitor

The screenshot shows the CloudIQ Health Issues page. The left sidebar contains navigation options like Home, Monitor, Systems, Virtualization, Pools, Health Issues, Alerts, Manage, Optimize, Reports, Cybersecurity, Lifecycle, and Admin. The main content area displays a table of health issues for various systems.

Health Score	System	Issues	Category	Last Health Scan
60	Test_Dev (UnityVSA)	3	-	Tue, Sep 27 2022, 2:43:37 PM UTC
60	APEX-Block-Boston (APEX Block Storage Services)	1	-	Tue, Sep 27 2022, 2:31:37 PM UTC
60	Account Management (ME5012)	6	-	Tue, Sep 27 2022, 2:27:37 PM UTC
-40	Controller A: The controller is not operational.	-	Components	-
-30	The storage pool Account Management_PoolA is oversubscribed and growing at a substantially in...	-	Capacity	-
-10	Disk 0:09: The disk in this slot or the midplane has a probable hardware failure.	-	Components	-
-10	Disk 0:04: The disk in this slot or the midplane has a probable hardware failure.	-	Components	-
-10	Disk 0:10: The disk in this slot or the midplane has a probable hardware failure.	-	Components	-
-5	The Disk group scrub interval 24 is less than recommended value 360. This may impact the health ...	-	Configuration	-
60	Security Office (PowerScale Cluster)	2	-	Tue, Sep 27 2022, 2:37:37 PM UTC
60	Dell Mart - Café Market San Francisco, CA (Virtail 0560)	4	-	Tue, Sep 27 2022, 1:54:37 PM UTC
60	vmbackup29 (D69400)	1	-	Tue, Sep 27 2022, 2:48:37 PM UTC
60	Production PowerSwitch East (S5296-0A)	2	-	Tue, Sep 27 2022, 2:22:37 PM UTC
70	Disaster Recovery (UNITY 400)	6	-	Tue, Sep 27 2022, 2:41:37 PM UTC
70	HR.Remote (PowerMax_2500)	2	-	Tue, Sep 27 2022, 2:38:37 PM UTC
70	Manufacturing.Dev (PowerStore 9000)	1	-	Tue, Sep 27 2022, 1:58:37 PM UTC

## Service Requests

The **Service Requests** page lists all service requests open against systems monitored by CloudIQ. The table identifies escalated service requests, service request number, status, creation date, and affected system. Clicking the hyperlink in the **Request #** column directs the user to the service request on the Dell support page.

The screenshot shows the CloudIQ Service Requests page. The left sidebar is similar to the Health Issues page. The main content area displays a table of service requests.

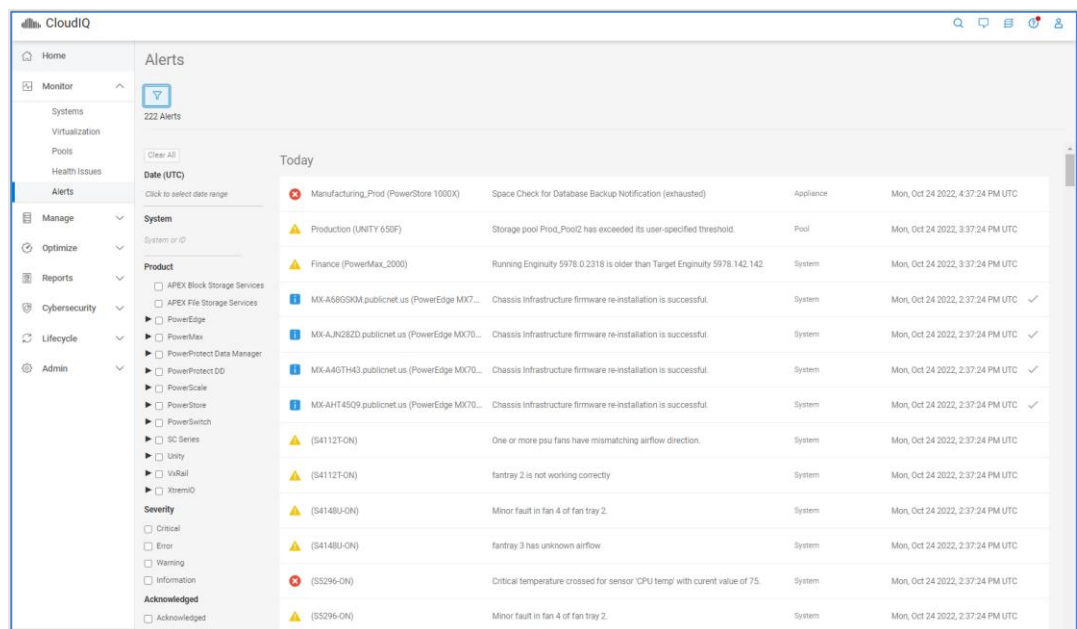
Escalation	Request #	Summary	Status	Date	System	Identifier
-	<a href="#">11098070</a>	Product problem	Assigning	Sep 24, 2022 6:40:50 AM UTC	Production	FCNCH0972C32F1
1	<a href="#">11098071</a>	Unable to access with admin / service - Technical assistance...	Assigning	Sep 24, 2022 6:32:29 AM UTC	Market Research	FCNCH0972C32F4
1	<a href="#">11098072</a>	Access issue on support platform	Assigning	Sep 24, 2022 6:32:41 AM UTC	Test_Dev	FCNCH0972C32F3
1	<a href="#">11098073</a>	Upgrade request	Assigning	Sep 24, 2022 6:35:28 AM UTC	HR Data Center	ELMISLFAGEF456
-	<a href="#">11098074</a>	Failed hard drive to be replaced	Assigning	Sep 24, 2022 6:41:33 AM UTC	Finance Data Center	ELMISLFAGEF123
-	<a href="#">11098075</a>	Licensing install issue	Working	Aug 2, 2022 4:02:36 AM UTC	Dell Mart - Café Mar...	HR21LH20000000
1	<a href="#">11098076</a>	Data unavailable / Data loss	Working	Sep 24, 2022 6:40:54 AM UTC	Dell Mart - Mega M...	23HBYK20000000
-	<a href="#">11098077</a>	Physical installation appointment	Working	Sep 24, 2022 6:32:36 AM UTC	Dell Mart - Comer/G...	52LBYK20000000
-	<a href="#">11098078</a>	Health check / Connectivity	Awaiting action	Sep 24, 2022 6:35:43 AM UTC	Prod with iCDM	SI000174657100
1	<a href="#">11098079</a>	Super user not working	Awaiting action	Nov 11, 2022 7:10:18 PM UTC	Production SAN Ext...	EAF300M001

## Alerts

The **Alerts** page displays all alerts associated with the monitored systems. The Filter icon allows the user to filter alerts based on the following criteria:

- **Date** – Date range
- **System** – System Name or ID
- **Product** – Product type
  - APEX Block Storage Services
  - APEX File Storage Services
  - PowerEdge
  - PowerFlex

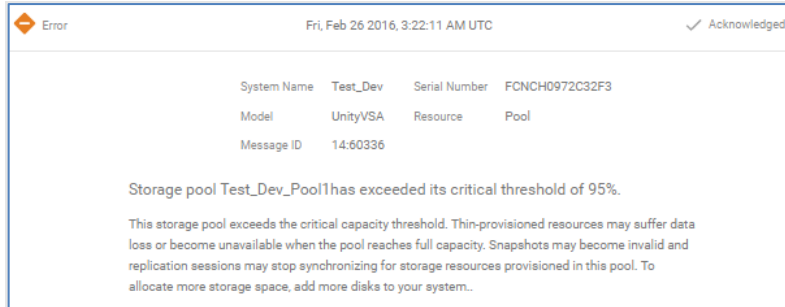
- PowerMax
  - PowerProtect Data Manager
  - PowerProtect DD
  - PowerScale
  - PowerStore
  - PowerSwitch
  - SC Series
  - Unity XT family
  - VxRail
  - XtremIO
- **Severity**
    - Critical – Event that has significant impact on the system and needs to be remedied immediately
    - Error – Event that has minor impact on the system and needs to be remedied
    - Warning – Event that administrators should be aware of but has no significant impact on the system
    - Information – Event that does not impact the system functions
  - **Acknowledged**
    - Acknowledged – Event that has been reviewed and acknowledged on the system
    - Unacknowledged – Event that has not been acknowledged on the system



**Note:**

- Alerts shown in CloudIQ originate from the system and can only be acknowledged, unacknowledged, and cleared on the system.
- Alerts for PowerVault, Connectrix, and VxBlock systems are not yet supported.

The alerts are grouped in current and weekly sections. A checkmark on the right side of the alert row indicates that the alert has been acknowledged. More details pertaining to an alert can be seen by selecting the alert.



## Manage

### System Updates

The System Updates page has up to five tabs: Storage, Networking, HCI, Data Protection, and Server.

#### Storage

The Storage tab displays a list of all available system code, management software, and drive firmware updates across all supported systems. It includes the system name, update category, update type, the current version, and recommended version. The Recommended Update column is a hyperlink to the code allowing the user to quickly access the update code. Selecting the “>” icon expands the row to display the Release Summary with more details about the update and a link to the release notes for the system update.

This page also allows users to stage Unity XT code updates to the array. By selecting the Unity XT family arrays and the Stage to Array button, the code in the Recommended Update column is downloaded to the arrays. The user can log in to Unisphere and initiate the code upgrade at an appropriate time.

The user can filter the results by selecting the Filter icon, sort any of the columns and export the list to a CSV file.



System	Identifier	Model	Update Type	Current Version	Update Version	Update Category	Drive Count	Staged
000194900732	000194900732	VMAX3SE	Mgmt Software	V9.0.2.12	V9.2.3.20	Latest	-	-
<b>Release Summary</b> V9.2.3.19 is the latest Unisphere for PowerMax release version for Dell EMC VMAX Models: VMAX SE, VMAX 10K, VMAX 20K, and VMAX 40K. <a href="#">Release Notes</a>								
Business Analytics	95148	SC7020F	System Code	07.03.01.999	07.03.05	Recommended	-	-
Disaster Recovery	FCNCH0972C32F2	Unity 400	System Code	4.2.0.9433914	4.2.1.951234	Urgent	-	-
Disaster Recovery	FCNCH0972C32F2	Unity 400	Drive Firmware	C332.C333	C334	Recommended	4	-
Finance	000197900049	PowerMax_2000	System Code	5882.309.401	5978.221.221	Recommended	-	-
Finance	000197900049	PowerMax_2000	Mgmt Software	V9.0.2.5	V9.0.2.10	Recommended	-	-
me4c64	C3MNSM	ME4084	System Code	07280906-02	07280909...	Recommended	-	-
Production	FCNCH0972C32F1	Unity 650F	System Code	4.2.0.9433914	4.4.0.15947...	Recommended	-	-
Remote DC	92252	SC5020F	System Code	07.03.01.999	07.03.05	Recommended	-	-
Replication-2	8X3MDEV2	ME4012	System Code	07280906-02	07280910...	Latest	-	-
xbrickadm1076	XI000174657545	X2-S	Mgmt Software	6.4.0-11	6.4.0-22	Recommended	-	-

**Note:** The System Updates listing in CloudIQ does not support PowerScale/Isilon, PowerFlex, and PowerSwitch.

## Networking

The Networking tab provides a list of recommended switch firmware updates for Connectrix switches.

System	Identifier	Model	Update Type	Current Version	Update Version	Update Category	Drive Count
Production East	JPG194000DK	Connectrix MDS-9396	Switch Firmware	8.3(2)	8.5(1)	Recommended	-
<b>Release Summary</b> The below recommended target versions are available now. <a href="#">Release Notes</a>							
Production SAN Extension	EAF300M001	Connectrix ED-DCX6-4B	Switch Firmware	8.2.1a	v8.2.2a	Recommended	-
Production West	JPG194001DK	Connectrix MDS-9718	Switch Firmware	8.3(2)	8.3(2a)	Urgent	-
SRDF LINK	EAF300M000	Connectrix DS-6510	Switch Firmware	9.0.0a	v9.0.1c	Recommended	-

## HCI

The HCI tab allows users to initiate multi-system updates from CloudIQ. Users can run pre-check, code download, and system update tasks on their VxRail clusters. The top of the page provides a chart with the VxRail software distribution for all monitored VxRail clusters. The bottom of the page lists each cluster along with various information such as current version, target version, and vCenter hostname. CloudIQ intelligently provides a list of all possible target versions based on the current cluster version. Selecting the details icon provides additional information about the current installation timestamp, the update file size, and the component current and target versions.

**VxRail Current Versions**

7.0.240	50.0%
4.7.100	12.5%
7.0.300	12.5%
Other	25.0%

Cluster Name	Status	Current	Target	vCenter	Estimated Time
Dell Mart - Corner M...	Not Supported	8.0.010	8.0.100	DellMart.vCenter1.lo...	-
Dell Mart - Mega Ma...	Not Supported	7.0.240	7.0.300	DellMart.vCenter1.lo...	-
Dell Mart - Corner/G...	Not Supported	7.0.240	7.0.320	DellMart.vCenter2.lo...	-
Dell Mart - Café Mar...	Not Supported	7.0.240	7.0.320	DellMart.vCenter3.lo...	-
Development Enviro...	Available	4.7.100	7.0.300	DellMart.vCenter4.lo...	-
Cloud data center	Available	7.0.300	7.0.350	DellMart.vCenter5.lo...	-
Dell Mart - Gas Mark...	Available	7.0.240	7.0.320	DellMart.vCenter6.lo...	-
Dell Mart - Corner M...	Available	7.0.100	7.0.320	DellMart.vCenter7.lo...	-

Component	Current	Target
VxRail Manager	4.7.510	→ 7.0.300
VxRail Manager VIB	4.7.510	→ 7.0.300
VMware vCenter Server	6.7.0	→ 7.0.300
VMware ESXi	6.7.0	→ 7.0.300
Dell PTAgent	1.9.4	→ 1.9.6

When preparing for a cluster update, users can run the Pre-check task. The Pre-check task determines the cluster’s readiness for a system update and includes the checks found in VxVerify. The Pre-check task produces a pass/fail status with a job report that lists the details of each check. If a check fails, the job report provides a link to a knowledge base article that users can review to help remediate the issue before proceeding with a code download and system update. This is covered in more detail in the [CloudIQ administration](#) section of this paper.

The Download task downloads and stages the update bundle onto the VxRail Manager VM of the cluster. This operation performs a change analysis between the existing software version running on the cluster and the selected target version. It then identifies and bundles only the necessary component files needed for the system update. This intelligent bundling can significantly reduce file transfer size and download times for all clusters, and particularly for those clusters at remote sites with limited bandwidth.

Once the Pre-check and Download tasks are successful, users can confidently run the Update task. Users can select a combination of tasks at once. For example, instead of running each task individually, they could select both the Pre-check and Download tasks and then come back and initiate the Update task. They could also select all three tasks. If a task failure occurs, the remaining tasks will not run.

### Data Protection

The Data Protection tab lists recommended updates for PowerProtect DM instances and PowerProtect DD series appliances.

System Updates

STORAGE NETWORKING HCI DATA PROTECTION SERVER

3 Updates STAGE TO ARRAY As of Aug 16, 2023, 5:47:30 PM (UTC)

System	Identifier	Model	Update Type	Current Version	Update Ver...	Update Cate...	Drive Count	Staged
dk-ppdm-prod1	ELMPPD0620H1DN	PowerProtectDM	System Code	19.8.0-5	<a href="#">19.11.0-14</a>	Latest	-	
<p><b>Release Summary</b></p> <p>This 19.11 release, is the latest update to the PowerProtect Data Manager software. PowerProtect Data Manager is an enterprise solution that provides software-defined data protection, deduplication, operational agility, self-service, and IT governance. PowerProtect Data Manager key features include the following: Software-defined data protection with integrated deduplication, replication, and reuse Data backup and recovery self-service operations from native applications that are combined with central IT governance. Please refer to release notes and deployment guides prior to installation or update. These guides are now available from the Dell Technologies support site. If you are updating from version 19.10 and have deployed the reporting engine, see the PowerProtect Data Manager Administration and User Guide for reporting enginespecific considerations.</p> <p><a href="#">Release Notes</a></p>								
ha-test-cf1-p1	AFM00171219234	DD6800	System Code	7.4.0.5	<a href="#">7.7.3.0</a>	LTS (2022)	-	
ppdm01	ELMPPD0821607J	PowerProtectDM	System Code	19.9.0-13	<a href="#">19.11.0-14</a>	Latest	-	

### Server

The Server tab lets users initiate BIOS and firmware updates for their PowerEdge servers and chassis. OpenManage Enterprise v3.10 or later with CloudIQ plugin v1.2 or later are required and the Remote Management option must be enabled in the CloudIQ plugin in OME. Also, users must have the Server Admin role in CloudIQ to initiate updates. See [Identity Management](#) for more information about CloudIQ roles.

The top banner summarizes the updates by severity for both device level and component level updates. The bottom of the page lists all available updates per system. Expanding the system lists each of the available component updates. The latest version available column provides hyperlinks to the description of the update on the Dell support site.

The filter lets users filter out the table based on system name, location, site ID, product type, update severity, software type, and category.

System Updates

STORAGE NETWORKING HCI DATA PROTECTION SERVER

Device Level Compliance: 17 Urgent, 16 Recommended, 12 Optional, 9 Downgrade, 74 Up To Date, 0 Not Available

Component Level Compliance: 33 Urgent, 80 Recommended, 103 Optional, 32 Downgrade, 625 Up To Date, 9 Not Available

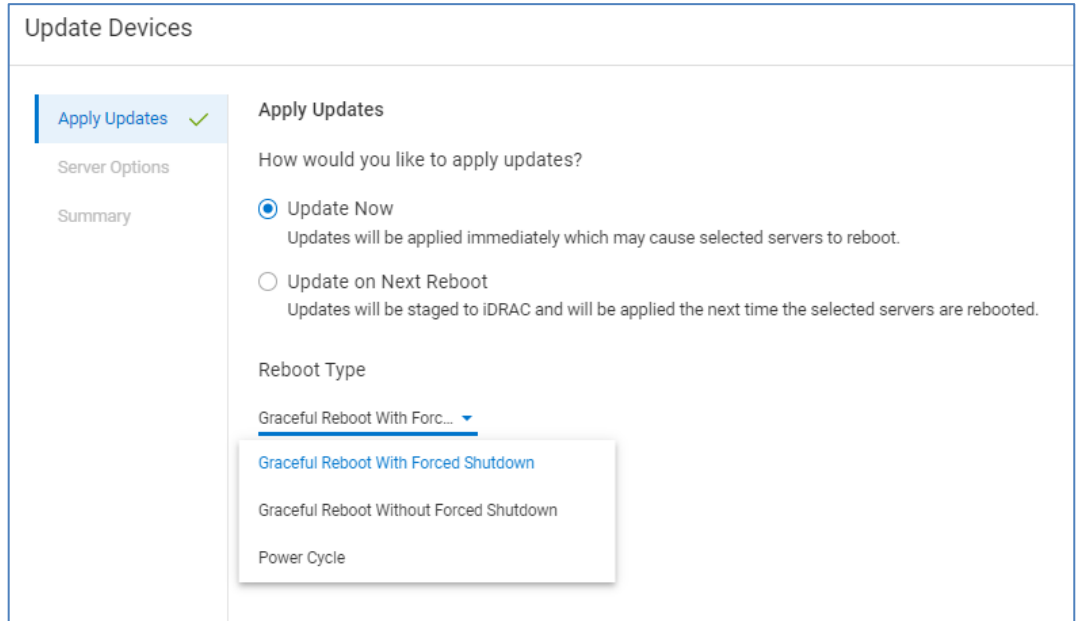
128 Systems UPDATE 14 components across 3 devices Selected

System Name	Update Severity	Model	Service Tag	Management IP	OME IP Address																																																												
WIN28YM7C2	Urgent	PowerEdge M1000e	AJDJYT	198.51.100.2	198.51.100.201																																																												
<p><b>Component Name</b>   <b>Update Severity</b>   <b>Current Version</b>   <b>Latest Version Available</b>   <b>Category</b>   <b>Software Type</b></p> <tr> <td>140 Expander Backplane</td> <td>Urgent</td> <td>4.25</td> <td><a href="#">5.3</a></td> <td>Firmware</td> <td>FRMW</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Urgent</td> <td>1.6.11</td> <td><a href="#">3.1</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td colspan="6"> <p><b>Component Name</b>   <b>Update Severity</b>   <b>Current Version</b>   <b>Latest Version Available</b>   <b>Category</b>   <b>Software Type</b></p> <tr> <td>Expander Backplane</td> <td>Recommended</td> <td>4.25</td> <td><a href="#">4.3</a></td> <td>Network</td> <td>FRMW</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Recommended</td> <td>1.6.11</td> <td><a href="#">1.8</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Recommended</td> <td>1.0.2</td> <td><a href="#">1.1</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td>iDRAC with Lifecycle Controller</td> <td>Recommended</td> <td>4.11.11.11</td> <td><a href="#">4.12</a></td> <td>BIOS</td> <td>FRMW</td> </tr> </td></tr> <tr> <td>SYSMGMTMLLABS-96</td> <td>Recommended</td> <td>PowerEdge R640</td> <td>AQ3YBS</td> <td>198.51.100.96</td> <td>198.51.100.201</td> </tr> <tr> <td>SYSMGMTMLLABS-162</td> <td>Recommended</td> <td>PowerEdge R640</td> <td>AJXCIDR</td> <td>198.51.100.162</td> <td>198.51.100.104</td> </tr> <tr> <td>SYSMGMTMLLABS-214</td> <td>Recommended</td> <td>PowerEdge R640</td> <td>AQ56ZYT</td> <td>198.51.100.214</td> <td>198.51.100.201</td> </tr>						140 Expander Backplane	Urgent	4.25	<a href="#">5.3</a>	Firmware	FRMW	PowerEdge BIOS	Urgent	1.6.11	<a href="#">3.1</a>	BIOS	BIOS	<p><b>Component Name</b>   <b>Update Severity</b>   <b>Current Version</b>   <b>Latest Version Available</b>   <b>Category</b>   <b>Software Type</b></p> <tr> <td>Expander Backplane</td> <td>Recommended</td> <td>4.25</td> <td><a href="#">4.3</a></td> <td>Network</td> <td>FRMW</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Recommended</td> <td>1.6.11</td> <td><a href="#">1.8</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Recommended</td> <td>1.0.2</td> <td><a href="#">1.1</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td>iDRAC with Lifecycle Controller</td> <td>Recommended</td> <td>4.11.11.11</td> <td><a href="#">4.12</a></td> <td>BIOS</td> <td>FRMW</td> </tr>						Expander Backplane	Recommended	4.25	<a href="#">4.3</a>	Network	FRMW	PowerEdge BIOS	Recommended	1.6.11	<a href="#">1.8</a>	BIOS	BIOS	PowerEdge BIOS	Recommended	1.0.2	<a href="#">1.1</a>	BIOS	BIOS	iDRAC with Lifecycle Controller	Recommended	4.11.11.11	<a href="#">4.12</a>	BIOS	FRMW	SYSMGMTMLLABS-96	Recommended	PowerEdge R640	AQ3YBS	198.51.100.96	198.51.100.201	SYSMGMTMLLABS-162	Recommended	PowerEdge R640	AJXCIDR	198.51.100.162	198.51.100.104	SYSMGMTMLLABS-214	Recommended	PowerEdge R640	AQ56ZYT	198.51.100.214	198.51.100.201
140 Expander Backplane	Urgent	4.25	<a href="#">5.3</a>	Firmware	FRMW																																																												
PowerEdge BIOS	Urgent	1.6.11	<a href="#">3.1</a>	BIOS	BIOS																																																												
<p><b>Component Name</b>   <b>Update Severity</b>   <b>Current Version</b>   <b>Latest Version Available</b>   <b>Category</b>   <b>Software Type</b></p> <tr> <td>Expander Backplane</td> <td>Recommended</td> <td>4.25</td> <td><a href="#">4.3</a></td> <td>Network</td> <td>FRMW</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Recommended</td> <td>1.6.11</td> <td><a href="#">1.8</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td>PowerEdge BIOS</td> <td>Recommended</td> <td>1.0.2</td> <td><a href="#">1.1</a></td> <td>BIOS</td> <td>BIOS</td> </tr> <tr> <td>iDRAC with Lifecycle Controller</td> <td>Recommended</td> <td>4.11.11.11</td> <td><a href="#">4.12</a></td> <td>BIOS</td> <td>FRMW</td> </tr>						Expander Backplane	Recommended	4.25	<a href="#">4.3</a>	Network	FRMW	PowerEdge BIOS	Recommended	1.6.11	<a href="#">1.8</a>	BIOS	BIOS	PowerEdge BIOS	Recommended	1.0.2	<a href="#">1.1</a>	BIOS	BIOS	iDRAC with Lifecycle Controller	Recommended	4.11.11.11	<a href="#">4.12</a>	BIOS	FRMW																																				
Expander Backplane	Recommended	4.25	<a href="#">4.3</a>	Network	FRMW																																																												
PowerEdge BIOS	Recommended	1.6.11	<a href="#">1.8</a>	BIOS	BIOS																																																												
PowerEdge BIOS	Recommended	1.0.2	<a href="#">1.1</a>	BIOS	BIOS																																																												
iDRAC with Lifecycle Controller	Recommended	4.11.11.11	<a href="#">4.12</a>	BIOS	FRMW																																																												
SYSMGMTMLLABS-96	Recommended	PowerEdge R640	AQ3YBS	198.51.100.96	198.51.100.201																																																												
SYSMGMTMLLABS-162	Recommended	PowerEdge R640	AJXCIDR	198.51.100.162	198.51.100.104																																																												
SYSMGMTMLLABS-214	Recommended	PowerEdge R640	AQ56ZYT	198.51.100.214	198.51.100.201																																																												

When the user clicks the **Update** button, they select various options. Under the **Apply Updates** section, users choose to apply the updates now, or on the next reboot. If they choose to apply the update now, they then choose the reboot type:

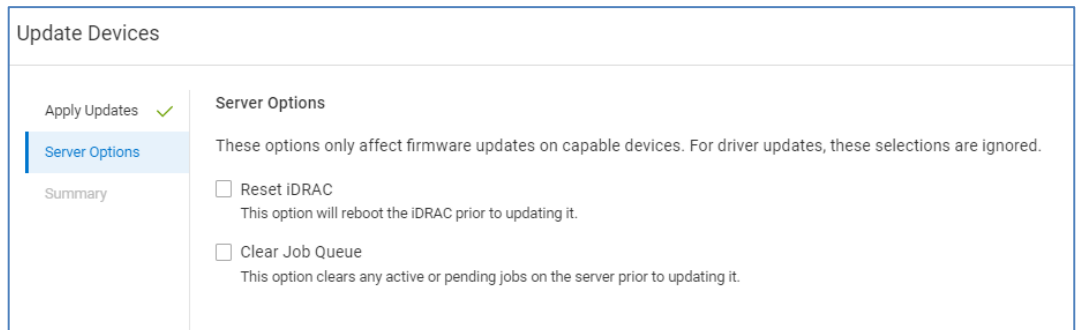
- Graceful reboot with forced shutdown
- Graceful reboot without forced shutdown

- Power cycle



Under the **Server Options** section, the user chooses each of the following for firmware updates. The selections are ignored for driver updates.

- Reset iDRAC
- Clear job queue



The Summary page provides a summary of the devices and components being updated. Clicking Finish sends the update request to the appropriate OpenManage Enterprise server. Users can monitor the update on the [CloudIQ Jobs](#) page.

## Optimize

### Reclaimable Storage

The **Reclaimable Storage** page shows block and file objects that may no longer be in use. Reclaimable storage is supported for PowerMax or VMAX, PowerVault, the Unity XT family, and SC Series systems. It shows the total number of storage objects and the total amount of potentially reclaimable space across all systems. The following rules are used to identify potentially reclaimable storage:

- Block Objects with no front-end I/O activity in the past week or longer

- File Objects with no front-end I/O activity in the past week or longer
- Block Objects with no hosts attached
- Block-based virtual machines that have been shut down for at least a week
- File-based virtual machines that have been shut down for at least a week

**Note:** The Reclaimable Storage report intelligently filters out objects that are array-based replicas, because those replicas are not attached to hosts and do not have front-end I/O.

The **Group By** drop-down menu allows the user to group the storage objects by system or by the rule types mentioned above.

**Group by System** (Default) shows the total number of storage objects and reclaimable space per system. A more detailed view of the objects identified under each rule can be seen by selecting the line item to expand to display the associated details.

The Filter button allows the user to filter the results based on System or Rule Type.

System	Storage Objects	Reclaimable Space
Production (Unity 650F)	10	23.0 TB
Block Objects with no front en...	5	10.0 TB
Block Objects with no Hosts A...	2	2.0 TB
File Objects with no front end I...	1	7.0 TB
File-based virtual machines th...	1	2.0 TB
Block-based virtual machines t...	1	2.0 TB
Market Research (Unity XT 88...	4	7.0 TB
Business Analytics (SC7020F)	6	7.61 TB
Product Design (ME4084)	5	2.02 TB
Finance (PowerMax 2000)	3	300.0 GB
Multiple impacted arrays	1	2.0 TB

Object	Reclaimable Sp...	Pool	Last I/O Time	Host
Prod_Pool1_LUN1	2.0 TB	Production_Pool1	Tue, Jul 18 20...	ProdApp1_Host1
Prod_Pool1_LUN2	1.0 TB	Production_Pool1	Tue, Jul 18 20...	ProdApp1_Host2
Prod_Pool2_LUN1	3.0 TB	Production_Pool2	Tue, Jul 18 20...	-
Prod_Pool2_LUN2	2.0 GB	Production_Pool2	Tue, Jul 18 20...	ProdApp2_Host2
Prod_Pool2_SAN_Dat...	2.0 GB	Production_Pool1	Tue, Jul 18 20...	LocalESX2

The **Group by Rule Type** shows reclaimable storage for each rule. In this view, the total number of storage objects and reclaimable capacity is summarized for each rule.

Rule	Storage Objects	Reclaimable Space
Block Objects with no front end I/O activity in at least the past week	13	14.0 TB
Production	5	10.0 TB
Market Research	1	1.0 TB
Business Analytics	2	1.63 TB
Product Design	3	1.7 TB
Finance	2	200.0 GB
Block Objects with no Hosts Attached	12	14.0 TB
File Objects with no front end I/O activity in at least the past week	1	7.0 TB
Block-based virtual machines that have been shut down for at least...	2	4.0 TB
File-based virtual machines that have been shut down for at least t...	1	2.0 TB

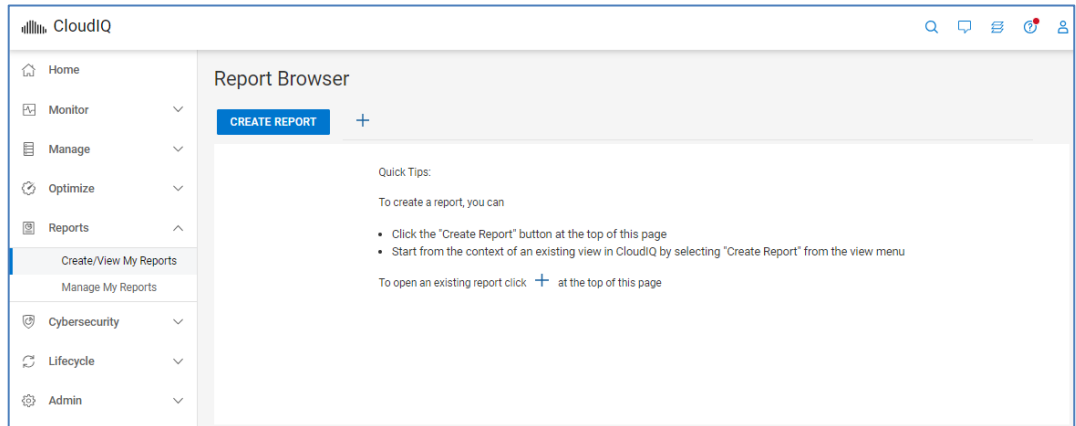
Object	Reclaimable Sp...	Pool	Last I/O Time	Host
Prod_Pool1_LUN1	2.0 TB	Production_Pool1	Tue, Jul 18 20...	ProdApp1_Host1
Prod_Pool1_LUN2	1.0 TB	Production_Pool1	Tue, Jul 18 20...	ProdApp1_Host2
Prod_Pool2_LUN1	3.0 TB	Production_Pool2	Tue, Jul 18 20...	-
Prod_Pool2_LUN2	2.0 GB	Production_Pool2	Tue, Jul 18 20...	ProdApp2_Host2
Prod_Pool2_SAN_Dat...	2.0 GB	Production_Pool1	Tue, Jul 18 20...	LocalESX2

# Reports

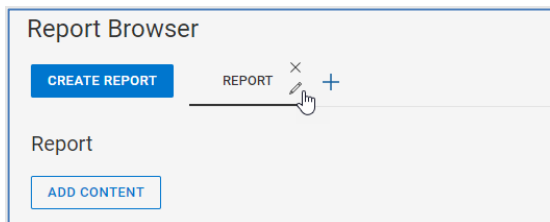
## Create/View My Reports

The Report Browser is accessed from the Create/View My Reports menu. It acts as a user's reporting workspace and dashboard. It allows users to create, view, and modify reports. Reports can be scheduled, duplicated, bookmarked, and exported in PDF format. Reports can consist of any combinations of tables and line charts.

The CREATE REPORT button is used to create a report. The plus icon is used to add an existing report to the dashboard.

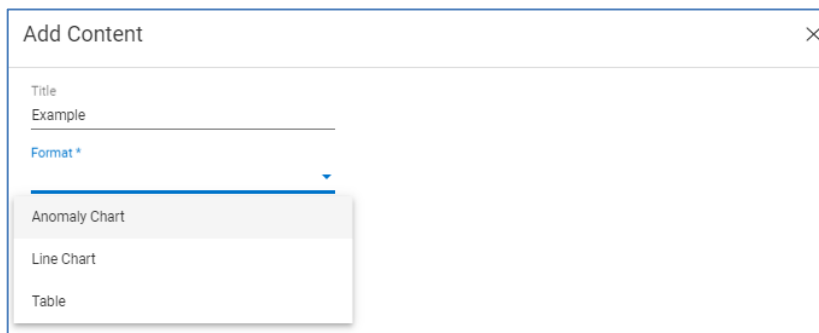


A default name is given to a new report. To edit the name, select the edit icon next to the report name. The icon becomes visible when the mouse is moved over that area. To remove the report from the Report Browser, select the X icon. Removing the report from Report Browser does not delete the report. It is still available from All Reports which is discussed in Manage My Reports.



The ADD CONTENT button is used to add tables and charts to the report.

It opens the Add Content window shown here. This window presents a series of drop-down menus to define the content including the format. The remaining menus differ based on the selected format.

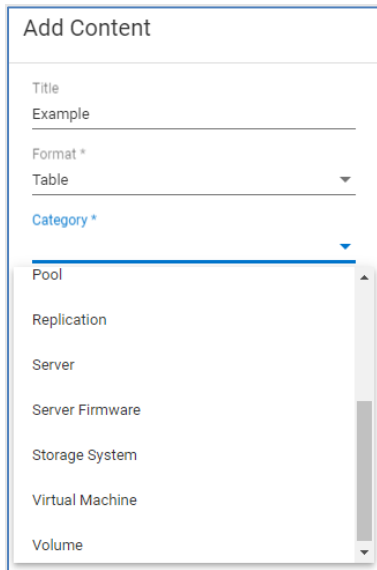


The screenshot shows a dialog box titled "Add Content" with a close button (X) in the top right corner. Inside the dialog, there is a "Title" field with the placeholder text "Example". Below the title field is a "Format" dropdown menu. The dropdown menu is open, showing three options: "Anomaly Chart", "Line Chart", and "Table". The "Anomaly Chart" option is currently selected and highlighted.

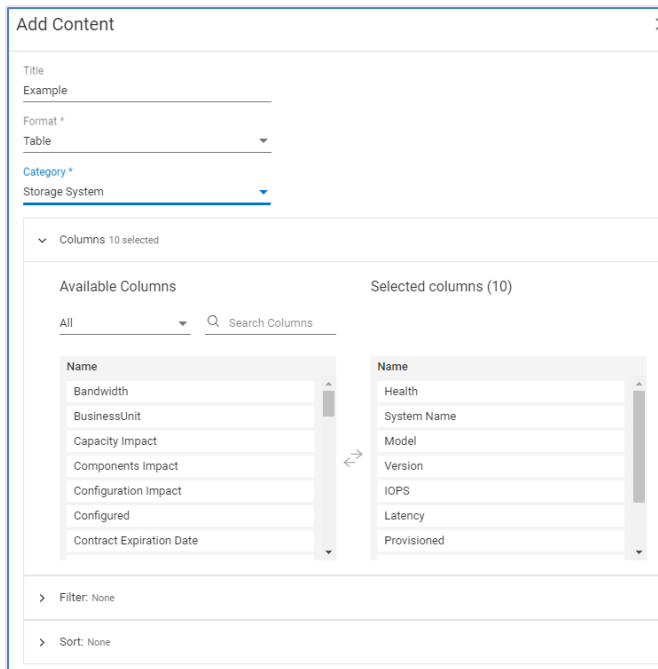
## Tables

A table allows the user to select one of the following categories:

- Data Protection System
- Filesystem
- Host
- MTree
- Network System
- Pool
- Replication
- Server
- Data Reduction Storage System
- Server Firmware
- Storage System
- Virtual Machine
- Volume
- HCI System

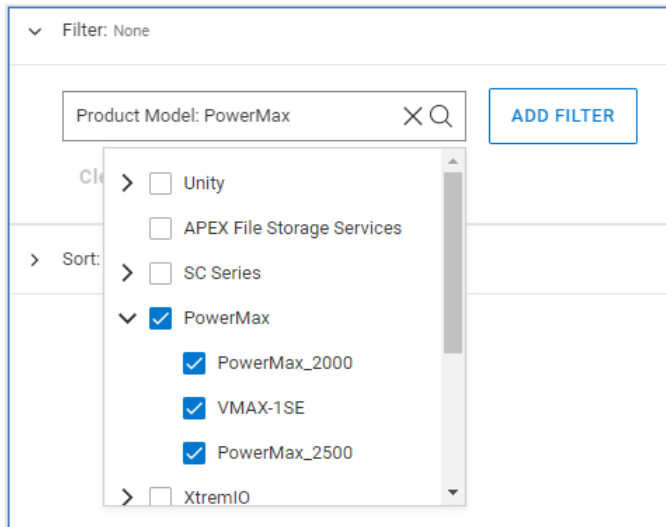


When the user selects the Category, a list of available and selected columns is displayed. CloudIQ prepopulates the report with common columns. The user can either drag and drop or double-click a column name to add or remove it.



The next section is the filter. The user can select in the Search Filters field and scroll through the full list of columns, or they can begin typing to find a specific one. When the column is selected, the user can choose from an applicable value. The following example shows a filter on the Product Model column and then on all PowerMax systems.

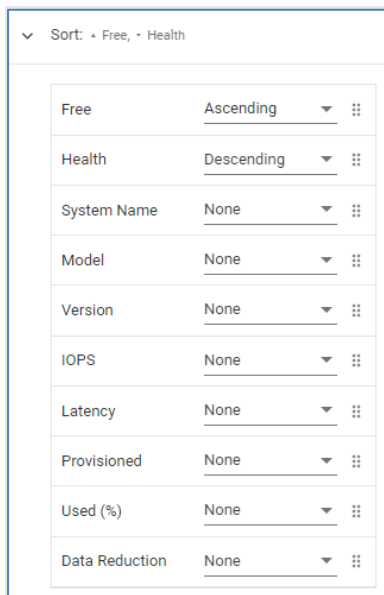




Users can display custom tags in their reports and can use filtering to create reports specific to custom tags such as applications or business units. See the [Custom Tags](#) section for more information.

The final section is Sort. Sort allows the user to add one or more columns to sort the table. Sort columns can be ordered by dragging and dropping the columns to the preferred sort order.

In this example, the first sort is an ascending sort based on Free capacity. The second sort is a descending sort on Health Score.

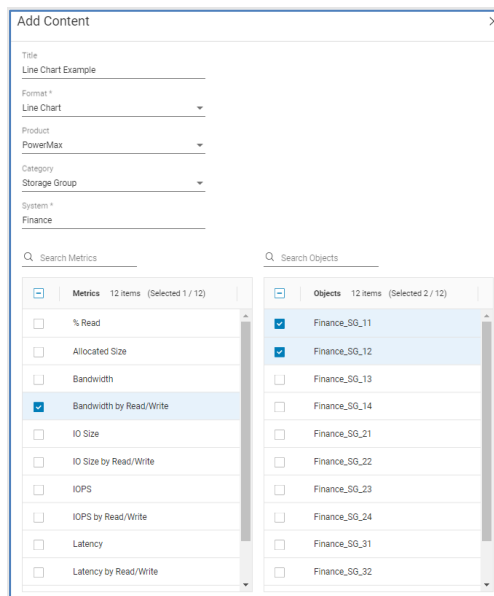


### Line charts

A line chart requires the user to select the Product, Category, System, and Metric. If the chosen category is System, the System selection is not necessary. Once the chosen metric is selected, the user selects which Objects to including in the chart.

Metrics available for line charts are shown in [Appendix D: Report Browser metrics](#).

This example shows the configuration of a chart that includes various read/write metrics for the Finance\_SG\_11 and Finance\_SG\_12 storage groups.



### Anomaly charts

Anomaly charts are like line charts. The list of supported products is currently restricted to the following:

- APEX Block Storage Services
- Connectrix
- PowerMax
- PowerStore
- PowerVault
- SC Series
- Unity XT
- VMware

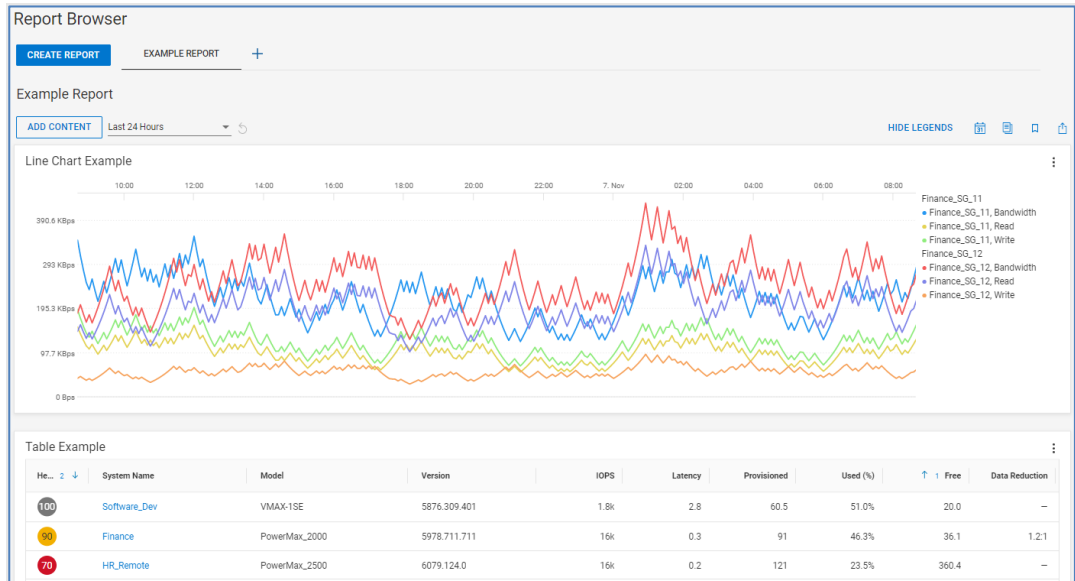
Anomaly charts provide both the value of the metric and the historic seasonality. This allows users to identify any unexpected anomalies or changes in patterns. Anomaly charts show up to 24 hours of data.

### Report options

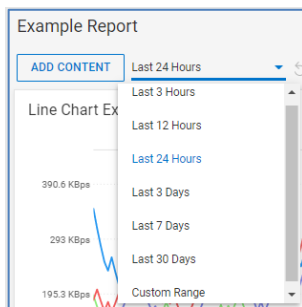
When a report is created, there are several options that are available for the user at the report level.

- HIDE LEGENDS – For line charts, it provides the option to hide the legend of each object on the right side of the chart. The legend shows the data timestamp and value for each object as the user hovers over the chart. The legend also serves as a filter to remove metrics from the chart.

- **Schedule:** Schedules the report. Choose initial runtime and one of the following intervals: Daily, Weekly, Bi-weekly, Monthly, or Quarterly. Choose format of PDF or CSV. Enter email addresses for recipients.
- **Duplicate:** Creates a duplicate copy of the report in the Report Browser. This is used to create multiple similar reports where the user wants to make minor changes to a report.
- **Bookmark:** Adds or removes the bookmark on the report. Bookmarks allow the user to easily find and view the report in the Report Browser from the Add Report icon.
- **Export PDF:** Exports the report in PDF format.



The time range of line charts is set to Last 24 Hours by default. It can be changed to another preset value or a custom range using the pull down.



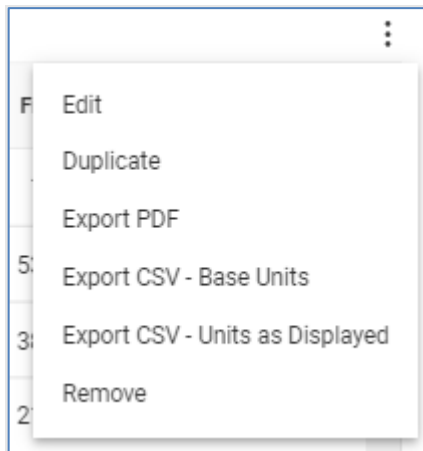
### Chart and table options

For each individual chart or table, the user is presented several options after selecting the options icon (⋮).

- **Edit** – Modify the individual chart or table.
- **Duplicate** – Create a duplicate chart or table in the same report.
- **Export PDF** – Exports the individual chart or table in PDF format.
- **Export CSV** – Base Units. Exports the individual table in CSV format.

## Reports

- Export CSV – Units as Displayed. Exports the individual chart or table in CSV format using scaled values shown in the table.
- Remove – Deletes the chart or table.



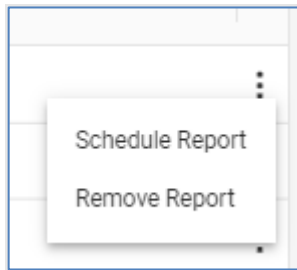
## Manage My Reports

All reports are accessible from the Manage My Reports menu. Selecting a report from All Reports adds the report to the Report Browser and directs the user to it. In situations where there are many reports, the search field can be used to find a report. The list of reports shows if a report is bookmarked, when it was last modified, and when it is scheduled to run next. The options icon on the right side of each row allows the user to edit the report or delete the report from CloudIQ. The CREATE REPORT button directs the user to the Report Browser to create a report.

A screenshot of the 'All Reports' page in CloudIQ. The page has a header 'All Reports' and a 'CREATE REPORT' button. Below the button is a search field with the placeholder text 'search'. The main content is a table with columns for 'Title', 'Last Modified', and 'Next Scheduled'. There are five rows of reports, each with a three-dot menu icon on the right side.

Title	Last Modified	Next Scheduled ↓	
<a href="#">PowerProtect DD</a>	Oct 28, 2022, 9:50:06 AM	Nov 10, 2022, 2:35:00 PM	⋮
<a href="#">Storage Systems &amp; Hosts</a>	Nov 3, 2022, 11:17:40 AM	–	⋮
<a href="#">All LUNs &amp; Filesystems</a>	Oct 27, 2022, 1:58:27 PM	–	⋮
<a href="#">Unity - Capacity &amp; Workload</a>	Oct 27, 2022, 1:58:29 PM	–	⋮
<a href="#">Virtual Machines</a>	Oct 27, 2022, 1:58:31 PM	–	⋮

Users can schedule and delete a report by selecting the three dots on the right side of the row.



## Cybersecurity

### Introduction

Cybersecurity is a feature within CloudIQ that adds the ability to monitor Dell resources for security risks. CloudIQ compares configurations and setups to a set of security-related evaluation criteria, notifying users of any deviations from the configured plan. It also provides vulnerability awareness by displaying applicable Security Advisories for supported systems. Cybersecurity is supported for PowerMax, PowerStore, and PowerEdge Server and Modular Chassis systems and will continue to expand coverage to other Dell systems.

---

**Note:** To gain access to Cybersecurity, users must be given either the Cybersecurity Viewer or Cybersecurity Admin role. A CloudIQ Admin user must assign these roles to users, including themselves. See [Identity Management](#) and [KB#000205045](#) for additional details.

---

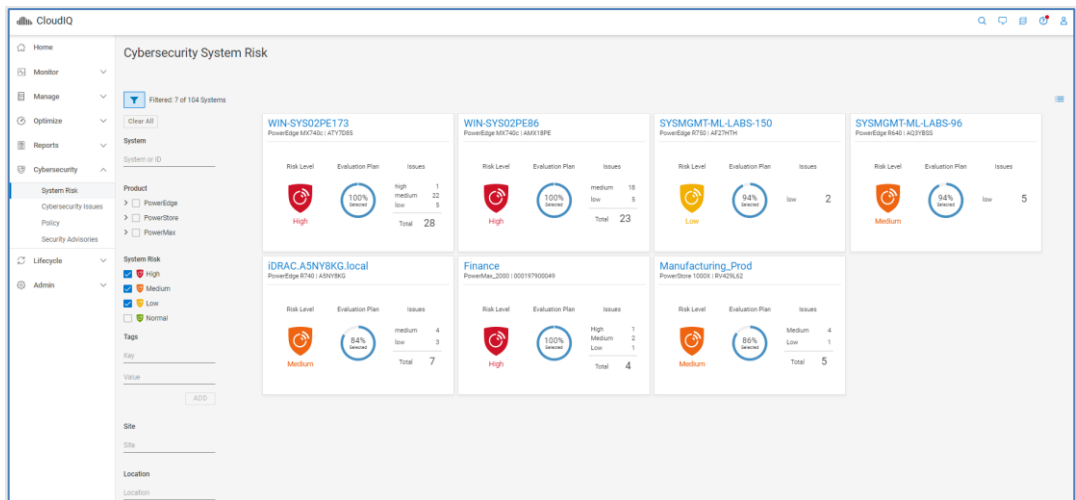
### System Risk

The System Risk page is the multisystem view for Cybersecurity. It displays all systems that are enabled for Cybersecurity along with the Risk Level, percentage of tests enabled in the Evaluation Plan, and summary of Issues. The Risk Level provides an overall assessment for the system based on the enabled evaluation tests, and has one of the following values:

- Normal
  - No active Cybersecurity issues.
- Low
  - One or two active Low severity Cybersecurity issues.
  - There are at least five enabled tests and the number of enabled tests is greater than 70%.
- Medium
  - One to five active non-High severity Cybersecurity issues with at least one being Medium and number of enabled tests greater than five.
  - Greater than two active Low severity Cybersecurity issues and the number of enabled tests is greater than five.
- High
  - One or more active High severity Cybersecurity issues and the number of enabled tests is greater than five.

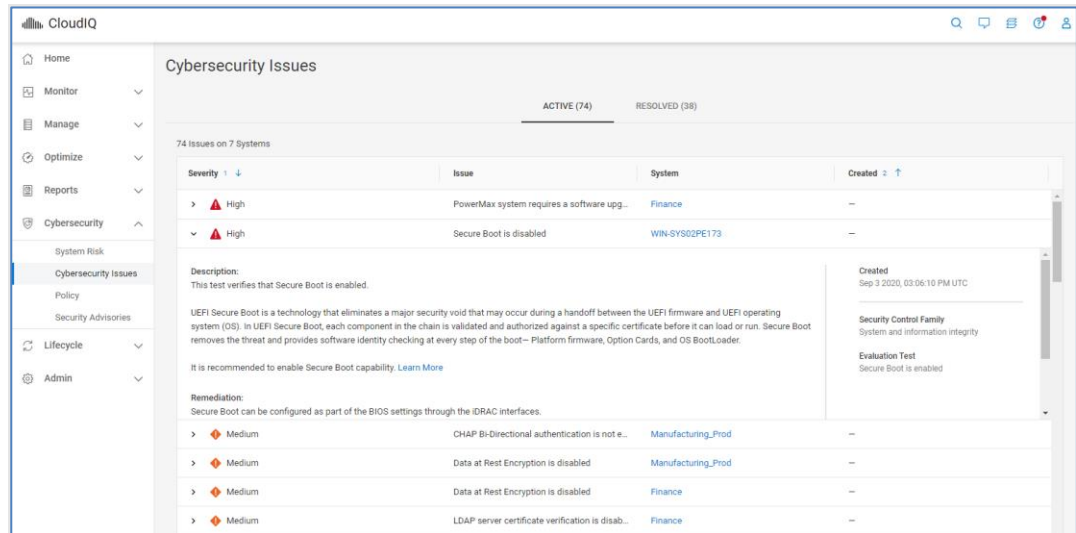
- More than five non-High active issues where at least one issue is Medium severity and the number of enabled tests is greater than five.
- Unknown
  - Evaluation Plan is disabled.
  - Number of enabled tests is less than or equal to five.
  - There are no active Cybersecurity issues and the number of enabled tests is less than 70%.
  - There are one or two active Low severity Cybersecurity issues and the number of enabled tests is less than 70%.

The page can be filtered based on System, Product, System Risk, Custom Tag, Site, or Location.



## Cybersecurity Issues

The Cybersecurity Issues page provides an overall listing of Cybersecurity issues that have been identified in the environment. The Active tab lists out all active issues and provides the severity, issue name, associated system, and when it was created. Expanding the issue provides the issue description and the recommended remediation, creation timestamp, security control family, and evaluation test. The Resolved tab lists out all issues that have been corrected and the timestamp for when the issue was resolved.



## Policy

The Policy page is where users enable, disable, and configure the tests in the Evaluation Plan. This can be done by creating individual evaluation plans for each system or by creating a template and applying it to multiple systems. There are two tabs in the Policy page: SYSTEMS and TEMPLATES.

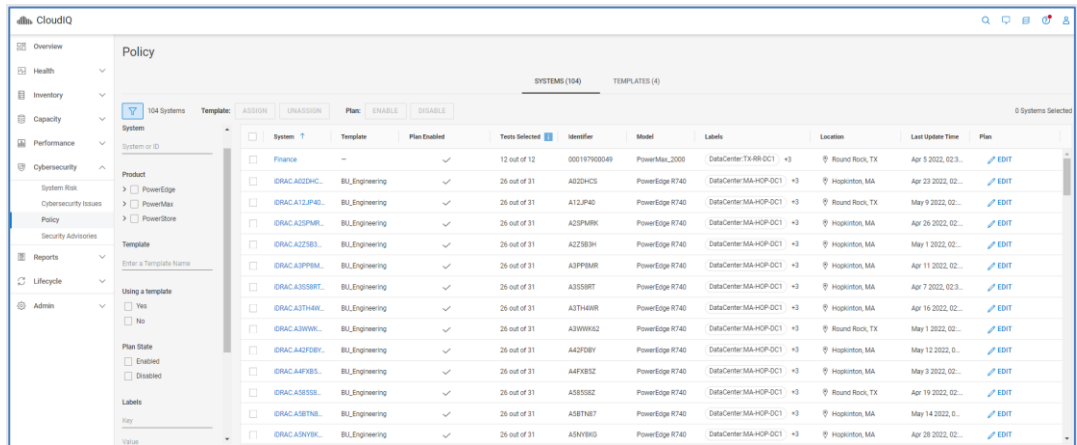
## Systems

The Systems tab lists the Cybersecurity enabled systems. It also includes information such as if there is an associated template, if the evaluation plan is enabled, how many tests are selected for the plan, custom labels, and the last time the evaluation plan was updated. Cybersecurity Admins can assign or unassign templates to systems, enable or disable the evaluation plan for systems, or edit the evaluation plan for an individual system.

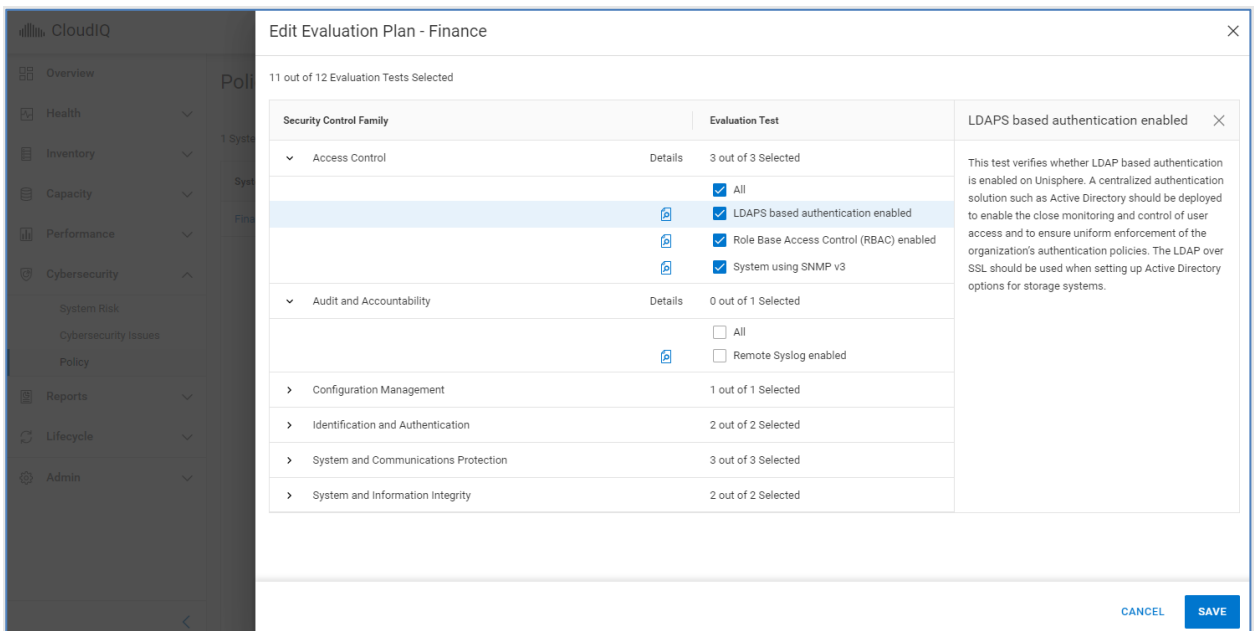
The filter icon allows users to filter the list of systems based on the following:

- System name or ID
- Product type
- Template name
- Systems using or not using a template
- Systems evaluation plan status
- Custom tags
- Site
- Location

By using the filter mechanism, users can produce a group of systems on which they can perform an action like assign a template or disable the evaluation plan. For example, a user can select all PowerEdge systems from product and select “No” under “Using a template” and then assign a template to all of those systems that are not currently associated to a template.

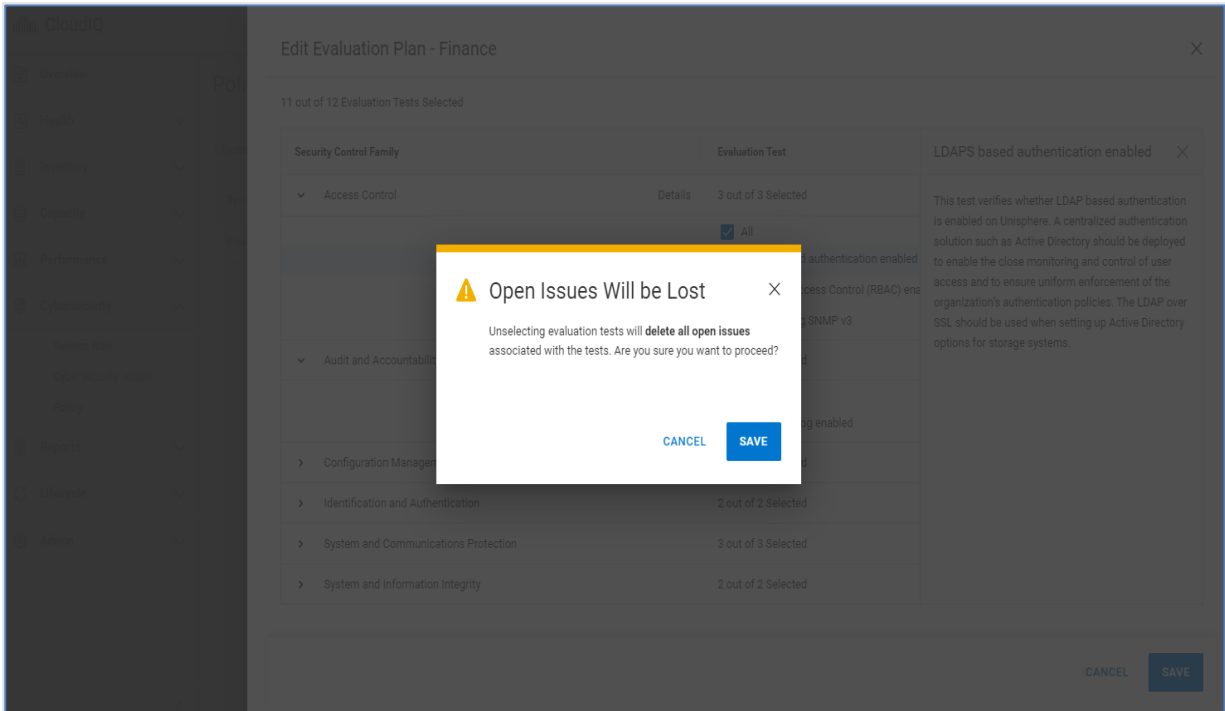


There are a few scenarios that require further explanation. If a user assigns a template to a system that already has a template, the old template is automatically unassigned. If the evaluation plan of a system is disabled, it does not affect the assigned template. The template will remain associated to the system. If the evaluation plan is edited by selecting the Edit icon in the right-side column, the template for that system is unassigned. Selecting the Edit button opens the Edit Evaluation Plan window for the system and allows the user to set the plan for that individual system. Each of the possible evaluation tests is listed and grouped by Security Control Family (based on NIST 800-53 R5). Each test can be selected or cleared for inclusion in the Evaluation Plan. Selecting the Details icon provides a detailed description of the test.



When an Evaluation Test is cleared and removed from the Evaluation Plan, any associated active issues for that test will be deleted. The following warning is provided anytime the user removes an Evaluation Test and saves the Evaluation Plan.

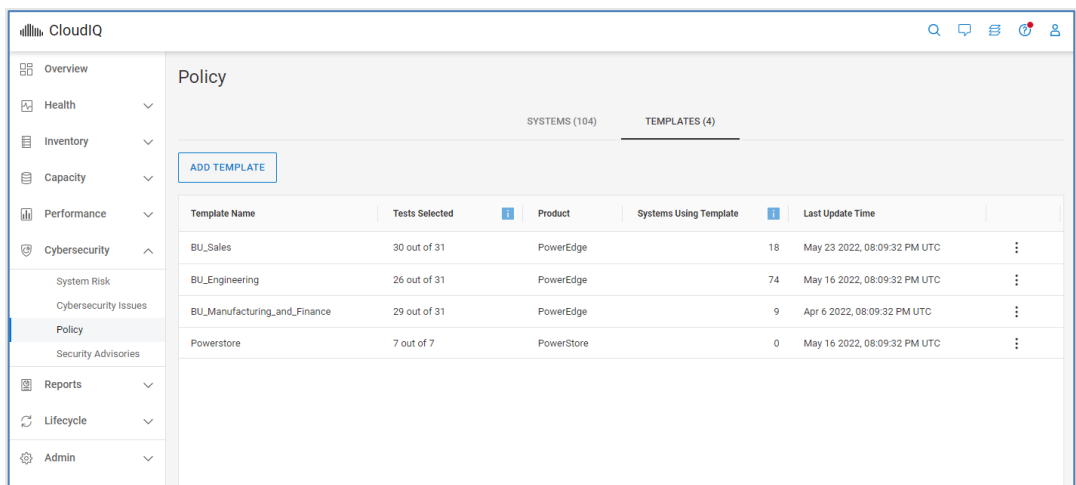




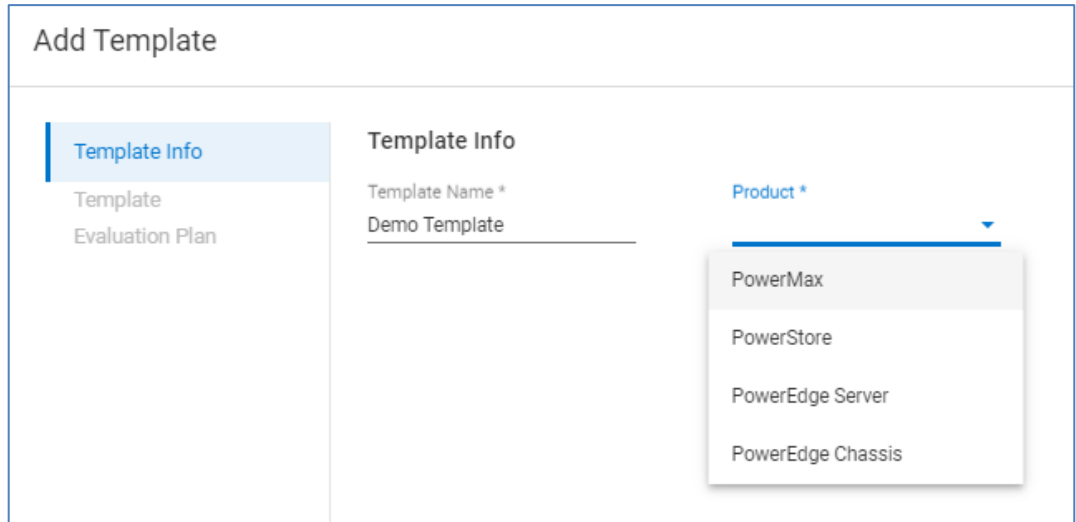
Users will be notified in the What’s New section when new tests are added to the product. By default, those tests will be disabled by default.

### Templates

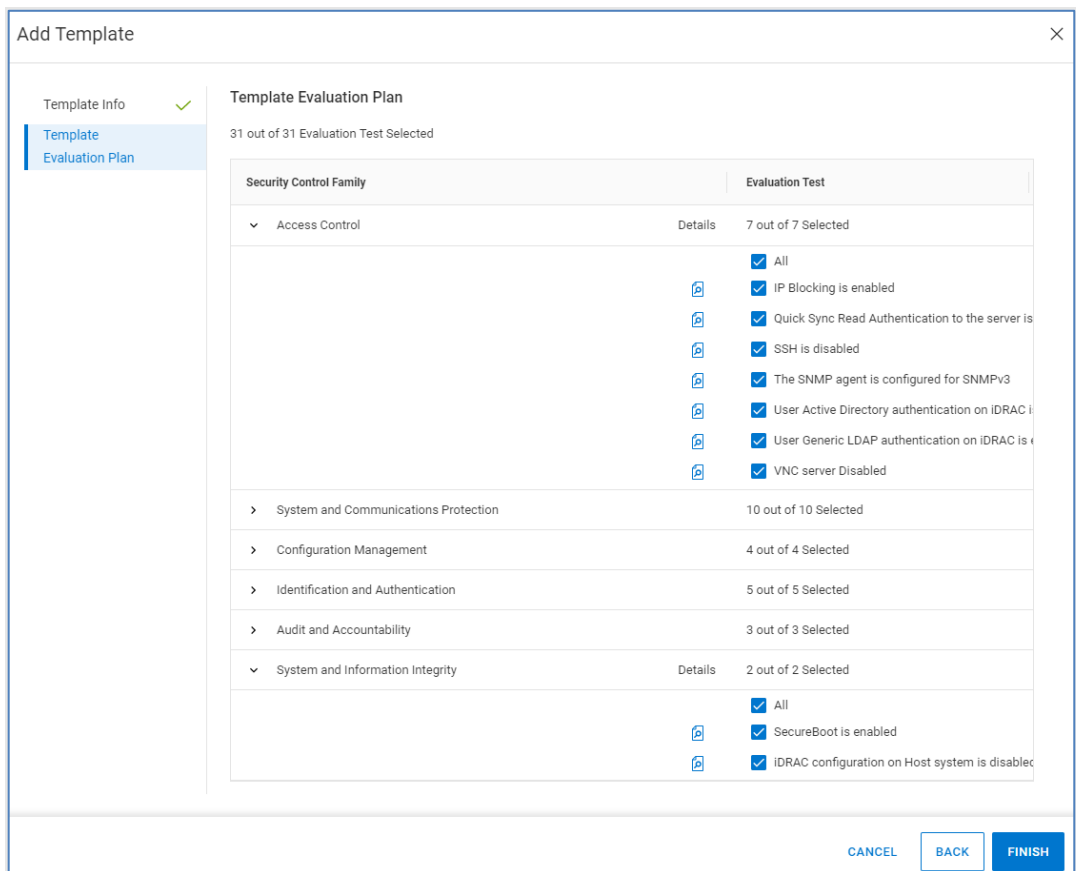
The Templates tab lists the configured templates and allows users to create templates and view, edit, and delete existing templates. A template contains a list of configured tests which can be assigned to multiple systems of the same product technology. It allows users to efficiently set a consistent evaluation plan across many systems. A template can only be edited and deleted when there are no systems assigned to it. If a template has an assigned system, it can only be viewed or duplicated.



Selecting Add Template steps the user through the template creation wizard. The user provides a template name and then selects the product type for the template.



Then, the user selects which tests to include in the evaluation plan and then selects Finish to save the template. Then, it is available to assign to systems of that product type.



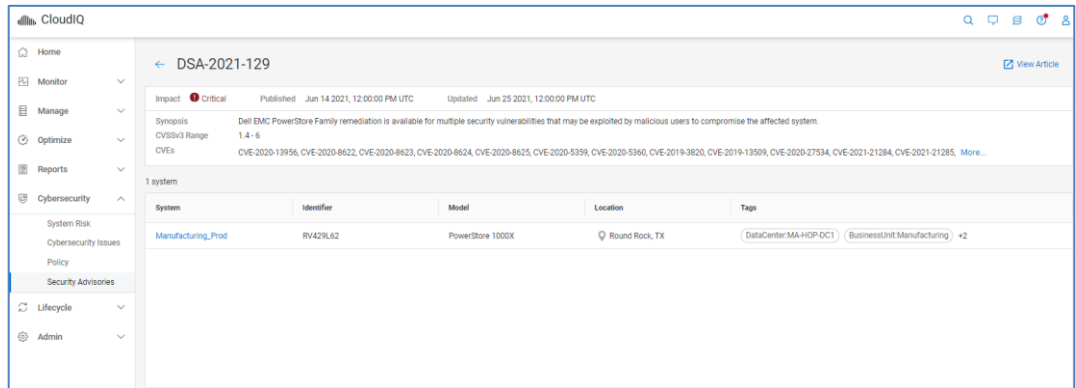
The operations that are available for a template depend on whether there are systems assigned to the template. For templates with assigned systems, the allowable operations are View and Duplicate. Templates with assigned systems cannot be edited or deleted.

Templates without assigned systems have the Edit, Duplicate, and Delete operations available.

## Security Advisories

The Security Advisories page provides a full list of applicable Security Advisories along with their impact, number of impacted systems, and publish date. Clicking the **View Article** hyperlink opens the article details on the Dell or VMware support page.

Clicking the **Advisory ID** hyperlink opens a window providing a list of all affected systems. This window also shows additional information about the security advisory including the list of Common Vulnerabilities and Exposures (CVEs) addressed by the security advisory.



## Storage system details

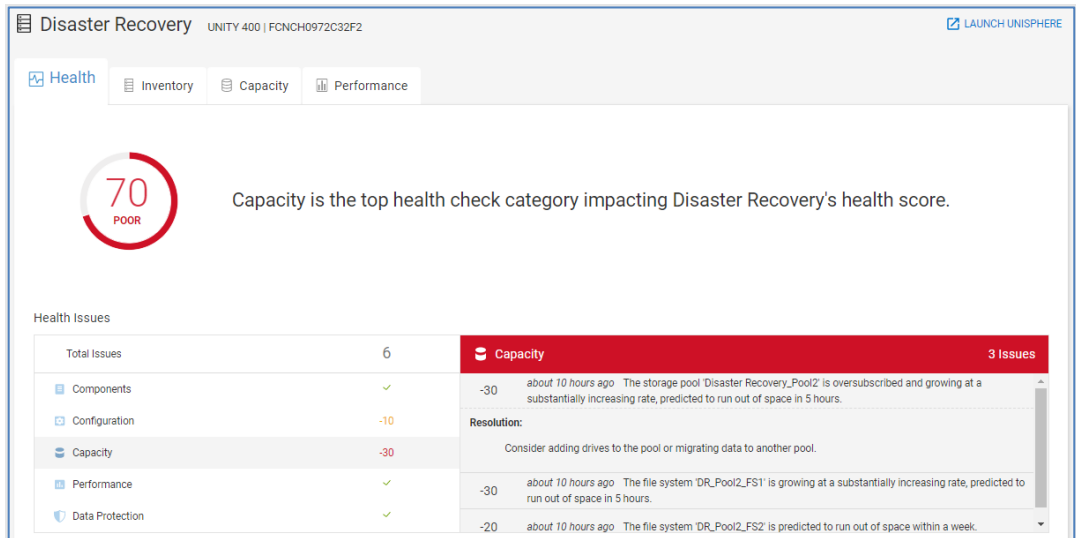
### Introduction

Clicking the storage system hyperlink in the Home page or any of the multisystem views opens the System Details page for that system. The following sections discuss each tab of the Storage System Details page in greater depth.

### Storage system details – Health

The Health tab shows the details for a selected system driving the health score number. The view provides a listing of issues found in each of the following categories:

- Components
- Configuration
- Capacity
- Performance
- Data Protection

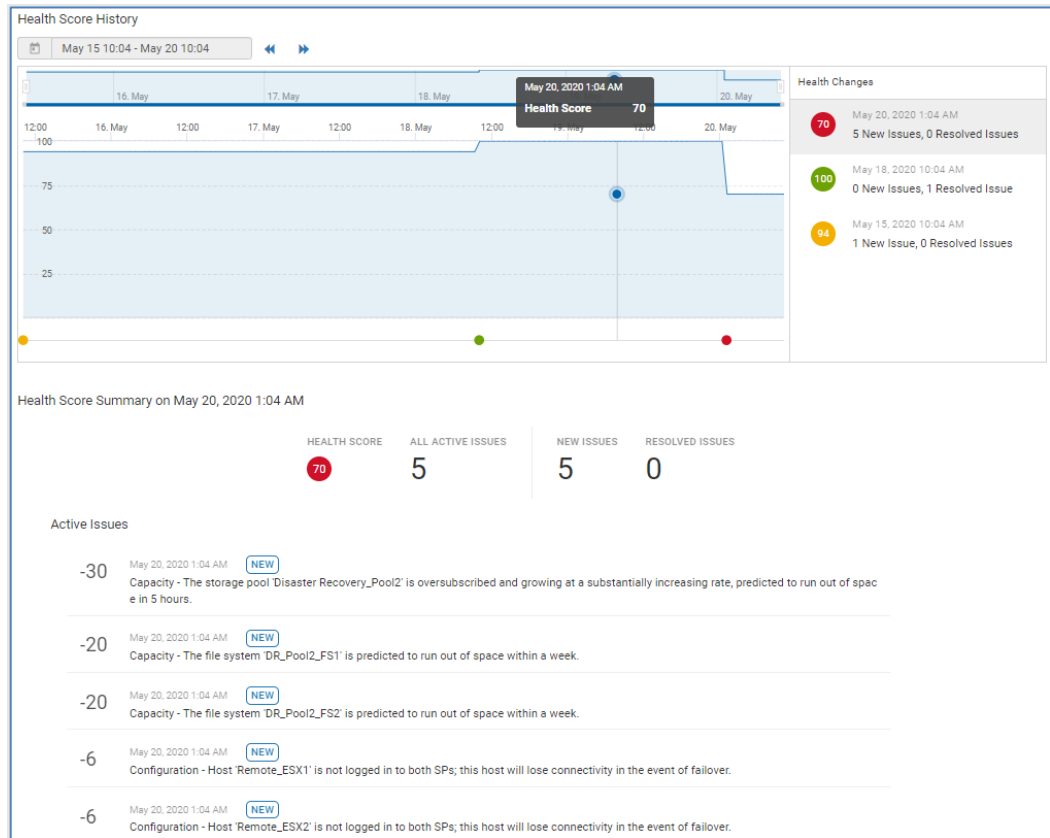


In this example there are five issues, two in the Configuration category and three in the Capacity category. Selecting the category and then selecting one of the issues will display the recommended resolution.

**Note:**

- The Components and Data Protection categories do not apply for PowerMax/VMAX systems.
- The Performance and Data Protection categories do not apply for PowerVault ME4 systems.
- The Data Protection category does not apply for VxRail systems.
- Only the Components category is used for PowerEdge, Connectrix, and PowerSwitch.

Scrolling down in this view shows the history of the health score for the system as shown below. This graph displays the historical trend of the health score and details of any issues over the displayed range of time.



Selecting an issue listed to the right of graph will mark the change on the timeline and a summary of the active issues will be displayed below the graph. Selecting an individual active issue will open a recommended resolution.

Selecting the calendar will open a drop-down, allowing users to select one of the predefined ranges or enter a custom time range. A custom view is the default. Selecting any of the dates on the right will present the list of issues for that date.

Viewing a history of health issues across a longer-term time range can be helpful in identifying recurring issues in the environment.

## Storage system details – Inventory

The Inventory tab shows the configuration data and contract information of the selected system as well as the physical and logical components of the system. For traditional storage systems, the upper portion of this view provides the system attributes such as Serial Number/ServiceTag, Model, Location, Code Version, IP Address, and Contract Expiration. Some attributes vary by system type (such as Uptime and Hotfixes which are specific to the Unity XT family).

For APEX Data Storage Services, not all of this information is applicable. APEX Data Storage Services will show the Site ID, Site Name, Site Location, and Last Contact Time.

Disaster Recovery UNITY 400 | FCNCH0972C32F2 [LAUNCH UNISPHERE](#)

Health **Inventory** Capacity Performance

IPv4 10.0.0.3 Version 4.2.0.9433914 Last Contact Time about 1 hour ago  
 IPv6 2620:0:170:7430:260:1600:3c2c:32f1 A recommended target version 4.2.1.951234 is now available. Location Hopkinton, MA  
 Contract Expiration Nov 24, 2020 Site Name ACME Branch Office  
 Contract Number 315788178R Site ID ACME Branch Office 01  
 Service Plan ProSupport 4HR/Mission Critical [LEARN MORE](#)

POOLS STORAGE VIRTUAL MACHINES DRIVES HOSTS

3 pools

Issues	Name ↑	Type	Total Size (TB)	Used (%)	Subscription (%)	Time To Full	Free (TB)
✓	Disaster Recovery_Pool1	Traditional	24.7	45.3	145.5	Unpredictable	13.6
1	Disaster Recovery_Pool2	Traditional	13.7	54.7	145.5	Imminent	6.2
✓	Disaster Recovery_Pool3	Traditional	82.5	54.5	145.5	Within a month	37.5

As noted earlier, CloudIQ indicates when a storage system has a code update available. In this single system view, there is also an indication if the management software has an available update. Clicking the “Learn More” link opens a dialog with summary information and relevant links to support resources.

The bottom half of the page provides details about the physical and logical components of the system. The tabs differ based on product type but could include:

- Pools (Unity XT family, SC Series, PowerVault, and PowerScale/Isilon) / Storage Resource Pools (PowerMax/VMAX)
- Storage (APEX Block Storage Services, Unity XT family, PowerStore, SC Series, and PowerVault) / Volumes (XtremIO) / Storage Groups (PowerMax/VMAX)
- Virtual Machines (APEX Block Storage Services, Unity XT family, PowerStore, SC Series, XtremIO, and PowerMax/VMAX)
- Drives (Unity XT family, PowerStore, SC Series, and PowerVault)
- Hosts (APEX Block Storage Services, PowerStore, PowerMax<sup>13</sup>, Unity XT family, and XtremIO) / Servers (SC Series) / Initiators (PowerVault)
- Consistency Groups (XtremIO)
- Service Levels (PowerMax/VMAX)
- File Systems (PowerMax)
- System Health Checks (PowerMax)
- Nodes (PowerScale/Isilon)
- Node Pools (APEX File Storage Services)
- Appliances (PowerStore)
- Storage Containers (APEX Block Storage Services and PowerStore)
- Quotas (PowerScale or Isilon)
- Block (PowerFlex)

<sup>13</sup> Host information for PowerMax requires Unisphere 9.2 or later

- Resources (PowerFlex)
- Gateways (PowerFlex)

The **Pools** or **Storage Resource Pools** tab shows various information about the configured storage pools including Total Size, Used %, Subscription %, Time to Full, and Free. This information helps in understanding the pools at risk where subscription rate is greater than the total free storage and the Time to Full has a defined prediction.

The **Storage** or **Volumes** tab shows all the storage objects in the system. Depending on product type, this tab displays various used and free capacity information for the storage objects.

- PowerStore, APEX Block Storage Services: Volumes, Volume Groups, and File Systems
- Unity XT family: LUNs, File Systems, VMware vStorage VMFS, and VMware NFS
- SC Series: Volumes
- XtremIO: Volumes
- PowerVault: Base and Snapshot

This view can help to determine which specific object is consuming the greatest amount of storage.

The **Storage Groups** tab lists the storage groups on the system with the capacity, the associated storage resource pool, the service level, and the status of compliance with the service level objective.

The **Virtual Machines** tab lists the VMs on the storage system along with various details including the operating system and associated vCenter, ESXi Server, and ESXi Cluster.

The **Drives** tab gives the details on the drives for the given storage system and their location in the system. It includes remaining endurance, storage tier, and firmware version. There will also be an indication if there is a firmware update available.

The **Hosts, Servers, or Initiators** tab gives the details about the hosts attached to this storage system. Host information differs slightly for each storage platform, and may include hostname, IP Address, operating system, initiator protocol, and total accessible storage for each host from the specific storage system. For PowerVault initiators, it lists the initiator name, protocol, and total provisioned storage to each initiator from the storage system. For PowerMax systems, it includes host group name, initiator type, number of initiators, number of masking views, number of PowerPath hosts, and if the Consistent LUN flag is set. For PowerStore, it provides host group name, OS, initiator protocol, number of volumes and number of initiators.

The **Consistency Groups** tab lists the XtremIO consistency groups on the system including their mapped status, number of volumes and total and used capacities.

The **Service Levels** tab lists the configured service levels on PowerMax systems along with the expected response times.

The **File Systems** tab for PowerMax lists the name, used and total capacities, NAS server, and protection and performance policies for each file system.

The **System Health Checks** tab (PowerMax) provides pass or fail information for various system checks.

The **Nodes** tab provides information about each PowerScale/Isilon node such as node type, total, and capacity, used capacity, and associated pool. See PowerScale Node Details section for additional information.

The **Node Pools** tab provides a list of the node pools in the APEX File Storage Services along with their associated subscription.

The **Appliances** tab lists each appliance in the PowerStore cluster along with attributes such as State, Serial Number, CPU, Used, and Provisioned storage.

The **Storage Containers** tab provides capacity information for the storage containers in the PowerStore cluster or APEX Block Storage Service.

The **Quotas** tab lists each quota path, quota type, threshold size, efficiency, advisory limit, soft limit, and hard limit. See PowerScale Quotas Details section for additional information.

The **Block** tab is a pull down that displays the following components for PowerFlex systems:

- **Hosts** – Host WWN, Operating System, IP address, Protocol, and Version
- **Protection Domains** – Total, Used, and Free Capacity and Protection Domain State
- **Fault Sets** – Protection Domain Name and Fault Set State
- **SDS** – IP address, Version, State, Total Capacity, Protection Domain, and Fault Set
- **Storage Pools** – Layout, Protection Domain, Total, Used, Spare, and Provisioned Capacity
- **Devices** – Type, Total and Used Capacity, and Storage Pool
- **Volumes** – Type, Size, Mapped status, number of SDCs, Creation Time, Read Only status, Secured state.

The **Resources** tab lists the PowerFlex Metadata Managers (MDMs) and whether they are running in primary, secondary, tiebreaker, or standby mode. Management IP address, version, and count information are also provided.

The **Gateways** tab lists the Support Connect Gateways in use by the PowerFlex system. Clicking the serial number opens the Secure Connect Gateway Details page shown in the following figure. The Gateway Details page provides information about the Secure Connect Gateway including serial number, version, site and location information, and connectivity status. It also shows which systems it manages.



ELMAPL7396LGO LAUNCH SECURE CONNECT GATEWAY UI

**Properties**

Serial Number	ELMAPL7396LGO	Gateway Connectivity	Connected
Location	Durham, NC	Gateway Heartbeat	Connected
Site Name	Branch Office		
Site ID	Branch Office 01		
Software Version	5.0.112-10		
Last Update Time	55 minutes ago		

**SYSTEMS**

1 system

System	Identifier	Model	Remote Support	API Access
Security DC	SIOLIC1124	PowerFlex software	Configured	Configured

The following series of screenshots shows examples of the Inventory tab for various storage types.

PowerMax:

Finance PowerMax\_2000 | 000197900049

Health **Inventory** Capacity Performance Cybersecurity Cybersecurity

Unisphere Version	V9.2.1	Connection	Local	Last Contact Time	54 minutes ago
PowerMax OS	5978.711.711	Embedded	NO	Location	Round Rock, TX
Contract Expiration	Oct 24, 2022	System Health Check	Wed, Jul 3 2019, 2:54:37 PM UTC	Site Name	ACME Headquarters
Contract Number	31778817IS	IOPS Remaining Headroom	259992.3	Site ID	ACME Branch Office 01
Service Plan	ProSupport 4HR/Mission Critical	Alternate Serial	HK197900049		

STORAGE RESOURCE POOLS STORAGE GROUPS SERVICE LEVELS HOSTS VIRTUAL MACHINES SYSTEM HEALTH CHECKS

2 storage resource pools

Name ↑	% Effective Used	Total Usable Capac...	Used Usable Capacity(TB)	Total Subscribed Capacity(TB)	Total Allocated Ca...	Time To Full
Finance_SRP1	8.0%	98956.05	86916.39	90.0	90.0	Within a month
Finance_SRP2	3.0%	50240.5	3120.5	60.5	16.6	Greater than quarter

PowerScale:

Security Office PowerScale Cluster | ELMISLFAGEF789 Launch OneFS WebUI

Health **Inventory** Capacity Performance

Contract Expiration	Oct 14, 2022	Version	v9.4.0	Last Contact Time	53 minutes ago
Contract Number	31678017IS	Node Count	3	Location	Shanghai, CN
Service Plan	PREMIUM	Inline Dedupe Status	Disabled	Site Name	ACME Branch Office
		Inline Compression Status	Enabled	Site ID	INITIAL_SITE_ID

POOLS NODES QUOTAS

1 pool

Issues	Name ↑	Total Size(TB)	Used(%)	Time To Full	Free (TB)
2	Camera Recording Data Pool	23.04 TB	91.1	Within a day	0.46 TB

Dell Unity XT:

The screenshot shows the 'Disaster Recovery' page for a Dell Unity XT system (UNITY 400 | FCNCH0972C32F2). The 'Inventory' tab is active, displaying system details such as IP addresses, version (4.2.0.9433914), and contract information. Below this, a table lists three storage pools:

Issues	Name ↑	Type	Total Size (TB)	Used (%)	Subscription (%)	Time To Full	Free (TB)
✓	Disaster Recovery_Pool1	Traditional	24.7	45.3	145.5	Unpredictable	13.6
1	Disaster Recovery_Pool2	Traditional	13.7	54.7	145.5	Imminent	6.2
✓	Disaster Recovery_Pool3	Traditional	82.5	54.5	145.5	Within a month	37.5

PowerFlex:

The screenshot shows the 'Security DC' page for PowerFlex software (SIOLIC1124). The 'Inventory' tab is active, displaying system details such as Presentation Server IP (10.234.220.14), PowerFlex Manager SWID (ELMVXFRENG001), and contract information. Below this, a table lists three hosts:

Name ↑	Operating System	Network Address	Protocol	Identifier	Version	Host IP
14b1e48400000000	Linux	192.168.177.28	SDC	-	3.6.0.0	192.168.177.28
14b1e48400000000	Linux	192.168.177.47	SDC	-	3.6.0.0	192.168.177.47
14b1e48400000000	Linux	192.168.177.27	SDC	-	3.6.0.0	192.168.177.27

Storage system details – Capacity

The Capacity tab shows slightly different information depending on the product type. The storage capacity details for PowerStore, Unity XT family, SC Series, PowerVault, PowerFlex, and PowerScale/Isilon include:

- Total Capacity
- Storage Usage
- Drive Type Usage (not available for PowerStore, PowerScale/Isilon, or PowerFlex)
- Pools (not applicable for PowerStore or PowerFlex)

The **Total Capacity** graph provides a breakdown of raw storage to Used, Free, and Unconfigured Drives (Unprovisioned Capacity for PowerScale or Isilon).

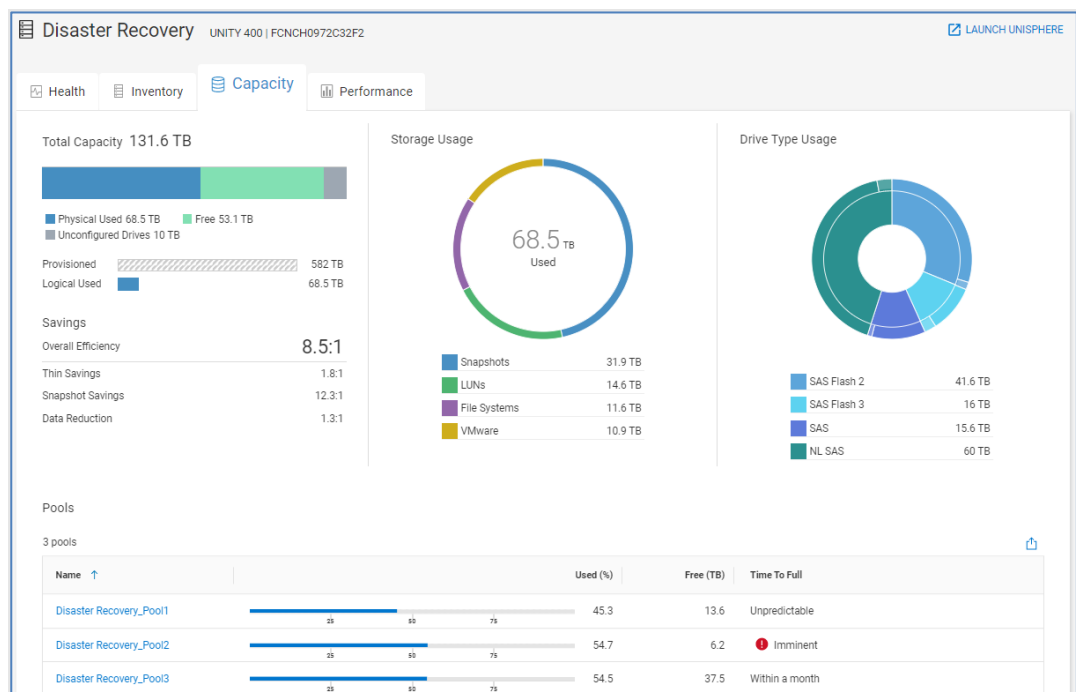
Savings includes a breakdown of the Logical and Used capacity of the total storage visible to the hosts, and the Efficiency Savings explained previously.

**Storage Usage** shows the consumed capacity of these categories of storage objects:

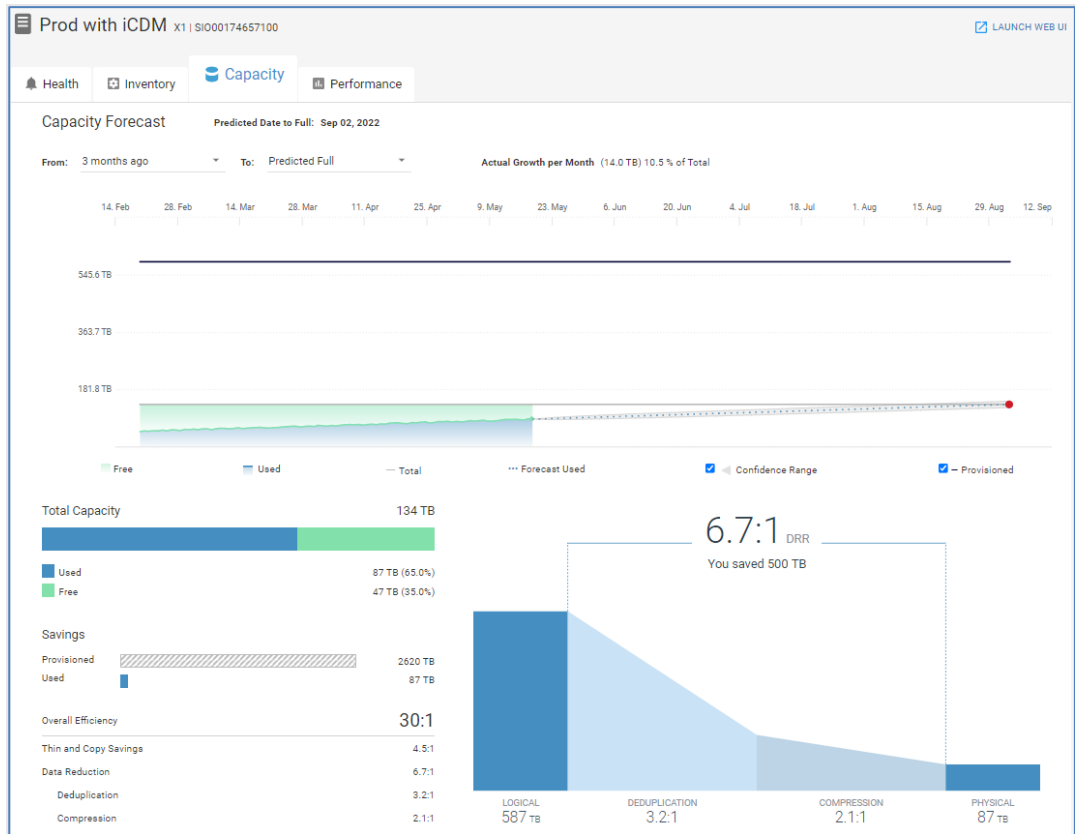
- LUNs (Unity XT family)
- Volumes (PowerStore, SC Series, and PowerVault)
- Thick Volumes (PowerFlex)
- Thin Volumes (PowerFlex)
- File Systems (Unity XT family and PowerStore)
- Virtual Hot Spares (PowerScale/Isilon)
- User data (PowerScale/Isilon)
- VMware (VMware datastores for Unity XT family and PowerStore)
- Snapshots

**Drive Type Usage** shows the drive types installed in the system, with configured and unconfigured capacity. Hovering over the rings will show the details related to that configuration.

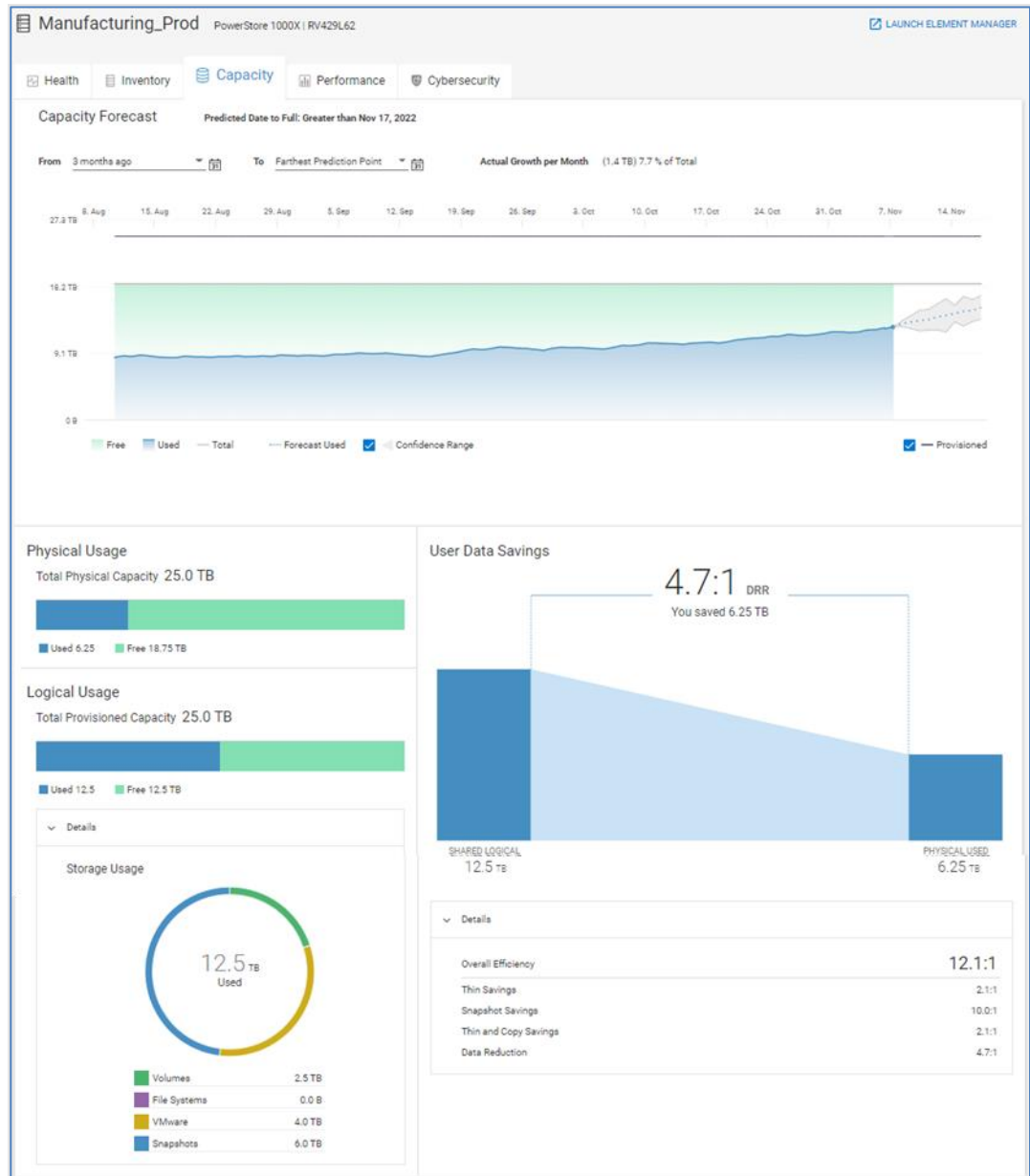
The **Pools** table lists the configured storage pools on the system. It includes the Free, Used, and Time to Full details for each pool. Selecting a pool name navigates the user to the Pool Details page.



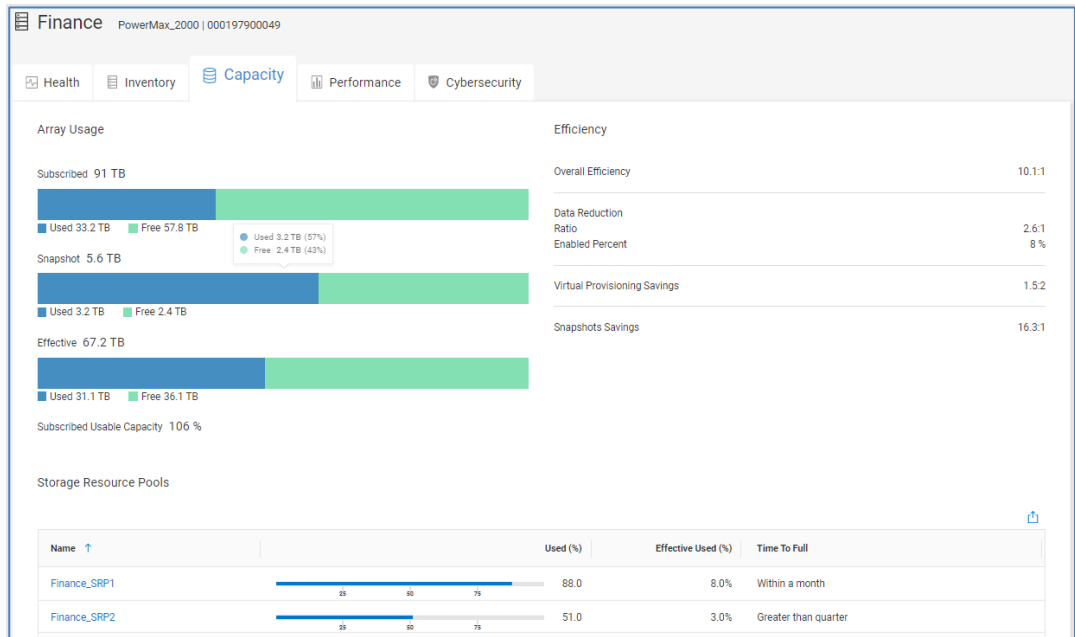
XtremIO systems show the Capacity Forecast chart on the top of the page. The bottom of the page shows the total capacity broken down by used and free along with a detailed data reduction chart.



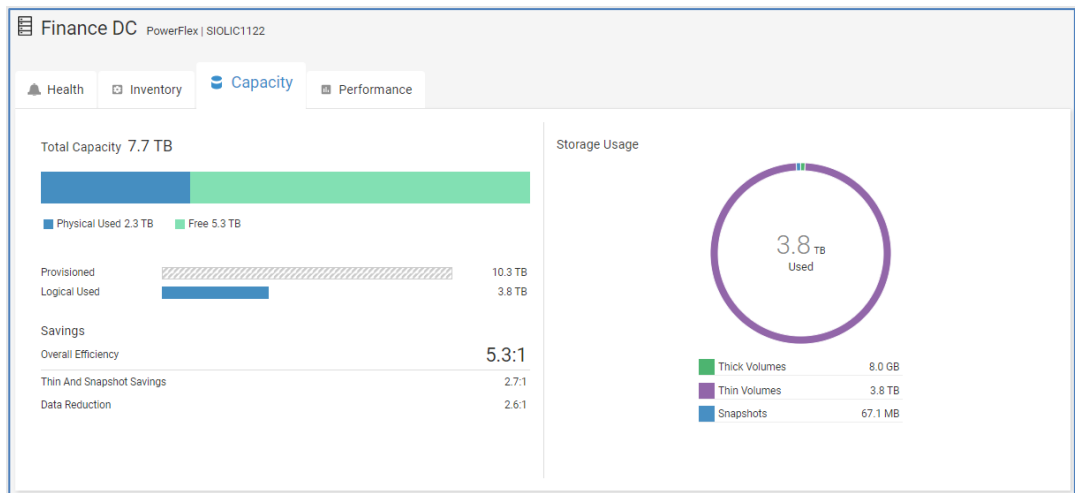
PowerStore systems provide the Capacity Forecast chart at the top of the page. The bottom of the page includes charts for physical and logical usage and the space savings due to data reduction.



PowerMax or VMAX systems display Used and Free capacities for Subscribed, Snapshot, and Usable storage as well as the storage efficiency ratios and the percent used per storage resource pool.

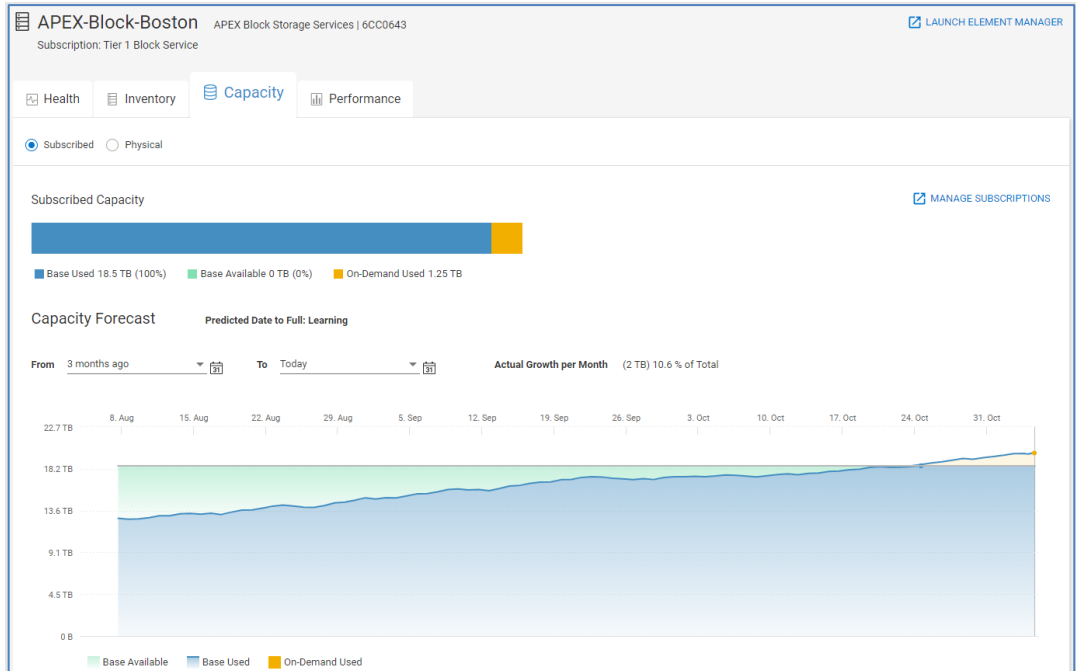


PowerFlex provides a breakdown of Total Capacity based on physical used and free. It also provides total provisioned and logical used charts and overall efficiency based on thin and snapshot savings and data reduction.

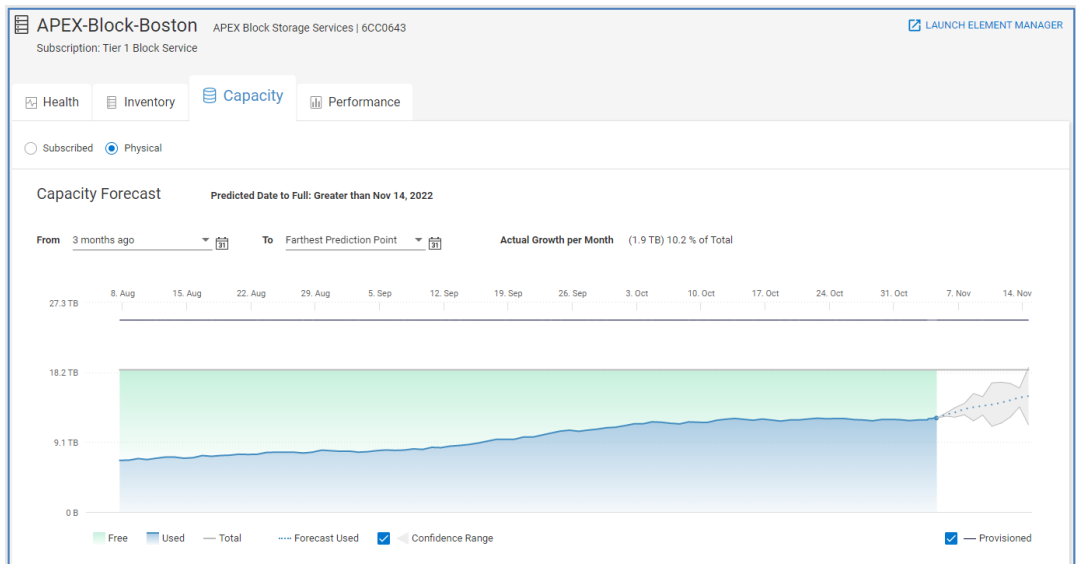


For APEX Block Storage Services, there are two views for capacity under the Capacity tab: **Subscribed** and **Physical**. The Subscribed chart displays the Base Used, Base Available, and On-Demand Used capacities. The Capacity Forecast chart provides historical trends for each of these metrics. This brings attention to the user how often they are using storage from the On-Demand category. If consistently using On-Demand storage, they may want to consider modifying their subscription to increase the Base capacity, which results in a lower cost per GB.

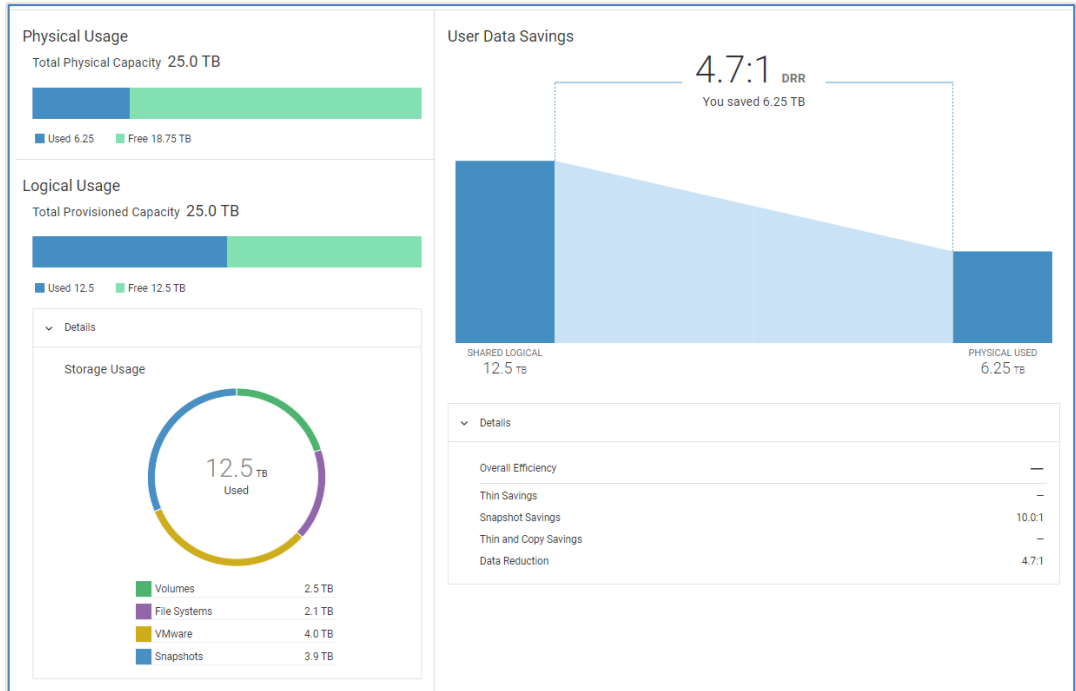
The Manage Subscriptions link directs the user to the APEX Console.



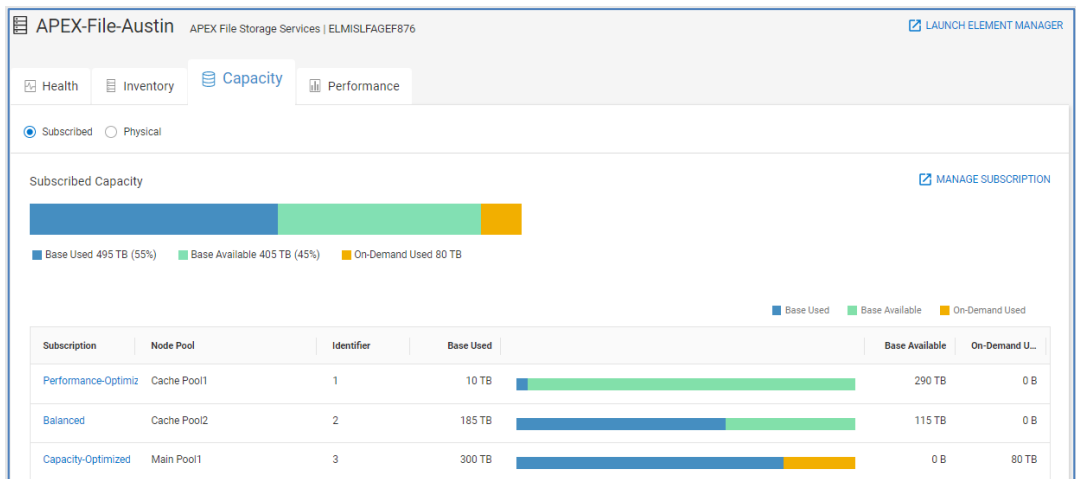
The Physical view shows the Total, Free, and Used physical capacities on the cluster. The Capacity Forecast chart at the top of the page provides the historical and forecast capacity usage and the predicted time to full.



The bottom half of the Physical view provides Used and Free breakdowns for both physical and logical usage, the storage usage chart, and a chart with the space savings due to data reduction.

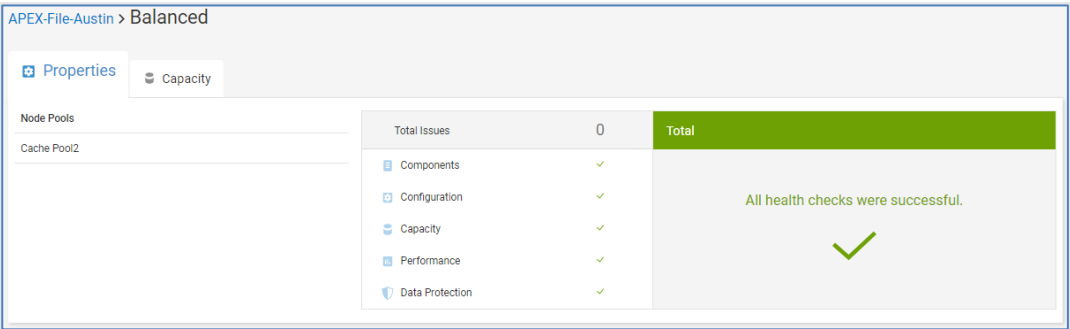


For APEX File Storage Services, the capacity tab also has a Subscribed and Physical view. The Subscribed view has the Subscribed Capacity bar chart showing the total Base Used, Base Available, and On-Demand Used capacities for all subscriptions. The table at the bottom half of the page provides a breakdown of the capacity usage for each subscription.

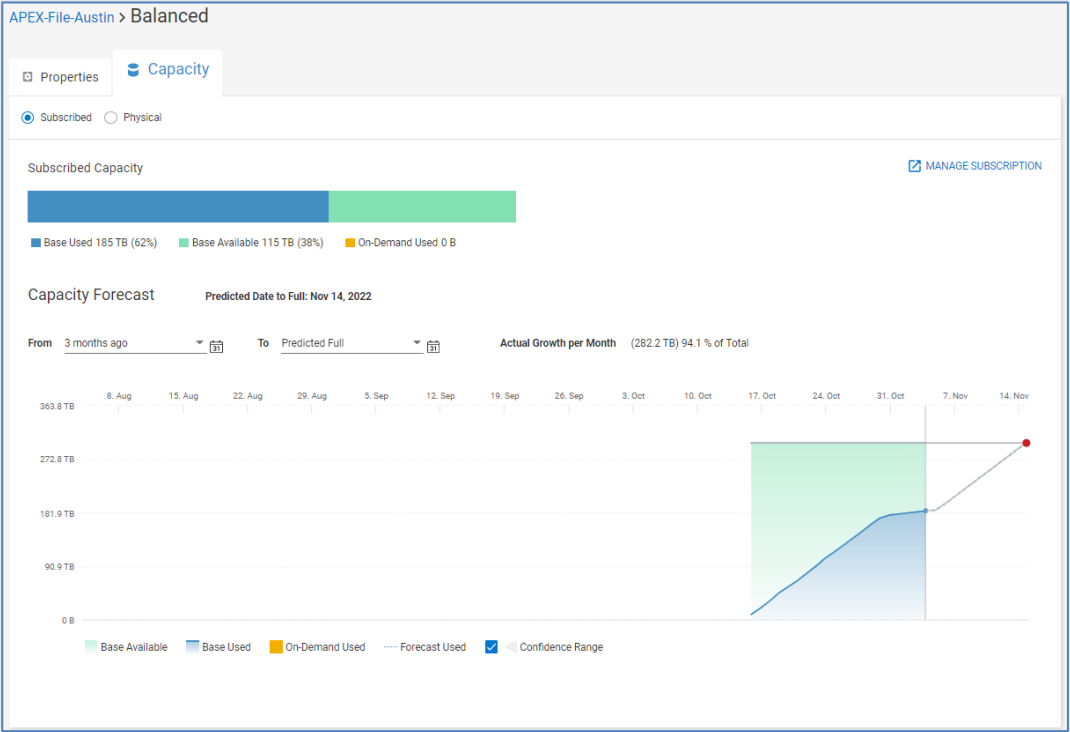


Selecting the Subscription link opens a subscription details page with a Properties and Capacity tab. The Properties tab lists the Node Pools and the summary of any health issues.

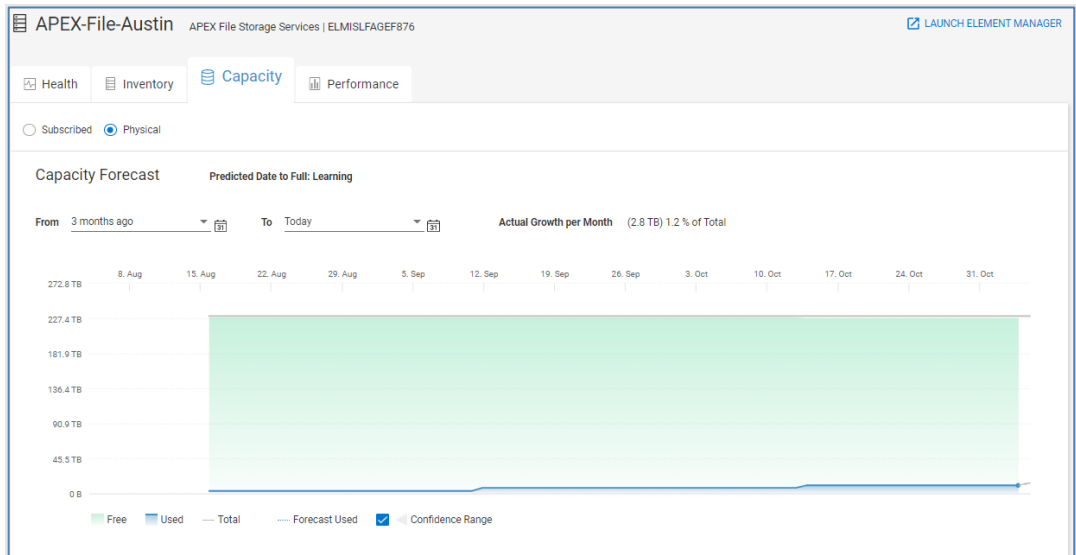




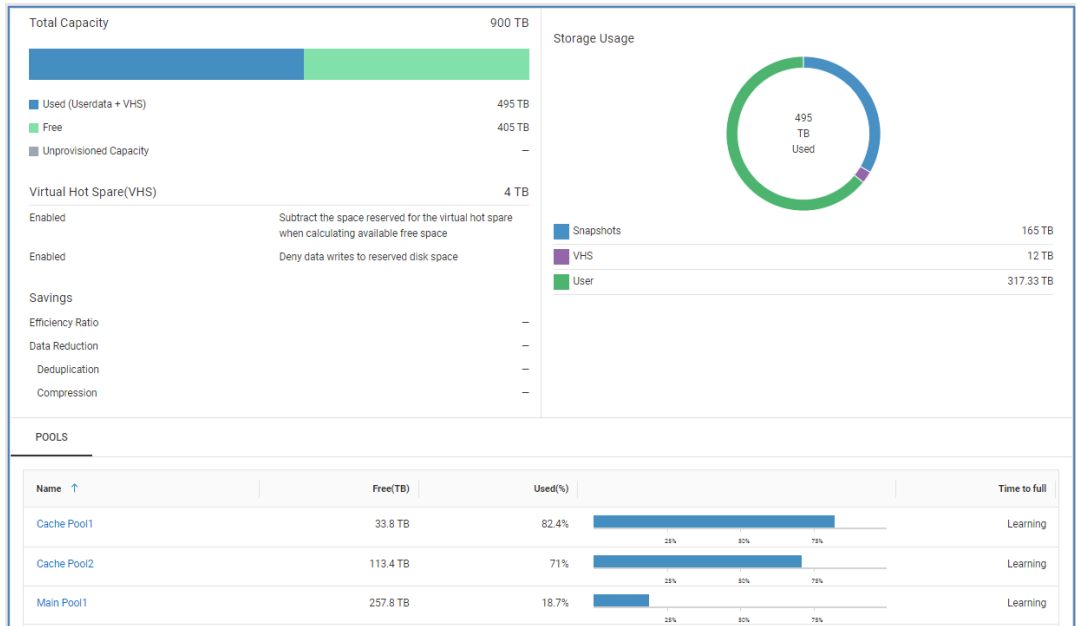
The Capacity tab provides Subscribed and Physical views of the capacity similar to what is available at the system level.



The Physical view for APEX File Storage Services



The bottom half of the page provides a breakdown of the Total Capacity, a Storage Usage chart, and a table with Free and Used capacity metrics for each node pool.



### Storage system details – Performance

The Performance tab is supported for all storage systems and APEX Data Storage Services. It is similar to the Performance tab for Pools discussed earlier in this paper. The top portion of this tab is the Object Activity and it shows key performance metrics for storage objects sorted by their 24-hour averages. The result is the user immediately sees the top contenders for resources on the system.

The following metrics are displayed with a 24-hour trend line and the 24-hour average. It is sorted to show objects with the highest averages over the last 24 hours allowing the user to immediately see the top contenders for resources on the system.

- Latency (PowerStore, PowerMax/VMAX, Unity XT family, XtremIO, APEX Block Storage Services), Volume Latency (SC Series)

- IOPS (all platforms)
- Bandwidth (all platforms)

---

**Note:**

- For PowerMax or VMAX systems, CloudIQ displays these performance metrics at the Storage Group level.
  - Top Object Activity is not displayed for PowerScale or Isilon, PowerFlex, or APEX File Storage Services
- 

The remaining charts show 24-hour history of key system level performance metrics with an overlay of historic seasonality. The metrics vary slightly by product type:

- Latency (APEX Block Storage Services, APEX File Storage Services, Unity XT family, PowerStore, PowerMax or VMAX, PowerScale or Isilon, PowerFlex, XtremIO, and SC Series)
- IOPS (all platforms)
- Backend IOPS (for Unity XT family - if multiple storage tiers exist, each tier has a separate chart)
- Bandwidth (all platforms)
- Storage Processor Utilization (Unity XT family) / Controller Utilization (SC Series) / CPU Utilization (XtremIO, PowerScale or Isilon, and APEX File Storage Services)
- Client (PowerScale or Isilon, and APEX File Storage Services)
- Protocol: Latency (PowerScale or Isilon, and APEX File Storage Services)
- Protocol: IOPS (PowerScale or Isilon, and APEX File Storage Services)
- Protocol: Bandwidth (PowerScale or Isilon, and APEX File Storage Services)

---

**Note:** For Unity XT family, the system performance page has both a Past 24 Hours view and a Forecast view. Performance forecasting is only supported for Unity XT family and is discussed below.

---

For additional performance metrics, the user can select the **Create Report** button in the upper right corner of the Object Activity window to access the Report Browser.

CloudIQ identifies performance anomalies on all system level performance charts for all system types except APEX File Storage Services. A shaded blue area identifies performance anomalies. For APEX Block Storage Services, Unity XT family, PowerStore, PowerMax, PowerScale, and PowerFlex systems, CloudIQ identifies areas of performance impacts on the Latency chart. A pink shaded area identifies performance impacts. Similar to the latency chart for Unity XT storage pools, the user can select the DETAILS button to see the most likely competing workloads causing the impact.

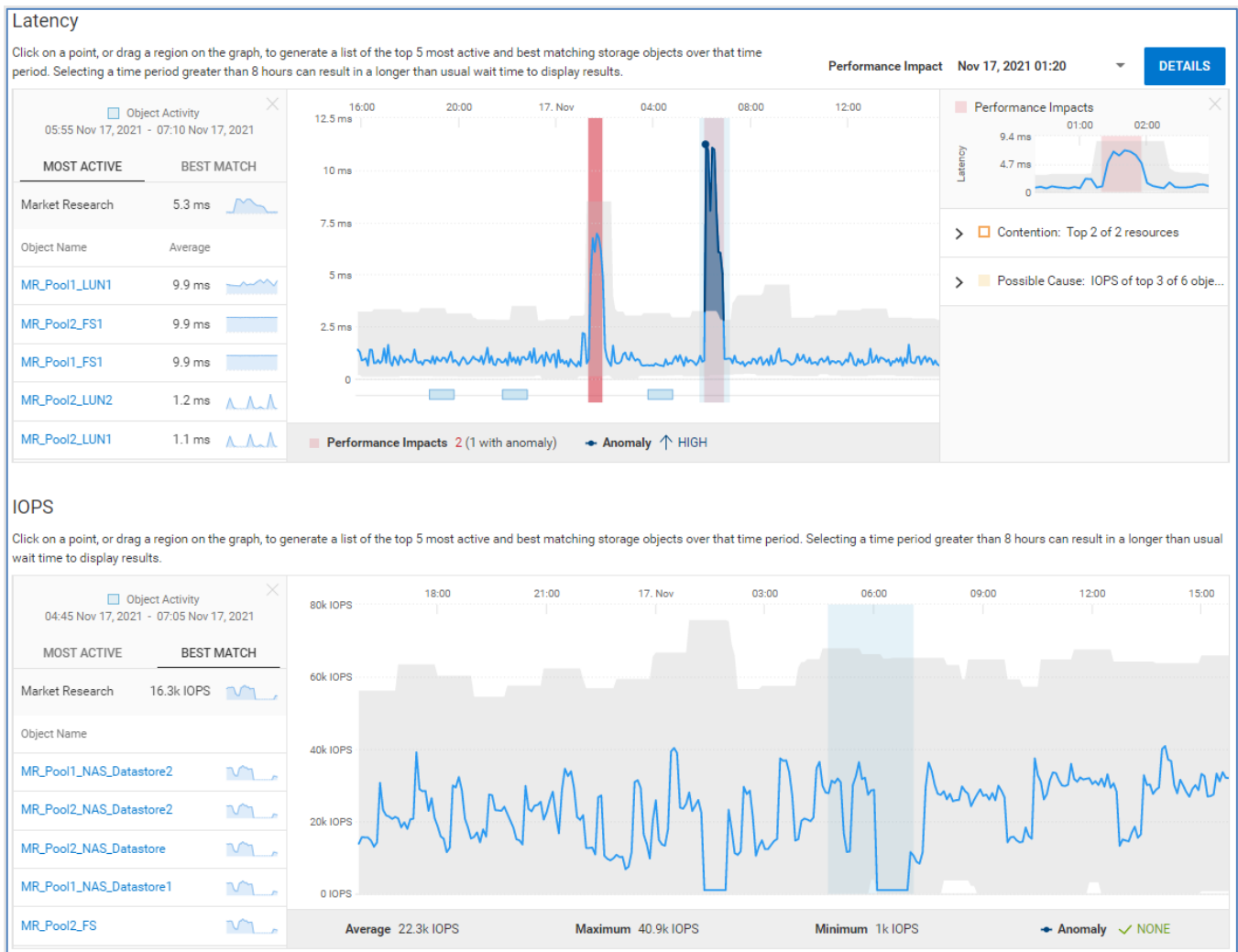
For APEX Block Storage Services, Unity XT family, PowerStore, PowerScale, and PowerVault systems, configuration changes are identified as rectangles along the X-axis of the charts. Selecting the configuration change rectangle opens the Storage Configuration Changes window which contains details of the changes. By identifying when configuration changes occur, CloudIQ helps the user potentially correlate configuration changes in the environment to performance impacts.

## Storage system details

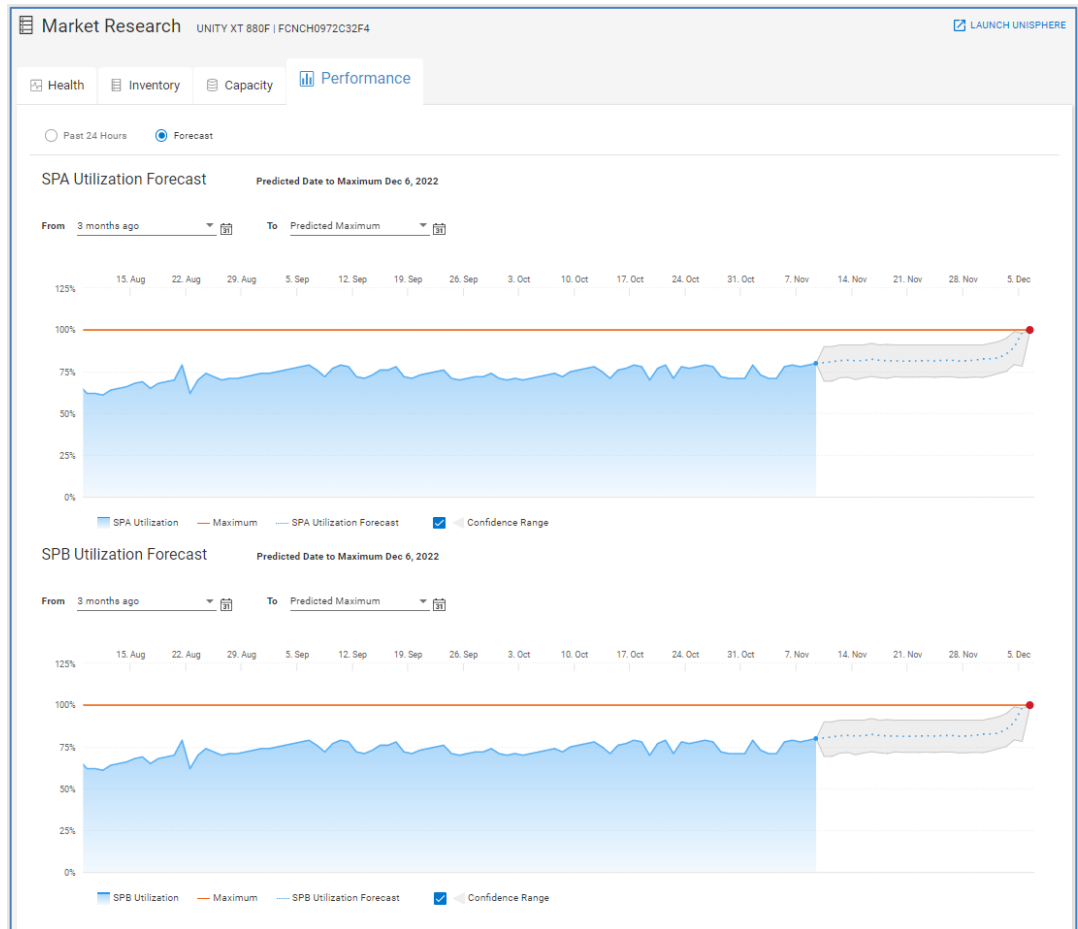
Selecting any area in the Latency, IOPS, and Bandwidth charts for any system type (except APEX File Storage Services and PowerFlex) displays the top five most active storage objects during that time period in the left side of the chart. Objects would be LUNs or files systems for Unity XT family, volumes or file systems for PowerStore, volumes for APEX Block Storage Services, SC Series, PowerVault and XtremIO, storage groups for PowerMax or VMAX, and nodes for PowerScale. In the example below, the area around the second impact with the performance anomaly is highlighted and it shows the most active objects in the left side of the screen. For APEX Block Storage Services, PowerStore, Unity XT family, and PowerVault, CloudIQ also provides the Best Match tab identifying objects whose performance characteristics most closely correlate to the selected range in the performance chart. The Best Match tab is shown in the IOPS chart below.

As with Pools performance, the user can select the Details button and see possible causes and resource contention for performance impact.

**Note:** Resource contention is supported for Unity XT family systems only.



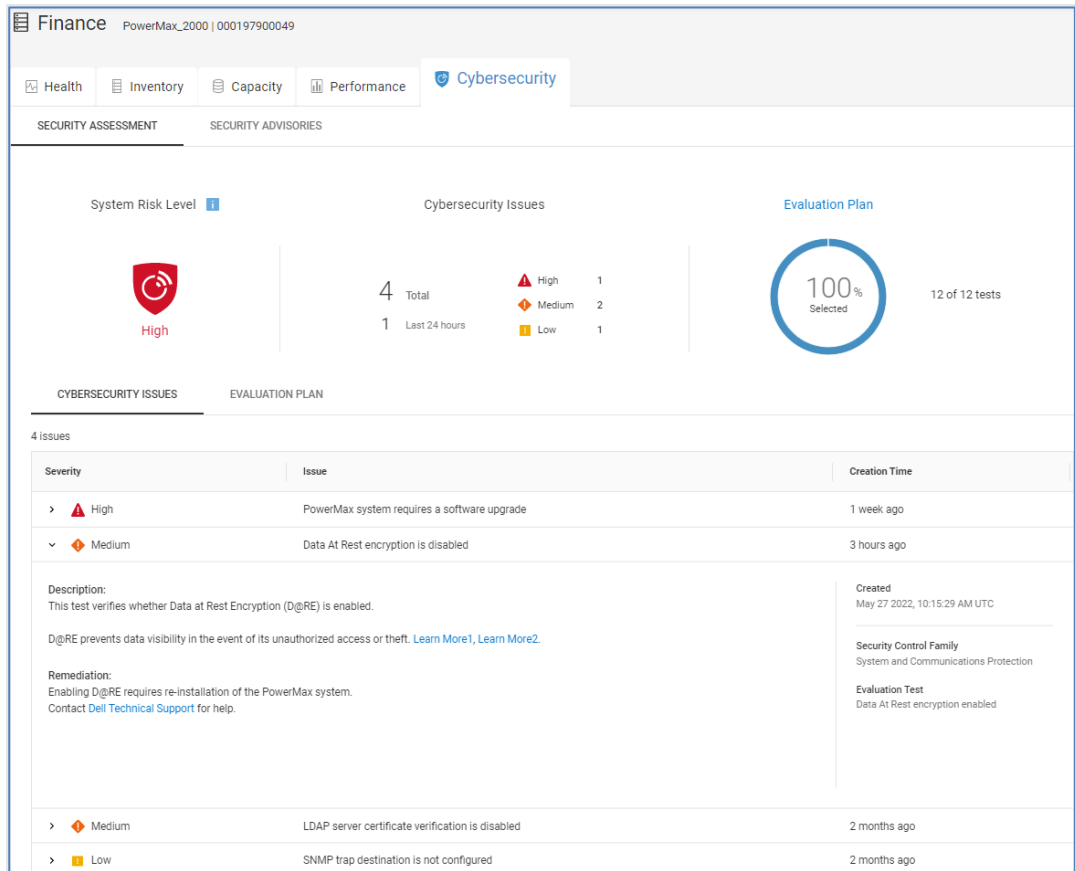
The Unity XT family supports performance forecasting charts. By selecting the Forecast radio button, users can see SP Utilization historical trends and forecasting along with predicted date to reach maximum. This allows users to properly balance and plan future workload requirements.



## Storage system details – Cybersecurity

The Cybersecurity tab is available for systems that have Cybersecurity enabled. Cybersecurity is supported for PowerMax, PowerStore, and PowerEdge systems, and will continue to expand coverage to other Dell assets. The top of the page shows information provided in the multisystem view: The System Risk Level, the summary of active issues, and the percentage of enabled tests in the Evaluation Plan. The bottom of the page has two tabs: Cybersecurity Issues and Evaluation Plan.

The **Cybersecurity Issues** tab lists all active issues identified on this system. Expanding each issue provides a detailed issue description and the recommended remediation. Users can also see the time the issue was created, the security control family (defined by NIST 800-53 R5), and the name of the evaluation test.



The **Evaluation Plan** tab lists all possible tests for this system type. The evaluation tests are grouped into Security Control Families. Each family can be expanded to show the individual tests that make up the group and one of the following statuses for each test:

- OK – Test is enabled and no issues identified.
- Deviation – Test is enabled and an active issue exists.
- Not In Plan – Test is not enabled.

When an active issue exists, the Last Detected Column shows the first time the issue was detected. When an issue does not exist, it shows the last time this data was changed (as reported by the system).

There is a details icon which shows the details of each test. In instances where there is a deviation, it will also show the recommended remediation.

CYBERSECURITY ISSUES		EVALUATION PLAN		
12 Evaluation Tests				
Evaluation Tests	Status	Last Detected	Details	Determine if any SNMP trap destination is configured
> Access Control				This test verifies whether an SNMP destination is configured according to the organizational policy.  <b>Issue:</b> SNMP trap destination is not configured  This test verifies whether an SNMP destination is configured according to the organizational policy.  <b>Remediation:</b> Configure the SNMP trap by following the instructions in the "Configure SNMP Notifications" topic of the Unisphere online help.
> Audit and Accountability				
Remote Syslog enabled	OK	Wed, Feb 10 2021, 1...		
> Configuration Management	1 Deviation			
Determine if any SNMP trap destination is configured	Deviation	Wed, Feb 10 2021, 1...		
> Identification and Authentication	1 Deviation			
> System and Communications Protection	1 Deviation			
> System and Information Integrity	1 Deviation			

The **Security Advisories** tab provides information about the applicable Dell and VMware Security Advisories that impact this system.

Finance PowerMax_2000   000197900049						
Health	Inventory	Capacity	Performance	Cybersecurity		
SECURITY ASSESSMENT			SECURITY ADVISORIES			
Impact				Type		
2 Critical	2 High	0 Medium	0 Low	2 Storage	2 Hypervisor	
Details	Advisory ID	Impact	Synopsis	Type	Impacted Systems	Published
	VMSA-2021-0014	High	VMware ESXI updates address...	Hypervisor	1	07-13-2021
	VMSA-2021-0010	Critical	VMware vCenter Server updat...	Hypervisor	1	05-25-2021
	DSA-2021-134	High	Dell EMC Unisphere for Power...	Storage	1	07-22-2021
	DSA-2021-185	Critical	Dell EMC Unisphere for Power...	Storage	1	9-22-2021

## Block object details

### Introduction

Block objects include LUNs for Unity XT family systems and volumes for APEX Block Data Services, PowerStore, SC Series, XtremIO, and PowerVault. They can be accessed from the Storage listing for individual Systems and Pools and can also be found using global search.

### Block object details – Properties

The Properties tab for a block object displays attributes for the object and any health issues associated with this object. The bottom of the page varies slightly depending on storage type. It displays the Hosts (for APEX Block Data Storage Services, Unity XT family, PowerStore, and XtremIO systems), Servers (for SC Series), or Initiators (for PowerVault) associated to the object. The Virtual Machines tab lists information for VMs residing on the object and is available for APEX Block Data Storage Services, Unity XT family, SC Series, and XtremIO objects. The Consistency Groups tab is available for XtremIO volumes listing consistency group information to which the volume belongs.

## Block object details

Market Research > MR\_Pool1\_LUN1 LAUNCH UNISPHERE

**Properties** | Capacity | Performance | Data Protection

Pool: Market Research\_Pool1  
 Type: LUN  
 FAST Cache: —  
 FAST VP Policy: Start High Then Auto-Tier  
 Consistency Group: MRApp1CG  
 Thin: Yes  
 SP Owner: SP A  
 CLI ID: sv\_10  
 WWN: 60:06:01:60:0A:30:3E:00:AB:2D:48:58:26:AE:B2:23  
 Data Reduction: On

Total Issues: 0 **Total**

All health checks were successful.

HOSTS: VIRTUAL MACHINES 2 Hosts

Issues	Name	Network Address	Operating System	Initiator Protocol	Initiators (#)	Total Size (TB)
1	MRApp1_Host1	10.0.0.20	Windows Server 2012	FC	2	5.8
1	MRApp1_Host2	10.0.0.21	Windows Server 2012	FC	2	5.8

## Block object details – Capacity

The Capacity tab for Unity XT family, SC Series, and PowerVault block objects provides details for the capacity being used including Data Reduction savings and capacity utilization by Snapshots. The Historical Trend shows the capacity changes over time helping users identify increasing trends to anticipate future capacity usage.

Market Research > MR\_Pool1\_LUN1 LAUNCH UNISPHERE

Properties | **Capacity** | Performance | Data Protection

Size: 3 TB  
 Data Reduction Savings: 1.1:1 (5% or 256.0 MB)  
 Allocated: 825 GB  
 Non-base Space Used: 990 GB  
 Total Pool Space Used: 1.8 TB

Total Capacity 3 TB

Allocated 825 GB

Tier Distribution

Tier	Data Distribution (%)
Extreme Performance	100.0

Historical Trend

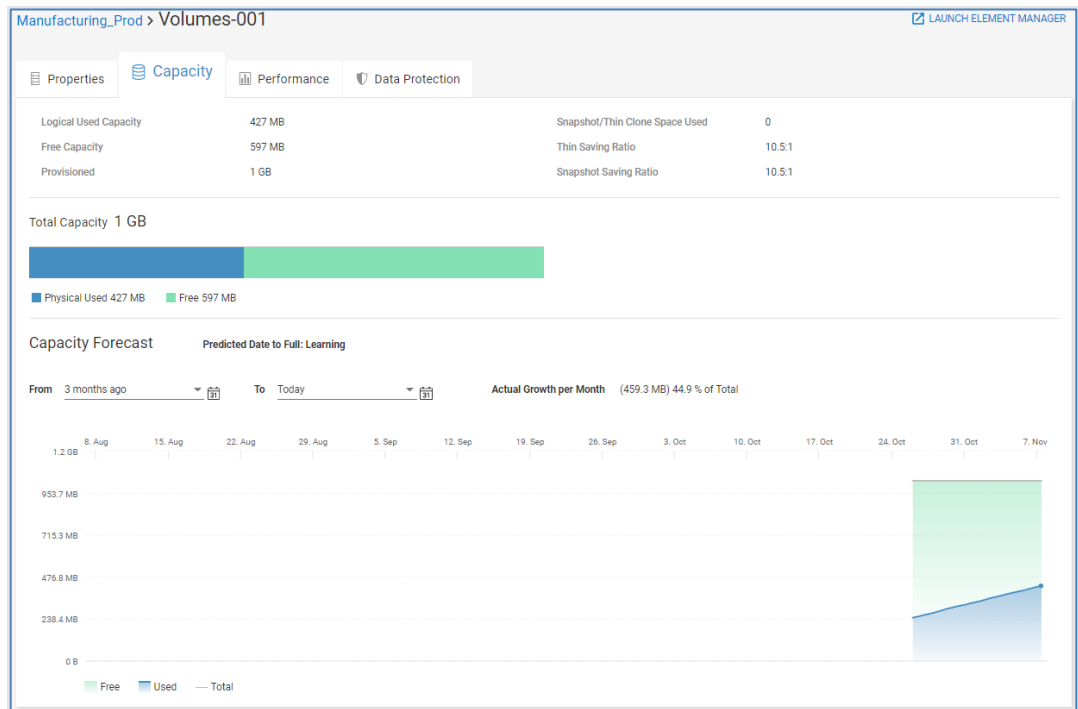
Value: Total (129.7 TB), Allocated (117.3 TB, 90.5%)  
 Last Received: 129.7 TB

From: 3 months ago To: Today

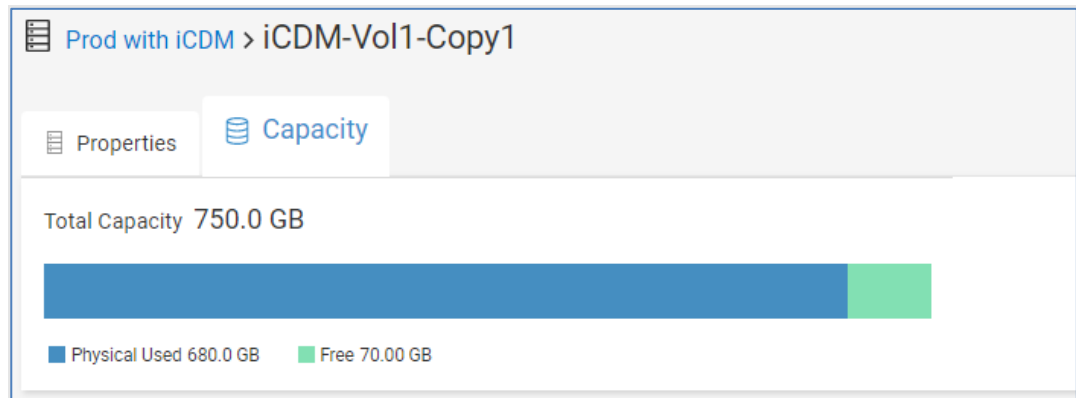
8 Aug, 15 Aug, 22 Aug, 29 Aug, 5 Sep, 12 Sep, 19 Sep, 26 Sep, 3 Oct, 10 Oct, 17 Oct, 24 Oct, 31 Oct, 7 Nov

The Capacity tab for a PowerStore volume provides provisioned, logical used, physical used, and free capacities along with a capacity trend and forecast.





The Capacity tab for an XtremIO volume does not support the historical trend. Volume Size, Physical Used, and Free metrics are graphed as shown below.

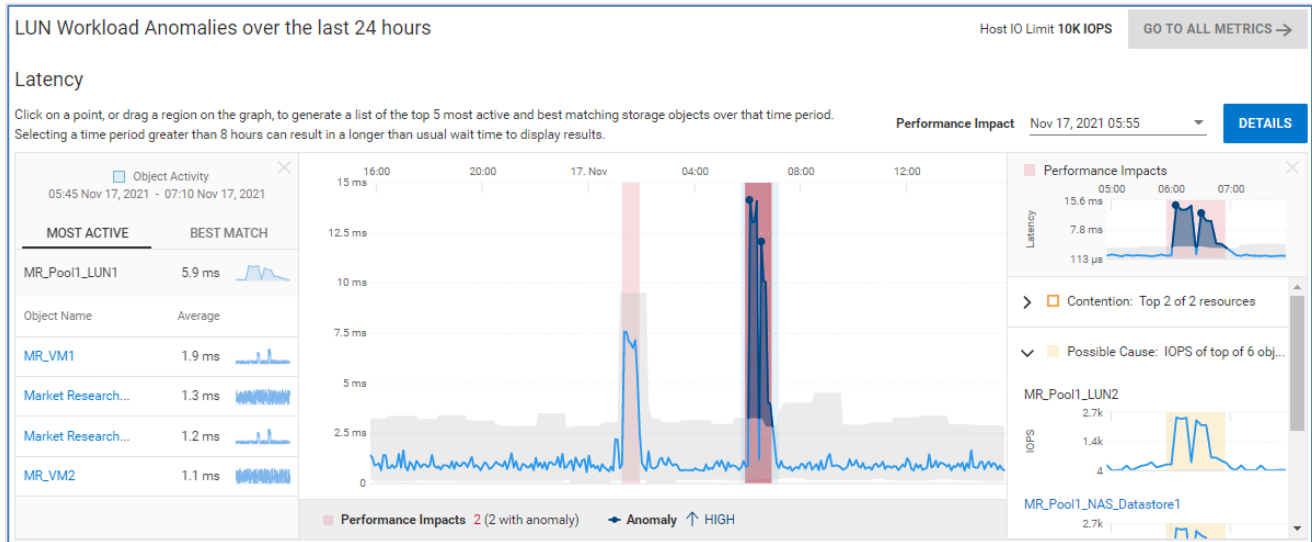


## Block object details – Performance

The Performance tab for block objects (APEX Block Data Storage Services, PowerStore, Unity XT family, SC Series, and PowerVault) provides performance details for the block object activity. Similar to the system and pool level performance charts, CloudIQ identifies performance anomalies for each performance metric. For Unity XT family systems, APEX Block Data Storage Services, and PowerStore, CloudIQ also identifies performance impacts at the object level.

Highlighting an area in the performance charts for a block object identifies up to the five most active virtual machines contributing to the metric during that time period. Unity XT family systems, APEX Block Data Storage Services, and PowerStore have the additional feature of providing the virtual machines that most closely correlate to the behavior in the selected time range. This correlation is shown under the Best Match tab.

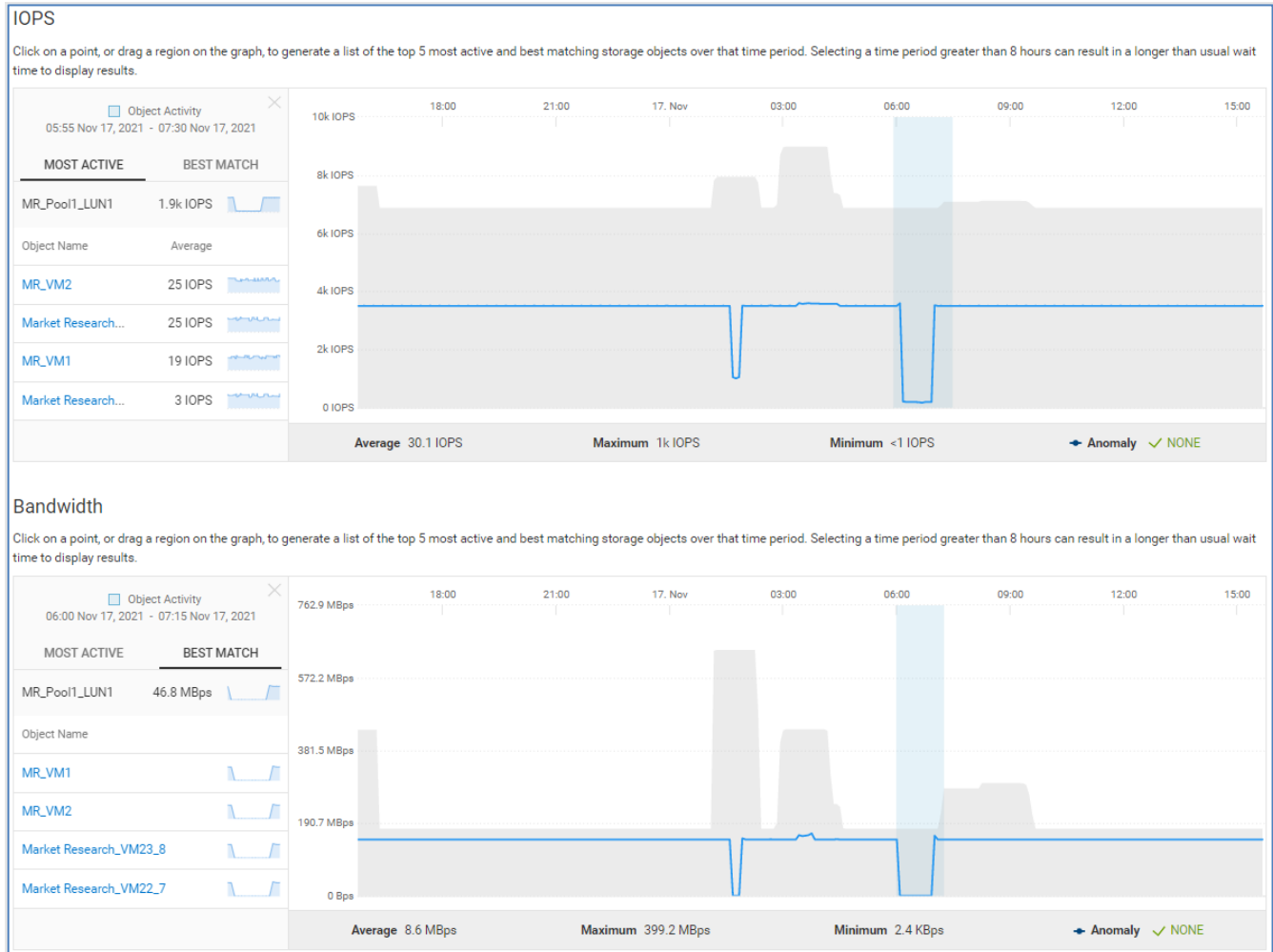
The following shows two performance impacts on a Unity XT block latency chart. The first is an impact only, the second is an impact with a performance anomaly. Selecting the Details button opens a window in the right side of the chart identifying storage objects whose IOPS are correlated with the rise in latency for the impacted LUN. These objects are the most likely candidates causing workload contention and the performance impact. CloudIQ also identifies if there is possible resource contention for Unity XT LUNs experiencing a performance impact.



The bottom of the page displays LUN or Volume performance charts for the following metrics:

- Latency (Unity XT family and SC Series)
- IOPS (all)
- Bandwidth (all)
- % Read (Unity XT family and PowerVault)
- IO Size (Unity XT family, APEX Block Data Storage Services, PowerStore, and PowerVault)
- Queue Length (Unity XT family)
- Queue Depth (APEX Block Data Storage Services and PowerStore)

In the following screenshot, a region of the IOPS chart is highlighted. The left side of the chart displays the Most Active tab which displays the most active virtual machines contributing to the metric during that time period. In the Bandwidth chart, the Best Match tab is selected which identifies the VM whose bandwidth most closely correlates to the metric during the selected time period.



## Block object details – Data Protection

The Data Protection tab for APEX Block Data Storage Services, PowerStore, Unity XT family, and SC Series block objects displays how data protection has been configured for the selected object. There are two levels of data protection available:

- Replication – remote protection from system to system
- Snapshots – local protection within the system

## File object details

The Replication section on the top of the page shows replication details and status of the replication session. The Snapshots section at the bottom half of the page shows how data is backed up within the system using snapshot technology. Snapshot schedules and deletion policies are displayed. The snapshot list can be exported to a CSV file.

The screenshot displays the 'Data Protection' section for 'Market Research > MR\_Pool1\_LUN1'. It includes a navigation bar with 'Properties', 'Capacity', 'Performance', and 'Data Protection'. The 'Replication' section shows session details for 'rep\_async', including mode, local role, sync progress (80% complete), transfer rate (395.2 MB/Sec), and last sync time. A diagram illustrates data flow from 'Market Research MR\_Pool1\_LUN1' to 'Disaster Recovery DR\_Pool3\_LUN1' with 'Auto Sync Configured'. The 'Snapshots' section details a schedule for 'Snap Schedule all rules' and a 'Pool Automatic deletion policy'. Below is a table of 7 snapshots.

Name	Source	State	Taken	Taken By	Attached	Last Writable Time	Modified	Auto Delete	Expiration Time
mySnap-1556112110020	MR_Pool1_LUN1	Ready	Sun, Mar 31 2019, 2:39:23 ...	Snap Schedule all r...	No	Fri, Mar 29 2019, 2:39:23 P...	No	No	Tue, Apr 16 2019, 2:39...
mySnap-1556112110021	MR_Pool1_LUN1	Ready	Thu, Mar 21 2019, 2:39:23 ...	Snap Schedule all r...	No	Tue, Mar 19 2019, 2:39:23 ...	Yes	No	Tue, Apr 2 2019, 2:39...
mySnap-1556112110021	MR_Pool1_LUN1	Ready	Tue, Mar 19 2019, 2:39:23 ...	Snap Schedule all r...	No	Fri, Mar 15 2019, 2:39:23 P...	Yes	No	Sun, Mar 31 2019, 2:3...
mySnap-1556112110021	MR_Pool1_LUN1	Ready	Tue, Mar 5 2019, 2:39:23 P...	Snap Schedule all r...	No	Sun, Mar 3 2019, 2:39:23 P...	Yes	No	Thu, Mar 21 2019, 2:3...
mySnap-1556112110024	MR_Pool1_LUN1	Ready	Mon, Mar 11 2019, 2:39:23 ...	Snap Schedule all r...	No	Thu, Mar 7 2019, 2:39:23 P...	Yes	No	Tue, Mar 19 2019, 2:3...
mySnap-1556112110024	MR_Pool1_LUN1	Ready	Mon, Feb 25 2019, 2:39:23 ...	Snap Schedule all r...	No	Sat, Feb 23 2019, 2:39:23 P...	Yes	No	Mon, Mar 11 2019, 2:3...
mySnap-1556112110024	MR_Pool1_LUN1	Ready	Mon, Feb 11 2019, 2:39:23 ...	Snap Schedule all r...	No	Sat, Feb 9 2019, 2:39:23 P...	Yes	No	Mon, Feb 25 2019, 2:3...

## File object details

### Introduction

File Objects (PowerStore and Unity XT family systems) are accessible in the Storage listing for individual Systems and Pools. File objects can also be accessed using global search.

### File object details – Properties

The Properties tab displays various attributes for the file object and any health issues found for the object. Attributes for Unity XT file objects include the Pool, FAST VP Policy, NAS Server, Protocol, and Data Reduction status. It also allows users to pause the capacity health check for the file system. This can also be accomplished from the Customization menu under Admin. See [CloudIQ administration](#) for more details.

The bottom half of the view shows any virtual machines that reside on the file object.

Market Research > MR\_Pool1\_FS1

Properties | Capacity | Performance | Data Protection

Pool: Market Research\_Pool1  
 Type: File System  
 Thin: Yes  
 FAST Cache: Start High Then Auto-Tier  
 FAST VP Policy: Start High Then Auto-Tier  
 NAS Server: NAS\_Server\_5  
 CLI ID: sv\_910  
 Protocol: Linux/Unix Shares (NFS)  
 Data Reduction: On - Standard

PAUSE CAPACITY HEALTH CHECKS

Total Issues: 0

Total

All health checks were successful.

VIRTUAL MACHINES

1 Virtual Machine

Name	Export Path	Network Address	Operating System	vCenter	ESXi	Cluster
MR_VM2	10.1.2.3/nfs_share	10.0.1.2	Red Hat Enterprise Linux ...	10.0.0.100	LocalESX1	Research Cluster

Attributes for PowerStore file objects include description, NAS server, and protocol. The bottom half of the page provides information for NFS export or the SMB path.

Appliance-Manufacturing\_Dev > fs\_0

Properties | Capacity

Appliance: Manufacturing\_Dev-appliance-1  
 Type: File System  
 Description: test file system  
 NAS Server Name: NasCCT\_dev\_0  
 Protocol: NFS

LAUNCH ELEMENT MANAGER

Total Issues: 0

Total

All health checks were successful.

NFS EXPORT | SMB PATH

1 NFS Export

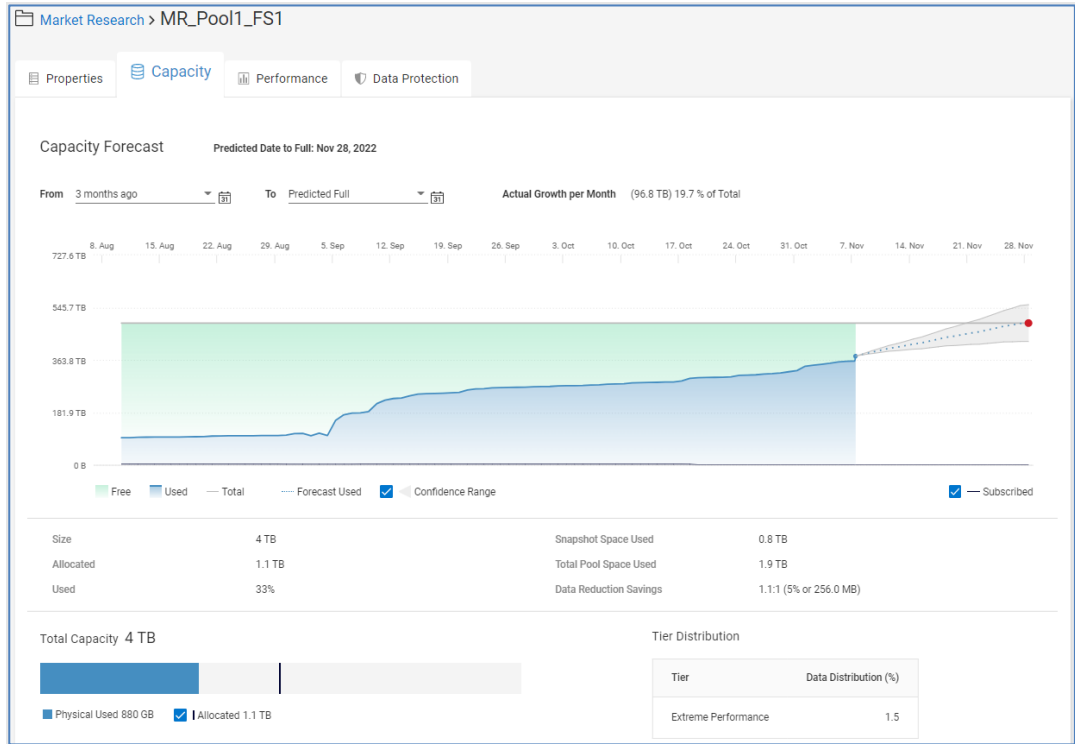
NFS Export Name	NAS Server Name	NFS Export Path	Local Path
Export One	NasCCT_dev_0	/path/to/export	/local/path

## File object details – Capacity

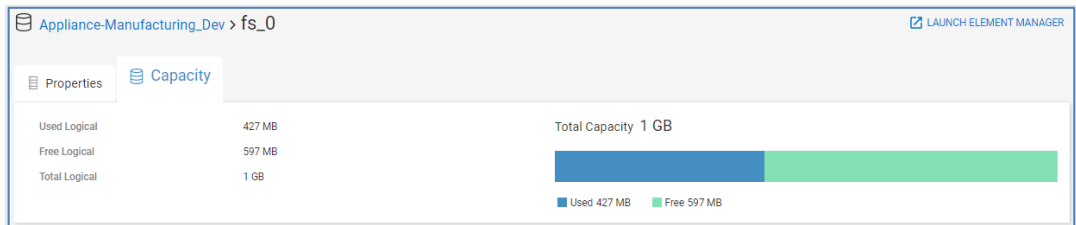
The Capacity tab for a Unity XT file object provides details for how the file capacity is being used, including capacity utilization for snapshots and Data Reduction Savings. The file used percentage is based on the actual data written to the file system.

The Capacity Forecast shows a historical trend and capacity changes since the object was created. CloudIQ predictive analytics algorithms are applied to provide ongoing predictions as to when the file system will become full.

Hovering across the trend line displays the specific total, used and free values for that selected point in time.



The Capacity tab for a PowerStore file object provides total, used, and free logical capacity metrics.



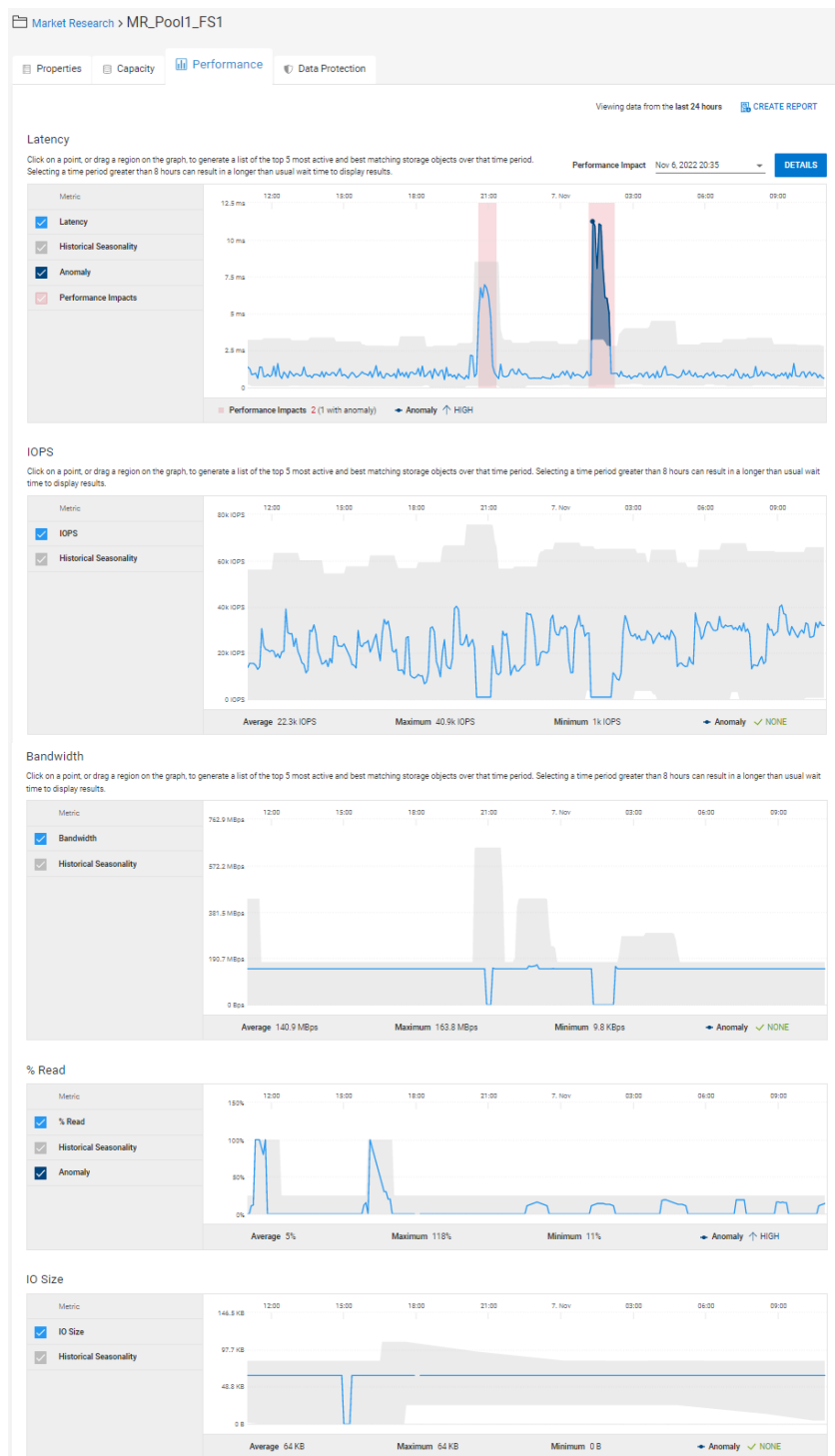
**File object details – Performance**

The tab is applicable for Unity XT file objects and provides 24-hour performance charts for the following metrics:

- Latency
- IOPS
- Bandwidth
- %Read
- IO Size
- Queue Length

Performance impact analysis is supported and identified as pink shaded areas on the Latency chart. Performance anomalies are supported for each of these metrics.

**Note:** Latency and Queue Length metrics are available for Unity XT v5.0 and higher.



## File object details – Data Protection

The Data Protection tab for a Unity XT file object displays how data protection has been configured for that object. There are two levels of data protection available:

- Replication – remote protection from system to system
- Snapshots – local protection within the system

## Storage Group Details (PowerMax/VMAX systems)

The Replication section on the top of the page shows remote replication details and status of the replication session. The Snapshots section at the bottom half of the page shows how data is backed up within the system using snapshot technology. Snapshot schedules are also displayed. The snapshot list can be exported to a CSV file.

The screenshot displays the 'Data Protection' section for the storage group 'DR\_Pool1\_FS1'. It includes a 'Replication' section with a diagram showing data flow from 'Production Prod\_Pool1\_FS1' to 'Disaster Recovery DR\_Pool1\_FS1' via 'Auto Sync Configured'. Below this is a 'Snapshots' section with a table of snapshot rules and a list of 7 snapshots.

Rule	Schedule
Rule 1	Every Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday at 11:00 PM, retain for 14 days

Note: Schedule times are in UTC displayed in 12-hour format.

Name	Source	State	Taken	Taken By	Shared	Last Writab...	Modified	Auto Del...	Expiration ...	Access Type
mySnap-16675440...	DR_Pool1_FS1	Ready	Mon, Oct 1...	Snap Schedule	No	Sat, Oct 8 ...	No	No	Tue, Oct 1...	Share
mySnap-16675440...	DR_Pool1_FS1	Ready	Sun, Oct 2 ...	Snap Schedule	No	Fri, Sep 30 ...	Yes	No	Sun, Oct 1...	Share
mySnap-16675440...	DR_Pool1_FS1	Ready	Sun, Sep 1...	Snap Schedule	No	Wed, Sep 1...	Yes	No	Sat, Sep 2...	Share
mySnap-16675440...	DR_Pool1_FS1	Ready	Sat, Aug 2...	Snap Schedule	No	Thu, Aug 2...	Yes	No	Mon, Sep ...	Share
mySnap-16675440...	DR_Pool1_FS1	Ready	Mon, Aug ...	Snap Schedule	No	Sat, Aug 1...	Yes	No	Mon, Aug ...	Share
mySnap-16675440...	DR_Pool1_FS1	Ready	Mon, Aug ...	Snap Schedule	No	Sat, Aug 1...	Yes	No	Mon, Aug ...	Share

## Storage Group Details (PowerMax/VMAX systems)

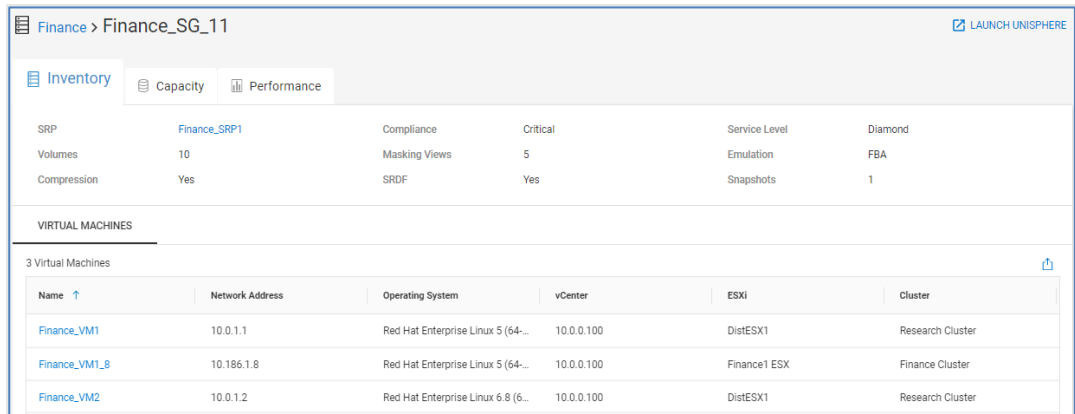
### Introduction

Each PowerMax/VMAX system lists the storage groups with key information including the associated Storage Resource Pool, the assigned Service Level and whether the Storage Group is in compliance. The storage group name is hyperlinked to enable easy navigation to the details pages for a given storage group. The Storage Group Details Page is also accessible using global search of the storage group name.

### Storage group details – Inventory

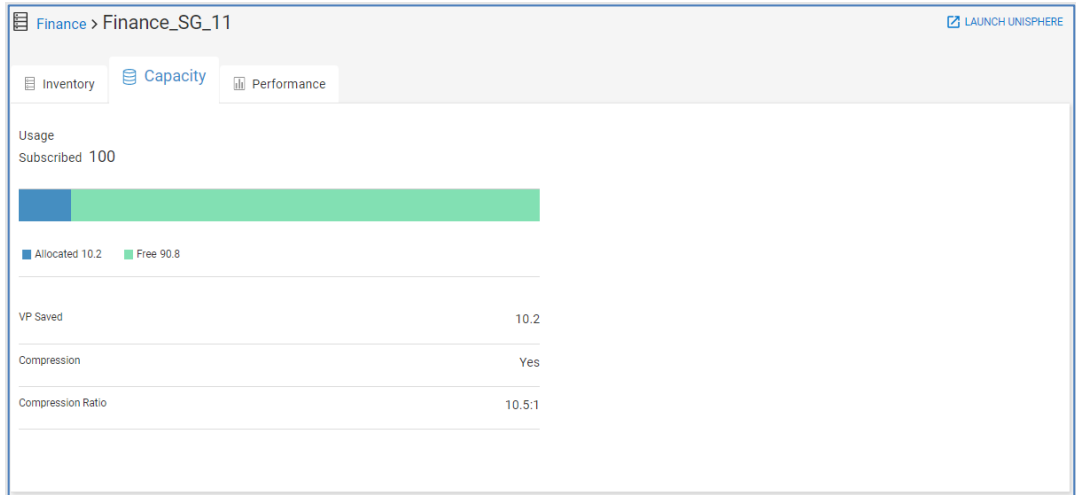
The Inventory tab for a storage group displays the attributes of the storage group. In the upper right is a link to “Launch Unisphere.” Selecting this link opens the Unisphere element manager for the system hosting this storage group.





**Storage group details – Capacity**

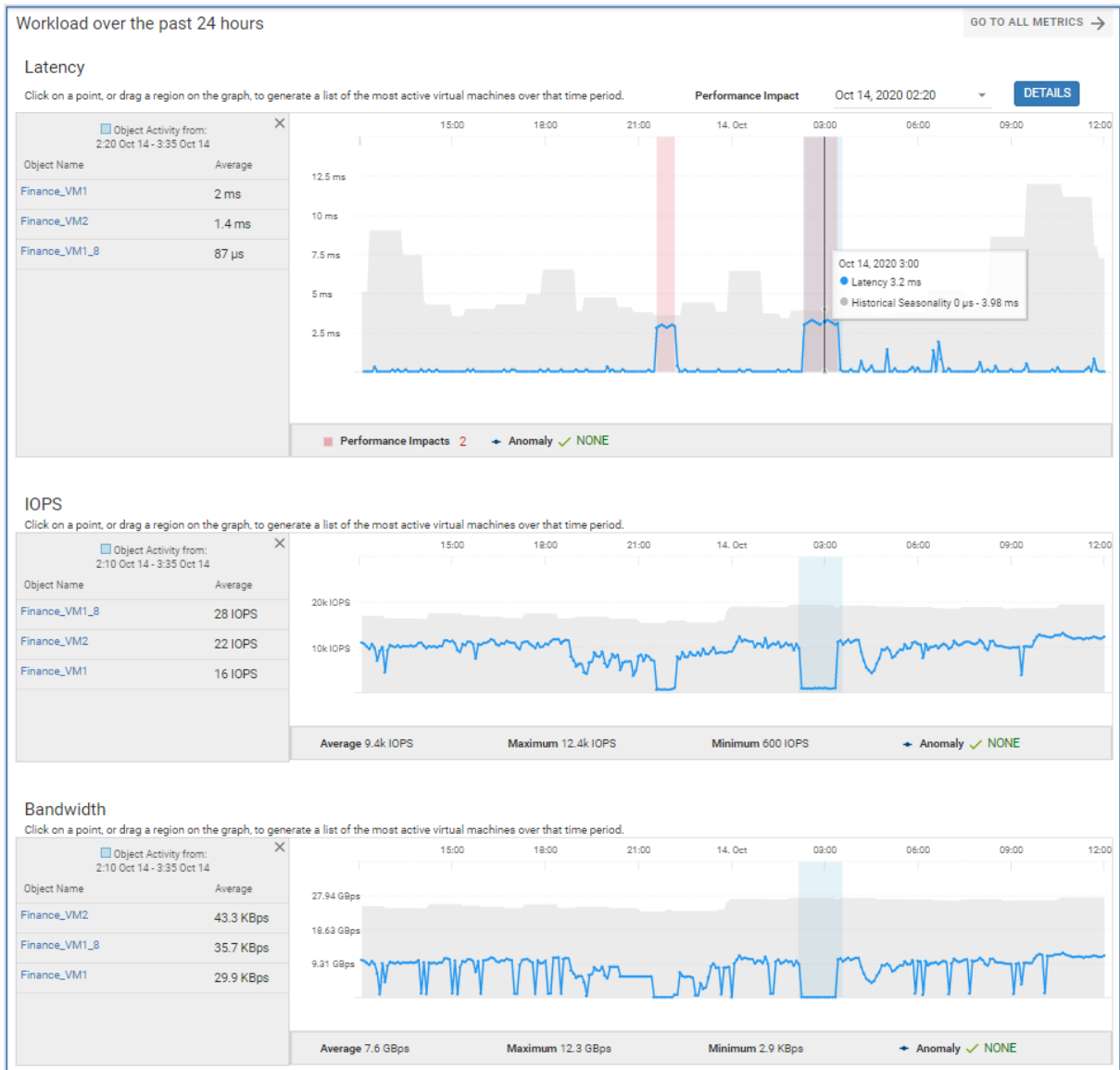
The Capacity tab for a Storage Group provides details for the Storage Group capacity, showing Used and Free Allocation. Also, Storage Efficiency information is provided, including virtual provisioning (VP) savings and the compression ratio.



**Storage group details – Performance**

The Performance tab for a Storage Group provides performance details over a 24-hour period. Performance charts include Latency, IOPS, Bandwidth, %Read, IO Size, and Queue Length. CloudIQ identifies performance impacts on the Latency chart as pink shaded areas. CloudIQ identifies performance anomalies on all storage group performance charts as blue shaded areas.

Highlighting an area in the Latency, IOPS or Bandwidth charts displays the top contributing VMs in the left side of the chart.



## PowerStore appliance details

PowerStore appliance details are accessible by selecting the appliance name hyperlink from the Appliances tab on the PowerStore cluster system details page.

### Appliance details - Properties

The Properties tab provides general attributes for the PowerStore appliance and any health issues and corresponding remediation. Attributes include the parent cluster name, model, mode, service tag, site and location, version, and IP address.

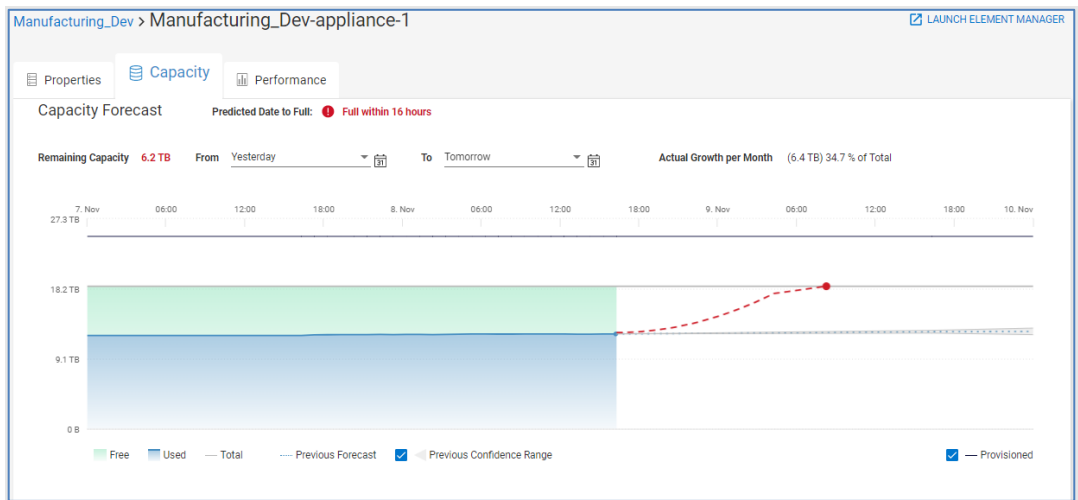
Manufacturing\_Dev > Manufacturing\_Dev-appliance-1 LAUNCH ELEMENT MANAGER

Properties Capacity Performance

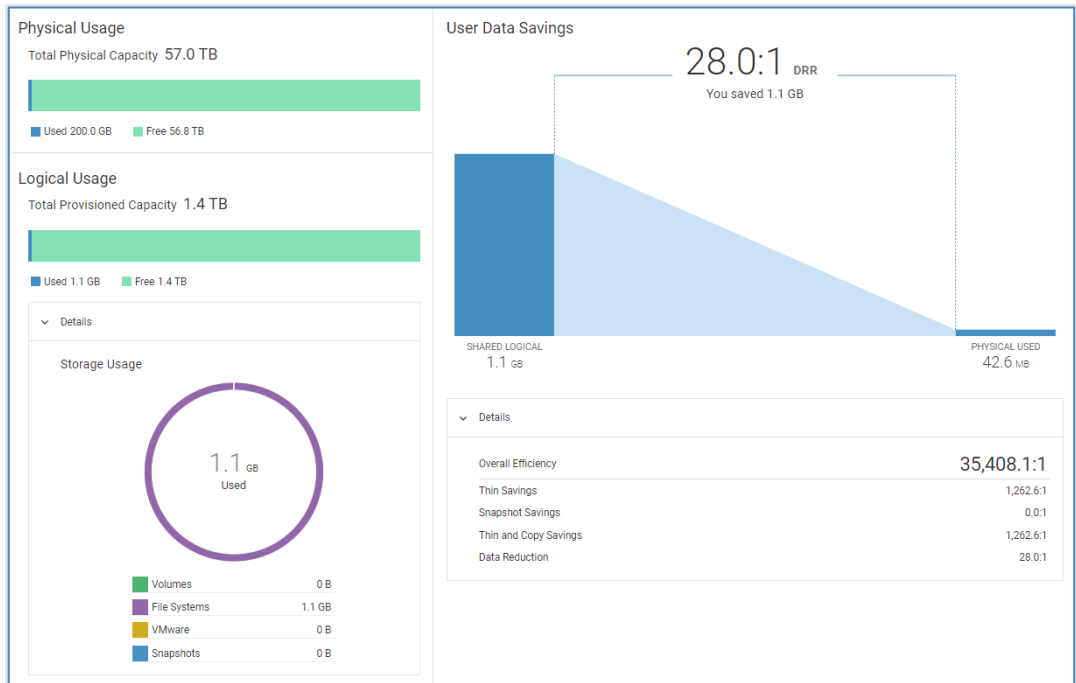
Parent Cluster Name	Manufacturing_Dev	Total Issues	1	<b>Capacity</b>	1 Issue
Appliance Name	Manufacturing_Dev-appliance-1	Components	▼	-30	9 hours ago The Appliance 'Manufacturing_Dev-appliance-1' is growing at a substantially increasing rate, predicted to run out of space within 16 hours.
Model	PowerStore 9000	Configuration	▼	<b>Resolution:</b> Free up space through volume deletions and snapshot expirations, consider adding drives to the Appliance or migrating data to another Appliance.	
Mode	Unified	Capacity	1		
Dell Service Tag #	RV429L63	Performance	▼		
Location	Hopkinton, MA	Data Protection	▼		
Site	CIQ Engineering Site				
SW Version	1.0.0.5.012				
IPV4 address	10.0.0.201				
IPV6 address	-				

**Appliance details - Capacity**

The Capacity tab displays similar information as to what is provided in the PowerStore cluster capacity tab. The top of the page provides the capacity trend and forecast.

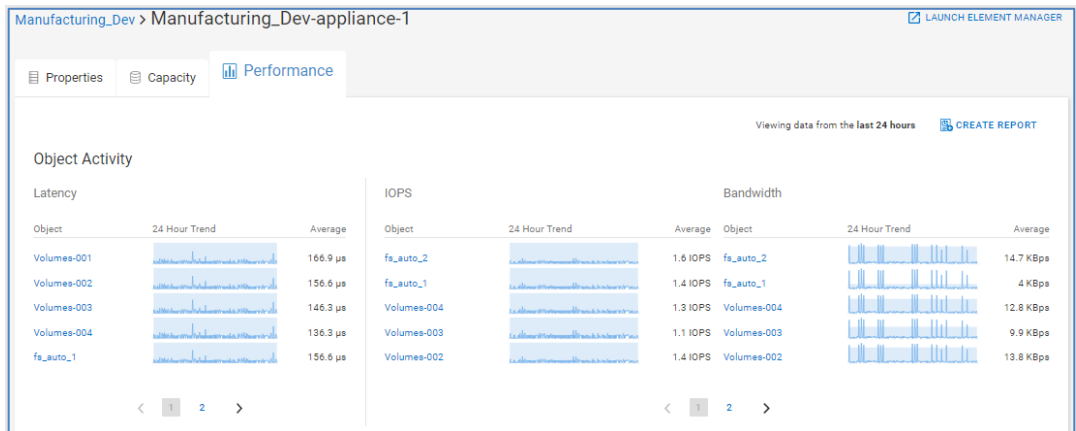


The bottom of the page provides summaries of physical and logical capacity utilization, the Storage Usage chart, and storage efficiencies and savings due to data reduction.

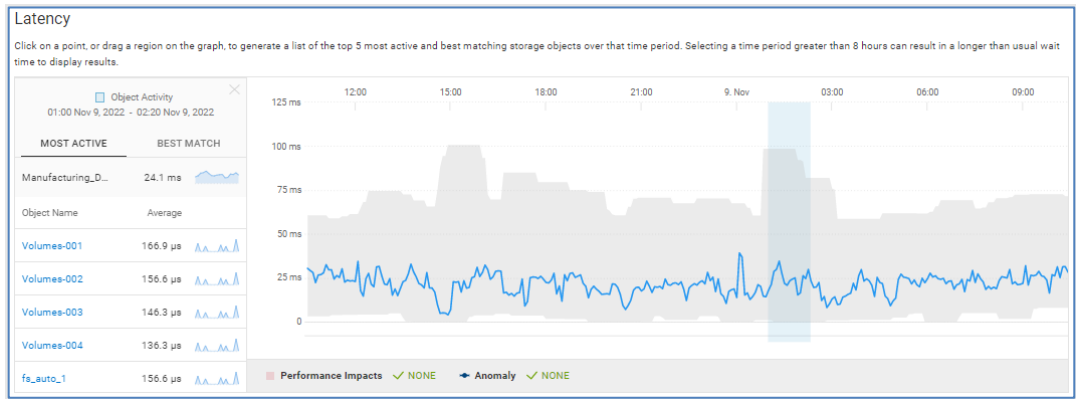


**Appliance details – Performance**

The Performance tab is similar to the performance tab for PowerStore clusters. The top of the page lists top object activity charts for Latency, IOPS, and Bandwidth.



The remaining page displays 24-hour charts for these metrics and supports both performance anomalies and performance impacts. These charts are selectable to provide the top objects during the selected time range. Best match to the performance shape is also supported. An example of the Latency chart is shown below.

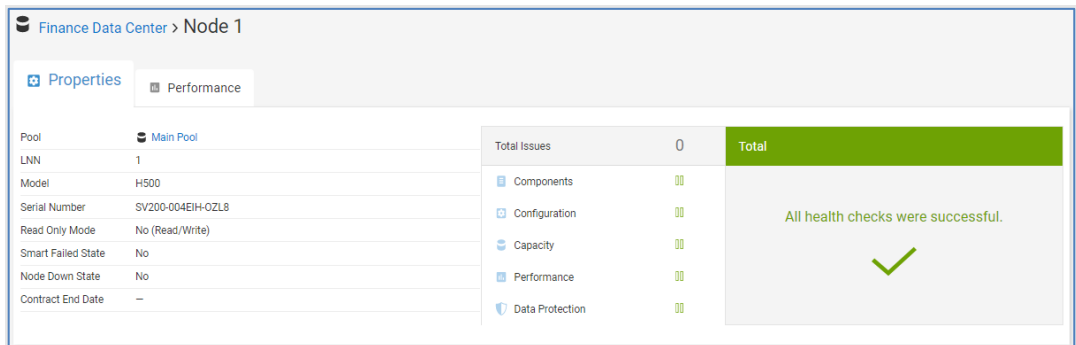


## PowerScale node details

For PowerScale and Isilon systems, CloudIQ provides node details. Selecting a node hyperlink from the Nodes tab on the PowerScale system details page.

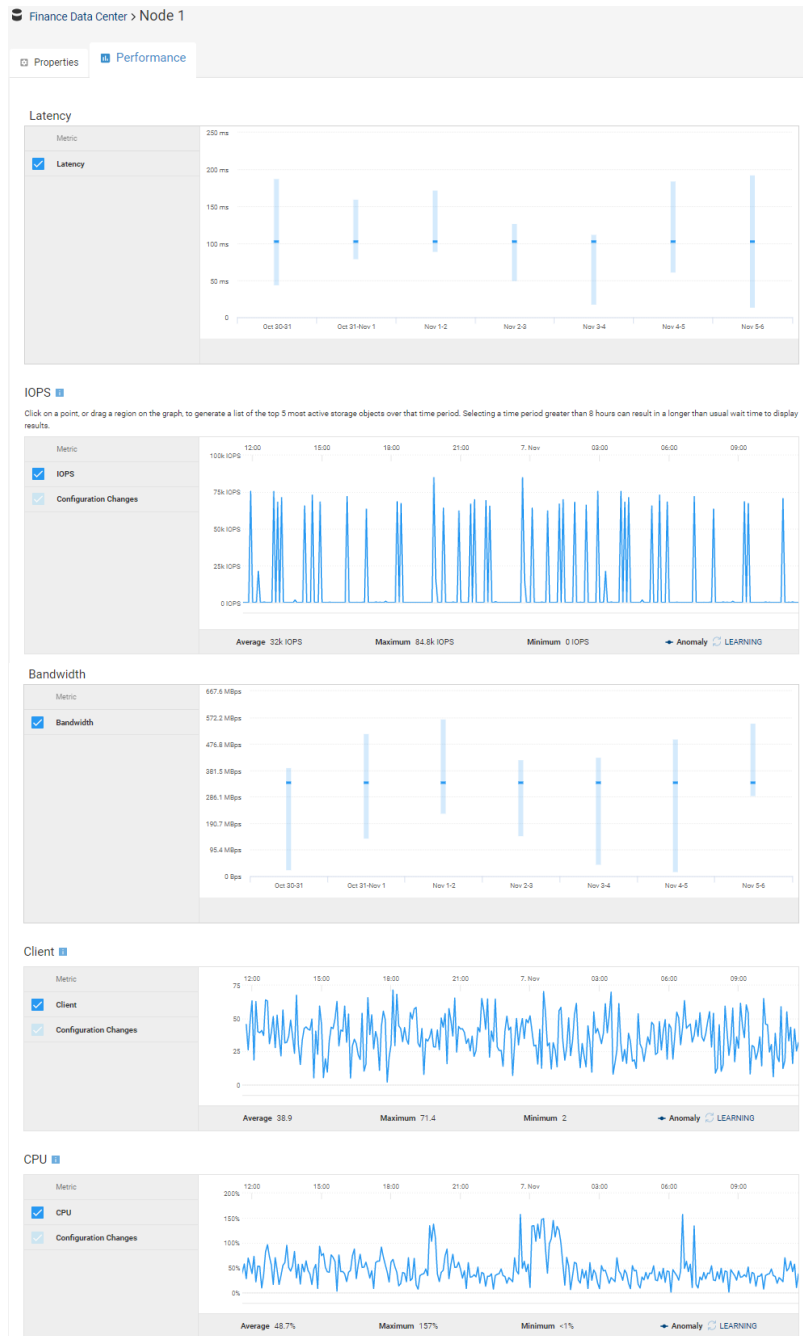
### Node details - Properties

The Properties tab for a PowerScale node provides various information associate to the node including the pool, logical node number, mode, if the node is smart failed, node state and contract end date.



### Node details - Performance

The Performance tab displays 24-hour metrics for a number of key performance metrics including latency, IOPS, bandwidth, clients, CPU utilization, latency per protocol, IOPS per protocol, and bandwidth per protocol.

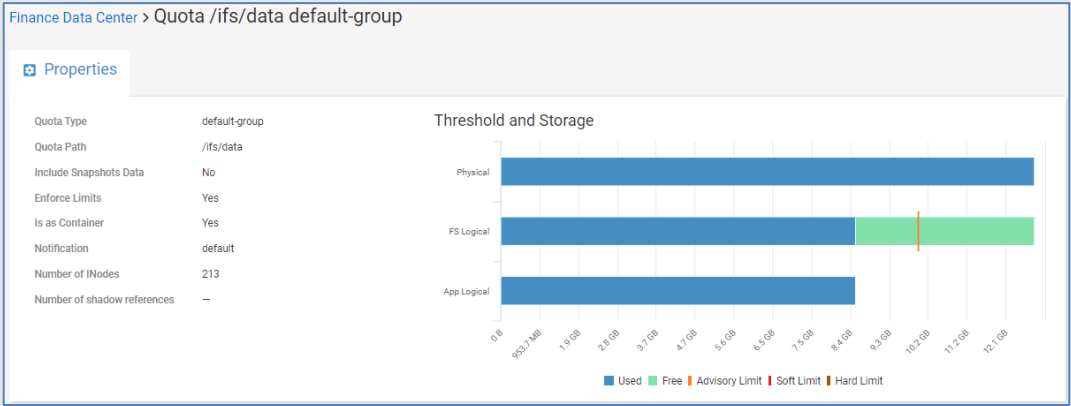


## PowerScale quota details

PowerScale quota details are available by selecting the quota hyperlink from the Quotas tab on the PowerScale system details page.

### Quota details - Properties

For each quota, the Properties tab provides the quota type, path, if the quota includes snapshots, if the limits are enforced, notification status for enforced quotas, number of inodes, and number of shadow references. Bar charts provide visual representations of physical, file system logical, and app logical capacity utilization along with limits.

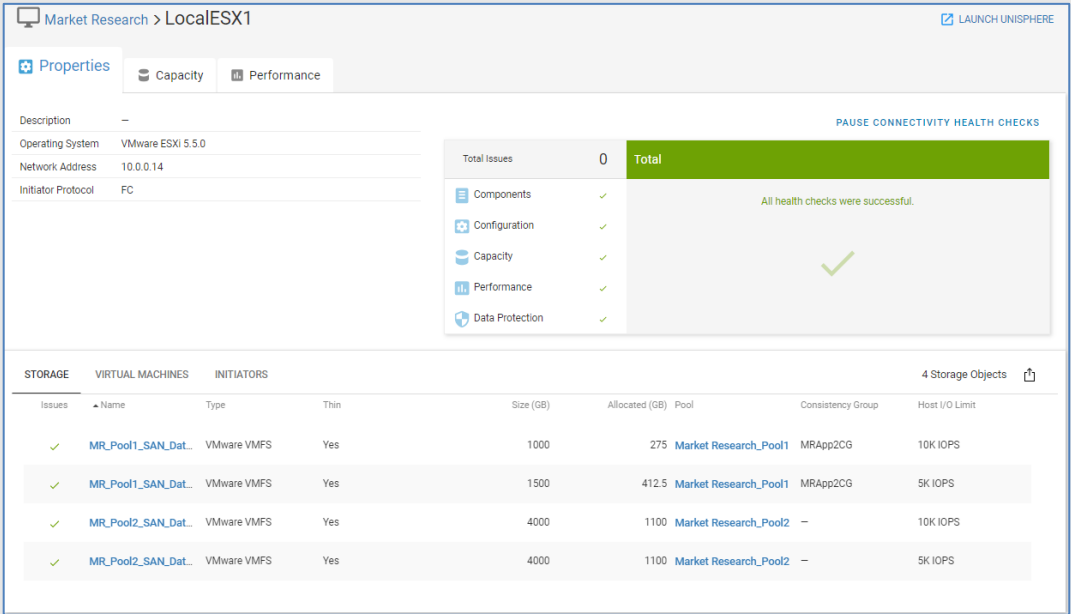


## Host details

Host detail drill downs are available for Unity XT family, APEX Block Storage Services, PowerStore, XtremIO, SC Series (Servers), and PowerVault (Initiators).

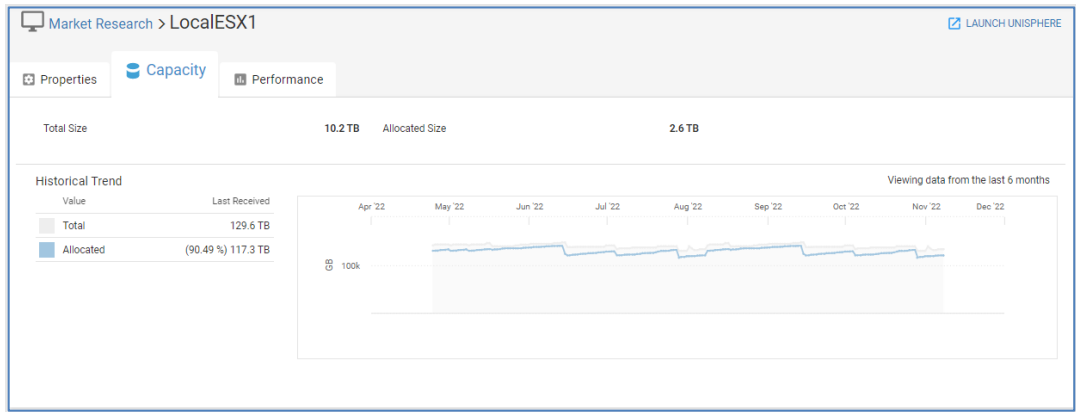
### Host details - Properties

The Properties tab displays configuration data for a host including the operating system, IP Address, and initiator protocol. It also displays any health issues associated to the host with suggested remediation. Details about the storage objects attached to the host, virtual machines residing on the host, and initiators are provided in the tabs at the bottom of the page.



### Host details - Capacity

The Capacity tab for a host provides details for the current capacity from the associated storage system. These details include provisioned and allocated size, and historical capacity trends, of all the block objects provisioned to that host. The capacity tab is not supported for PowerStore or APEX Block Storage Services.



### Host details – Performance

The Performance tab for a host provides the 24-hour average values of key performance indicators (Latency, IOPS, and Bandwidth) of each block object provisioned the host. It also displays the names of other hosts to which the block objects are also provisioned.

The Performance tab is not supported for APEX Block Storage Services or PowerStore. Latency is not supported for PowerVault initiators.

Name	Pool	Other Hosts	Latency (ms)	IOPS (K)	Bandwidth (MBps)
MR_Pool1_SAN_Datastore1	Market Research_Pool1	LocalES... and 2 others	1.0	0.1	0.0
MR_Pool1_SAN_Datastore2	Market Research_Pool1	LocalES... and 2 others	0.0	0.1	0.0
MR_Pool2_SAN_Datastore2	Market Research_Pool2	LocalES... and 2 others	0.0	0.0	0.0
MR_Pool2_SAN_Datastore1	Market Research_Pool2	LocalES... and 2 others	0.0	0.0	0.0

## Connectrix and PowerSwitch details

### Introduction

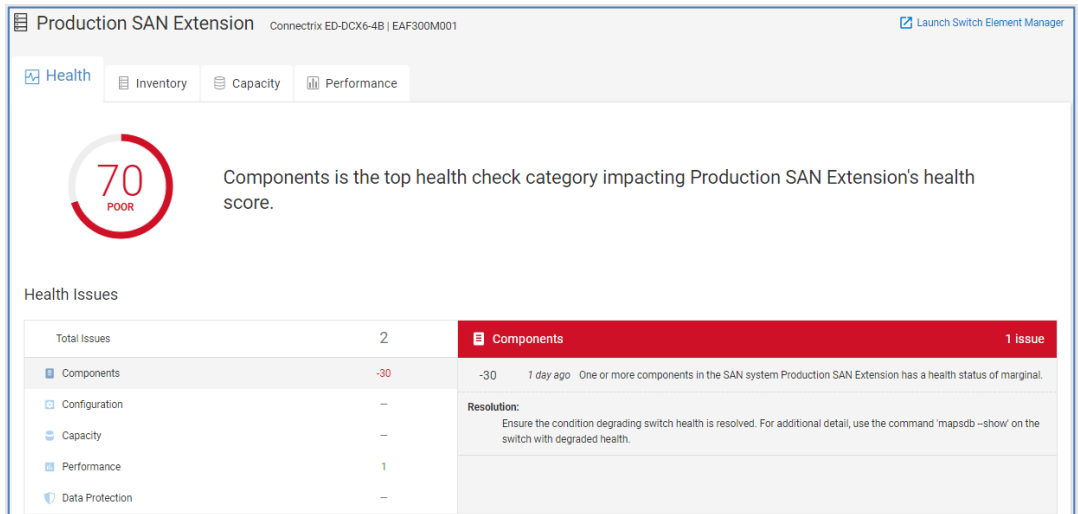
CloudIQ can monitor both Connectrix and PowerSwitch networking devices. For both Connectrix and PowerSwitch devices, CloudIQ uses a local collector that communicates to the switches using a read-only privilege. The collector sends the data back to CloudIQ through the Secure Connect Gateway.

Selecting the switch hyperlink in the overview page or any of the multisystem views opens the System Details page for that switch. The following sections discuss each tab of the Switch System Details page in greater depth.

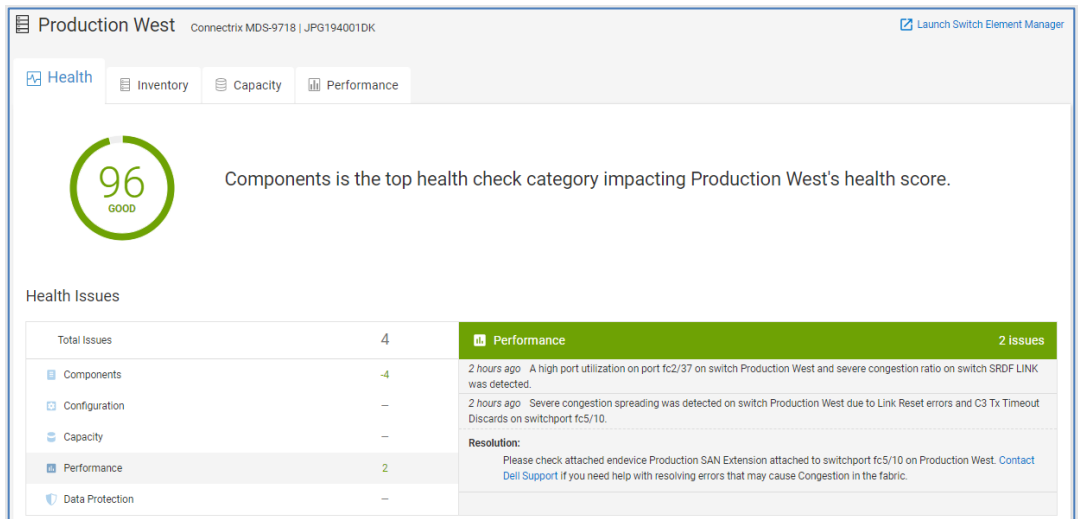
### Switch system details – Health

The Health tab shows the details for a selected switch driving the health score number. Only the Components category is used in calculating the switch health score, although CloudIQ does detect and report on congestion spreading events under the Performance category for Connectrix. This is discussed in more detail below. Selecting any issue provides a corresponding recommendation for obtaining additional information and resolution. The bottom of the page shows the Health Score History chart for both Connectrix and PowerSwitch devices.





CloudIQ can detect congestion spreading on Connectrix switches. The detection evaluates various conditions including congested ports, port errors, and port utilization on the local switch or connected switches. Health score deductions for these scenarios are under investigation, and this condition does not yet affect the health score of the switch. Instead of displaying a health score deduction, CloudIQ displays the number of congestion spreading events.



### Switch system details – Inventory

The Inventory tab differs slightly between Connectrix and PowerSwitch. For Connectrix, it contains various switch attributes at the top half of the screen, including the serial number, model, location, site, firmware, management IP address, and contract information. It also highlights if a model had reached End of Life (EOL) or End of Service Life (EOSL) and identifies if recommended firmware updates are available. The bottom half of the window contains the following tabs: Fabrics, Partitions, Zones, Attached Devices, Virtual Machines, Components, and Licenses.

Production SAN Extension Connectrix ED-DCX6-4B | EAF300M001 [Launch Switch Element Manager](#)

Health **Inventory** Capacity Performance

Management IP Address	10.0.12.1	Switch Model EOL/EOSL	Feb 22, 2024	Last Contact Time	20 hours ago
Collector	<a href="#">ciqc.conn.emc.com</a>	Firmware Version	8.2.1a	Location	Round Rock, TX
Contract Expiration	Aug 22, 2027	Switch Up Time	14 days	Site Name	ACME Headquarters
Contract Number	32678017TM	Switch WWN	10:00:C4:F5:7C:2D:AA:01	Site ID	ACME Headquarters 01
Service Plan	ProSupport MC	Chassis WWN	10:00:C4:F5:7C:2D:AA:02		

FABRICS PARTITIONS ZONES ATTACHED DEVICES VIRTUAL MACHINES COMPONENTS ▲ LICENSES

2 fabrics

Principal Switch WWN ↑	Principal Switch IP Address	Partition ID	Total Switches	Monitored Switch...	Total End Devices	Used (%)
10:00:C4:F5:7C:2D:11:A1	10.0.12.1	8	1	1	0	0.0
10:00:C4:F5:7C:2D:AA:01	10.0.12.1	128	4	3	32	—

The top half of the Inventory tab for PowerSwitch includes the service tag, serial number, model, operating-system type, location, site, BIOS or software versions, management IP address, and contract information. The bottom half of the page has the Components and Attached Devices (Ethernet Ports) tabs.

Production PowerSwitch North S4112T-ON | BXW0023

Health **Inventory** Capacity

Management IP Address	10.12.29.2	Bios Version	3.40.0.9-9	Last Contact Time	7 minutes ago
OS Type	OS10	Software Version	10.5.3.0	Location	Hopkinton, MA
Contract Expiration	Nov 24, 2023	Switch Up Time	16 seconds	Site Name	POWERSWITCH-BXW0023
Contract Number	1135134567	Switch WWN	—	Site ID	POWERSWITCH-BXW0023 01
Service Plan	AE	Chassis WWN	—		
Serial Number	VMS5248F00674000ABCJ	Switch MAC	14:18:77:20:4d:cf		

COMPONENTS ATTACHED DEVICES (ETHERNET PORTS)

7 Component Objects

Type ↑	Slot/Unit	State	Part Number	Serial Number
FANTRAY	1	ONLINE	70-1003226-09	D2D3208M012
FANTRAY	2	ONLINE	70-1003226-10	D2D3208M01M
FANTRAY	3	ONLINE	70-1003226-11	D2D3208M01M
FANTRAY	4	ONLINE	70-1003226-12	D2D3208M01M
POWER_SUPPLY_UNIT	1	ONLINE	70-1003155-13	GQV9247LLOB
POWER_SUPPLY_UNIT	2	ONLINE	70-1003155-14	GQV9247LLOB
SWITCH_UNIT	1	ONLINE	04YGWF	VMS5248F00674000ABCJ

### Fabrics

The Fabrics tab (Connectrix only) provides the following information about the fabrics in which the switch participates:

- Principal Switch WWN – Worldwide name of the principal switch in the fabric.
- Principal Switch IP – The IP address of the principal switch in the fabric.
- Partition ID
  - Brocade: If Virtual Fabrics (VF) are enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - Cisco: This field shows the VSAN ID.

- Total Switches – Total number of switches participating in the fabric that this VF or VSAN or switch is a member of. This number is a hyperlink which, when selected, displays a window listing all switches in the fabric.
- Total End Devices – Total number of N\_Ports participating in the fabric that this VF or VSAN or switch is a member of.
- Monitored Switches – Total number of switches participating in the fabric that are also monitored by CloudIQ.
- Used % – Percentage of ports in this fabric that are in use.

FABRICS		PARTITIONS	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS	
2 Fabrics							
Principal Switch WWN ↑	Principal Switch IP Address	Partition ID	Total Switches	Monitored Switches	Total End Devices	Used (%)	
10:00:C4:F5:7C:2D:11:A1	10.0.12.1	8	1	1	0	0.0	
10:00:C4:F5:7C:2D:AA:01	10.0.12.1	128	4	3	32	–	

### Partitions

The Partitions tab (Connectrix only) provides information about Virtual Fabrics (Brocade) and VSANs (Cisco).

- Partition ID
  - Brocade: If Virtual Fabrics (VF) are enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - Cisco: This field shows the VSAN ID.
- Switch Name – Switch name as defined by the end user. If no switch name is set, this field displays the switch serial number.
- Management IP – IP address of the switch.
- Number of switches – Total number of switches participating in the fabric that this VF or VSAN or switch is a member of.
- Total end devices – Total number of N\_Ports participating in the fabric that this VF or VSAN or switch is a member of.
- End devices, this switch only – Total number of N\_Ports that are members of this VF or VSAN and are also directly attached to this switch.

FABRICS		PARTITIONS	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS	
2 Partitions							
↑ Partition ID	Switch Name	Management IP	Number of switches	Total End Devices	End devices, this switch only		
8	Production SAN Exten...	10.0.12.1	1	0	0		
128	Production SAN Exten...	10.0.12.1	4	32	32		

### Zones

The Zones tab (Connectrix only) lists out zoning information for the zones in the active configuration.

- Active Configuration – Name of the enabled zoning configuration.
- Zone Name – Name of the zone.

- Symbolic Name – Symbolic name of a zone member (only shown if zone member is logged into the switch).
- Member Name – Name of the zone member. This is typically the WWPN of the attached device but could also be the WWPN of the switch port or the WWNN of the attached device. It could also be in the “Domain, Port” format or “switch wwn, port” format.
- Alias – User-defined alias associated with the zone member.
- Is Logged In – Identifies if the end device is a member of a zone and logged into the fabric.
- Interface – Identifies the interface on the switch where the end device is logged in.
- Partition ID
  - Brocade: If Virtual Fabrics (VF) are enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - Cisco: This field shows the VSAN ID.

Active Configuration ↑	Zone Name	Symbolic Name	Member Name	Alias	Is Logged In	Interface	Partition...
PRDConfig	PrdSQL_IOP063182_VMAX_...	[61] *Emulex LPe12002-E F...	10:00:00:00:C9:9D:E0:...	PrdSQL_182_hba0	Yes	3/0	128
PRDConfig	PrdSQL_IOP063182_VMAX_240_FA_1D_1	[98] *SYMMETRIX:0001976...	50:00:09:73:98:03:C5:...	VMAX_240_FA_1D_1	Yes	3/16	128
PRDConfig	PrdSQL_IOP063182_VMAX_...	[61] *Emulex LPe12002-E F...	10:00:00:00:C9:9D:E0:...	PrdSQL_182_hba1	Yes	3/1	128
PRDConfig	PrdSQL_IOP063182_VMAX_...	[98] *SYMMETRIX:0001976...	50:00:09:73:98:03:C5:...	VMAX_240_FA_1D_2	Yes	3/17	128

### Attached Devices (Connectrix)

The Attached Devices tab lists out various information for devices that are physically attached to the switch.

- WWPN – Worldwide Port Name of the attached device
- Symbolic Name – Symbolic name of the attached device (only shown if the zone member is logged into the switch).
- Zoned – Identifies if the attached device is a member of the zone that is present in the active configuration.
- Interface – Identifies the interface on the switch where the end device is logged in.
- Speed (Gbps) – Speed that the attached device negotiated with the switch during the login process.
- Partition ID
  - Brocade: If Virtual Fabrics (VF) are enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - Cisco: This field shows the VSAN ID.

FABRICS	PARTITIONS	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS
40 Attached Devices					
WWPN ↑	Symbolic Name	Zoned	Interface	Speed (Gbps)	Partition ID
10.00.00.00:C9:9D:E0:...	[61] Emulex LPe12002-E FV1.11A5 DV12.0.0.2. HNiop063182. OS:Linux.	Yes	3/0	32	128
10.00.00.00:C9:9D:E0:...	[61] Emulex LPe12002-E FV1.11A5 DV12.0.0.2. HNiop063182. OS:Linux.	Yes	3/1	32	128
10.00.00.00:C9:9D:E0:...	[61] Emulex LPe12002-E FV1.11A5 DV12.0.0.2. HNiop063182. OS:Linux.	Yes	3/2	32	128
10.00.00.00:C9:9D:E0:...	[61] Emulex LPe12002-E FV1.11A5 DV12.0.0.2. HNiop063182. OS:Linux.	Yes	3/3	32	128

### Attached Devices (Ethernet Ports) (PowerSwitch)

The Attached Devices tab for PowerSwitch lists each of the devices attached to the Ethernet ports of the switch.

COMPONENTS					
ATTACHED DEVICES (ETHERNET PORTS)					
6 attached devices					
Local Port ID	Remote Hostname	Remote Port ID	Remote Chassis ID	Remote Management IPv4	Remote Management IPv6
ethernet1/1/33	switch1	eth3	f4:e9:d4:e8:b9:cd	10.134.149.19	fe80::4/64
ethernet1/1/35	switch2	eth4	f8:f2:1e:a6:6e:2c	10.134.149.19	1001:1:1:1:20c:29ffe54:c853/...
ethernet1/1/36	switch3	eth2	f8:f2:1e:b1:24:30	10.134.149.20	100::1/64
ethernet1/1/37	switch4	eth5	90:e2:ba:ee:49:15	10.134.149.21	fe80::20c:29ff:fe54:c853/64
ethernet1/1/44	switch5	eth2	90:e2:ba:f0:7b:2c	10.134.149.22	fe80::20c:29ff:fe54:c8bc/64
mgmt1/1/1	swlab3-maa-tor-D5	ethernet1/1/6	d8:9e:f3:b5:5c:20	10.134.149.23	fe80::20c:29ff:fe54:c852/64

- Local Port ID – The Port ID of the switch.
- Remote Hostname – Hostname of the attached device.
- Remote Port ID – Port ID of the attached device.
- Remote Chassis ID – Chassis ID of the attached device.
- Remote Management IPv4 – Management IPv4 address of the attached device.
- Remote Management IPv6 – Management IPv6 address of the attached device.

### Virtual Machines

The Virtual Machines tab (Connectrix only) shows virtual machines residing on ESXi servers that are connected to the switch.

- Name – Name of the virtual machine.
- Network Address – IP address of the virtual machine.
- Operating System – Operating system installed on the virtual machine.
- vCenter – Hostname of vCenter managing the virtual machine.
- ESXi – Hostname of ESXi server hosting the virtual machine.
- Cluster – Name of ESXi Cluster hosting the virtual machine.

FABRICS	PARTITIONS	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS
11 Virtual Machines					
Name ↑	Network Address	Operating System	vCenter	ESXi	Cluster
Market_Research_VM16_1	10.1.16.1	Red Hat Enterprise Linux 5 (64-bit)	10.0.0.100	LocalESX4	Market Research Cluster
Market_Research_VM20_1	10.1.20.1	Red Hat Enterprise Linux 5 (64-bit)	10.0.0.100	LocalESX4	Market Research Cluster
Test_VM0_1	10.178.0.1	Red Hat Enterprise Linux 5 (64-bit)	VC-Test-27T42L.infra.lab	TD_ESX_2	Test Cluster
Test_VM1	10.0.7.243	Red Hat Enterprise Linux 5 (64-bit)	VC-Test-27T42L.infra.lab	TD_ESX_1	Test Cluster
Test_VM1_2	10.178.1.2	Red Hat Enterprise Linux 5 (64-bit)	VC-Test-27T42L.infra.lab	TD_ESX_1	Test Cluster

### Components

The Components tab lists out the system hardware for both Connectrix and PowerSwitch.

- Type – The type of component installed in the chassis.
- Slot/Unit – Location of the component in the chassis.
- State – For optics, this field provides the strength of the optical signal being received. For other hardware components, this field provides the operational state of the component.
- Part Number – Part number of the component.
- Serial Number – Serial number of the component.
- EOSL Date (Connectrix only) – Identifies components with upcoming End of Life (EOL) and End of Support Life (EOSL) dates.

FABRICS	PARTITIONS	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS
69 Components					
Type ↑	Slot/Unit	State	Part Number	Serial Number	EOSL Date
Blade (core blade)	5	enabled	60-1003226-09	DZD3208M01M	–
Blade (cp blade)	1	enabled	60-1003201-10	DYK3203N01P	–
Blade (cp blade)	2	enabled	60-1003201-10	DYK3203N06P	–
Blade (sw blade)	3	enabled	60-1003200-09	FDU3243N00J	–
Blade (sw blade)	8	enabled	60-1003584-07	GQV9247LL1B	May 5, 2025
Fan	1	ok	60-1003203-04	D1	This module is EOL (End of Life) and will reach EOSL (End of Support Life) by May 5, 2025.
Fan	2	ok	60-1003203-04	D1	<a href="#">LEARN MORE</a>

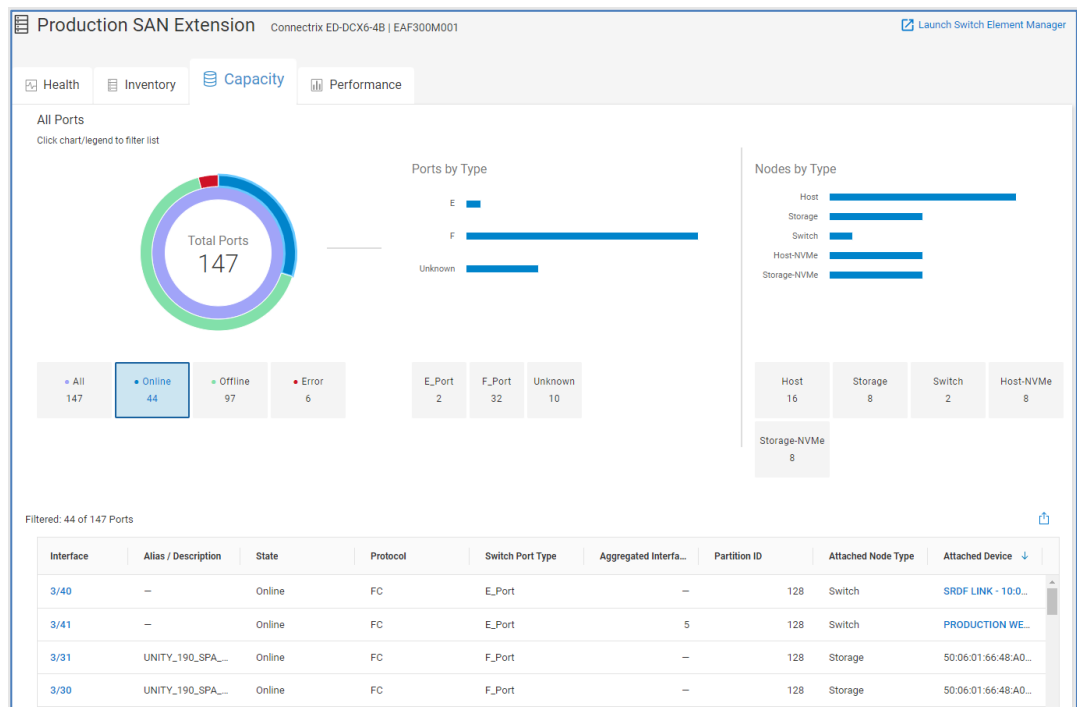
### Switch system details – Capacity

The Capacity tab for a switch provides port usage details for both Connectrix and PowerSwitch. The upper left portion of the view shows a breakdown of the ports on the switch broken down by Online, Offline, and Error status. The Ports by Type bar charts show a filtered list of ports broken down by port type. For Connectrix, the Nodes Attached bar charts show a breakdown of attached nodes by Host Ports, Storage Ports, and Switch ports. The bottom of the page displays a filtered list of ports based on the filters selected in the top half of the page. The following columns are displayed at the bottom of the page:

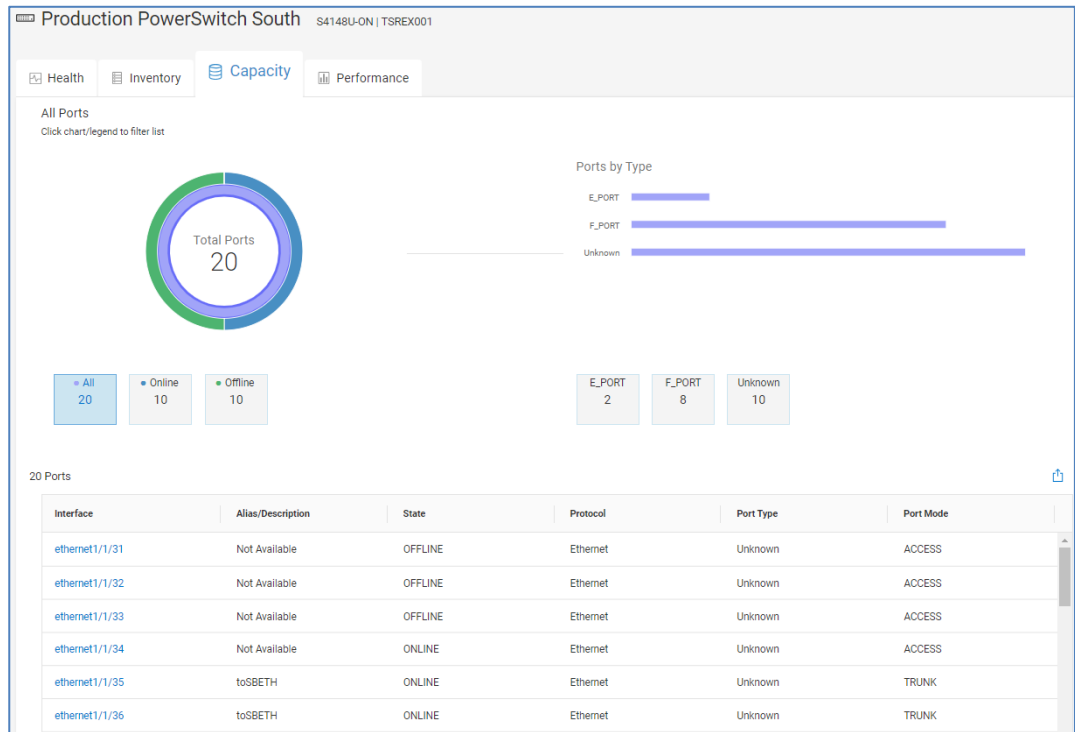
- Interface – Location of the port, shown as slot/port number. For Connectrix, it is also a hyperlink which directs user to port performance charts.
- Alias/Description – Switch port alias, if defined.
- State – Status of the switch port.
- Licensed – Shows whether the port is licensed, not licensed, or N/A for directors.
- Protocol – Protocol configured for the switch port.

- Switch Port Type – Logical configuration of the switch port. Possible values include F\_PORT, N\_PORT, E\_PORT, Unknown, or Disabled for FC ports. Set to Unknown for Ethernet ports.
- Port Mode (PowerSwitch only) – Logical configuration of the interface, such as Access or Trunk.
- Aggregated Interface ID (Connectrix only) – Value of trunk or port channel if the physical port is being aggregated.
- Partition ID (Connectrix only)
  - Brocade: If Virtual Fabrics (VF) are enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - Cisco: This field shows the VSAN ID.
- Attached Node Type (Connectrix only) – Describes the device attached to the switch port.
- Attached Device (Connectrix only) – Worldwide name of the attached device.

Capacity tab for Connectrix:



Capacity tab for PowerSwitch:



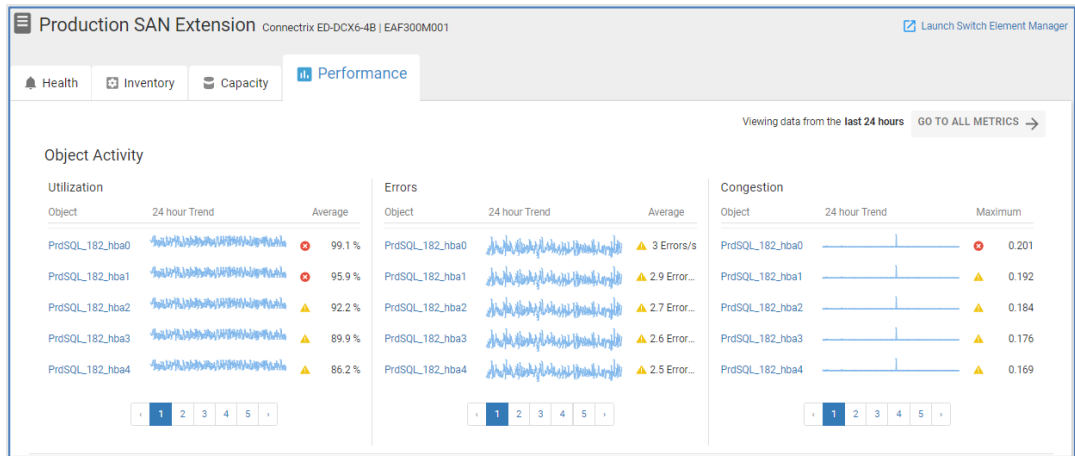
**Switch system details – Performance**

The top section of the Performance tab for Connectrix switches is Object Activity, and it displays the top ports contributing to Utilization, Errors, and Congestion sorted by their 24-hour average. Showing the top objects first allows the user to quickly identify ports using the most resources and experiencing the most errors in the last 24 hours.

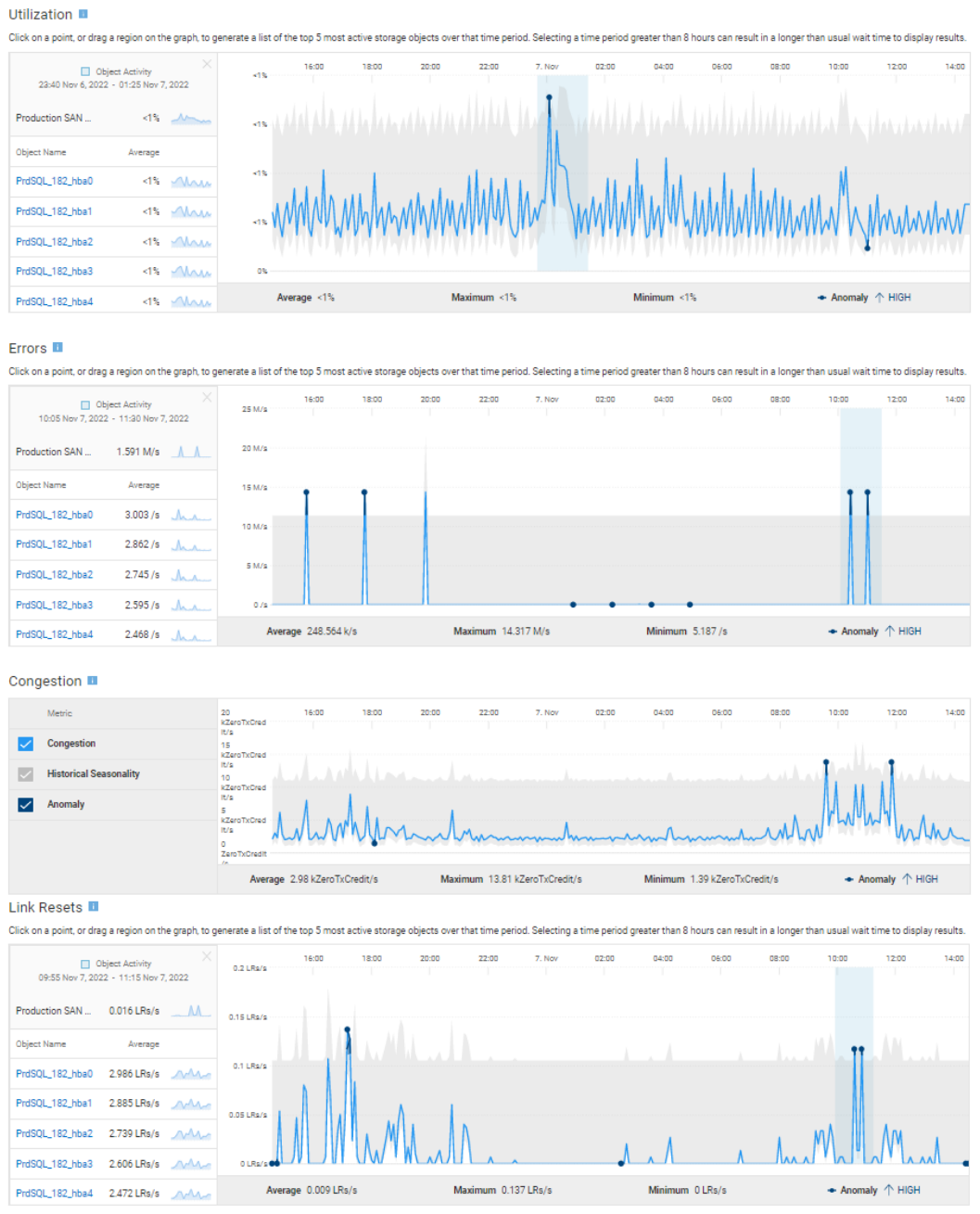
The user can scroll down to see 24-hour charts for the following Connectrix switch performance metrics:

- Utilization – The percentage of system bandwidth in use. This value represents the percentage of transmit bandwidth being used across all switch interfaces.
- Congestion – The sum of all “time spent at zero transmit” counters across all switch interfaces.
- Errors – The sum of all bit error counters across all switch interfaces.
- Link Resets – The sum of all Link Reset primitives that have been either transmitted or received across all switch interfaces.





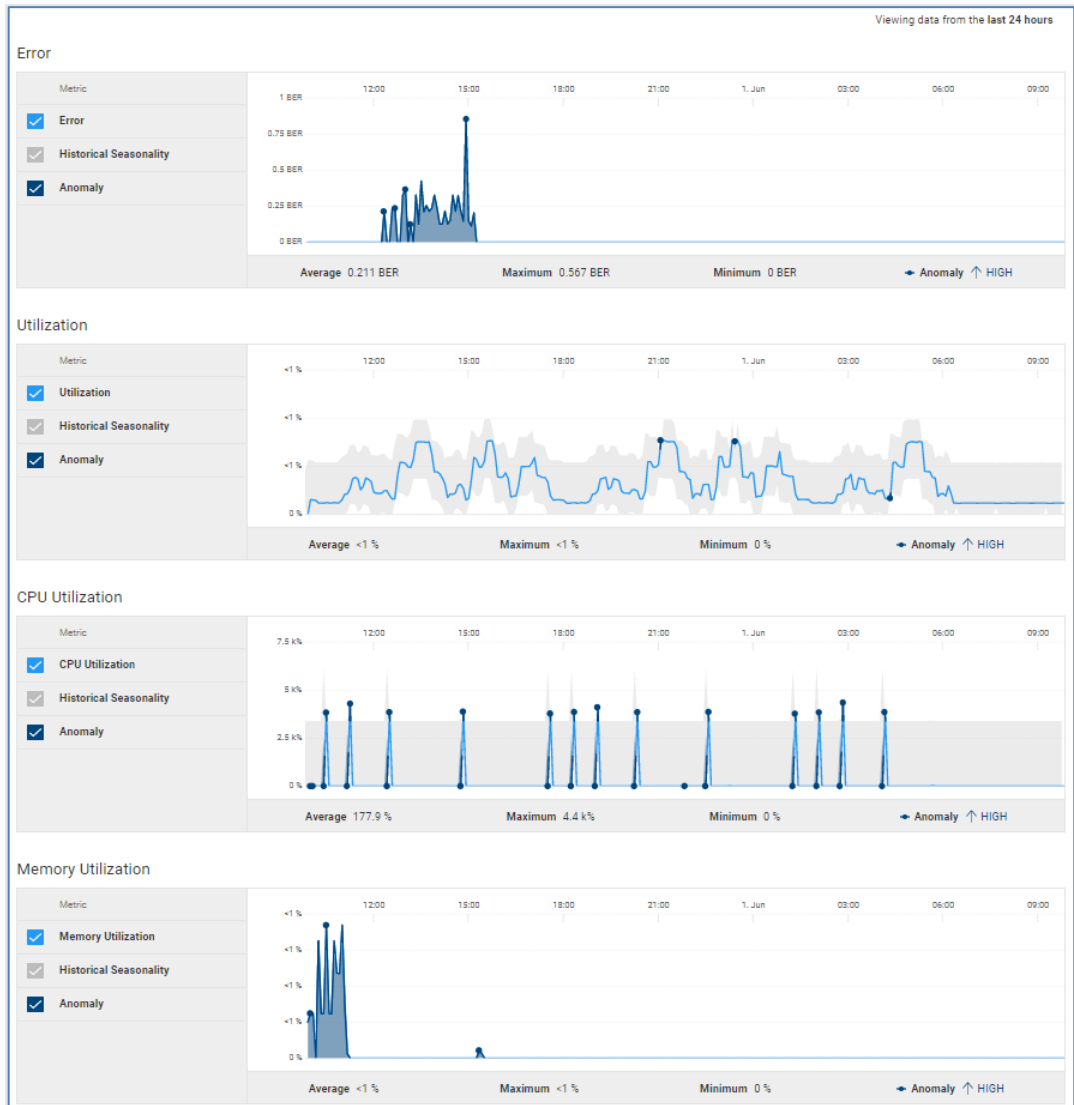
Highlighting an area in any of these performance charts shows the top five port contributors to that performance metric during that time period in the left side of the chart. The ports listed in the left side of each chart are hyperlinks that direct the user to port-level performance charts. Performance anomaly detection is supported in each of these performance charts.



PowerSwitch devices show 24-hour charts and performance anomalies for the following performance metrics:

- Error – The Bit Error Rate across all switch interfaces.
- Utilization – The percentage of transmit bandwidth being used across all switch interfaces.
- CPU Utilization – The percentage of CPU usage over the selected time period.
- Memory Utilization – The percentage of memory usage used by various processes running on the switch.

**Note:** Performance metrics required minimum of OS10 version 10.5.3.2. Memory utilization requires a minimum of OS10 version 10.5.4.

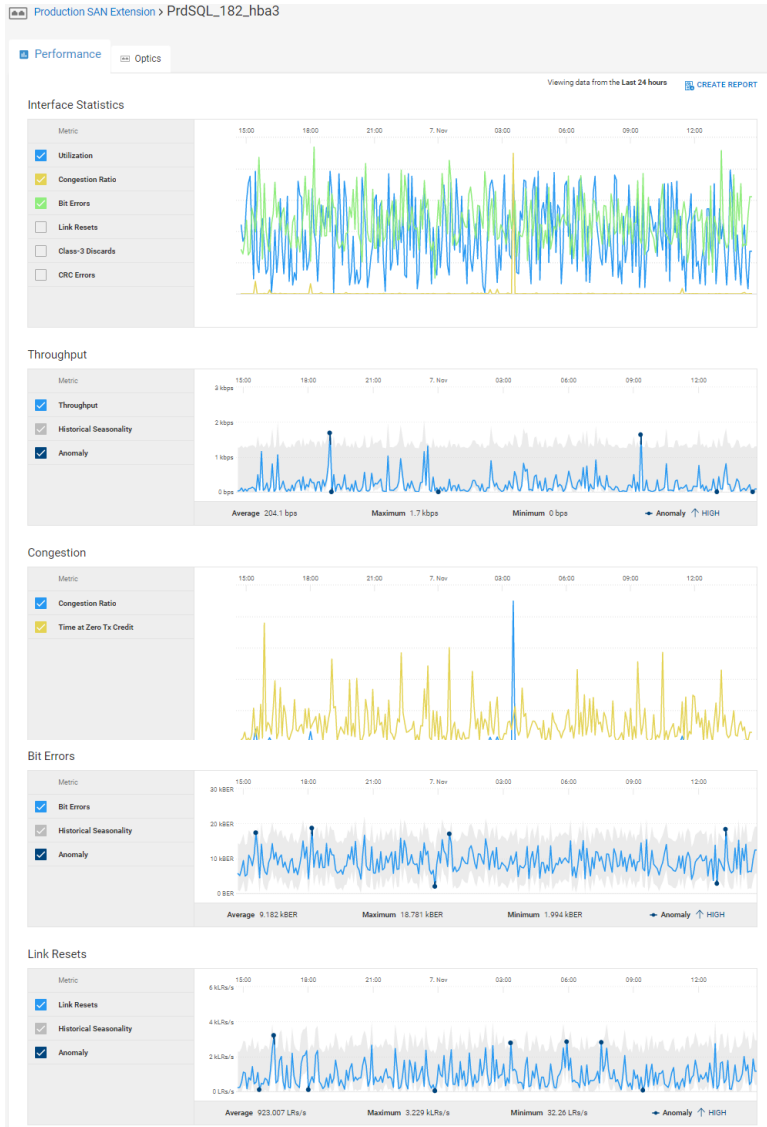


### Switch port details – Performance

Users can access port-level performance metrics for Connectrix switches. Select the port from the Interface column in the Switch Capacity page or select the port hyperlink in the top object activity shown in the previous section. Port-level performance metrics are shown in the following charts:

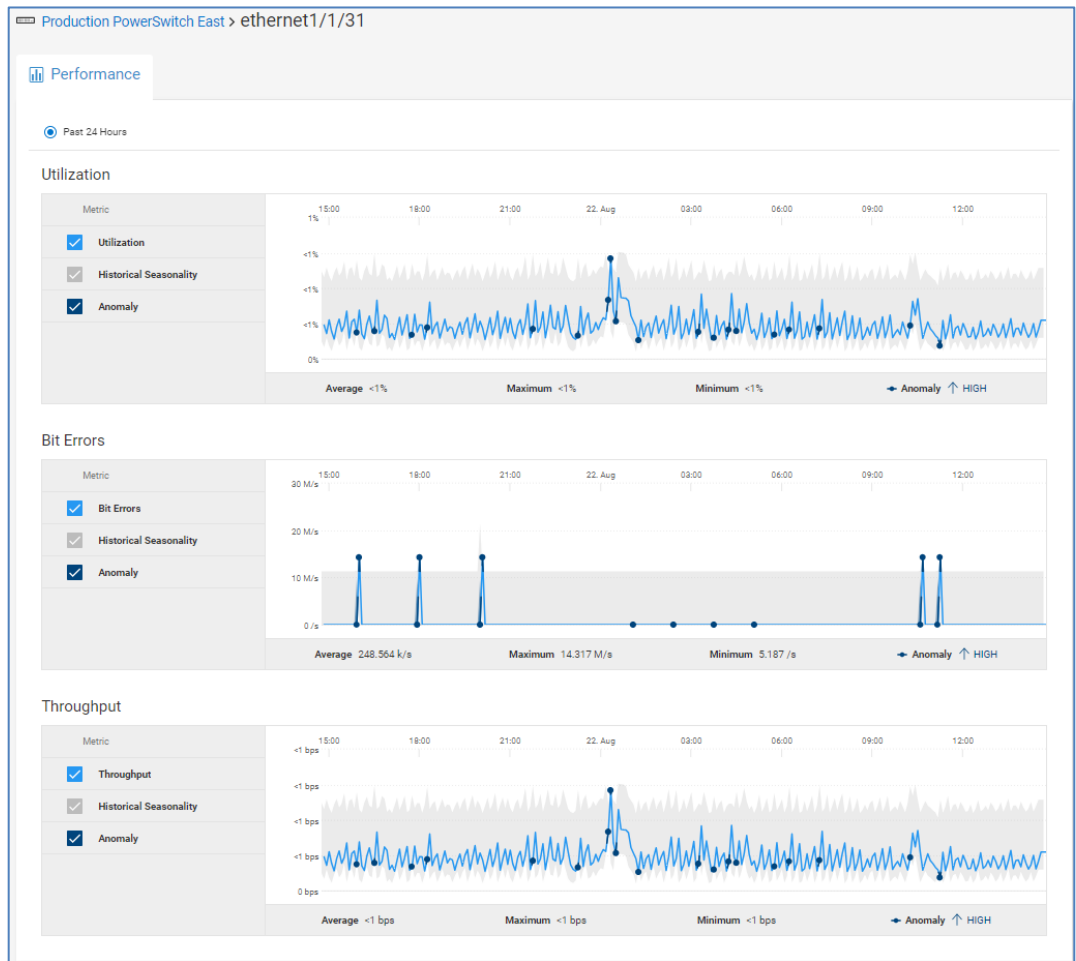
- Interface Statistics
  - Utilization
  - Congestion Ratio
  - Bit Errors
  - Link Resets
  - Class-3 Discards
  - CRC Errors

- Throughput
- Congestion
  - Congestion Ratio
  - Time at Zero Tx Credit
- Bit Errors
- Link Resets



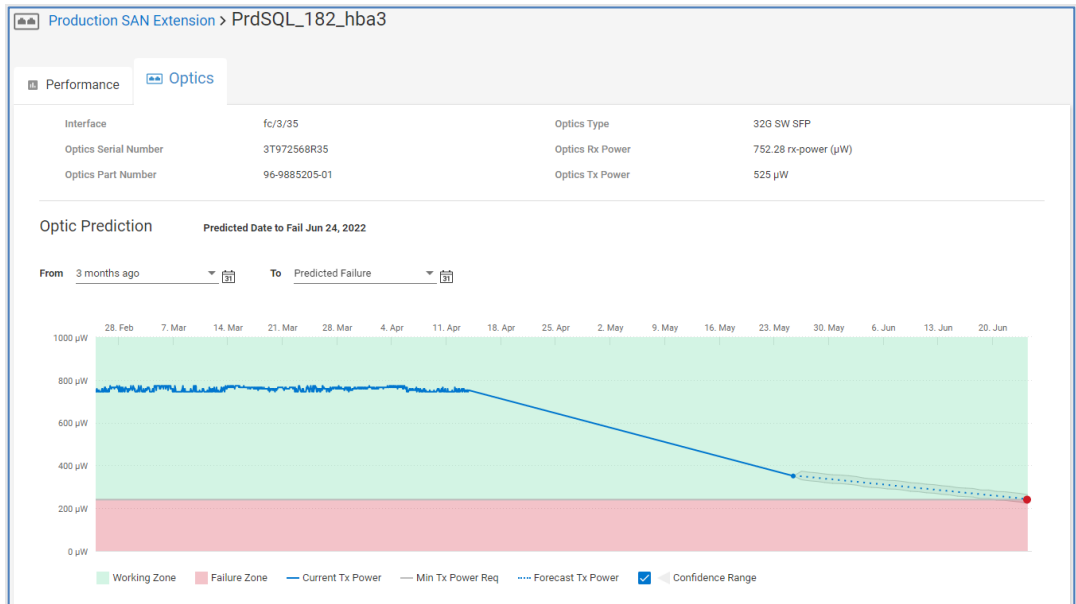
Users can access PowerSwitch port performance by selecting the port name hyperlink in Interface column of the Switch Capacity tab. PowerSwitch port performance charts include 24-hour charts for the following:

- Utilization
- Bit Errors
- Throughput



**Switch port details – Optics**

The Optics tab for Connectrix switches provides various property information about the optic on the top of the page and graphs the historical and predicted Tx power at the bottom of the page. The chart provides the working and failure zones and the predicted time until failure, giving users the ability to plan ahead and take mitigating measures to address expected failures.



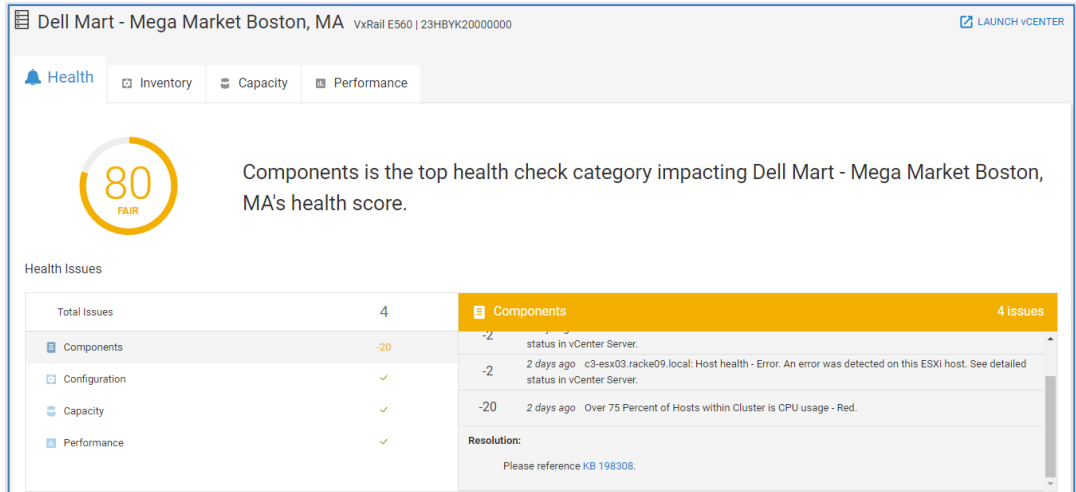
## VxRail hyperconverged infrastructure systems details

### Introduction

CloudIQ supports VxRail HCI systems. The HCI tab in the various multisystem views has been discussed earlier in this paper. This section describes the information provided in the system details view for a VxRail cluster. Each cluster has the Health, Inventory, Capacity, and Performance tabs. Each tab provides the Launch vCenter hyperlink to easily go to vCenter for more detailed information or to make configuration changes. The details of each tab are presented below.

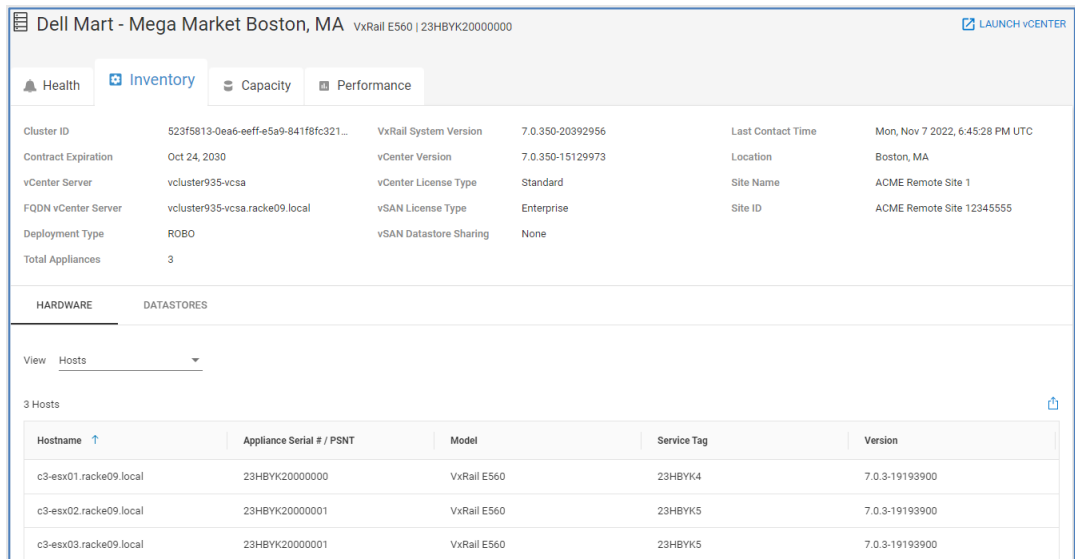
### VxRail system details – Health

The Health tab for VxRail clusters is similar to other systems. The Health Score is determined by monitoring issues in the following categories: Components, Configuration, Capacity, and Performance. Each issue provides a recommended remediation or link to an applicable knowledge base article. Health Score history is also supported for VxRail.



### VxRail system details – Inventory

The Inventory tab provides various cluster attributes at the top half of the screen, including the serial number, cluster ID, location, site, version, various vCenter information, and contract information. The bottom half of the window contains the following tabs: Hardware and Datastores. The Hardware tab provides views for Hosts, Disks, Power Supplies, and Version Information.



### Hardware – Hosts

The **Hosts** view lists the appliances that make up the cluster and their model, service tag, and version.

HARDWARE		DATASTORES		
View Hosts				
3 Hosts				
Hostname	Appliance Serial # / PSNT	Model	Service Tag	Version
c3-esx01.racke09.local	23HBYK2000000	VxRail E560	23HBYK4	7.0.3-19193900
c3-esx02.racke09.local	23HBYK20000001	VxRail E560	23HBYK5	7.0.3-19193900
c3-esx03.racke09.local	23HBYK20000001	VxRail E560	23HBYK5	7.0.3-19193900

### Hardware - Disks

The Disks view provides a listing of the hard drives in the cluster. This tab includes the ESXi host, slot and enclosure, serial number, and firmware. The capacity and datastore are also listed.

HARDWARE		DATASTORES							
View Disks									
6 Disks									
Hostname	Slot	Enclosure	Protocol	Model	Serial Number	Version Number	Manufacturer	Capacity (GB)	Datastore
c3-esx01.rac...	0	0	SAS	PX06SMB070X	25H856G3	AS10	TOSHIBA	3481.6	VxRail-Virtua...
c3-esx01.rac...	1	0	SAS	PX06SMB071X	25H856G4	AS10	TOSHIBA	3481.6	VxRail-Virtua...
c3-esx02.rac...	0	0	SAS	PX06SMB072X	25H856G5	AS10	TOSHIBA	3481.6	VxRail-Virtua-SAN-Datastore-33077fe-9c13-4168-8247-16448a497384
c3-esx02.rac...	1	0	SAS	PX06SMB073X	25H856G6	AS10	TOSHIBA	3481.6	VxRail-Virtua...
c3-esx03.rac...	0	0	SAS	PX06SMB074X	25H856G7	AS10	TOSHIBA	3481.6	VxRail-Virtua...

### Hardware - Power Supplies

The Power Supplies view displays each power supply along with location, serial number, part number, and version.

HARDWARE		DATASTORES				
View Power Supplies						
4 Power Supplies						
Appliance Serial # / PSNT	Power Supply	Slot	Serial Number	Part Number	Version Number	
23HBYK20000000	Power Supply 1	1	V074103PSUSN000	OCMPGMA01	04.08.26	
23HBYK20000000	Power Supply 2	2	V074103PSUSN001	OCMPGMA01	04.08.26	
23HBYK20000001	Power Supply 1	1	V074203PSUSN000	OCMPGMA01	04.08.26	
23HBYK20000001	Power Supply 2	2	V074203PSUSN001	OCMPGMA01	04.08.26	

### Hardware - Version Information

The Version Information view provides the version information for the different objects on the system.



HARDWARE		DATASTORES								
View <span>Version Information</span>										
3 Hosts										
Hostname	ESXI	Dell PTAgent	BIOS	BMC	BOSS	Boot Device	Expanded Back...	CPLD	HBA	
c3-esx01.racke...	7.0.3-19193900	2.5.2.7	2.12.2	5.100.10.20	2.5.13.3024	N201DL43	3.35	1.0.7	16.17.01.00	
c3-esx02.racke...	7.0.3-19193900	2.5.2.7	2.12.2	5.100.10.20	2.5.13.3024	N201DL43	3.35	1.0.7	16.17.01.00	
c3-esx03.racke...	7.0.3-19193900	2.5.2.7	2.12.2	5.100.10.20	2.5.13.3024	N201DL43	3.35	1.0.7	16.17.01.00	

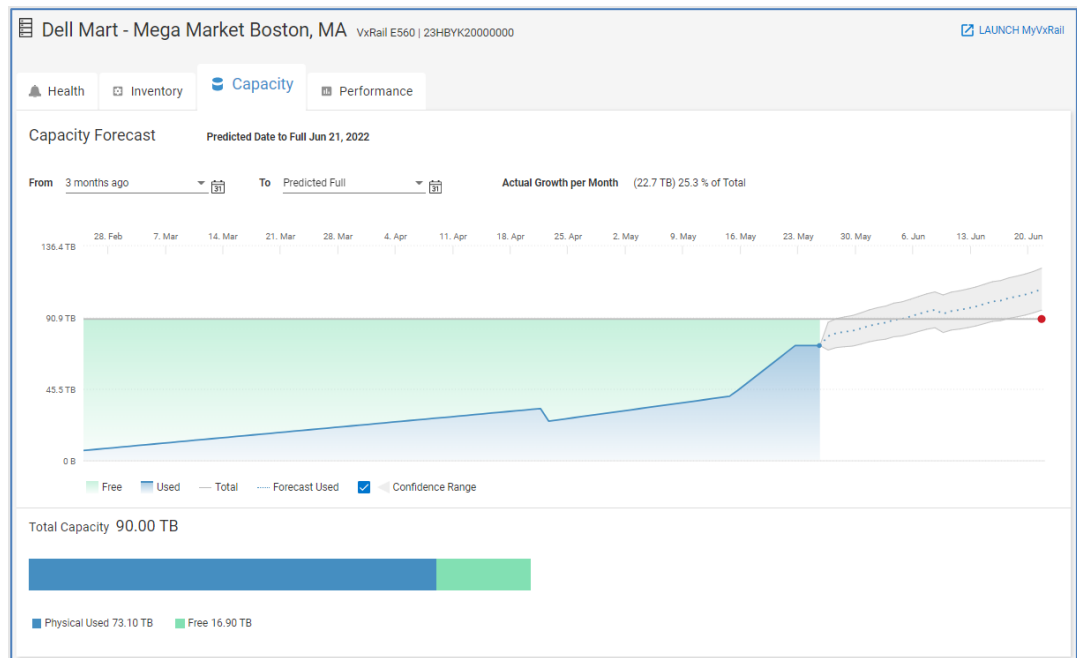
### Datstores

The **Datstores** tab provides capacity utilization information for each of the datstores on the cluster.

HARDWARE		DATASTORES			
1 Datastore					
Name	Type	Used (%)	Free	Capacity	
VxRail-Virtual-SAN-Datastore-330f7fea-9c13-41d8-8247-16448a487384	VSAN	24.3	15.8 TB	20.9 TB	

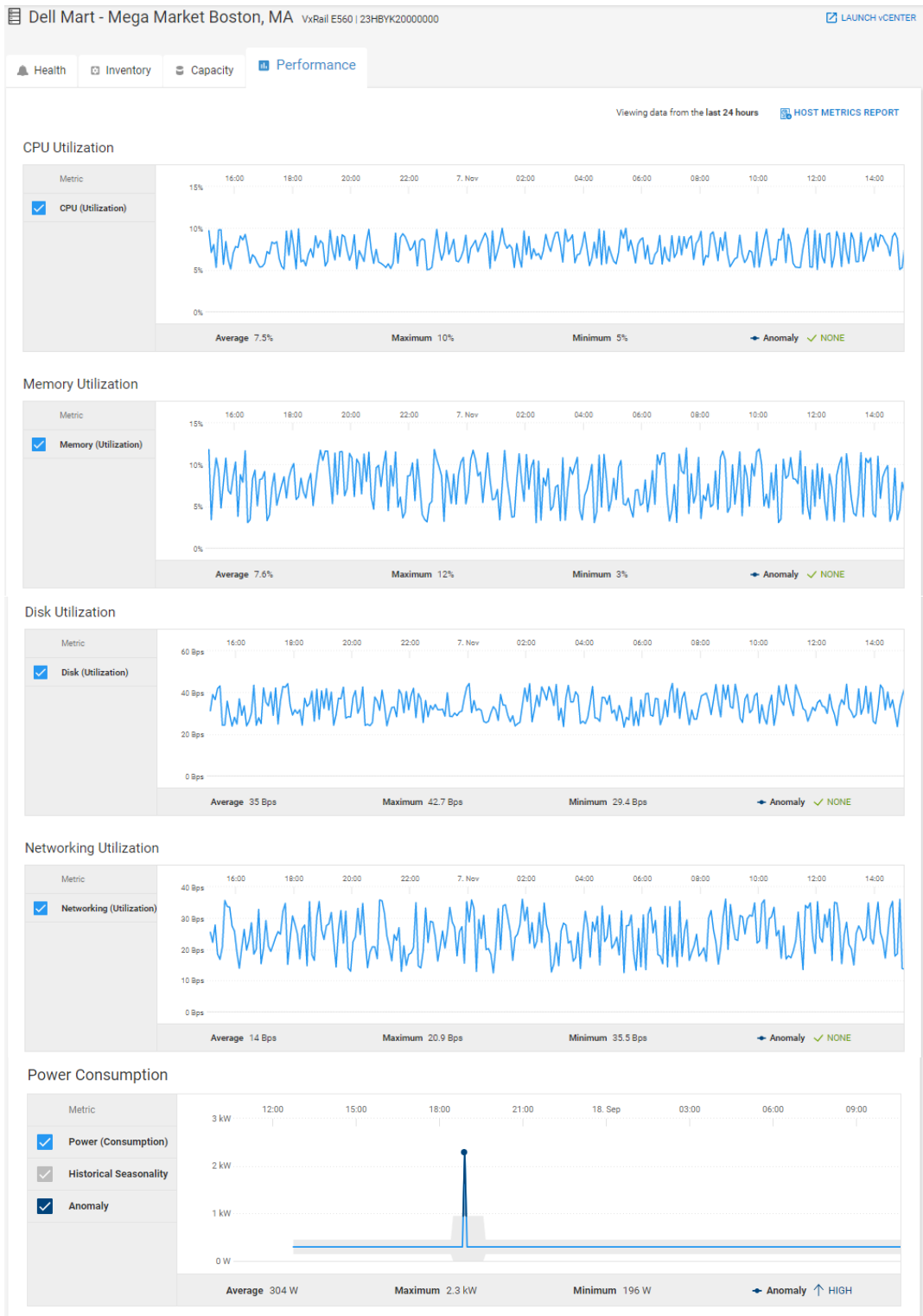
### VxRail system details – Capacity

The Capacity tab provides a capacity forecast chart on the top of the page. As with other systems, the chart displays the predicted full date along with a confidence range. The time range of the chart can be changed using the “From” and “To” drop-down menus. The bottom of the page displays a simple horizontal bar chart showing the breakdown of Total, Used, and Free capacity on the cluster.



### VxRail system details – Performance

The Performance tab provides 24-hour charts of CPU, Memory, Disk, Networking utilization, and Power consumption on the system. Clicking the Host Metrics Report link creates a custom report on CPU, memory, disk, and networking utilization for each host in the VxRail cluster.



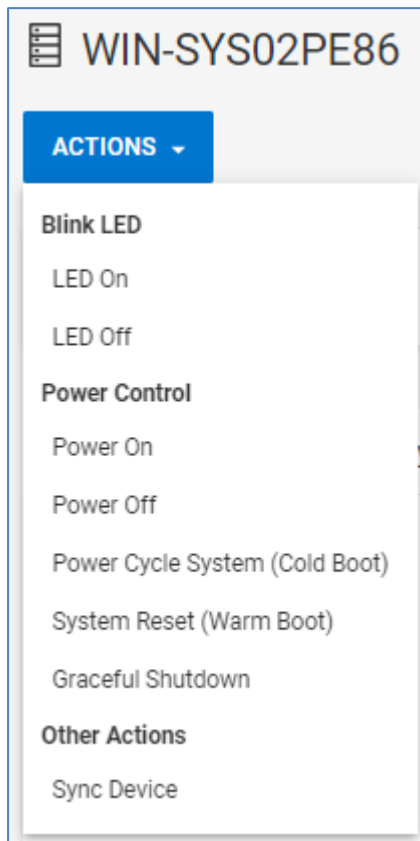
## Server details

### Introduction

CloudIQ supports the monitoring of PowerEdge servers and modular chassis through a plug-in to OpenManage Enterprise. The multisystem views for servers have been

discussed earlier in this paper. This section documents the available information in the system details page for a PowerEdge server. Each server has the Health Score, Inventory, and Performance tab. Each tab provides a link to view the server in OpenManage Enterprise. The details of each tab are presented in the following sections.

Each tab also provides an **Actions** menu. If remote operations are enabled in OpenManage Enterprise, and the CloudIQ user has a role of Server Admin, then that user can perform maintenance actions on the PowerEdge system. These actions include blinking the LED to help locate the server in the data center. Users can also perform power control operations such as power on, power off, and shutdown. The sync device option refreshes the server to retrieve the latest data for inventory, health, alerts, and cybersecurity.



### PowerEdge system details – Health

CloudIQ provides the Proactive Health Score for each server monitored by CloudIQ. Only the Components category is used to calculate the health score for servers. As with other systems, each health issue identified in CloudIQ has a corresponding recommended remediation. The Health Score History is tracked at the bottom of the page to help identify recurring issues.

WIN-SYS02PE86 PowerEdge MX840c | AMX18PE VIEW IN OPENMANAGE ENTERPRISE

**ACTIONS** ▾

IDRAC Health Status ❌ Critical Power State 🟢 On Management IP 🔗 198.51.100.86

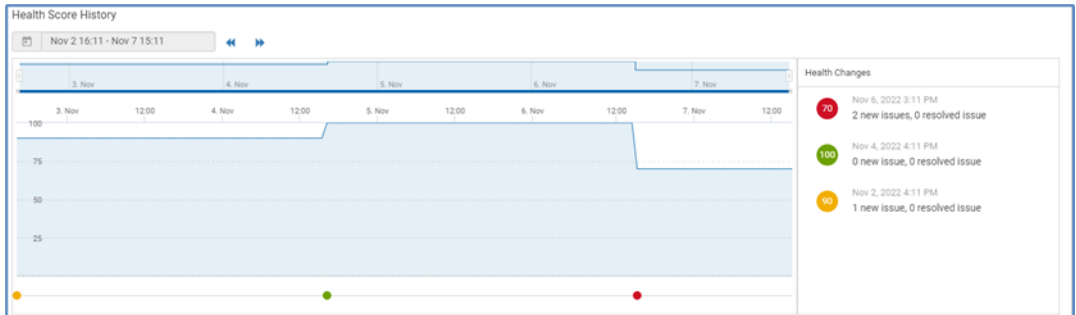
**Health** | Inventory | Performance | Cybersecurity

70  
POOR

Components is the top health check category impacting WIN-SYS02PE86's health score.

HEALTH ISSUES | SYSTEM ALERTS

Health Issue	Score	Total	Count
Total Issues	2	Total	2 issues
	-30	-30	1 day ago FAN0029: Fan 5 is either removed, incorrectly installed, or not present.
	-10	-10	1 day ago TMP0120: The system inlet temperature is greater than the upper warning threshold.



The **Actions** button is available on each tab.

### PowerEdge system details – Inventory

The Inventory page provides configuration, firmware, contract, and license information for the server. The top half of Inventory provides various attributes about the server including operating system name and version, memory and CPU information, and Chassis information.

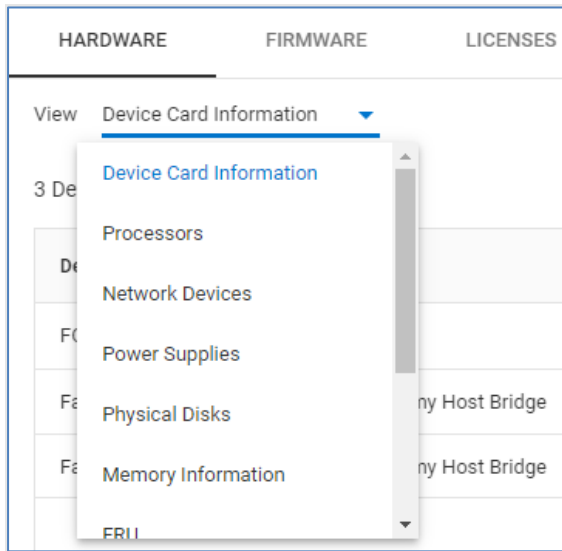
Health	Inventory	Performance	Cybersecurity
<b>Status</b> iDRAC Health Status <span style="color: red;">● Critical</span> Power State <span style="color: gray;">○ Off</span> Contract Expiration <span style="color: green;">● Nov 7, 2025</span> Last Contact Time Nov 6, 2022		<b>Identification</b> Asset Tag MI-Research-173 Service Tag ATY7D85 iDRAC DNS Name idrac-aty7d85.devops.acme.com Express Service Code 12349876184 MAC Address 01:00:5E:90:10:42	
<b>Management</b> Management IP <a href="#">198.51.100.173</a> OME IP Address <a href="#">198.51.100.104</a> OME Collector <a href="#">RR-Site-OME</a>		<b>Location</b> Site Name ACME Round Rock Site ID ACME Round Rock Datacenter Round Rock, TX Location Details Marketing Analytics Lab, 42, 18, 31	
<b>Chassis Information</b> Chassis Health <span style="color: green;">● Ok</span> Chassis Name ML_Research Chassis 02 Chassis Service Tag AMX70PE Chassis Slot Name Slot 1 Chassis Slot 1		<b>OS Information</b> OS Name Windows Server 2012 R2 OS Version 6.3 Hostname WIN-02PE173	
		<b>Hardware</b> Model PowerEdge MX740c Processor Summary 2 Processors: Intel(R) Xeon(R) CPU E5-263... Total Memory 16.0 GB	

The bottom of the page has the following tabs: Hardware, Firmware, Licenses, Contract, and Management Info. A Virtual Machines tab is available and populated for servers running ESXi. Virtual machine information requires discovery of vCenter using the CloudIQ Collector. See [Appendix A: Enabling CloudIQ at the system](#) for additional details.

## Hardware

The Hardware tab has an additional drop-down menu to view information for the following components:

- Device Card Information
- Processors
- Network Devices
- PowerSupplies
- Physical Disks
- Memory Information
- FRU
- Virtual Flash
- Storage Enclosures
- Storage Controllers
- FC Ports



### Firmware

The Firmware tab lists out BIOS and Firmware versions, installation dates, and latest available versions.

Component Name	Software Type	Version	Install Date	Latest Version Available
Backplane 0	FRMW	5.1	August 21, 2022, 1:09:03 PM	4.27
Backplane 0	FRMW	5.1	August 21, 2022, 1:09:03 PM	Not Available
Backplane 0	FRMW	4.26	August 21, 2022, 1:09:03 PM	5.1
BIOS	BIOS	1.6.11	May 23, 2023, 1:09:03 PM	2.1
BIOS	BIOS	1.0.2	August 21, 2022, 1:09:03 PM	1.5.0

### Licenses

The Licenses tab shows various information about the license including the status, the license type (perpetual or evaluation), a description, license expiration (for evaluation licenses), and the Entitlement ID.

Status	Type	Description	Expiration	Entitlement ID
Unknown	Perpetual	iDRAC8 Enterprise License	-	FN-469545409

### Contract

The Contract tab shows support contract information. This includes Status, a description, the contract type, and start and end dates.

HARDWARE	FIRMWARE	LICENSES	CONTRACT	MANAGEMENT INFO	VIRTUAL MACHINES
2 Contracts					<a href="#">VIEW ON DELL SUPPORT SITE</a>
Status	Service Level Description	Contract Type	Start Date	Expiration	
Active	Prosupport Plus	Extended	November 7, 2021, 3:22:42 PM	November 7, 2023, 3:22:42 PM	
Expired	Onsite Diagnosis Service	Full	November 7, 2020, 3:22:42 PM	November 7, 2021, 3:22:42 PM	

### Management Info

The Management Info tab provides the IP Address, MAC Address, Name, and DNS Name of the iDRAC. There is also a hyperlink to launch the iDRAC management URL so that users can quickly go to the iDRAC and perform any necessary remote management tasks.

HARDWARE	FIRMWARE	LICENSES	CONTRACT	MANAGEMENT INFO	VIRTUAL MACHINES
1 Management Agent					
IP Address	MAC Address	Name	Management Uri	DNS Name	
198.51.100.69	01:00:5E:90:10:53	SYSMGMT-ML-LABS	<a href="https://198.51.100.69/">https://198.51.100.69/</a>	idrac-arh1qy.devops.acme.com	

### Virtual Machines

The Virtual Machines tab is visible for servers running ESXi and lists out various information about each VM including name, IP address, operating system, vCenter name, and ESXi Cluster.

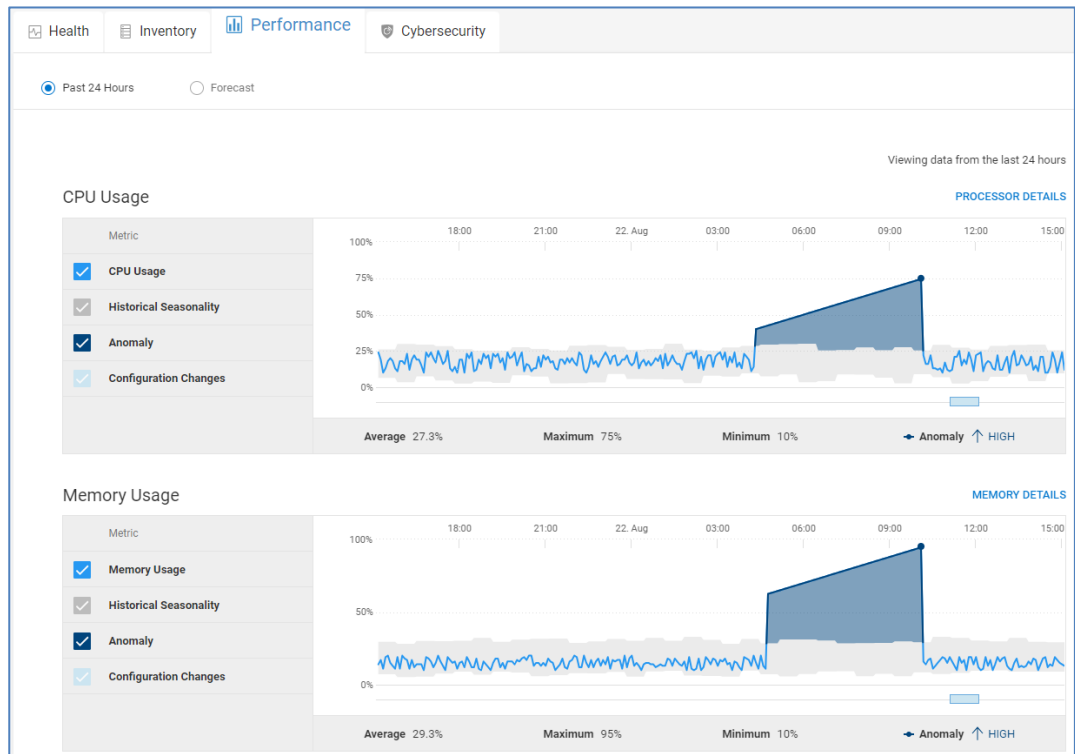
HARDWARE	FIRMWARE	LICENSES	CONTRACT	MANAGEMENT INFO	VIRTUAL MACHINES
0 Virtual Machines					
Name	Network Address	Operating System	vCenter	Cluster	
HR_Remote_VM1	10.0.2.1	Red Hat Enterprise Linux 5 (64-bit)	DistESX1	HR_Remote Cluster	

### PowerEdge system details – Performance

The Performance tab provides 24-hour charts for key performance metrics including:

- CPU Usage
- Memory Usage
- SYS Usage
- System Board IO Usage
- CPU Temperature
- System Inlet Temperature
- System Net Airflow
- Power Consumption

Each chart provides the average, minimum and maximum values of the metric during the time period. Performance anomalies are highlighted in the charts as dark blue shaded areas. Configuration changes are identified with blue rectangles along the X-axis. Clicking the rectangle opens a window that provides details about the configuration change. The following is an example of the CPU and Memory Usage chart.



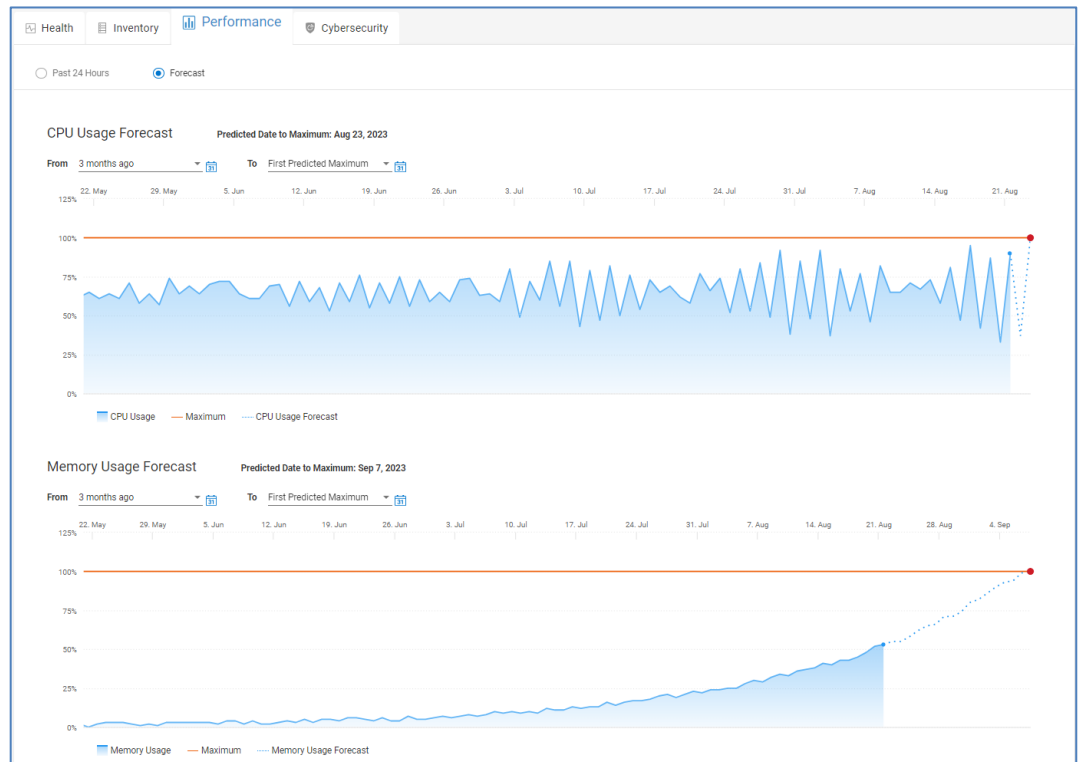
**Note:** Available metrics vary based on license type, hardware, and firmware levels. See the CloudIQ section of the [OpenManage Portfolio Software Licensing Guide](#) for additional details.

CloudIQ also provides performance forecasting charts for PowerEdge. The forecasting charts are available for:

- CPU Usage
- Memory Usage
- System Usage
- IO Usage

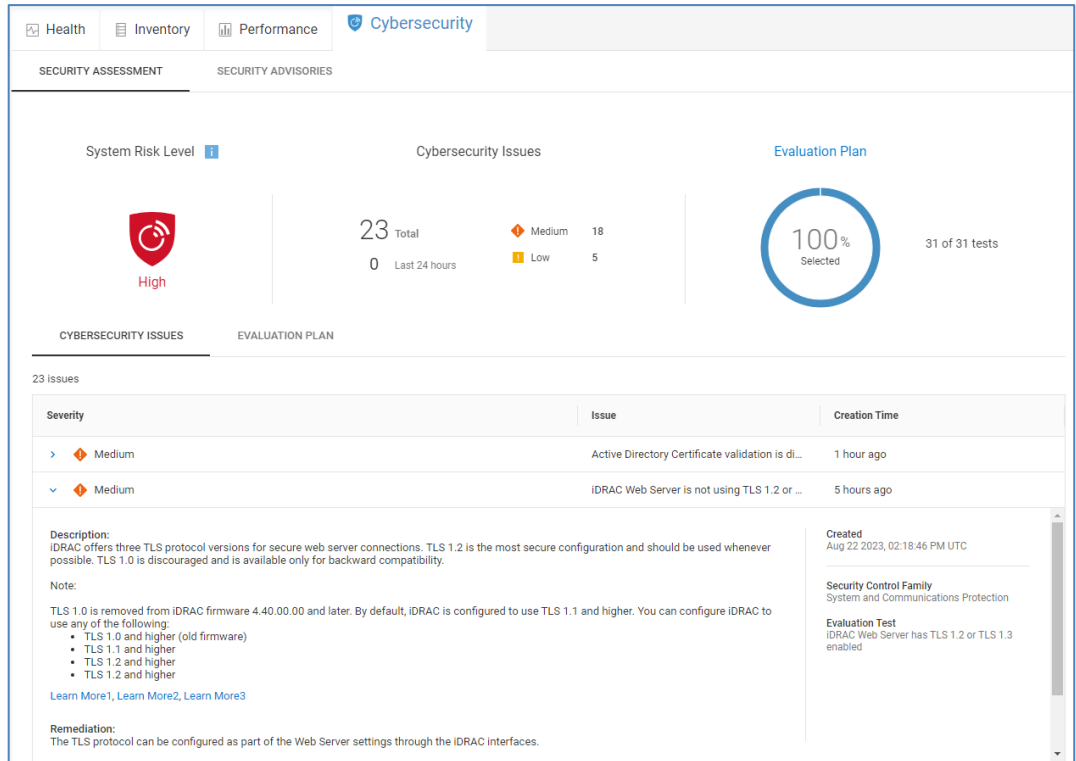
CloudIQ uses predictive analytics to understand the historical trends and usage and determine when these resources will reach their maximum value. By identifying when a resource will be fully utilized, CloudIQ helps with workload planning, allowing users to plan to add additional resources to a server or migrate certain workloads to lesser utilized systems.





## PowerEdge system details - Cybersecurity

The Cybersecurity tab is available for PowerEdge servers and chassis that have cybersecurity collections enabled in OpenManage Enterprise. The Security Assessment tab provides the risk level of the system, a summary of the cybersecurity issues and severities, and a chart showing the percentage of enabled tests in the evaluation plan. There are two tabs at the bottom of the screen: Cybersecurity Issues and Evaluation Plan. The Cybersecurity Issues tab lists the active issues along with the recommended remediation and the time the issue was identified.



The Evaluation Plan tab lists the possible tests and the status of each test:

- Not in Plan: The test is not part of the evaluation plan.
- Deviation: The test is enabled, and there is an active issue.
- OK: The test is enabled, and there are no active issues.
- Not Supported: The test is not supported.
- Not Applicable: The test is for a capability that depends on another capability that is disabled.
- Not Evaluated: The test is for a system with a disabled evaluation plan or for a system with an enabled evaluation plan, but the test has not yet been executed.

The Details icon shows the test description and in instances where there is an active deviation, it shows the recommended remediation.

CYBERSECURITY ISSUES		EVALUATION PLAN	
31 evaluation tests			
Evaluation Tests	Status	Last Detected	Details
Access Control	4 deviations		
IP Blocking is enabled	Deviation	Wed, Oct 28 2020, 08:12:55 PM ...	<p><b>Issue:</b> Wed, Oct 28 2020, 08:12:55 PM UTC</p> <p><b>IP Blocking is disabled</b></p> <p>This test verifies that IP Blocking is enabled on iDRAC.</p> <p>IP blocking dynamically determines when excessive login failures occur from an IP address, and block or prevent the IP address from logging into the iDRAC for a preselected time span.</p> <p>All consecutive login failures from a specific IP address are tracked by an internal counter.</p> <p>When the user logs in successfully, the failure history is cleared, and the internal counter is reset. Enabling this feature is a recommended security best practice. By automatically detecting potential malicious actions being performed and preventing unauthorized access to iDRAC through brute force attacks, IP blocking hardens iDRAC network security resilience. <a href="#">Learn More</a></p> <p><b>Remediation:</b> Go to iDRAC Settings &gt; Connectivity &gt; Advanced Network Settings &gt; IP Blocking Enabled - Enabled</p> <p>IP blocking can be configured as part of the Advanced Network settings through the iDRAC interfaces.</p> <p>(For example, in the iDRAC UI, you can search for or locate the IP Blocking settings.)</p> <p>For additional configuration information, refer to the iDRAC online help or select the appropriate <a href="#">iDRAC manuals</a> and refer to the documentation for the Users and Security Configuration guides.</p>
Quick Sync Read Authentication to the server is enabled	Deviation	Wed, Oct 28 2020, 08:12:55 PM ...	
SSH is disabled	Deviation	Wed, Oct 28 2020, 08:12:55 PM ...	
The SNMP agent is configured for SNMPv3	OK		
User Active Directory authentication on iDRAC is enabled	OK		
User Generic LDAP authentication on iDRAC is enabled	OK		
VNC server Disabled	deviation		
Audit and Accountability	2 deviations		
Configuration Management	4 deviations		
Identification and Authentication	5 deviations		
System and Communications Protection	10 deviations		
System and information integrity	2 deviations		

The Security Advisories tab lists any Dell Security Advisories that are applicable to the server or chassis.

## Data protection details

### Introduction

CloudIQ has added the ability to monitor PowerProtect DD series backup storage systems and PowerProtect Data Manager. This section describes the current use cases for each.

### PowerProtect DD

There are four tabs available on the system details page for PowerProtect DD: Health, Inventory, Capacity, and Performance. The “Launch DD System Manager” hyperlink is available on each tab to allow users to quickly go to the element manager in circumstances where additional detailed information is needed. The details available in each tab are presented below.

#### PowerProtect DD system details – Health

All five categories are supported for determining the health score of each DD system. As with all other systems, each issue has a recommended resolution and the health score history is available at the bottom of the page.

The screenshot shows the 'Health' tab for system 'dd-lab-01'. A large circular gauge displays a score of 80, labeled 'FAIR'. A message states: 'Capacity is the top health check category impacting dd-lab-01's health score.' Below this, a 'Health Issues' table lists various categories with their status and a detailed view for the Capacity issue.

Category	Status	Value	Details
Total Issues	1		
Components	✓		
Configuration	✓		
Capacity	-20		<p><b>Capacity</b> 1 Issue</p> <p>-20 about 16 hours ago Capacity threshold has exceeded 80% of the total cloud tier capacity</p> <p><b>Resolution:</b> Free space in the specified tier or unit by deleting unneeded items and running cleaning on the tier. If items cannot be deleted, storage must be added to the appropriate tier. If you need assistance recovering space, contact your contracted support provider. To purchase additional storage, please contact your Dell EMC sales representative or channel partner.</p>
Performance	✓		
Data Protection	✓		

### PowerProtect DD system details – Inventory

The top portion of the tab provides various attributes including the serial number, model, site, location, version, and contract information. The bottom of the page contains the following tabs: Services, Replication, MTrees, and Disks. Each tab is discussed below.

The screenshot shows the 'Inventory' tab for system 'dd-lab-01'. It displays system metadata in a table and a list of services with their status.

Attribute	Value	Attribute	Value
Hostname	dd-lab-01.hopkinton.dell.com	Version	7.4.0.5-671629
Contract Expiration	Nov 11, 2030	Last Contact Time	May 25 2022, 05:46:02 PM UTC
Contract Number	1	Location	Hopkinton, MA
Service Plan	ProSupport 4HR/Mission Critical	Site Name	ACME Headquarters
		Site ID	ACME Headquarters 01

Service	Status
CIFS	Enabled
Cloud	Enabled
DDBoost	Enabled
Encryption	Enabled
File System	Enabled
High Availability	Enabled
NFS	Enabled
VTL	Disabled

### Services

The Services tab provides a listing of the various services running on the system along with their status.

SERVICES	REPLICATION	MTREES	DISKS	9 Services
Service		Status		
CIFS		Enabled		
Cloud		Enabled		
DDBoost		Enabled		
Encryption		Enabled		
File System		Enabled		
High Availability		Enabled		
NFS		Enabled		
VTL		Disabled		

### Replication

The Replication tab provides a listing and status of the replication sessions on the system. This information includes the source and destination, the state, the time of the last sync, and amount of remaining data to replicate from the source to the destination.

SERVICES	REPLICATION	MTREES	DISKS	2 Replications	
Source		Destination	State	Synced As Of Time	Remaining(GB)
mtree://dd-lab-01.hopkinton.dell.com...		mtree://corpbkup.hopkinton.dell.com...	Normal	Fri Dec 18 09:55	12.4
mtree://dd-lab-01.hopkinton.dell.com...		mtree://corpbkup.hopkinton.dell.com...	Normal	Fri Dec 18 09:48	0.0

### MTrees

The MTrees tab lists each of the configured MTrees, Storage Units, Virtual Tape Library (VTL) Pools, and so on, with the logical used, physical used, and compression factor for the last 24 hours.

SERVICES	REPLICATION	MTREES	DISKS	3 MTrees
				Last 24 hours
Name		Logical Used(GB)	Physical Used(GB)	Compression Factor
/data/col1/finance		217.6	308.3	0
/data/col1/payroll		120.1	198.5	0
/data/col1/backup		2.8	1.1	2.5

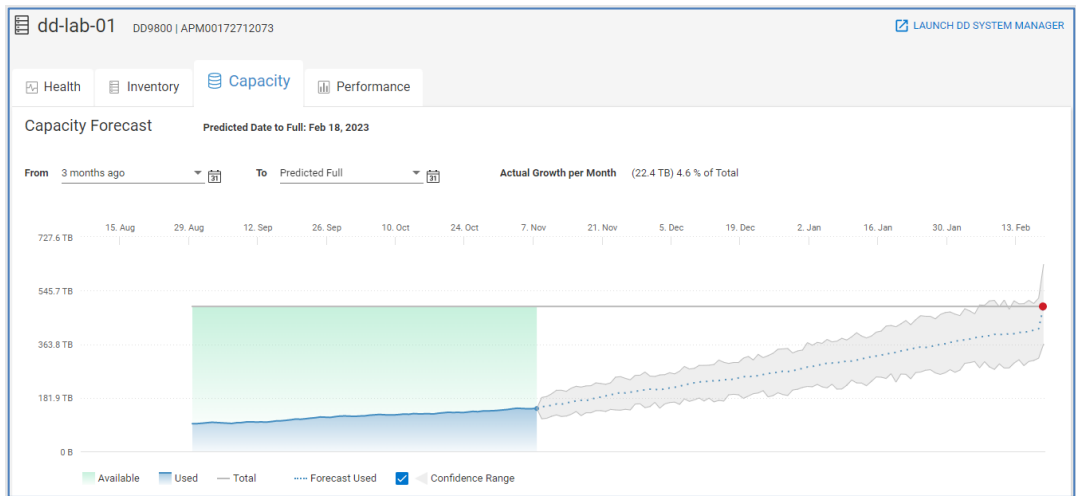
### Disks

The final tab is the Disks tab. Each disk is listed with its slot, model, firmware, serial number, capacity, and type.

DISK ↑	Slot	Manufacturer/Model	Firmware	Serial Number	Capacity(TB)	Type
1.1	0	M500DC400-MTFDBAK4...	0154	1711164A8586	0.3	SATA-SSD
1.2	1	M500DC400-MTFDBAK4...	0154	1711164A5B00	0.3	SATA-SSD
1.3	2	M500DC400-MTFDBAK4...	0154	1711164A5656	0.3	SATA-SSD
1.4	3	M500DC400-MTFDBAK4...	0154	1711164A5B25	0.3	SATA-SSD
2.1	0	HITACHI H4SMR328_CLA...	S142	74V0J17X	0.7	SAS-SSD
2.10	9	HITACHI H4SMR328_CLA...	S142	74V0LB0X	0.7	SAS-SSD
2.11	10	HITACHI H4SMR328_CLA...	S142	74V0H11X	0.7	SAS-SSD
2.12	11	HITACHI H4SMR328_CLA...	S142	74V07TJX	0.7	SAS-SSD

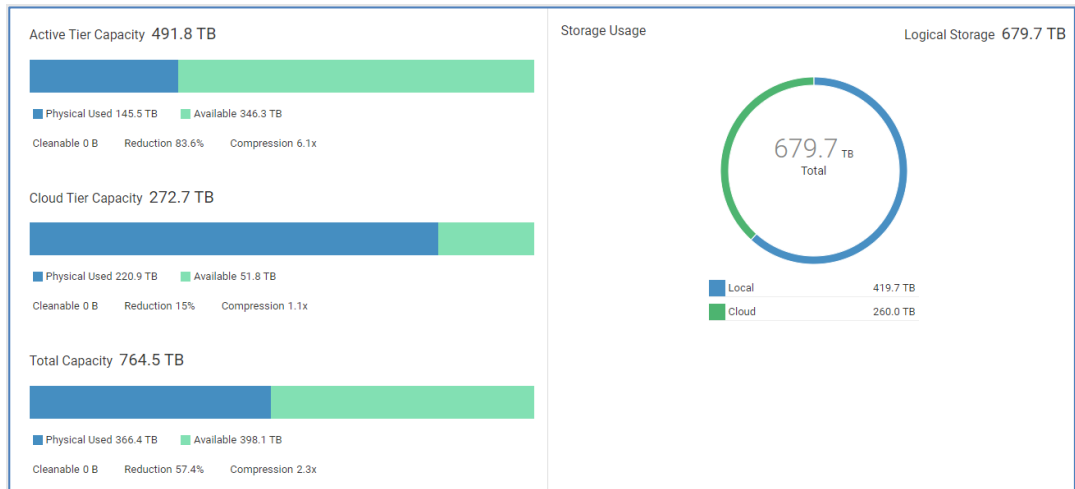
### PowerProtect DD system details – Capacity

The top of the Capacity tab displays the Capacity Forecast chart with the historical available and used capacity and the predicted used capacity with the confidence range.



The bottom of the page breaks down the physical and logical capacity on the DD system. The left side of this view displays horizontal bar charts for Active Tier and Cloud Tier Capacity. A third chart shows the total of active and cloud tier capacity. Each chart provides the total, used and free capacity. The amount of cleanable storage is also displayed as well as the reduction percentage and compression factor.

The right half of this view provides a doughnut chart of total logical storage broken down between local and cloud. This page allows users to gain insight into the capacity utilization on the system and savings due to reduction and compression.

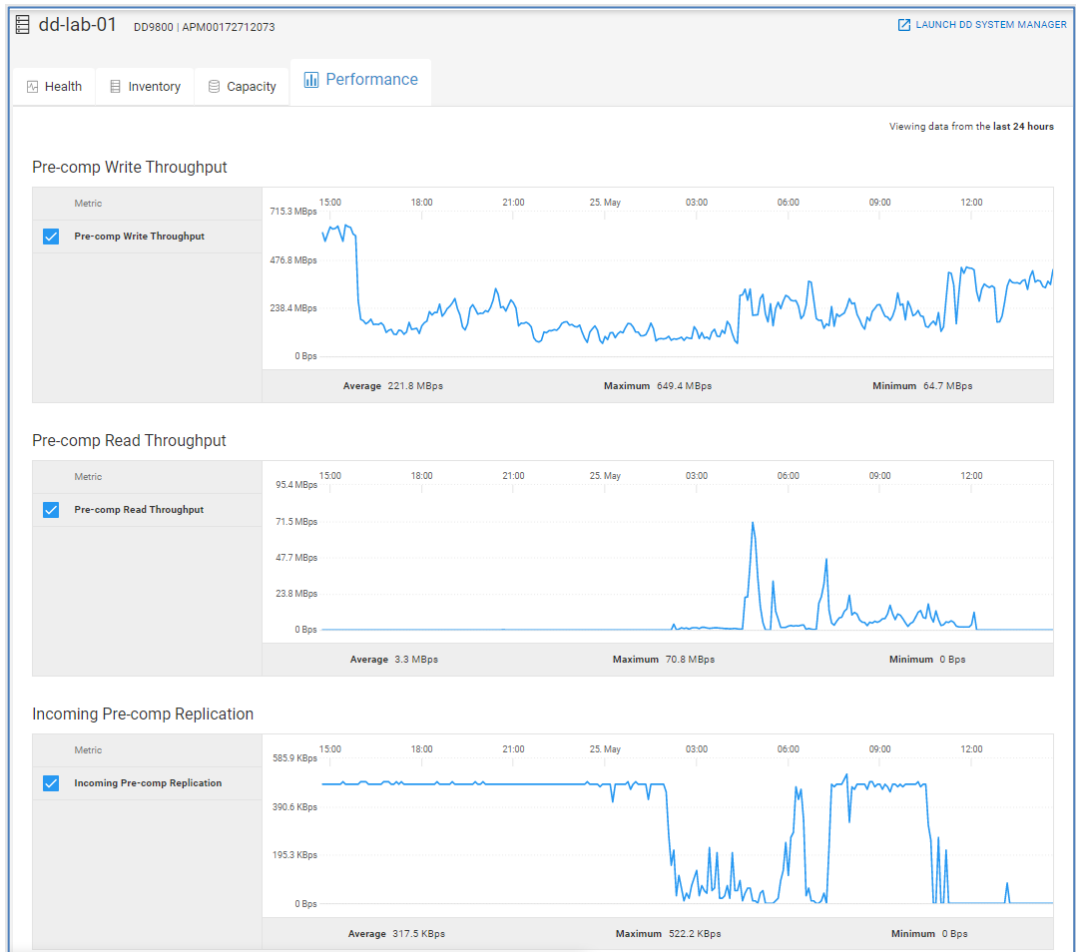


### PowerProtect DD system details – Performance

The Performance tab provides 24-hour performance charts for the following metrics:

- Pre-compressed Write Throughput
- Pre-compressed Read Throughput
- Incoming Pre-compressed Replication
- Outgoing Pre-compressed Replication
- CPU Usage
- Replication Streams Count (incoming and outgoing)
- Streams Count (reads and writes)

An example of the first few charts is shown below.



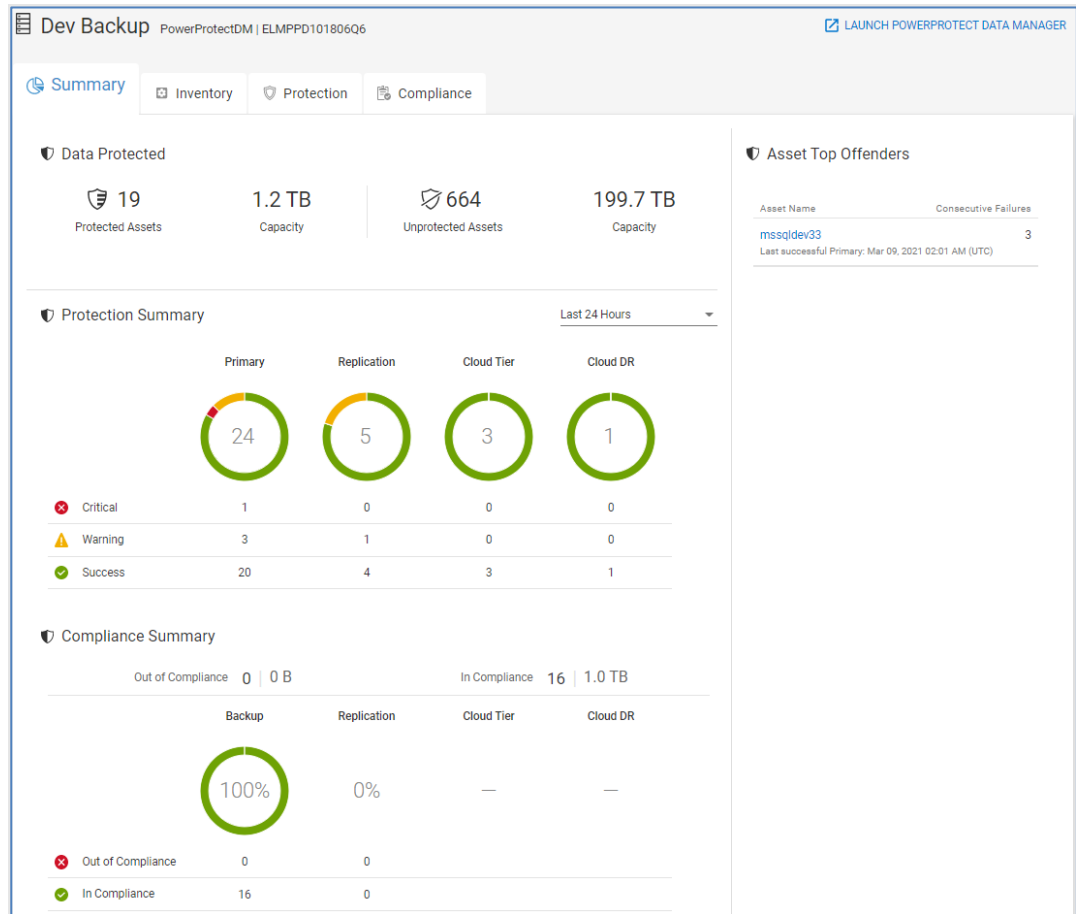
## PowerProtect Data Manager

In addition to PowerProtect DD, CloudIQ can monitor instances of PowerProtect Data Manager. This allows users to see reports from Data Manager directly in the CloudIQ UI. We saw earlier that instances of PowerProtect Data Manager are displayed in Data Protection tab in the multisystem view for Inventory. Selecting an individual instance of Data Manager directs the user to the details page which has four tabs: Summary, Inventory, Protection, and Compliance. Each tab is discussed below.

### PowerProtect Data Manager details – Summary

The Summary tab allows the user to quickly see status and resource information for the protection environment. The Data Protected section provides total amount of protected and unprotected assets with their capacity.





The Protection Summary section summarizes the number of assets that are protected within a specified time range. The last 24 hours is the default time range, but this can be changed to either last 3 days or last 7 days. The status is critical if all protection activities failed during the selected time range. Warning means that the asset has both failed and successful protection activities. Success means all protection activities completed successfully. The assets are grouped into one of the following four backup categories: Primary, Replication, Cloud Tier, and Cloud DR.

The Compliance Summary section displays the number and percentage of assets in each of the four backup categories that are in and out of compliance with their protection policy.

The Asset Top Offenders section lists those assets with the most consecutive failures. For those assets, a link to the asset details page is available. The asset details page shows the status of the last backup and the protection history of the asset. Users can filter the Protection History table by time range, status, or activity.

ppdmdev > mssqldev33

Asset Name mssqldev33 System ppdmdev Active Policy Bronze ● Enabled  
 Asset Type VM Asset Host sqldev33.\*\*\*\*\*

### Protection Summary

**Asset**  
mssqldev33

- Primary Backup**  
ppdmdev.\*\*\*\*\*  
Last backup: 3/29/21, 3:19 PM UTC  
Last successful: none
- Cloud Tier**  
ppdmdev.\*\*\*\*\*  
Last backup: none
- Replication**  
ppdmrepl.\*\*\*\*\*  
Last backup: none

### Protection History

10 Activities

Details	Protection Type	Status	Start Time	Completion Ti...	Duration	Initiated By	Transfer Rate
...	Primary	Critical	Thu, Apr 1 20...	Thu, Apr 1 20...	00:00:03	ADHOC	–
...	Primary	Critical	Thu, Apr 1 20...	Thu, Apr 1 20...	00:00:03	ADHOC	–
...	Primary	Critical	Thu, Apr 1 20...	Thu, Apr 1 20...	00:00:03	ADHOC	–
...	Primary	Critical	Thu, Mar 4 20...	Thu, Mar 4 20...	00:00:03	POLICY	–
...	Primary	Critical	Tue, Feb 16 2...	Tue, Feb 16 2...	00:00:03	POLICY	–
...	Primary	Critical	Sat, Feb 13 2...	Sat, Feb 13 2...	00:00:03	POLICY	–
...	Primary	Critical	Fri, Feb 5 202...	Fri, Feb 5 202...	00:00:03	POLICY	–
...	Primary	Critical	Thu, Feb 4 20...	Thu, Feb 4 20...	00:00:02	POLICY	–
...	Primary	Critical	Thu, Feb 4 20...	Thu, Feb 4 20...	00:00:03	POLICY	–
...	Primary	Critical	Mon, Feb 1 2...	Mon, Feb 1 2...	00:00:03	POLICY	–

## PowerProtect Data Manager details – Inventory

The Inventory tab shows various configuration information at the top of the page. The bottom of the page has three tabs: Asset, Storage, and Audit.

### Asset

The Asset tab shows the assets discovered by PowerProtect Data Manager along with the host, asset type, active policy, and status of the most recent backup.

Prod Backup PowerProtectDM | ELMPPD1018JVK6 LAUNCH POWERPROTECT DATA MANAGER

Summary **Inventory** Protection Compliance

IPV4	10.0.40.25	Version	19.10.0-19	Last Contact Time	about 1 hour ago
Protected Assets	19	Protected Capacity	1.2 TB	Location	Round Rock, TX
Unprotected Assets	664	Unprotected Capacity	19.7 TB	Site Name	ACME Headquarters
Assets Out of Compliance				Site ID	ACME Headquarters 01
Assets in Compliance					

---

ASSET STORAGE **AUDIT**

4 Assets

Asset ↑	Host	Asset Type	Active Policy	Primary Status	Replication Status	Cloud Tier Status	Cloud DR Status
mssql17.hr.prd	sqlsrv17.*****	VM	GoldPolicy	–	–	–	–
TestVM7	ldpdb011.*****	VM	29Policy	–	–	–	–
TestVM5	ldpdb011.*****	VM	29Policy	–	–	–	–
TestVM16	ldpdb014.*****	VM	29Policy	–	–	–	–

### Storage

The Storage tab shows the storage systems available to PowerProtect Data Manager systems. The model and total and available capacity are listed for each system.

ASSET STORAGE **AUDIT**

2 Storage Systems

Storage System Name ↑	Storage System Type	Model	Version	Total Capacity	Available Capacity
corpbkup	Protection Storage Syste...	DD9900	7.4.0.5-671629	181.7 TB	523.2 TB
ha-test-cf1-p0	Protection Storage Syste...	DD6800	7.4.0.5-671629	215.6 TB	79.6 TB

### Audit

The Audit tab aggregates the audit information from each of the PowerProtect Data Manager systems. It provides a list of changes on the system, time of the change, the user that made the change, the changed object, and the old and new values.

ASSET STORAGE **AUDIT**

18 Audit Logs

Audit Type ↑	Changed At	Change Descripti...	Changed By	Object Changed	Previous Values	New Values	Note
PROTECTION	Mon, Aug 9 202...	Adhoc backup tr...	admin	Prod Backup_Ar...	–	CentOS8.0_LVM...	–
SYSTEM	Mon, Aug 9 202...	The status of th...	admin	features	–	–	–
PROTECTION_...	Mon, Aug 9 202...	'3' asset(s) has/...	admin	[SearchData01, ...	[SearchData01, ...	–	–
PROTECTION_...	Mon, Aug 9 202...	NAS asset sourc...	admin	Unity-Prod *****	Unity-Dev.*****	–	–
PROTECTION_...	Mon, Aug 9 202...	Protection Polic...	admin	Prod Backup_N_...	Prod Backup_N_...	–	–
PROTECTION_...	Mon, Aug 9 202...	3 asset(s) unass...	–	*Prod Backup_N_...	SearchData02, S...	–	–
PROTECTION_...	Thu, Aug 5 2021...	Protection Polic...	admin	Prod Backup_N_...	true	false	–
PROTECTION_...	Thu, Aug 5 2021...	Protection Polic...	admin	Prod Backup_N_...	false	true	–

### PowerProtect Data Manager details – Protection

The Protection tab provides additional details of the protection status for each asset. This tab includes the following:

- Asset name and the host on which it is running

- Asset type (VM, Database, File System, VMAX Storage Group, or Kubernetes)
- Name of the active protection policy
- Status of each protection activity for the asset

A dash indicates that protection activity is not configured for the asset.

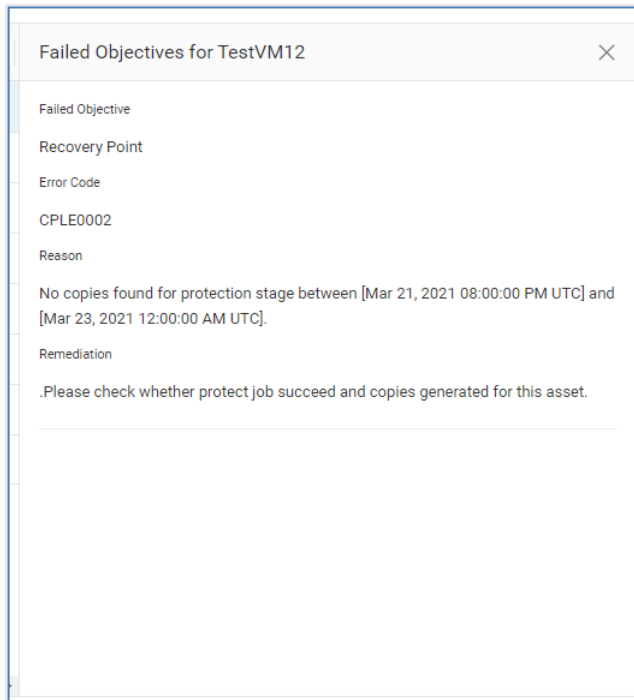
Asset	Host	Asset Type	Active Policy	Primary Status	Replication Status	Cloud Tier Status	Cloud DR Status
mssql17.hr.prd	sqlsrv17.*****	VM	GoldPolicy	Critical	Success	–	–
TestVM7	ldpdb011.*****	VM	29Policy	Success	Success	–	–
TestVM5	ldpdb011.*****	VM	29Policy	Success	Success	–	–
TestVM16	ldpdb014.*****	VM	29Policy	Success	Success	–	–

### PowerProtect Data Manager Details – Compliance

The Compliance tab displays details of each asset's compliance for each configured activity to the defined service level agreements in the protection policy. This tab includes the asset name and the host on which it is running, the asset type, the active policy, SLA name, activity type, status, and the number of failed objectives.

Details	Asset	Host	Asset Type	Active Policy	SLA Name	Activity	Status	Failed Object...
	TestVM12	ldpdb016.*****	VM	59Policy	59BackupSLA	Protect	Failed	1
	TestVM13	ldpdb016.*****	VM	59Policy	59BackupSLA	Protect	Failed	1
	TestVM12	ldpdb016.*****	VM	59Policy	59CloudTierSLA	Cloud Tier	Success	0
	TestVM12	ldpdb016.*****	VM	59Policy	59PromotionSLA	Promotion	Success	0
	TestVM12	ldpdb016.*****	VM	59Policy	59ReplicationSLA	Replicate	Success	0
	TestVM13	ldpdb016.*****	VM	59Policy	59CloudTierSLA	Cloud Tier	Success	0
	TestVM13	ldpdb016.*****	VM	59Policy	59ReplicationSLA	Replicate	Success	0
	TestVM13	ldpdb016.*****	VM	59Policy	59PromotionSLA	Promotion	Success	0

For instances where there is a compliance failure, the Details button provides additional information. This information includes the failed objective, the error code, the reason, and remediation.



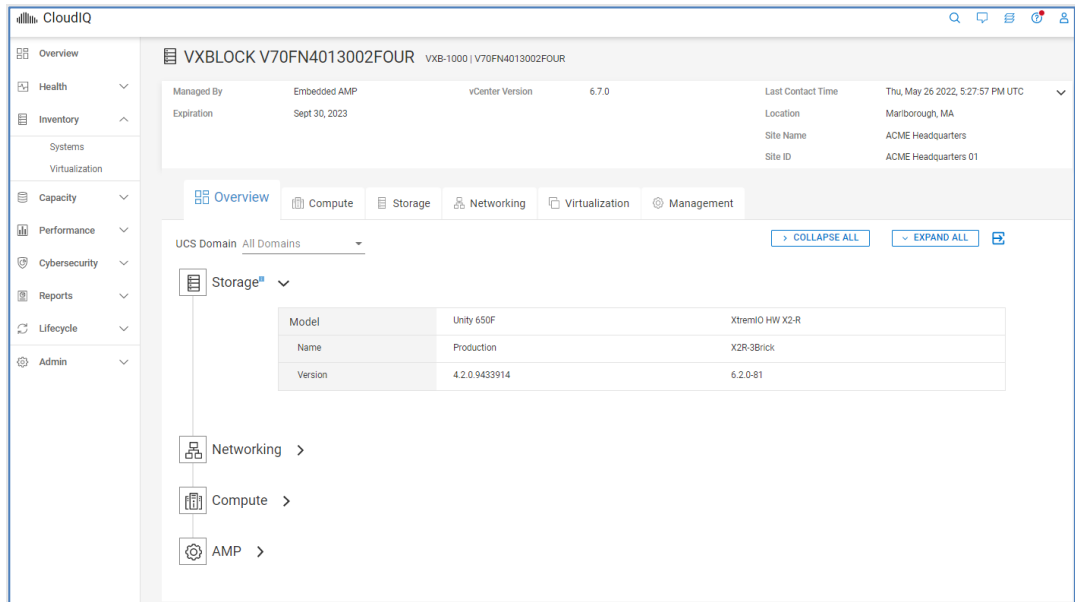
## Converged Systems details

### Introduction

CloudIQ can monitor VBlock and VxBlock Converged Systems. Converged Systems component information is displayed in the Inventory views under the CONVERGED tab. The Lifecycle menu provides the various milestone dates for each of the components in the Converged System. Each of these areas is described in the following sections.

### Converged Systems – Inventory

Selecting the system name hyperlink for the Converged System from the Inventory menu opens the system details page. The top of the system details page provides information similar to what is displayed in the multisystem view. The bottom of the page has six tabs: Overview, Compute, Storage, Networking, Virtualization, and Management for more detailed information.



**Note:** Users can onboard VMware, Connectrix, and Storage components of a VxBlock individually to use other CloudIQ features described in this document.

## Overview

The Overview tab (shown in the above screenshot) provides a high-level view of the components, software, and firmware versions that make up the converged system. The components include storage, networking, compute, and AMP (management).

- **Storage** – Listing of the types of storage arrays in the Converged System along with the names and firmware versions of the arrays.
- **Networking** – Listing of the LAN and SAN switches in the Converged System along with switch model, name, and firmware version.
- **Compute** – Listing of compute resources including the fabric interconnects per domain, chassis information, FEX information, and server profiles.
- **AMP** – Details of the storage array, managed applications, and server profiles for the Advanced Management Pod (AMP).

## Compute

The Compute tab provides information about the UCS servers in the Converged System and their resources. There can be up to four tabs under computer including server profiles, fabric interconnects, chassis, and fabric extenders (FEX).

**Server Profiles** – Provides number of Cisco UCS servers aggregated by server type and the number of UCS blade and rackmount servers. Also displays server profile information including profile name, number of servers in each profile, type of UCS server, and software version running on the server. The details of each profile can be opened and displays information in the following tabs: Summary and Servers.

- **Summary** – Displays hardware and software information about the profile including the operating system, storage, and MLOMs and mezzanines.

- **Servers** – Displays the location, serial number, hostname, and CPU information for each server in the server profile.

**Fabric Interconnects** – Provides the number of each type of fabric interconnect switch and the number and type of each of UCS server. Also displays a list of FI switches including the switch name, model number, fabric connected to the FI, UCS manager version of the FI and the FI serial number. The details of each FI switch can be opened and displays information in the following tabs: Summary, Configuration, Ports, and Hardware.

- **Summary** – Displays versions of Cisco switch operating system and UCS software running on the FI switch.
- **Configuration** – Displays number of ports for each role, including server, LAN, and SAN uplink ports. Also displays LAN and FC aggregate bandwidth for LAN and SAN ports, respectively.
- **Ports** – Displays port information including connections, port speed, and port role. The user can filter the port list.
- **Hardware** – Displays hardware information about FI switch including number of fan bays, number of fans and number of power supplies.

**Chassis** – Displays information about the UCS Chassis including the number of each type of UCS Blade servers and the number of used and available slots in the chassis. Also displays high-level chassis information including the UCS domain, chassis name, and serial number. The details of the chassis can be opened and displays information in the following tabs: IOMs and Hardware.

- **IOMs** - Displays the chassis model, serial number, number of active links, aggregated bandwidth, and firmware version for each IOM.
- **Hardware** – Displays number of fans, fan bays, and power supplies for the chassis.

**Fabric Extenders** – Displays the number of each type of UCS server connected to the FEX. Also displays high-level information about the FEX switches including UCS domain name, FEX name, model number, the fabric interconnect to which the FEX is connected and the FEX serial number. The details of each FEX can be opened and displays information in the following tabs: Configuration, Ports, and Hardware.

- **Configuration** – Displays number of ports connected to UCS servers and uplinks as well as the uplink bandwidth and aggregate bandwidth for each fabric.
- **Ports** – Displays port information including connections, port speed, and port role. The user can filter by port role to see only those ports connected to servers or FI uplinks.
- **Hardware** – Displays hardware information for each FEX including name, product ID, serial number, and software version running on the FEX. Hardware Summary provides number of fans and power supplies for the FEX.

The following shows an example of the Server Profiles tab under Compute.

## Converged Systems details

The screenshot shows the 'Compute' tab in the Dell CloudIQ interface. At the top, there are navigation tabs: Overview, Compute (selected), Storage, Networking, Virtualization, and Management. Below these are sub-tabs: SERVER PROFILES, FABRIC INTERCONNECT, and CHASSIS. The 'UCS Domain' is set to 'All Domains'. A summary section shows 'Server Types' with 6 B200 M5, 3 B200 M4, and 3 C220 M4S servers, and 'Connection Models' with 9 Blades and 3 Direct-Connect Rack Mounts. A table lists four server profiles, each with 3 servers and a 6.7.0 operating environment. The 'Profile 1 Details' sidebar is open, showing a 'SUMMARY' and 'SERVERS' section. The 'Overview' section includes: Servers (3), Model (UCSB-B200-M5), Server Firmware (4.0(4e)), Ethernet Version (1.0.29.0-10EM.650.0.0.4598673), and Fibre Channel Version (Version 1.6.0.50, Build: 2494585, Interface: 9.2 Built on: Mar 14 ...). The 'Operating Environment' section includes: Operating Environment (VMware ESXi), Operating Environment Build (13004448), and Operating Environment Ver... (6.7.0).

## Storage

The Storage tab provides information about each storage array. Configuration and hardware information is provided for each storage array; additional information will differ depending on the array type.

- **Configuration** – Listing of software versions, firmware versions, and capacity information.
- **Hardware** – Listing of drive enclosures and disks.

The screenshot shows the 'Storage' tab in the Dell CloudIQ interface. At the top, there are navigation tabs: Overview, Compute, Storage (selected), Networking, Virtualization, and Management. Below these are sub-tabs: Array Types, FABRIC INTERCONNECT, and CHASSIS. The 'Array Types' section shows 2 All Flash, 0 Hybrid, and 0 Virtual arrays. A table lists two storage arrays. The 'Production' array is selected, and its 'Production Details' sidebar is open, showing: Version (4.2.0.9433914), Capacity Available (GB) (9869), and Capacity Used (GB) (23922).



## Networking

The Networking tab provides information about the network switches in the system including role, name, model, software version, and serial number.

Opening the details about each switch provides the following tabs: Overview, Ports, and Hardware.

- **Overview** – shows port breakout utilization and port usage
- **Ports** – shows port, port speed and connected to device
- **Hardware** – summary of fans, fan bays, power supplies, and power supply bays

Details	Role	Name	Model	Version	Dev SAN Details
LAN	VXB-FRA21-N-9336C-FX2-A.qa.lab.dell.com	N9K-C9336C-FX2	9.3(1)		
LAN	VXB-FRA21-N-9336C-FX2-B.qa.lab.dell.com	N9K-C9336C-FX2	9.3(1)		
OOB-LAN	VXB-FRA21-N-31108-A.lab.dell.com	N3K-C31108TC-V	7.0(3)I7(6)		
OOB-LAN	VXB-FRA21-N-31108-B.lab.dell.com	N3K-C31108TC-V	7.0(3)I7(6)		
SAN	Dev SAN	MDS-9132T	8.4(1)		
SAN	VXB-FRA21-M-9396T8.qa.lab.dell.com	DS-C9396TK9	8.3(2)		

Port	Speed	Connected To
fc1/1	16 Gbps	FRA21-FI-6332/switch-A - fc1/1
fc1/8	16 Gbps	FRA21-FI-6332/switch-A - fc1/2
fc1/15	16 Gbps	FRA21-FI-6332/switch-A - fc1/3
fc1/19	16 Gbps	FRA21-FI-6332/switch-A - fc1/4
fc1/25	16 Gbps	FRA21-FI-6332/switch-A - fc1/5
fc1/31	16 Gbps	FRA21-FI-6332/switch-A - fc1/6
fc1/38	16 Gbps	FRA21-FI-6332/switch-A - fc1/7

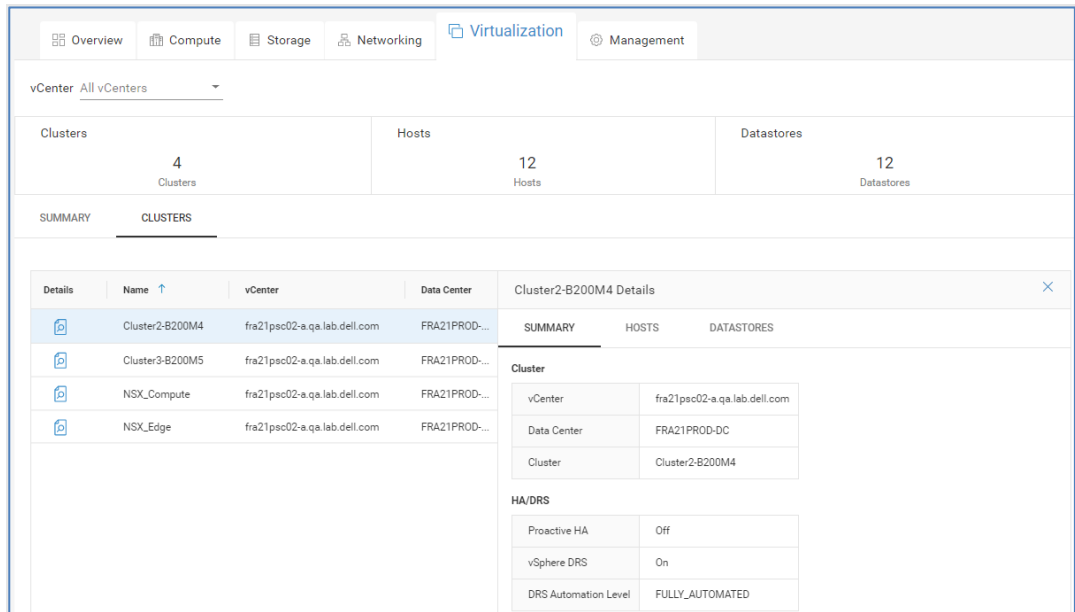
## Virtualization

The Virtualization tab provides information about each VMware vCenter in the Converged System. Summary level information at the top of this view includes number of clusters, hosts, and datastores associated with the vCenter server. There are two tabs under Virtualization: Summary and Clusters.

**Summary** – vCenter Configuration information including name of the vCenter server, hostname, vCenter version, and workload type (AMP or Production).

**Clusters** – Name of the cluster, name of the vCenter managing the cluster and the data center name. The details of each cluster can be opened and displays information in the following three tabs: Summary, Hosts, and Datastores.

- **Summary** – Summary level information for the cluster and the HA or DRS configuration.
- **Hosts** – Listing of ESXi hosts that make up the cluster including ESXi version, Ethernet version, Fibre Channel version, and server type.
- **Datastores** – Listing of associated datastores for the cluster including datastore name, total capacity, and free capacity.



### Management

The Management tab provides information about the AMP and is divided into the following tabs: Server Profiles, Storage, Virtualization Summary, and Workload.

**Server Profiles** – Includes name of the server profile, number of UCS servers in the server profile, model of UCS servers and firmware version of each UCS Blade server. The details of each profile can be opened and displays information in the following tabs: Summary and Servers.

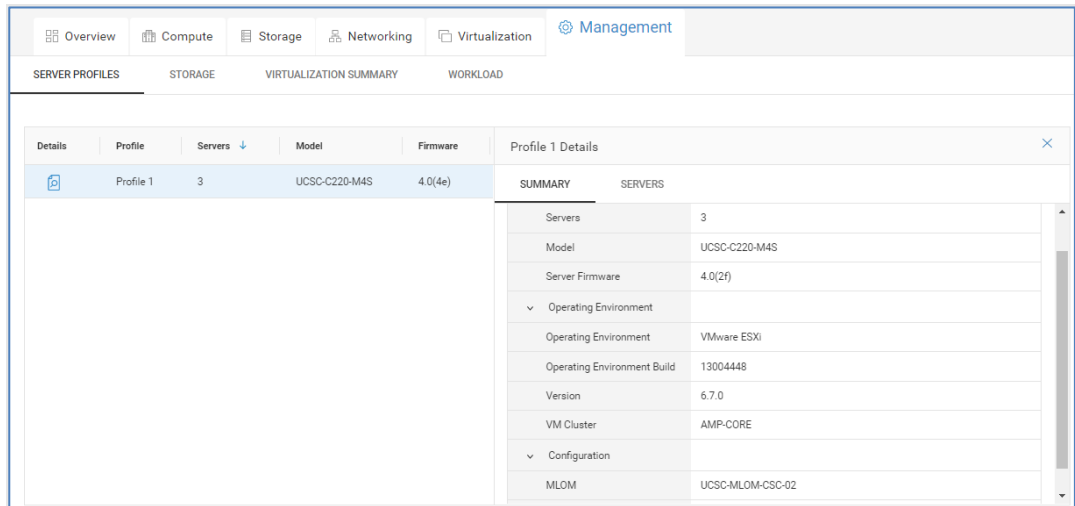
- Summary – Hardware and software information about the server profile including the operating environment, storage, and MLOMs and mezzanines.
- Servers – Displays the serial number, hostname, and memory for each server in the server profile.

**Storage** – Information about the storage for the AMP including the name, model, and operating system. The details of each storage system can be opened and displays information in the following tabs: Configuration and Hardware.

- Configuration – Displays firmware and total and free capacity.
- Hardware – Displays number of drive enclosures and disks.

**Virtualization Summary** – Virtualization information about the AMP including vCenter configuration and virtual resources.

**Workload** – Provides virtual machine information about the AMP including VM name, ESXi host, VM operating system, and the running state of the VM.



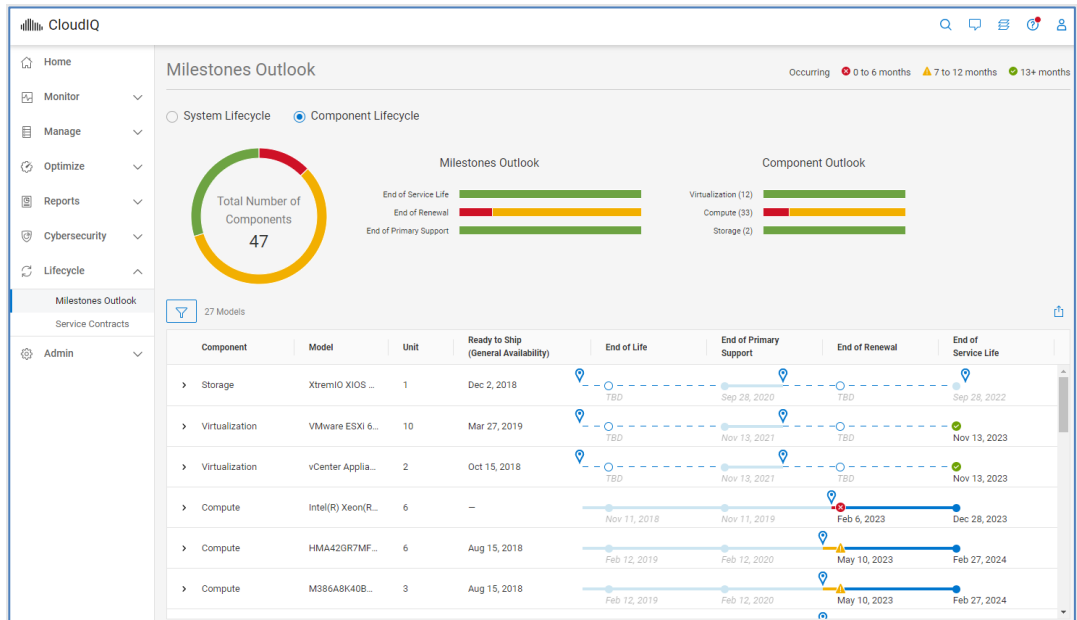
### Converged Systems – Milestones Outlook

CloudIQ helps provide life-cycle support for the various components of a Converged System. The Milestones Outlook page lists out the various components that make up the Converged System and provides timelines with the following dates: General Availability, End of Life, End of Support Life, End of Renewal and End of Service Life.

The information provided in the timeline helps users to:

- Develop plans to order next generation of components to replace existing components reaching their end of service life date.
- Determine financial needs and budget for components that require replacement in the next 0-6, 7-12, or 12+ months.
- Schedule upgrades and hardware replacements during off peak hours that do not impact operations.

The top of the page provides a graphical representation of the total number of components and highlights in red the number of components reaching a milestone date within six months. The bottom of the page provides the timelines for each component. The Refine button allows the user to filter the information based on System Name or Component Type. It also allows the user to select from a predefined set of life-cycle dates or enter a custom date range. For example, to see all components with a milestone date during 2022, enter a date range of 01/2022-12/2022 as shown below.



### Converged Systems – Service Contracts

The Service Contracts page lists service contract information for both the VxBlock system and the components of the system. Users can select between the Systems and CI Components view using the radio button on the top of the page. The following screenshot shows contract information for the components. The filter allows users to refine the view based on system ID, component type, expiration date, or a custom date range.

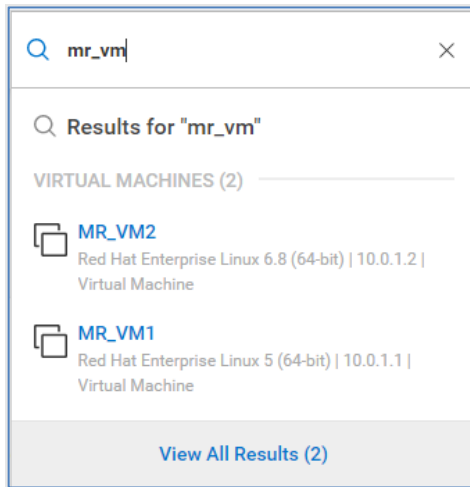
The screenshot shows the 'Service Contracts' page in CloudIQ, filtered for 'CI Components'. The table below lists the contract details for various components:

System	Component	Model	Serial Number	Name	Expiration
VXBLOCK V75FN4013002F...	Storage	Unity 300	UN300ABC	vxb-storageb1-ampun1mgrnt	Sep 28, 2023
VXBLOCK V75FN4013002F...	Storage	Unity 650F	FCNCH0972C232F1	Production	Sep 28, 2023
VXBLOCK V75FN4013002F...	Storage	XtremIO HW X3-R	UN8210160	X3R-3Block	Sep 28, 2023
VXBLOCK V75FN4013002F...	Network	N9K-C9396C-FX2	LAN123	VXB-FRA21-N-9396C-FX2-A-qa.lab...	Sep 28, 2023
VXBLOCK V75FN4013002F...	Network	N9K-C9396C-FX2	LAN321	VXB-FRA21-N-9396C-FX2-B-qa.lab...	Sep 28, 2023
VXBLOCK V75FN4013002F...	Network	N9K-C31108TC-V	OOB123	VXB-FRA21-N-31108-A.lab.dell.com	Sep 28, 2023
VXBLOCK V75FN4013002F...	Network	N9K-C31108TC-V	OOB321	VXB-FRA21-N-31108-B.lab.dell.com	Sep 28, 2023
VXBLOCK V75FN4013002F...	Network	MD5-9132T	JP02128002T	Dev SAN	Sep 28, 2023
VXBLOCK V75FN4013002F...	Network	DS-C9396TK9	SAN321	VXB-FRA21-M-9396TK9-qa.lab.dell.c...	Sep 28, 2023
VXBLOCK V75FN4013002F...	Compute	UCS-F1-4332-16AP	F160ABC	FRA21-F1-4332/switch-A	Sep 28, 2023
VXBLOCK V75FN4013002F...	Compute	UCS-F1-4332-16AP	F162ZYX	FRA21-F1-4332/switch-B	Sep 28, 2023

## VMware details

CloudIQ supports integration with VMware environments. It uses a local collector that communicates to vCenter using a read-only privilege. The collector sends the data back to CloudIQ through the Secure Connect Gateway.

Besides viewing VMs in the Virtual Machines tabs detailed earlier in this document, users can search to find a VM and access the Virtual Machines Details page.



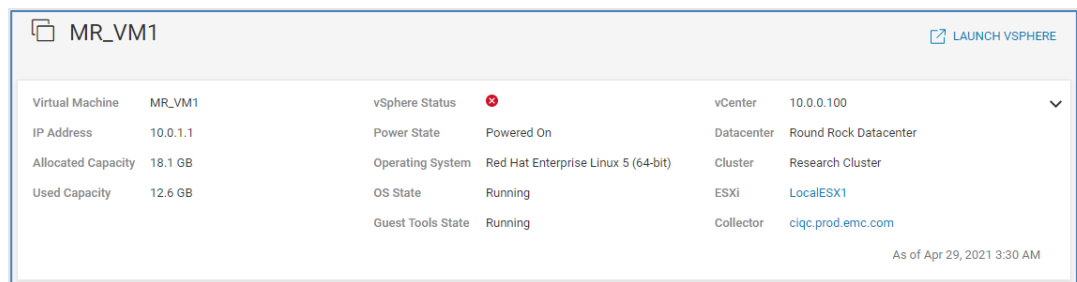
The search results immediately provide some initial information about the VM including name, operating system, and IP address. Selecting “View All Results” provides additional details including vCenter, ESXi, Datacenter, and ESXi Cluster.

The search feature will find the following VM-related properties:

- VM name
- vCenter
- ESXi Server
- ESXi Cluster
- Datacenter

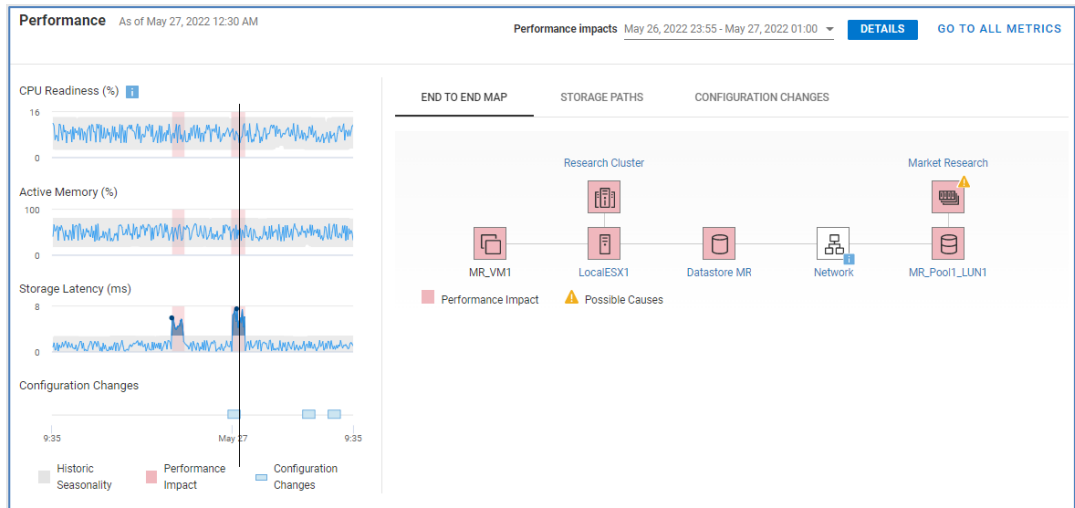
Selecting the VM name hyperlink directs the user to the Virtual Machine Details page.

The top of the VMware Details page contains various properties and attributes for the VM. It includes capacity information to understand the amount of storage allocated and used by the VM as well as vCenter and ESXi cluster information to understand where the VM resides. The downward pointing carat in the upper right of the window will minimize this section of the UI.



The bottom half of the page is dedicated to performance and storage path information. The left side of the window displays three 24-hour charts for the following key performance metrics: CPU Readiness (%), Active Memory (%), and Storage Latency (ms). Performance anomalies are identified in any of the charts as shaded blue areas. CloudIQ identifies performance impacts on the storage latency chart with pink shading. There is also a 24-hour chart identifying configuration changes. Selecting a box along the

horizontal axis opens a window with details of the configuration change. Selecting a point in the performance charts displays a window showing the values of the historic seasonality and actual value at the selected time.



The right side of the window has three tabs: End to End Map, Storage Paths, and Configuration Changes.

**End to End Map** (shown above) – This tab is an interactive end-to-end map of the following items:

- Virtual machine
- ESXi Server
- ESXi Cluster
- Datastore
- Network
- Storage Object (LUN, volume, or storage group)
- Storage System

Key performance metrics are displayed for the selected items in the map. By default, the latest value is displayed for each metric. However, if the user selects a point in time in the VM performance charts on the left, this view is updated to show the corresponding values at the selected time. Users can select a time of interest in the VM performance charts and then select various objects in the data path to view their corresponding performance metrics.

**Storage Paths** – This tab maps each datastore to the storage object (LUN, volume, or storage group) on each system. This information allows users to map different datastores to different storage objects. If a performance impact is selected in the performance charts, the impacted components are highlighted with a pink square.

END TO END MAP		STORAGE PATHS	CONFIGURATION CHANGES	
Datstore	Type	Storage	System	
▼ <span style="color: red;">■</span> Datstore MR	VMFS	<span style="color: red;">■</span> MR_Pool1_LUN1	<span style="color: red;">■</span> <span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">90</span>	Market Research
Host Adapter		Fabric/Partition ID	Array Adapter	
10:00:00:90:FA:53:56:72		17	SP A FC PORT 7	

**Configuration Changes** – This tab provides a summary of VM-related and infrastructure-related configuration changes over that last 24-hour time period.

END TO END MAP	STORAGE PATHS	CONFIGURATION CHANGES	
Last 24 Hours			
VM/ESXi	0	2	
	<i>vMotion/DRS</i>	<i>CPUs/RAM</i>	
Related Infrastructure	1	1	
	<i>Storage</i>	<i>Network</i>	

Selecting the number in the Configuration Changes view opens a window that displays details about the configuration change or changes. This allows the user to correlate configuration changes in the environment with potential performance impacts.

Date	Property	Previous Value	New Value
Apr 10, 2020, 9:11:00 AM	Memory Size	8.0 GB	12.0 GB
Apr 10, 2020, 9:11:00 AM	Number of CPU	1	2

CLOSE

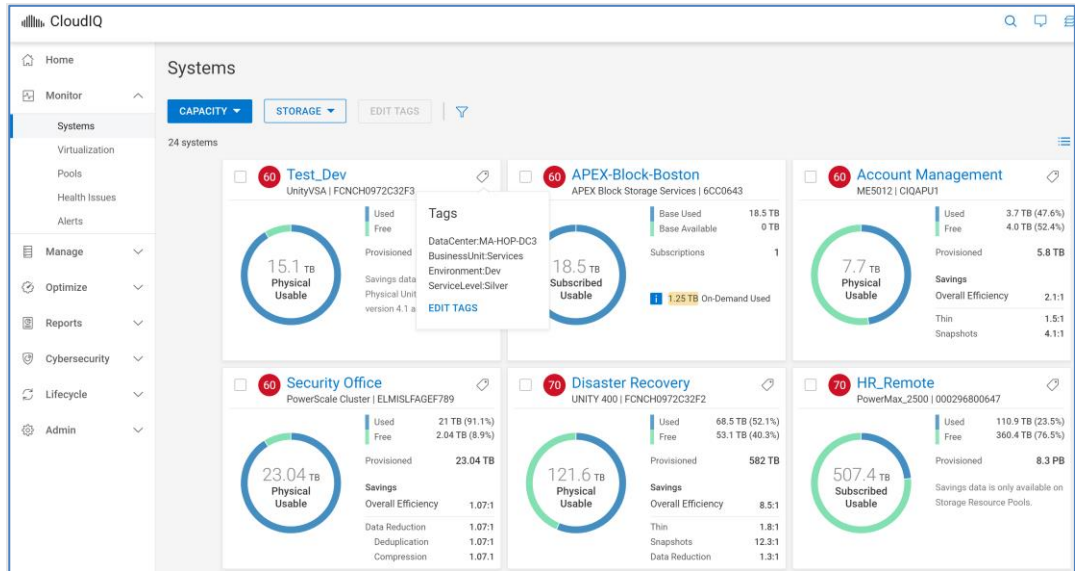
# Custom Tags

## Introduction

Users can enhance the collected data in CloudIQ with customer-specific metadata called tags. Tags can be used to tag systems and components with business-specific data. Tags are entered as a Key:Value pair. For example, BusinessUnit:Engineering is a tag where BusinessUnit is the tag key and Engineering is the tag value.

## Accessing tags

System level tags can be input and seen in any of the multisystem views. Once systems are tagged, views can be filtered based on one or more tags. The following figure shows the multisystem view for capacity for storage. By hovering over the tag icon in the top-right corner of each card, the user can see the defined tags for the system.



Users can also switch to the list view and see them under the **Tags** column.

Health Score	System	Identifier	Model	↑ Use...	Free (TB)	Usable L...	Provl...	Data ...	Over...	On-D...	Sub...	Tags
50	Security DC	SI01C1124	PowerFlex	0	272.5	272.5	88.0	1.01	0.01	-	-	
100	Finance DC	SI01C1122	PowerFlex	2.9	5.3	7.7	10.3	2.61	5.31	-	-	
60	Account Mana...	CIQAPU1	ME5012	3.7	4.0	7.7	5.8	-	2.11	-	-	DataCenter:TX-RR-DC1   BusinessUnit:Sales +2
70	Manufacturing...	RV429L63	PowerStore 90...	6.25	18.75	25.0	25.0	4.71	12.11	-	-	DataCenter:MA-HOP-DC1 +3
95	Manufacturing...	RV429L62	PowerStore 10...	6.25	18.75	25.0	25.0	4.71	12.11	-	-	DataCenter:MA-HOP-DC1   BusinessUnit:Manufacturing   Environment:Dev   ServiceLevel:Silver
100	Product Design	CRNJB01	ME4084	12.3	16.7	29.0	29.0	-	2.91	-	-	DataCenter:MA-HOP-DC1   BusinessUnit:Engineering +2
50	Research and ...	MJLZWR	ME4024	12.5	53.6	66.1	36.3...	-	1.81	-	-	DataCenter:TX-RR-DC1   BusinessUnit:Engineering +2

When the text in the Tags field exceeds the column width, a +X is shown where X is the additional number of tags defined for that system. To view the additional tags, hover over the +X.

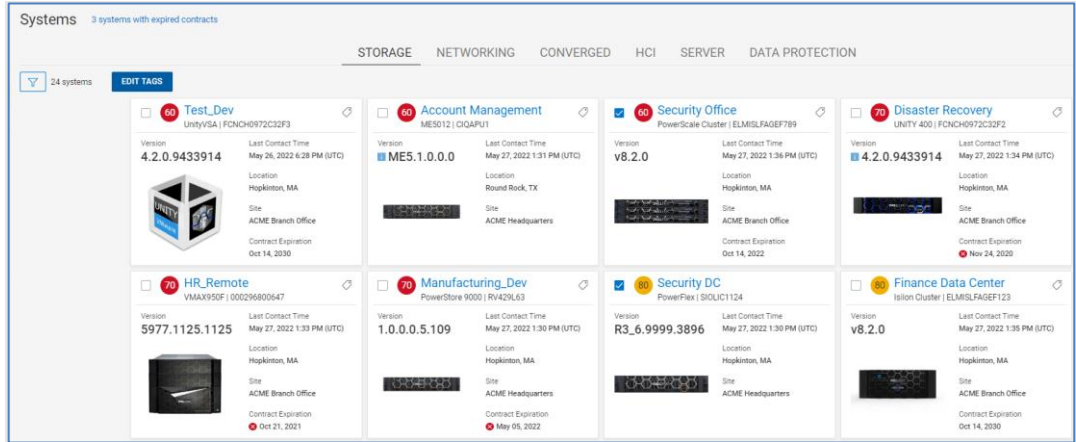
Overall Efficiency	Labels
2.1:1	DataCenter:TX-RR-DC1   BusinessUnit:Sales +2
12.1:1	DataCenter:MA-HOP-DC1 +3
12.1:1	DataCenter:MA-HOP-DC1 +3

## Editing tags

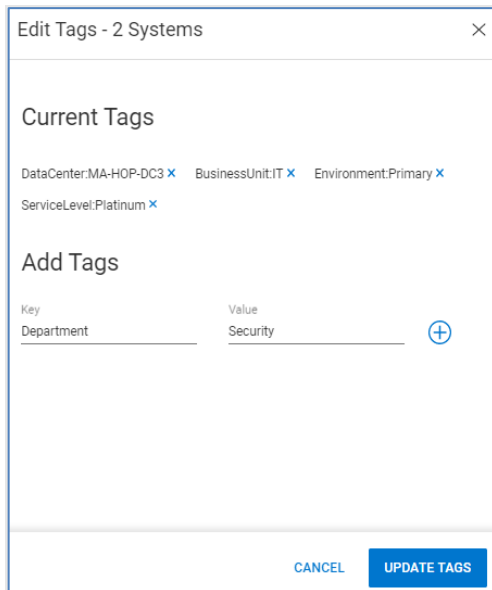
System level tags can be edited from either the card view, the list view, or the Tags page. In the card view, tags can be added or deleted for an individual system by selecting Edit



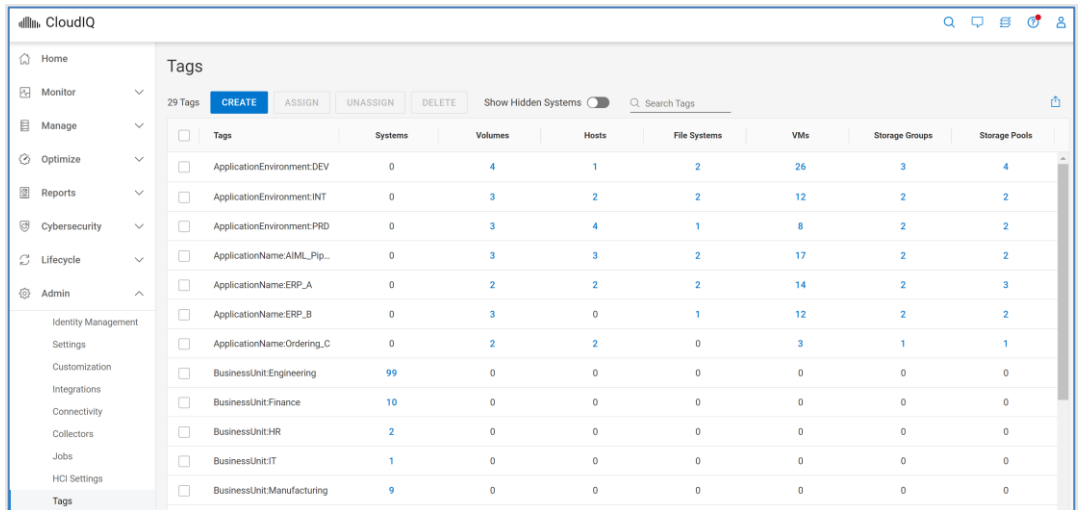
Tags after hovering the mouse over the tags icon. In the list view, tags can be added or deleted by selecting anywhere in the tags column for the system. Tags can be edited for multiple systems by selecting one or more systems in either the card or list view and selecting the Edit Tags button. The following shows an example of Security Office and Security DC systems selected and the Edit Tags button available.



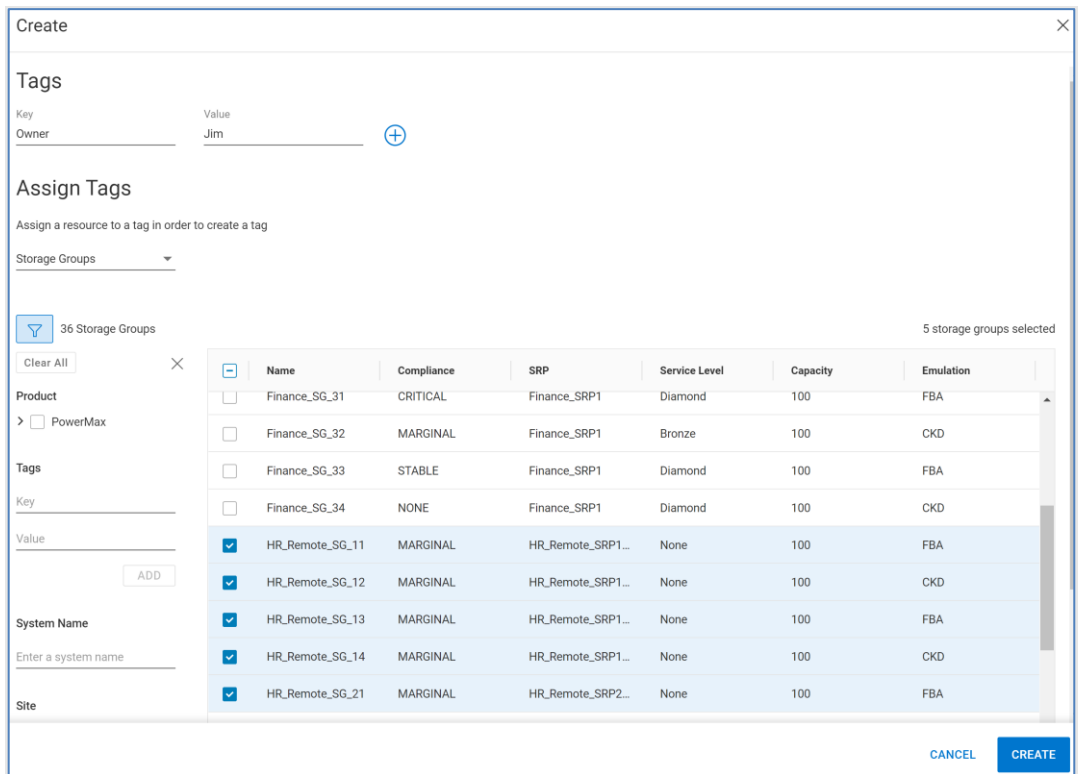
When the Edit Tags button is selected, the Edit Tags window appears. The current tags are shown and can be deleted by selecting the blue X next to the key:value pair. New tags are added by providing a Key and Value. The following example shows adding a new tag called Department with a value of Security. Select Update Tags to save the changes.



Component level tags are created and modified in the Tags page from the [Admin > Tags](#) menu selection. The Tags page lists all configured tags and allows users to create new ones, delete existing ones, and perform the assigning and unassigning of tags to various assets.



Selecting Create displays the create tag window. The tag key and value are entered and then the user assigns the tags to one or more components. The following example shows an Owner tag with a value of Jim being assigned to various storage groups on the HR\_REMOTE system.



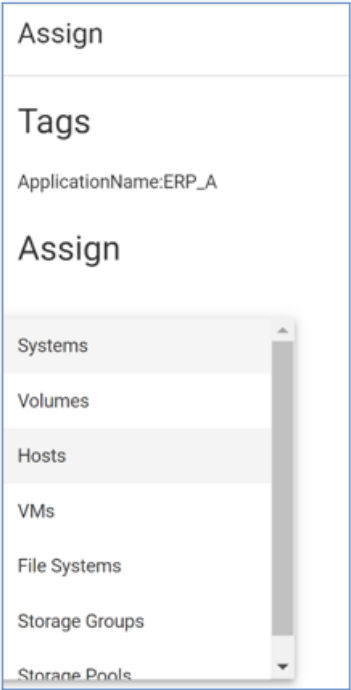
Tags can be assigned to any of the following assets:

- Systems
- Volumes
- Host
- VMs File Systems

- Storage Groups
- Storage Pools

Tags are fully supported in custom reporting. By providing the ability to tag assets at component levels, users can create custom reports that display the tags and filter the reports on those tags. This allows customer specific reports to be created and delivered to appropriate individuals. Reports can be created for various business units or applications to provide storage utilization and show back information.

Existing tags can be assigned or unassigned to objects by selecting the tag in the Tags view and selecting the appropriate button. The following shows the Assign window for the ApplicationName:ERP\_A tag.



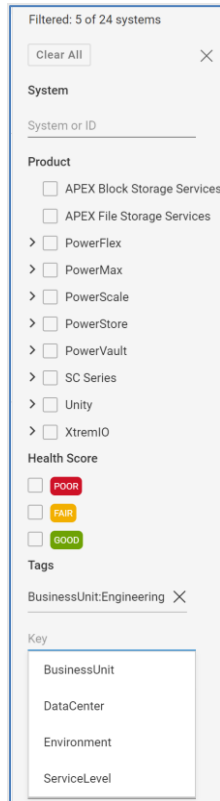
Users first select the category of asset, in this case Hosts. Then they select the objects from that category, in this example ProdApp1\_Host1 and ProdApp1\_Host2.

<input type="checkbox"/>	Name	System Name	Network Address	Operating System	Initiator Protocol
<input type="checkbox"/>	MRApp1_Host2	Market Research	10.0.0.21	Windows Server 2012	FC
<input type="checkbox"/>	MRApp1_Host3	Market Research	10.0.0.22	Windows Server 2012	FC
<input type="checkbox"/>	MRApp1_Host4	Market Research	10.0.0.23	Windows Server 2012	FC
<input checked="" type="checkbox"/>	ProdApp1_Host1	Production	10.0.0.10	Windows Server 2012	FC
<input checked="" type="checkbox"/>	ProdApp1_Host2	Production	10.0.0.11	Windows Server 2012	FC
<input type="checkbox"/>	ProdApp2_Host1	Production	10.0.0.12	Windows Server 2012	FC
<input type="checkbox"/>	ProdApp2_Host2	Production	10.0.0.13	Windows Server 2012	FC

The Show Hidden Systems toggle allows users to see systems that are filtered out from their view based on the settings in Your Account > Sites and Systems. See the [CloudIQ Administration](#) section for details.

## Filtering tags

In addition to using tags in custom reports, users can filter on custom tags in any of the filter views in CloudIQ. For example, the multisystem views can be filtered using the tags.



Select in the “Key” field and begin typing the tag key or select the key tag from the list of defined keys. When the key is chosen, select in the “Value” field and begin typing the tag value or select it from the list of defined values.

Select ADD to add the tag filter.

Multiple tags can be added.

## CloudIQ administration

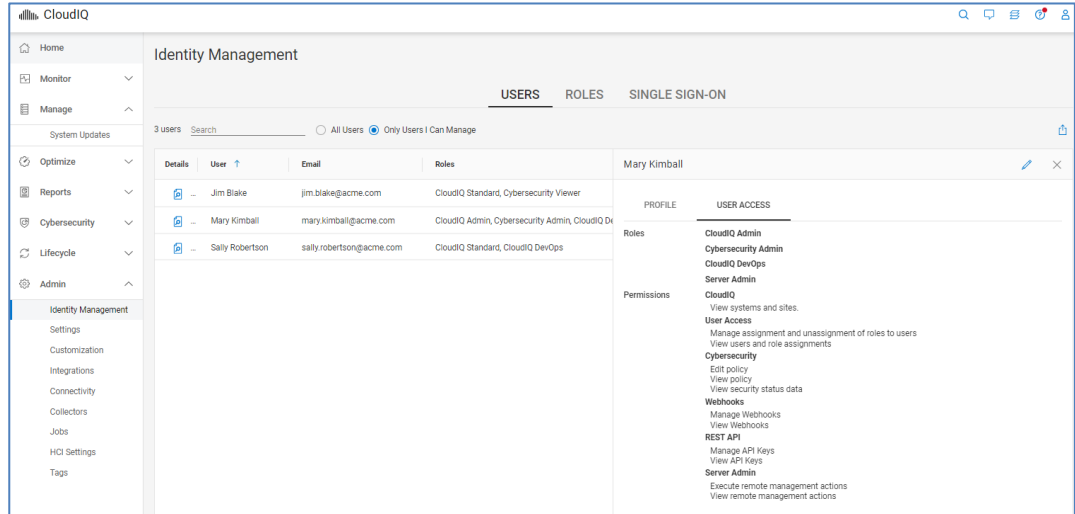
### Identity Management

The Identity Management section allows CloudIQ administrators to set up access controls by assigning users to predefined roles. Administrators can also initiate an invitation to their Identity Provider (IdP) experts to become Dell Identity Admins and federate with their IdP to enable single sign-on.

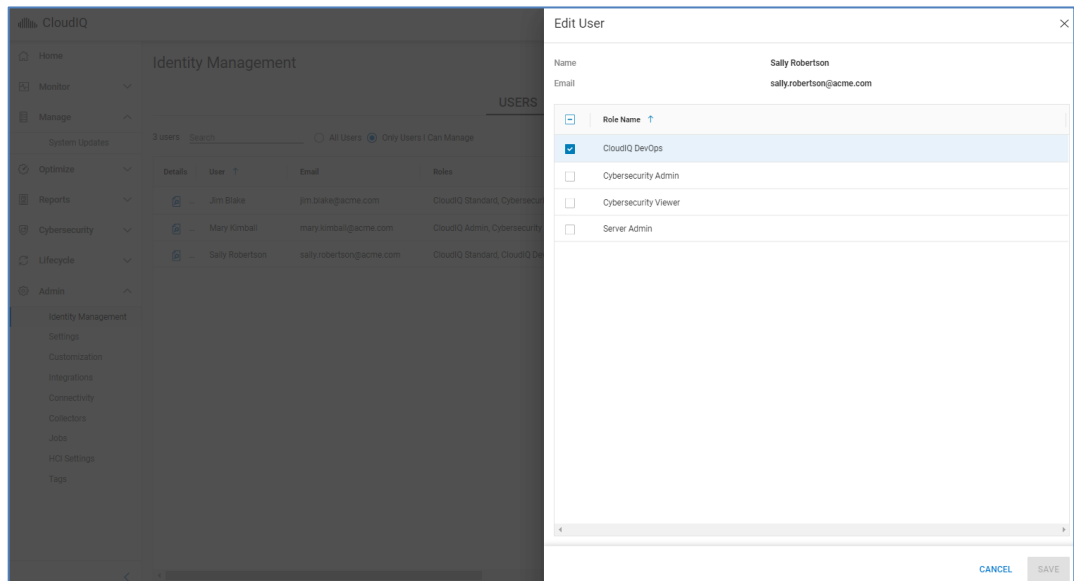
The administrator of an organization uses MyService360 to define the organization profile. See [KB#000183704](#) for details about using MyService360 for company administration. See [KB#000191817](#) for details about determining CloudIQ Admins for a company.

**Note:** MyService360 users with a company admin role are automatically mapped to the CloudIQ Admin role.

There are three tabs in the Identity Management page: The USERS tab lists out all users who have logged into CloudIQ at least once. This tab shows the username, email address, and assigned roles. Selecting the Details icon for an individual user provides details about the user profile and assigned roles and permissions.



CloudIQ Administrators can select the Edit button to assign a role to a user.



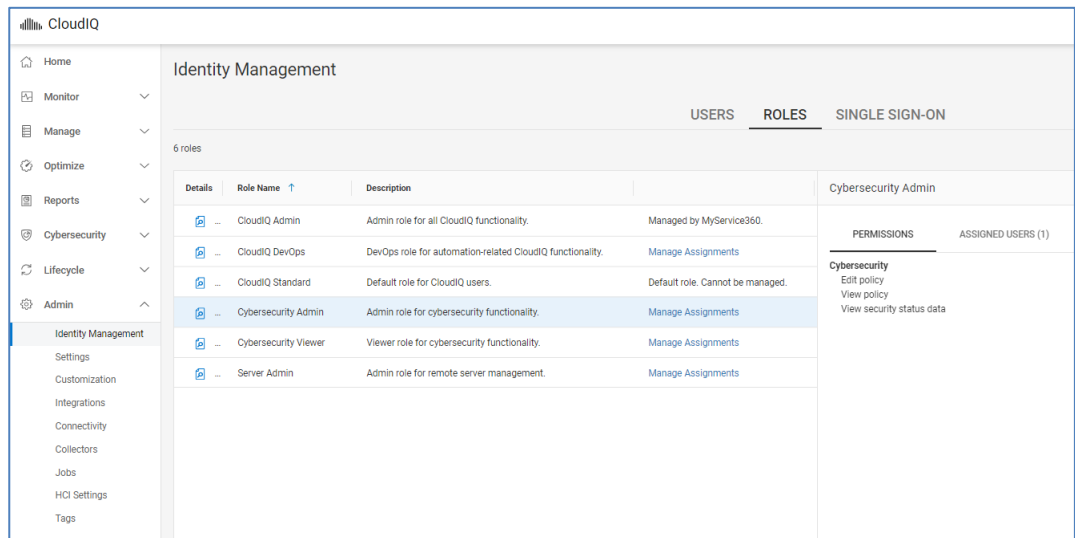
The ROLES tab lists out the available roles with their description. There are five roles in CloudIQ: CloudIQ Admin, CloudIQ Standard, CloudIQ DevOps, Server Admin, Cybersecurity Admin, and Cybersecurity Viewer. Users with an Administrator role in an organization are automatically assigned the CloudIQ Admin role. Users who do not have an Administrator role are automatically assigned the CloudIQ Standard role. These roles are automatically assigned based on the user's role in their organization and cannot be

managed within CloudIQ. Only Users in the CloudIQ Admin role have access to the User Access page.

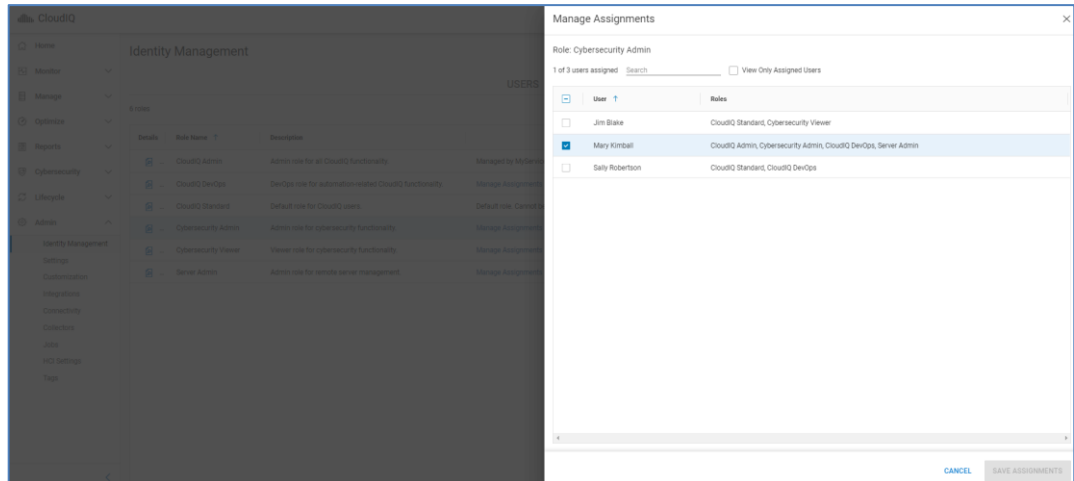
The CloudIQ DevOps role allows users access to the Integrations menu to view and configure Webhooks and REST API credentials. CloudIQ Admins can assign this role to any CloudIQ user, including themselves.

The CloudIQ Server role is required for users who want to initiate remote management functions on PowerEdge servers. Note that additional remote management permissions need to be enabled in the CloudIQ plugin in OpenManage Enterprise.

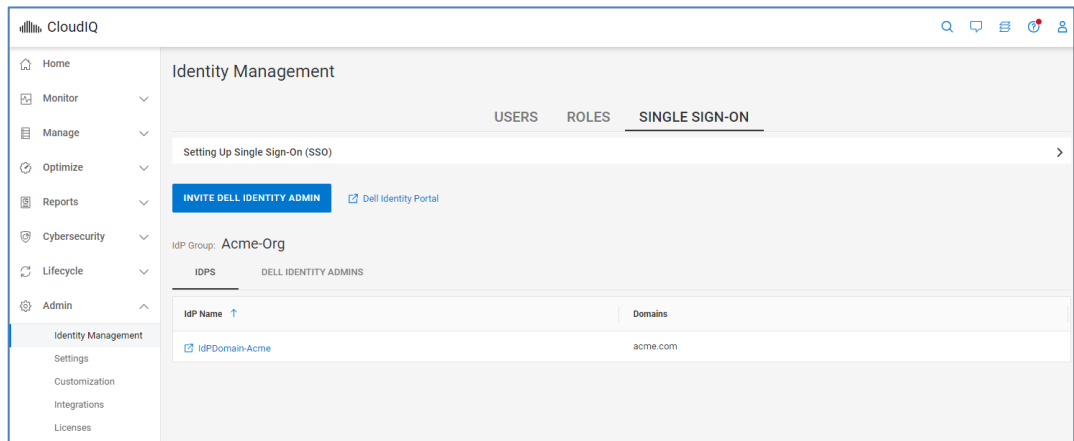
The other two roles are Cybersecurity Admin and Cybersecurity Viewer. Users in the CloudIQ Admin role can manage Cybersecurity access for users by assigning them either the Cybersecurity Admin role or the Cybersecurity Viewer role. Users who are members of the Cybersecurity Admin role have full access to the Cybersecurity feature. They can edit, enable, or disable the Evaluation Plan for a system and select or clear individual Evaluation Tests within the Evaluation Plan. Users who are assigned the Cybersecurity Viewer role can access the Cybersecurity feature and view system risks and Evaluation Plans. They are unable to enable, disable, or edit the Evaluation Plan.



CloudIQ Admins can select the Manage Assignments link to assign users to the CloudIQ Advanced, Cybersecurity Admin, or Cybersecurity Viewer role.



The Single Sign-On tab allows CloudIQ Administrators to send an invitation to their Identity Provider Administrators to become Dell Identity Admins. The Dell Identity Admin can then configure single sign-on on the Dell Identity Portal and federate with their IdP. This allows organizations to manage users' CloudIQ authorization using their IdP. After the Identity Admin federates their IdP, the IdP is listed under the IdPs tab. Clicking on the IdP hyperlink opens the Dell Identity Portal. Users can also see a list of Dell Identity Admins who can manage the IdP group. For additional information, see [KB#000212047](#).



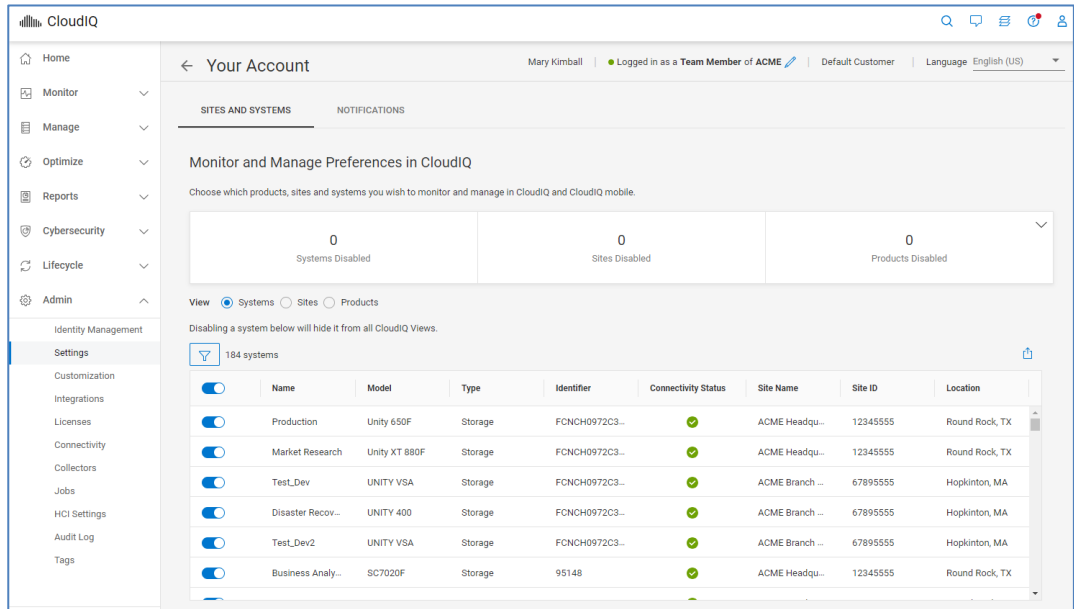
## Settings

The Settings section allows customers to control asset visibility, set up email notifications, and enable access to Dell advisors and customer support. Users can also set their preferred language. Supported languages include English, German, Spanish, French, Italian, Korean, and Japanese.

## Sites and Systems

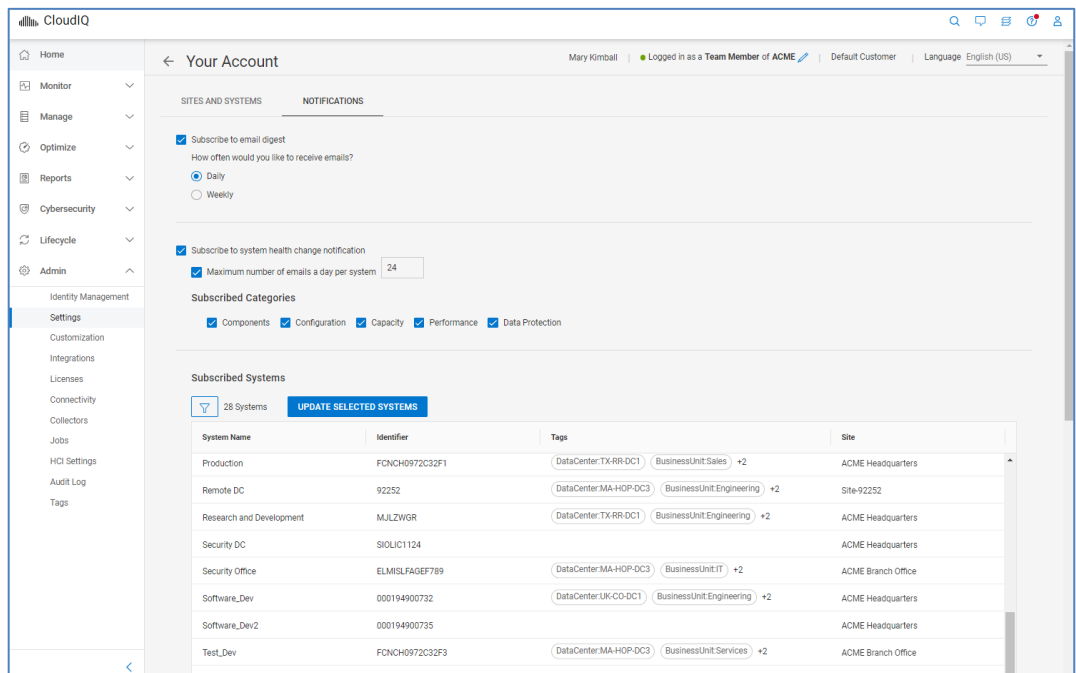
Users can set filters on which systems are available to view and receive notifications for in CloudIQ and the CloudIQ mobile app under the Sites and Systems tab. This also filters the systems from Webhook configuration. For example, an administrator can set their view to see systems from certain sites or see systems of one or more storage types such as Unity XT family and PowerMax. The filtering is set on a per user basis and can be

configured based on systems, sites, and products. This feature is accessible under the Sites and Systems tab under the Admin > Settings > Your Account menu selection.



### Email Preferences

The Notifications tab allows users to subscribe to email notifications for various events such health change notifications, job status change notifications, and cybersecurity risk notifications. Users can also subscribe to a daily or weekly email digest or a daily or weekly Data Protection email digest.



### User Community

Users can enable and disable CloudIQ access for Dell Trusted Advisors and Partners in the User Community section. They can also see the login status of other members of their



company under Team Members and identify which users are company administrators. Dell Trusted Advisors are members of the account team or other Dell employees whom customers want to proactively and routinely view their systems in CloudIQ. The purpose of this role is to provide assistance and recommendations to customers to help them optimize their storage usage. Dell employees and Partners must explicitly be provided access to CloudIQ from the customer. See the following KB article for details:

<https://www.dell.com/support/kbdoc/000020659>

The screenshot shows the CloudIQ User Community interface. The left sidebar contains navigation options: Home, Monitor, Manage, Optimize, Reports, Cybersecurity, Lifecycle, Admin, Identity Management, Settings, Customization, Integrations, Licenses, Connectivity, Collectors, Jobs, HCI Settings, Audit Log, and Tags. The main content area is titled 'User Community' and is divided into three sections:

- Advisors:** A list of users with their names, email addresses, and status. A '+ ENABLE ACCESS' button is in the top right.
 

Name	Email	Status
Bob Smith	bob.smith@rconsulting.com	Online
David Jones	david.jones@rconsulting.com	Enabled
Jean Hill	jean.hill@rconsulting.com	Enabled
Kelly Turner	kelly.turner@dell.com	Enabled
Gretchen Schmitt	gretchen.schmitt@dell.com	Online
Paul Knight	paul.knight@dell.com	Last login 6 years ago
- Team Members:** A list of users with their names, email addresses, and last login status.
 

Name	Email	Status
Jim Blake	jim.blake@acme.com	Last login 6 years ago
Sally Robertson	sally.robertson@acme.com	Last login 6 years ago
Mary Kimball (You)	mary.kimball@acme.com	Online
- Company Administrators:** A list of users with their names, email addresses, and last login status.
 

Name	Email	Status
Bob Smith	bob.smith@rconsulting.com	Never Logged In
David Jones	david.jones@rconsulting.com	Last login 3 months ago

## Customization

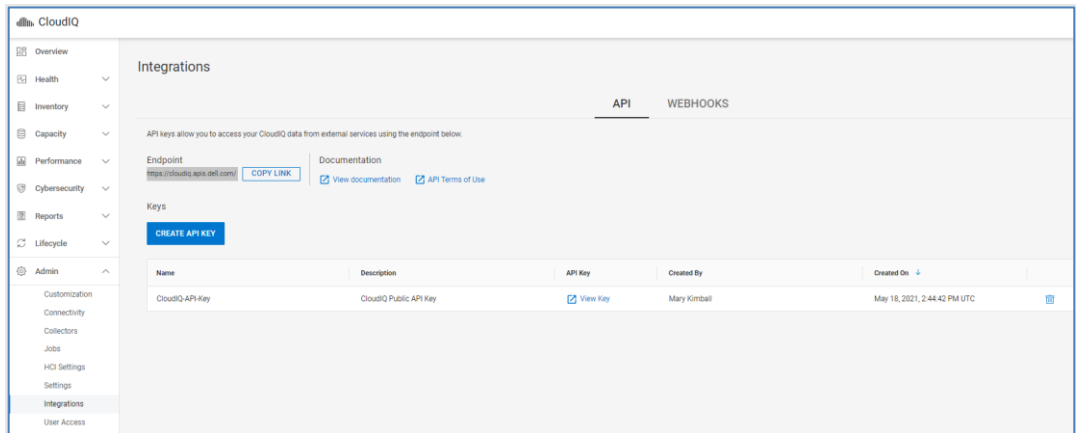
CloudIQ allows users to temporarily pause host connectivity health checks and file system capacity checks from being included in the system health score. Users may want to do this for nonproduction hosts or during times of maintenance when single-pathed hosts may be expected. Host connectivity checks are supported for both Unity XT family and SC Series systems. File system capacity checks are supported for Unity XT family systems.

## Integrations

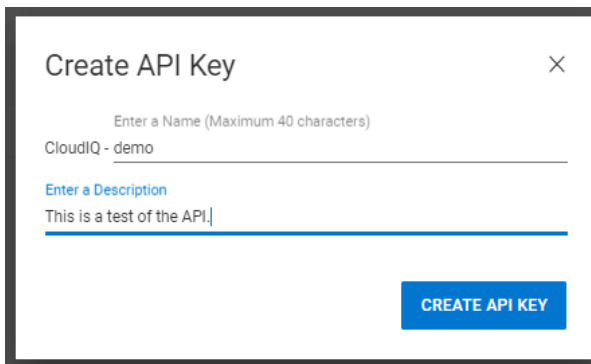
The Integrations section allows users with the CloudIQ DevOps role to configure Webhooks and REST API credentials. Users must have the role of CloudIQ DevOps to access the Integrations menu. This is described in the [Identity Management](#) section.

### REST API

The public REST API allows users to pull data from CloudIQ to integrate with collaboration and automation tools used in day-to-day IT operations. It is a read-only API allowing users to access inventory, configuration, performance, and capacity metrics available in CloudIQ. It uses the OAuth2 protocol for authentication and authorization. The API client credentials are obtained by selecting the Create API Key button under the API tab.



Enter an API key name and description and select Create API Key.



When the API key is created, the user selects the View Key link to obtain the Client ID and Client Secret. The user then uses these credentials to authenticate to a specific API endpoint to obtain an Access Token. When the user obtains the Access Token, the user can make the chosen REST API calls. The access token is active for one hour, and the client credentials are valid for one year.

Documentation for syntax and available API calls is available at <https://developer.dell.com/apis/products/analytics/cloudiq>. Use these links to developer blogs access examples for [Postman](#) and [Python and Jupyter](#).

### Webhooks

Webhooks is a push mechanism to integrate with third-party applications such as ServiceNow and Slack. Notifications are sent from CloudIQ when a health issue change is identified on a system. A brief tutorial for ServiceNow and Slack integration can be found [here](#). Other examples can be found by searching for CloudIQ at the [Dell Developer Community](#).

Configuration of Webhooks requires the user to enter a Name, the Payload URL (destination to send the Webhook), and a Secret. The secret is a user supplied string sent along with the payload and is used to create a signature that is passed as a header during the POST request. The URL server can create its own matching signature using its stored secret and the POST payload to verify that the signature in the header matches its own generated signature. Users can then select which systems to monitor. The Test Webhook

button sends a test notification to the server with a NULL payload. This is used to quickly test connectivity to the Webhook destination.

**Add Webhook**

Event: Health Issue Change

Whenever health issues change for the systems selected below, we'll send a POST request to the URL below with details of the event.

Name \_\_\_\_\_

Payload URL \_\_\_\_\_

Secret \_\_\_\_\_

TEST WEBHOOK

37 of 37 system selected

<input checked="" type="checkbox"/>	System ↑	Model	Identifier
<input checked="" type="checkbox"/>	APEX-Block-Boston	APEX Block Storage ...	6CC0643
<input checked="" type="checkbox"/>	APEX-File-Austin	APEX File Storage Se...	ELMISLFAGEF876
<input checked="" type="checkbox"/>	Account Management	ME4012	CIQAPU1
<input checked="" type="checkbox"/>	Business Analytics	SC7020F	95148
<input checked="" type="checkbox"/>	Dev SAN	Connectrix MDS-9132T	JPG2128002T

After a Webhook is configured and triggered, those events are captured on the Integrations page showing the time and status of the delivery.

**Integrations**

**WEBHOOKS**

Webhooks allow external services to be notified whenever health issues change by sending a POST request to each of the URLs you provide.

ADD WEBHOOK

Name ↑	URL	Last Delivery	Delivery Status	Errors (Recent deliveries)
My Webhook	https://www.webhookmgr.acme.com	Tue, May 21 2019, 1:39:04 PM UTC	Delivered	0

Event (Recent deliveries)	Delivered ↓	Delivery Status
Health Issue Change: Production	Tue, May 21 2019, 1:39:04 PM UTC	Delivered
Health Issue Change: Disaster Recovery	Mon, Apr 22 2019, 3:12:12 PM UTC	Delivered

The user can select an event to see the Headers and Payload of the request and the response. A Redeliver button allows users to resend the event which is helpful for testing Webhook integration.

Health Issue Change: Production
✕

✔ Tue, May 21 2019, 1:39:04 PM UTC
REDELIVER

REQUEST
RESPONSE: 200

**Headers**

```
{
  "x-ciq-signature": "3Erl/DwnFPMCmjBAPUQaN0T08gPnKcltqbaEU9LV4KA=",
  "x-ciq-event-version": "1.0",
  "x-ciq-delivery-id": "7f91ed6e-4b1f-439a-9e4a-836a04ba1c94",
  "x-ciq-event": "health-score-change",
  "user-agent": "x-ciq-webhook"
}
```

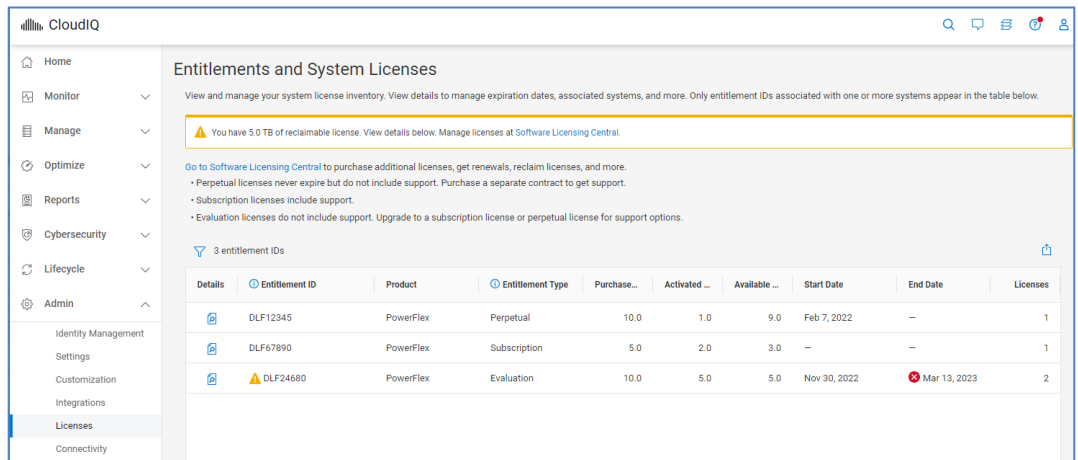
**Payload**

```
{
  "system": "FCNCH0972C32F1",
  "timestamp": 1558445944,
  "score": 100,
  "categories": [
    {
      "category": "DATA_PROTECTION",
      "impact": 0,
      "issueCount": 0,
      "issues": []
    },
    {
      "category": "PERFORMANCE",
      "impact": 0,
      "issueCount": 0,
      "issues": []
    },
    {
      "category": "CAPACITY",
      "impact": 0,
      "issueCount": 0,
      "issues": []
    },
    {
      "category": "CONFIGURATION",
      "impact": 0,
      "issueCount": 0,
      "issues": []
    }
  ]
}
```

CLOSE

## Licenses

The Licenses page shows license and entitlement details. Currently supported for PowerFlex systems, this page allows users to see their purchased, activated, and available capacity for each entitlement. The table also displays the entitlement type, start date, and expiration date. Users can use the link to Dell Software Licensing Central to manage their licenses.

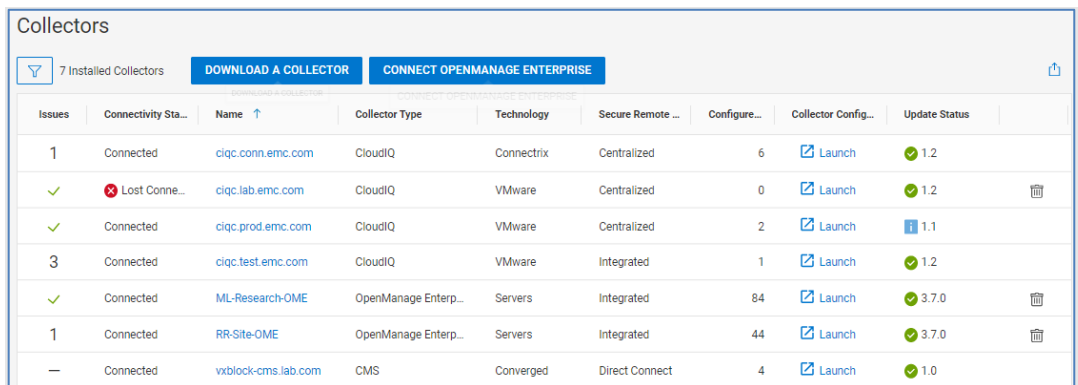


## Connectivity

The Connectivity page shows customers all systems that are connected, have lost connection, or need additional configuration work before CloudIQ can display data for them. The filter allows users to filter based on Connectivity Status, System ID, Product, Product Type, Site, Location, or Contract Status. It also provides links to onboard SC Series, PowerVault, and VxBlock systems. These systems require the user to enter information into CloudIQ to complete the onboarding process. PowerSwitch systems should now be onboarded using the CloudIQ Collector.

## Collectors

The Collectors page lists each CloudIQ Collector and OpenManage Enterprise installation. The CloudIQ Collector is used to collect VMware, Connectrix, and PowerSwitch data and sends that data back to CloudIQ Secure Connect Gateway. This area shows the connectivity status and versions of installed collectors. It also provides a download link to obtain the collector and instructions about how to configure OpenManage Enterprise.



The user can select the hyperlink in the Name column to open the Collector Details page. This page provides health-related information for the selected collector. It also provides as an inventory of the vCenters and Connectrix switches for which it is configured.

The screenshot shows the CloudIQ interface for a CIQC-ELMCIQ... instance. The top navigation bar includes the URL 'ciqc.conn.emc.com' and a 'LAUNCH COLLECTOR CONFIGURATION' link. On the left, a metadata panel lists details such as Serial Number, Version (1.2), SRS Type (Centralized), and Connectivity Status (Connected). The main area features a 'Total Issues' summary with 0 issues and a 'Performance' filter. A large green checkmark and the text 'All health checks were successful.' are displayed. Below this, a section titled 'CONNECTRIX' shows '6 collected Switches' in a table.

St...	Switch Name	Serial Number	Firmware Version	Management IP Address	Last Contact Time
✖	Production SAN Extens...	EAf300M001	v8.2.1a	10.0.12.1	about 20 hours ...
✔	Stretch Cluster Extension	EAf300M003	v8.2.1a	10.0.12.3	12 minutes ago
✔	SRDF LINK	EAf300M000	v8.2.1a	10.0.12.4	6 minutes ago
✔	Dev SAN	JPG2128002T	8.3(2)	10.0.12.2	11 minutes ago
✔	Production East	JPG194000DK	8.3(2)	10.0.12.5	11 minutes ago
✔	Production West	JPG194001DK	8.3(2)	10.0.12.6	6 minutes ago

For OpenManage Enterprise instances, it shows the health and the list of monitored PowerEdge servers and their collection status.

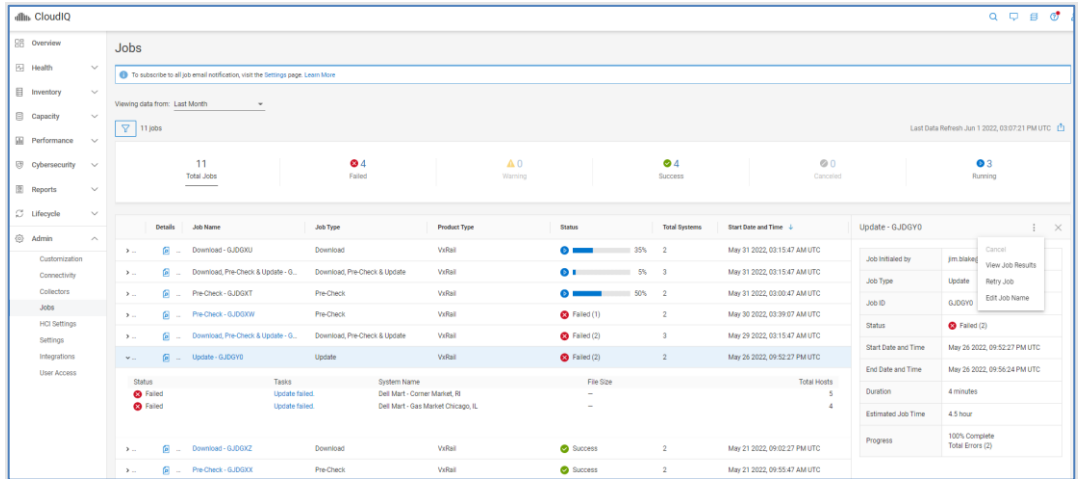
The screenshot shows the CloudIQ interface for an RR-Site-OME instance. The top navigation bar includes the URL 'RR-Site-OME' and a 'LAUNCH OPENMANAGE ENTERPRISE' link. The left metadata panel lists details like IP Address (198.51.100.104), Version (3.7.0), and Connectivity Status (Connected). The main area shows 'Total Issues' with 1 issue and a 'Components' filter. A red banner indicates '1 issue' with a description: 'about 20 hours ago - 2 out of 44 devices have not been sending data for a long time.' Below, a 'SERVER' section shows '44 collected Servers' in a table.

Status	System	IP Address	Service Tag	Model	Last Contact Time
✖	WIN-SYS02PE173	198.51.100.173	ATY7D85	PowerEdge MX740c	30 minutes ago
✖	SYSMGMT-ML-LABS-150	198.51.100.150	AF27HTH	PowerEdge R750	30 minutes ago
✔	iDRAC.AJHQK39.local	198.51.100.209	AJHQK39	PowerEdge R740	less than a minute ago
✔	iDRAC.AM3YNJH.local	198.51.100.117	AM3YNJH	PowerEdge R740	less than a minute ago
✔	iDRAC.AWPFSK1.local	198.51.100.115	AWPFSK1	PowerEdge R740	less than a minute ago
✔	iDRAC.AG86F1R.local	198.51.100.36	AG86F1R	PowerEdge R740	less than a minute ago

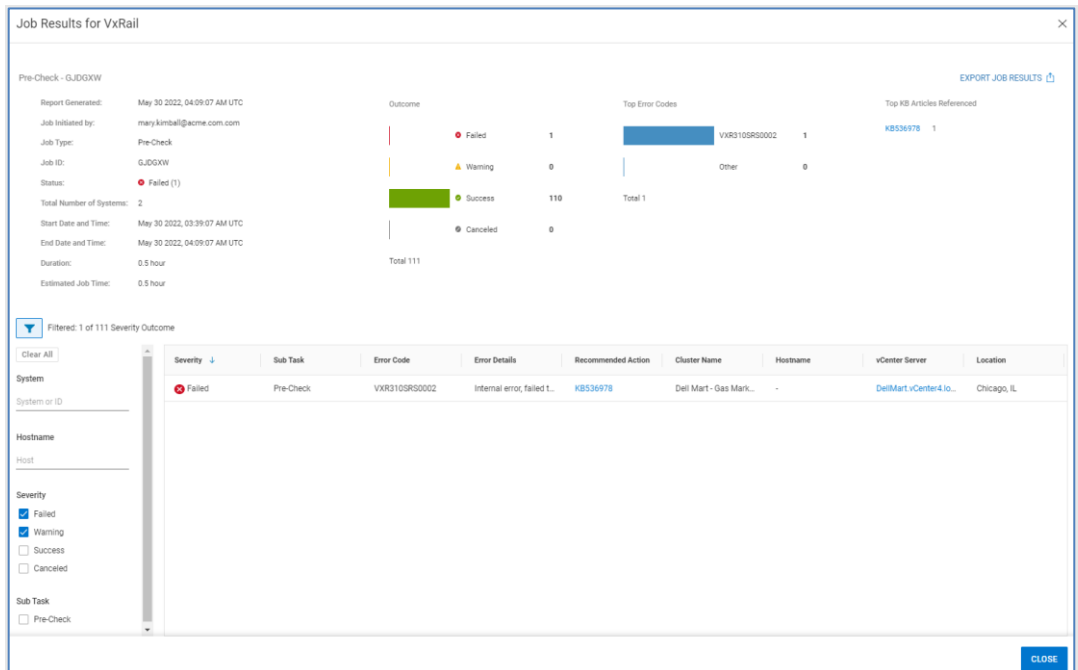
## Jobs

The Jobs page lists the existing update tasks and their status. The top of the page provides a summary banner of the total number jobs and their status. It also acts as a filter allowing users to view jobs with a specific status. The bottom of the page lists each

job with details about the job. Selecting the Details icon on the left opens the details window on the right which shows start and end times, duration of the job, and total number of errors if any were encountered. From the job details window, the user can choose to cancel a running task, view job results, retry a failed job, or edit the job name.



When a user selects View Job Results, the Job Results window is displayed showing details of the job and each action. The top of the page summarizes each outcome by status and lists the top error codes and KB articles if a failure occurred. The bottom of the page lists the actions with a failed or warning status by default along with the recommended action. The filter allows users to filter on additional status and system name, hostname, or sub task type.



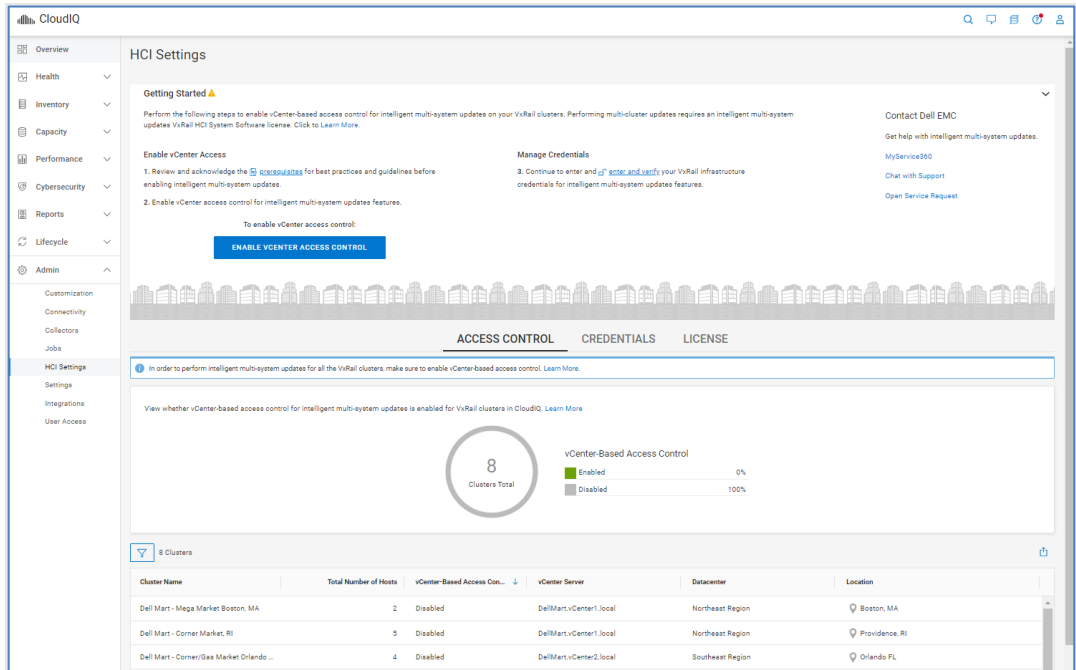
## HCI Settings

The HCI Settings page has three tabs that allow users to set up vCenter access controls, enter user credentials, and verify VxRail HCI System Software licenses. Each function and tab is described below.

### Access Control

The Access Control tab allows users to enable vCenter-based role-based access controls for intelligent multi-system updates. Users enter the vCenter Administrator account to build out the following privileges on vCenter which can then be assigned to the appropriate roles to which user accounts can be associated:

- **Download software bundle:** Downloads and stages the VxRail software bundle to the cluster
- **Execute health check:** Performs an on-demand pre-update health check on the cluster
- **Execute cluster update:** Initiates the cluster update operation on the cluster
- **Manage update credentials:** Modifies the VxRail infrastructure credentials used for active management



### Credentials

The Credentials tab is used to manage and verify the user credentials used to perform cluster updates. Typically, when performing a cluster update, users need to enter root account credentials for vCenter server, Platform Services Controller, and VxRail Manager. This becomes cumbersome when performing updates on multiple clusters. This allows administrators to enter the credentials once while setting up active management and then provide the appropriate update permissions to users without sharing the credentials. Credentials entered are stored in an encrypted RSA lockbox on each VxRail Manager. CloudIQ does not store passwords and credentials.



DellMart.vCenter2.local
✕

Use this page to enter and verify credentials for your vCenter and VxRail cluster. Click to [Learn More](#).

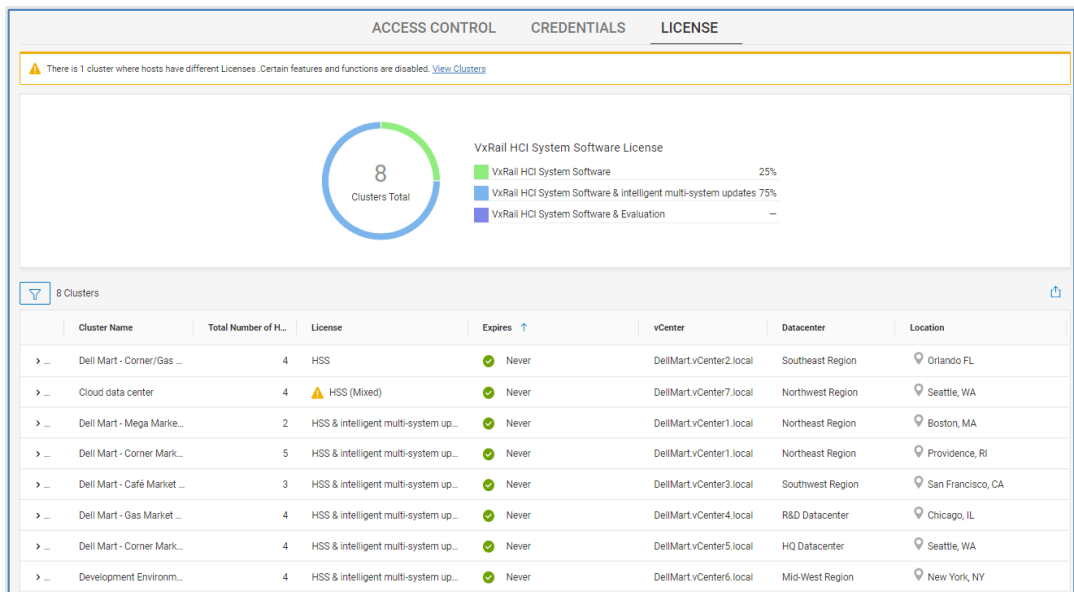
vCenter	VxRail Manager	Dell Mart - Mega Market Boston, MA
Root Username	Root Username	root
Root Password	Root Password	*****
Administrative Username	Administrative Username	administrator@vsphere.local
Administrative Password	Administrative Password	*****

Location	Boston, MA
VxRail HCI System Software License	HSS & intelligent multi-system updates

VERIFY CANCEL SAVE

## License

The License tab provides a summary of license information for VxRail clusters. The donut chart breaks down the number of clusters with the HCI System Software (HSS) license, the HSS and Intelligent multi-system update license, and the HSS and Evaluation license. The HCI System Software license is the standard license for all VxRail nodes. The Intelligent multi-system update license is an add-on license that enables the cluster update capability from CloudIQ. The Evaluation license is a time-based license that your sales team can request from the VxRail product management team.



## Tags

For information about tags, see the [Custom Tags](#) section in this document.

# Mobile application

## Introduction

CloudIQ also has a mobile application available for both iOS and Android phones. The mobile app has an Overview screen that shows similar information to the Overview Page in the browser version of the UI. It also includes support for Health, Capacity, and Performance details for the supported Dell storage platforms. The user can also configure push notifications to be updated in the app for any health change notifications.

Users can see additional details of the health for any given system and can even text or email the recommended remediation to a colleague for help with performing the resolution.

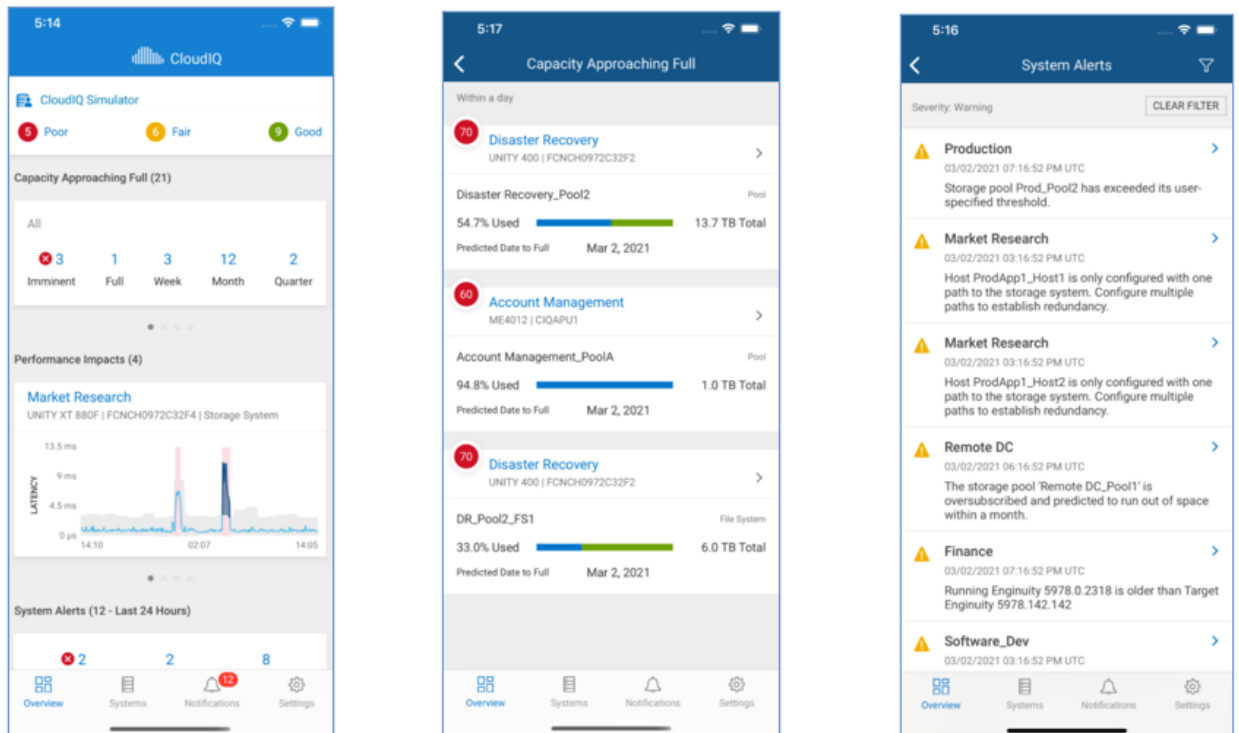
Users can also see if there are any connectivity issues in the environment.

Finally, users can manage push notifications by turning them on or off and can also submit feedback to the CloudIQ team.

Currently all storage platforms are supported except APEX Data Storage Services and PowerFlex. HCI systems and Connectrix switches are also supported. Data Protection, Converged, Servers, and PowerSwitch devices are not supported at the time of this publication.

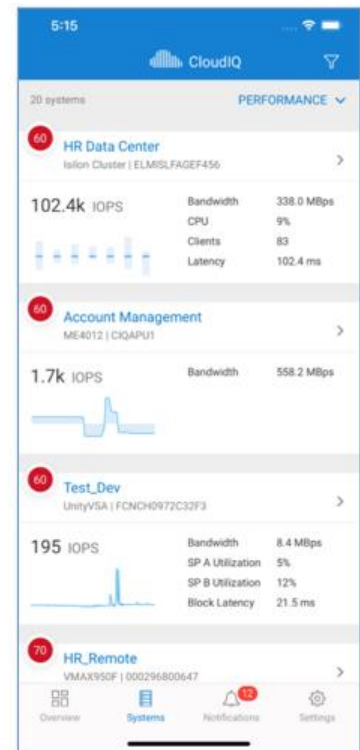
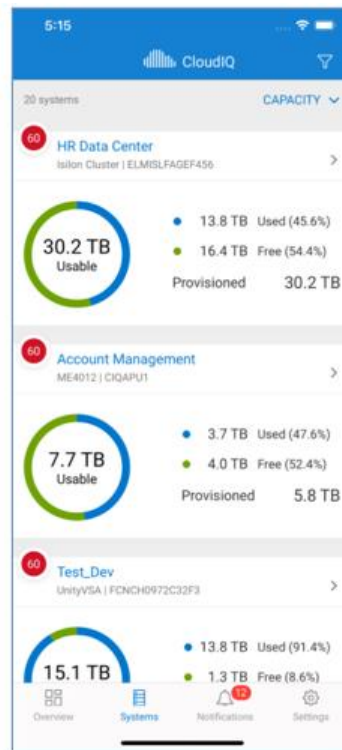
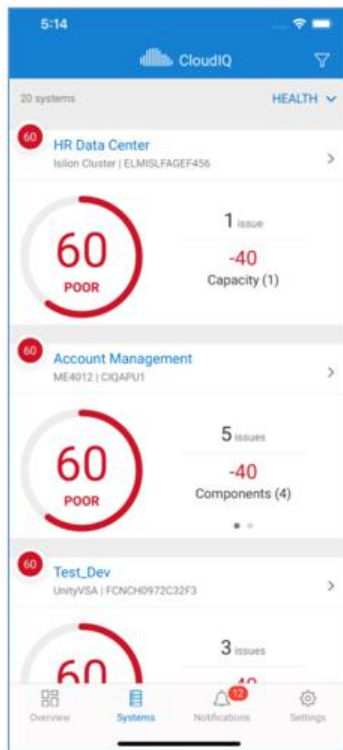
## Overview

The Overview screen of the mobile app summarizes the health scores, alerts, system connectivity, and capacity approaching full. These views are similar to the tiles on the Overview page of browser version of CloudIQ. Selecting items in the Overview screen will show additional details. The following images show the Overview screen, the details of the Capacity Approaching Full tile, and the details for System Alerts.



### System views

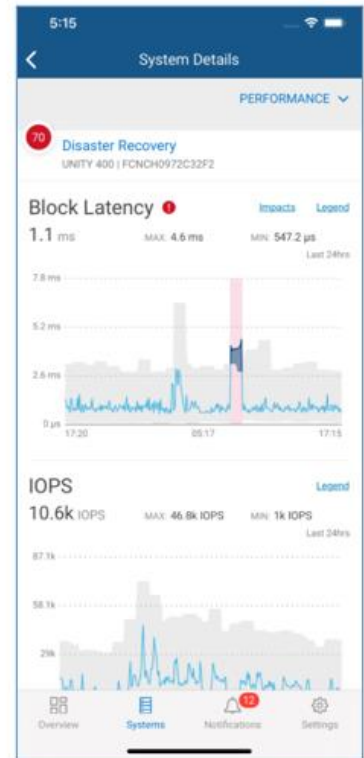
The user can select Systems at the bottom of the screen to see System level views for Health, Capacity, and Performance. Utilize the drop-down menu in the upper right of the screen to switch between the various views: Health, Capacity, and Performance. An example of each is shown below.



### System details

The user can analyze single system details for Health, Capacity, and Performance. These details include the identification and remediation recommendations for health issues, capacity summaries including efficiencies and pool details, and 24-hour performance charts for key system level performance metrics. The health issue and remediation can be emailed or texted using controls in the app.

Mobile application



## Appendix A: Enabling CloudIQ at the system

### Unity XT family, XtremIO, PowerMax/VMAX, PowerScale/Isilon, and PowerFlex systems

The Unity XT family, XtremIO, PowerMax/VMAX and PowerScale/Isilon systems use Secure Connect Gateway for CloudIQ data collection. This configuration must be enabled successfully on each individual Dell storage system before users can send data to CloudIQ. Once the secure connection has been configured within the Element Manger interface, CloudIQ must be enabled.

- Unity XT family
  - For Unity XT 4.2 and later, go to **Settings > Support Configuration > CloudIQ**, and then select **Send data to CloudIQ**.
  - For Unity XT 4.1, go to **Settings > Management > Centralized Management**. For the CloudIQ tab in Centralized Management, ensure the checkmark to **Send data to CloudIQ** is checked, and then click **Apply**.
- XtremIO
  - For XMS 6.2 and higher, access the Top Menu Bar and click the System Settings Icon to display cluster-level and XMS-level setting options. Next, select **XMS > Notifications > CloudIQ Reporting**, and ensure that **CloudIQ Reporting** is set to **YES**.
- PowerMax/VMAX
  - For Unisphere 9.0.1, go to **Settings > Management > CloudIQ**, ensure the checkmark to **Send data to CloudIQ** is checked, and then click **Apply**.
  - For Cybersecurity, in Unisphere 9.2.1 or higher, go to **Settings > Management > CyberSecIQ** and select **I agree to send data to CyberSecIQ**.
- PowerScale/Isilon
  - For PowerScale/Isilon systems, connectivity to Secure Connect Gateway and CloudIQ is established with the following CLI command:
 

```
isi esrs modify --enabled=true --primary-esrs-gateway=<gateway-server>
--gateway-access-pool=subnetx:poolx --username=<username>
[--password=<password>]
```
- PowerFlex software and Ready Node with PowerFlex Gateway
  - Log in to PowerFlex Installer and go to **Maintain** tab
  - Enter MDM admin username and password, LIA authentication type, and LIA password
  - Select **Retrieve system topology**
  - On **Maintain** tab, select **System Logs & Analysis**
  - Enter Secure Connect Gateway information
  - Verify **Send data to CloudIQ** box is checked
- PowerFlex Appliance with PowerFlex Manager

- Log in to PowerFlex Manager and go to **Settings > Events and Alerts**
- Under Policies, select **Configure Now** for SupportAssist
- Accept the **License Agreement** and **Telemetry Agreement**
- Choose either **Connect Directly** or **Connect via Gateway Server**
- If connecting through the gateway server, enter **Secure Connect Gateway IP**
- Verify that **Connect to CloudIQ** is selected
- Enter SupportAssist Access Key and Pin (see [KB#000180688](#)), device type, ELMS software unique ID, solution serial number, and site ID
- Enter Support contact information

The user can then go to <https://cloudiq.dell.com> and log in with their valid service account credentials to view their systems in CloudIQ. The amount of time it takes for a system to appear in CloudIQ varies, but typically is visible within one hour.

For detailed information about onboarding the Dell storage arrays, see the following documents:

Unity XT family – <https://www.dell.com/support/kbdoc/000067484>

XtremIO – <https://www.dell.com/support/kbdoc/000155454>

PowerMax/VMAX – <https://www.dell.com/support/kbdoc/000062039>

PowerScale/Isilon – <https://www.dell.com/support/kbdoc/000157794>

PowerFlex – <https://www.dell.com/support/kbdoc/000187624>

## Dell PowerStore

Dell PowerStore systems use SupportAssist for CloudIQ data collection. This must be enabled and configured successfully on each appliance in the PowerStore cluster.

To configure SupportAssist in PowerStore Manager, go to **Settings > Support > SupportAssist**. Click the SupportAssist setting to “Enabled” and configure one of the SupportAssist options. Ensure the checkmark next to Connect to CloudIQ is selected.

For detailed information about onboarding PowerStore systems, see <https://www.dell.com/support/kbdoc/000157595>.

## Dell SC Series

The Dell SC Series CloudIQ solution leverages Dell’s SupportAssist for CloudIQ data collection. This must be enabled and configured successfully on each individual Dell SC Series system before users can send data to CloudIQ.

To configure SupportAssist in Unisphere Central for Dell SC Series, open the Data Collector menu and select **Monitoring > SupportAssist > Turn On SupportAssist**.

To configure SupportAssist in the DSM thick Client, click **Storage > Edit Storage Center Settings > SupportAssist** tab.

Collect the following information from Unisphere as it will be required to complete the onboarding process in CloudIQ:

- System Serial Number
- Service Tag
- Storage Center Version

Log in to the CloudIQ UI and go to the **Admin > Connectivity** page. Select the **ADD SC SERIES** button and step through the wizard which prompts the user for the Serial Number, Service Tag, and Storage Center Version that was previously collected.

For detailed information about onboarding Dell SC Series arrays, see: <https://www.dell.com/support/kbdoc/000155957>.

## Dell PowerVault

The Dell PowerVault systems use SupportAssist for CloudIQ data collection. This must be enabled in the PowerVault ME Storage Manager.

To configure SupportAssist in ME Storage Manager, go to **System Settings > SupportAssist**, select the SupportAssist box, and verify the system is successfully connected.

Select the **CloudIQ Settings** tab and select the Enable CloudIQ box.

Collect the following information from ME Storage Manager as it is required to complete the onboarding process in CloudIQ:

- WWN
- Service Tag
- Firmware Version

Alternatively, login to the system and use the CLI to collect the above information.

Login to the CloudIQ UI and go to the **Admin > Connectivity** page. Select the **ADD POWERVAULT** button and step through the wizard which prompts the user for the WWN, Service Tag, and Firmware Version that was previously collected.

For detailed information about onboarding Dell PowerVault systems, see: <https://www.dell.com/support/kbdoc/000022224>.

## Dell VxBlock/VBlock

Dell Converged systems use Secure Connect Gateway for CloudIQ data collection. This must be enabled and configured successfully within VxBlock Central.

To configure Secure Connect Gateway in VxBlock Central, go to **Dashboard > SRS**. Confirm the SRS or Secure Connect Gateway information is properly configured and check the boxes for Send Data to SRS and Send Data to VxBlock Central Lifecycle Management (LCM) powered by CloudIQ.

Collect the following information from VxBlock Central as it is required to complete the onboarding process in CloudIQ:

- System Serial Number
- Network Switch Serial Numbers

Log in to the CloudIQ UI and go to the **Admin > Connectivity** page. Select ADD VXBLOCK and step through the wizard which prompts the user for the System Serial Number, Core Network Switch A Serial Number, and Core Network Switch B Serial Number.

For detailed information about onboarding Dell VxBlock/VBlock systems, see: <https://www.dell.com/support/kbdoc/0000208967>.

## Dell VxRail

Starting with v 7.0.350, VxRail Hyper-Converged Infrastructure systems require Secure Connect Gateway for CloudIQ Data Collection. See the appropriate VxRail Administration Guide for the correct procedures.

V7.0.x – [VxRail Administration Guide](#)

Alternately, see [Solve Online for VxRail](#).

Telemetry must also be enabled for CloudIQ collections.

For VxRail v7.0.x, you must enable Customer Improvement Program. The default and recommended collection level is Medium. This collects samples once per hour.

For detailed information about onboarding VxRail systems, see: <https://www.dell.com/support/kbdoc/000184396>

## PowerEdge

OpenManage Enterprise 3.7 or greater is used to collect data from PowerEdge servers and sends the data to CloudIQ. The CloudIQ plug-in is required to be installed in OpenManage Enterprise to enable the flow of data to CloudIQ.

1. Install OpenManage Enterprise 3.7 or greater.
2. In OpenManage Enterprise, go to **Application Settings > Console and Plugins**.
3. Select the CloudIQ plug-in, and click **Install Plugin**.
4. Select **Accept** on the licensing agreement.
5. Select **I agree that I have captured a snapshot of the OpenManage Enterprise appliance**.
6. Click **Confirm Install**.

After it is installed, the CloudIQ plug-in must be configured.

1. In OpenManage Enterprise, go to **Plugins > CloudIQ > Overview**.
2. Select **Activate Now**.
3. On the Authentication page, enter the Access Key and PIN to register OpenManage Enterprise with the Dell Connectivity Service. Generate the Access Key and PIN as documented in Dell KB article [000180688](#).



4. Enter a **Collector Name** on the Collector Name page.
5. Click **Select Groups** on the Device Groups page and select devices for monitoring in CloudIQ.
6. Select **Next** to see the summary of the configuration and click **Finish** to complete the configuration.

For detailed information about onboarding PowerEdge servers to CloudIQ, see: <https://www.dell.com/support/kbdoc/000189403>.

## Dell PowerProtect DD

PowerProtect DD systems use Secure Connect Gateway for CloudIQ data collection. To configure Secure Connect Gateway in DD System Manager, open the **Configuration** tab under **Maintenance > Support**.

Enable Secure Connect Gateway under the **Channel** section.

Select the Enable button under the **CloudIQ** section.

Verify "Share Data with CloudIQ" is set to Enabled.

For detailed information about onboarding PowerProtect DD systems, see: <https://www.dell.com/support/kbdoc/000183656>

## Dell PowerProtect Data Manager

PowerProtect Data Manager uses Secure Remote Services or Secure Connect Gateway for CloudIQ data collection. To configure Secure Remote Services in PowerProtect Data Manager, go to the **Support** menu under the **System Settings** menu.

In the **Secure Remote Services** section, enter the Secure Connect Gateway Hostname, Username, and Password.

In the **Auto Support** section, switch **Enable Auto Support** to Enabled.

Select **Save** to save the configuration.

For detailed information about onboarding PowerProtect Data Manager systems, see: <https://www.dell.com/support/kbdoc/000184014>

## Connectrix Switches

Connectrix switches use the CloudIQ Collector to collect the data from the switches and send the data back to CloudIQ using Secure Connect Gateway. The collector is a vApp that is downloaded from the Admin > Collectors menu in the CloudIQ user-interface or from [support.dell.com](https://support.dell.com). Then, it must be installed locally in the data center.

After it is deployed, the collector is configured to communicate to the Secure Connect Gateway and the Connectrix switches by accessing the collector administration UI using a web browser: <https://<collector hostname or IP>>.

Communication between the Collector and the switches is done using REST API. The following guidelines can be used to verify and enable the REST API interface for both Brocade and Cisco.

## Brocade

The following command can be used to verify that the REST API is enabled:

```
mgmtapp --show
  REST Interface State: Enabled
  REST Session Count: 3
  REST Throttling Configurations:
    Sample Requests      : 30
    Sample Time (in sec) : 30
    Idle Time (in sec)   : 3
  KeepAlive : Disabled
  KeepAliveTimeout : 15sec
```

The following command can be used to enable REST API if it is not enabled:

```
mgmtapp --enable rest
```

## Cisco

The following commands can be used to ensure that REST API is enabled:

```
switch# config t
switch(config)# feature nxapi
```

For detailed information about onboarding Connectrix switches, see:

<https://www.dell.com/support/kbdoc/000157620>.

## PowerSwitch

PowerSwitch devices use the CloudIQ Collector to collect the data from the switches and send the data back to CloudIQ using Secure Connect Gateway. The collector is a vApp that is downloaded from the Admin > Collectors menu in the CloudIQ user-interface or from [support.dell.com](https://support.dell.com). Then, it must be installed locally in the data center. The Collector must be running v1.11.0 or later.

After the Collector vApp is deployed, the collector is configured to communicate to the Secure Connect Gateway and PowerSwitch devices by accessing the collector using a web browser: `https://<collector hostname or IP>`.

Communication between the Collector and the switches is done using REST API. The following guidelines can be used to verify and enable the RESTCONF API service for each PowerSwitch.

To verify mode:

```
OS10# show switch-operating mode
Switch-Operating-Mode : Full Switch Mode
```

Enter Configuration mode:

```
OS10# configure terminal
OS10(config)#
```

Enable RESTCONF API:

```
OS10(config)# rest api restconf
OS10(config)# exit
```

It is recommended to use a user account with netoperator privileges.

For detailed information about onboarding PowerSwitch, see <https://www.dell.com/support/kbdoc/000192029>.

## VMware

VMware uses the CloudIQ Collector to communicate to vCenter and send data back to CloudIQ using Secure Connect Gateway. The collector is a vApp that is downloaded from the Admin > Collectors menu in the CloudIQ user-interface or from <https://support.dell.com>. It is then installed locally in the data center. The collector requires read-only privileges to access and pull data from vCenter.

Once the Collector vApp is deployed, the collector is configured to communicate to the SRS/Secure Connect Gateway and vCenter by accessing the collector using a web browser: `https://<collector hostname or IP>`.

For detailed information about onboarding VMware, see: <https://www.dell.com/support/kbdoc/000021264>.

## Appendix B: CloudIQ security

### CloudIQ Security summary

CloudIQ takes numerous steps to protect your information in transit and at rest. In addition, CloudIQ has been developed using architectural controls as part of the Dell standard secure development life cycle. This standard defines the security-focused activities that Dell product teams must follow when building and releasing products. It enables Dell Technologies to minimize the risks to our products and customer environments from security vulnerabilities. See the [CloudIQ Security](#) white paper for more information.

### CloudIQ data in transit to Dell

CloudIQ subscribes to notifications from Dell Secure Remote Services, Secure Connect Gateway, and Dell Phone Home services when storage system metadata arrives over those channels. This metadata can include, for example, system logs, system configuration, system capacity, and performance metrics. No customer data is sent, and only data generated by the customer's systems is sent. Customers control which systems send information over these channels. See the document [Secure Connect Gateway Security](#) for more information.

All data arriving through those channels is protected in transit by industry-standard best practices. Both channels use digital certificates and customer-controlled access policies to establish point-to-point encryption and ensure all data is securely transported to the Dell IT-managed infrastructure. In addition, Secure Connect Gateway provides for dedicated VPN and multifactor authentication. Once the data arrives, CloudIQ stores data relating to those systems which have CloudIQ management enabled in its own Dell IT-managed infrastructure.

### CloudIQ data at rest

CloudIQ data is stored on Dell infrastructure, which is highly available, fault tolerant, and provides a 4-hour Disaster Recovery SLA. Dell's Global Security Organization (GSO), led by a Chief Information Security Officer, is responsible for security and protection of Dell's information technology infrastructure. This is accomplished using establishment of governing security policies and procedures, and enforcement of Information Security control. This includes measures such as multilayered firewalls, intrusion detection systems, industry-leading anti-virus, and malware protection.

The Dell cybersecurity team is involved in running continuous vulnerability scans on the application and underlying environment. Any required remediation is handled through an ongoing vulnerability remediation program such as software upgrades, patches, or configuration changes.

All data sent to CloudIQ is stored on infrastructure hosted in Dell data center. The Information Security Policy ensures that all Dell information and resources are properly protected, information owners must ensure all resources are accounted for, and each resource has a designated custodian. All infrastructure is in the core network behind corporate firewalls, and is not exposed to external direct access. No individual direct login to the database server and database is allowed, except for the members of System Administrator and Database Administrator teams. Database application accounts are managed using standard database password authentication.

Dell has implemented an industry best practice Change Management process to ensure that Dell production line assets are stable, controlled, and protected. Change Management provides the policies, procedures, and tools needed to govern these changes, to ensure that they undergo the appropriate reviews, approvals, and are communicated to users.

### Accessing CloudIQ data

CloudIQ access requires that each user has a valid Dell support account. Customers use their existing support account to log in to CloudIQ. Authentication is handled by the Dell Single-Sign-On (SSO) infrastructure.

CloudIQ leverages information in the user profile stored in Dell Service Center related to company and site mapping for access control. The user profile is created and associated with a valid company profile when the user registers for an account with Dell.

CloudIQ provides each customer with an independent secure view of their systems and ensures that they will only be able to see their own data in CloudIQ. Each user can only see those systems in CloudIQ which are part of that user's site access as per the configuration of that user in Dell Service Center.

## Appendix C: Data collection frequencies and samples

The following chart provides the data collection frequency per system type.

	Performance	Capacity	Configuration
PowerMax/VMAX	5 minutes	1 hour	1 hour
PowerStore	5 minutes	1 hour	1 hour
PowerScale/Isilon	5 minutes <sup>14</sup>	1 hour	1 hour
PowerVault	15 minutes	1 hour	1 hour
PowerFlex	5 minutes	1 hour	1 hour
Unity XT family	5 minutes	1 hour	1 hour
XtremIO	5 minutes	1 hour	1 hour
SC Series	5 minutes	1 hour	1 hour
VxBlock	N/A	N/A	24 hours
PowerEdge	5 minutes	N/A	1 hour
Connectrix	5 minutes	5 minutes	5 minutes
PowerSwitch	5 minutes	1 hour	1 hour
VMware	5 minutes	5 minutes	5 minutes
APEX Block	5 minutes	1 hour	1 hour
APEX File	5 minutes	1 hour	1 hour
VxRail <sup>15</sup>	5 minutes	5 minutes	24 hours
PowerProtect DD	5 minutes	1 hour	1 hour

The following charts display the collected metric types for various components of the systems. The P column represents performance metrics, and the C column represents capacity metrics. See the section [Report Browser metrics](#) for a full list of individual performance metrics collected for each component type.

<sup>14</sup> Some PowerScale performance charts provide 24-hour interval metrics

<sup>15</sup> VxRail sends the 5-minute performance and capacity data to CloudIQ at 30-minute, 60-minute, or 24-hour intervals. The telemetry setting in VxRail Manager determines the upload interval

	System		Node / Appliance		Pool		Volume / LUN		File System		Storage Group		Drives		Host / Initiator	
	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C
PowerMax / VMAX	✓	✓			✓	✓					✓	✓				
PowerStore	✓	✓	✓	✓			✓	✓	✓	✓			✓		✓	✓
PowerScale / Isilon	✓	✓	✓	✓		✓										
PowerVault	✓	✓			✓	✓	✓	✓					✓	✓	✓	✓
PowerFlex	✓	✓														
Unity XT family	✓	✓			✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
XtremIO	✓	✓					✓	✓								
SC Series	✓	✓			✓		✓	✓					✓	✓	✓	✓

**Connectrix Switches**

	Switch		Partition		Zone		Attached Devices		Interface	
	Perf	Cap	Perf	Cap	Perf	Cap	Perf	Cap	Perf	Cap
Connectrix	✓	✓							✓	
PowerSwitch		✓								

**VMware**

	ESXi Cluster		ESXi Server		Datastore		Virtual Machine	
	Perf	Cap	Perf	Cap	Perf	Cap	Perf	Cap
VMware	✓		✓		✓	✓	✓	✓

## Appendix D: Report Browser metrics

The following charts provide the time series metrics available in Report Browser.

### APEX Block Storage Services

Metric	System	Volume	Volume Group
Bandwidth	X	X	X
Bandwidth by Read/Write	X	X	X
IOPS	X	X	X
IOPS by Read/Write	X	X	X
IO Size		X	X
IO Size by Read/Write		X	X
Latency	X	X	X
Latency by Read/Write	X	X	X
Queue Depth		X	

### Connectrix

Fibre Channel only

Metric	Switchport	System
Buffer Errors	X	
Buffer Errors by All Buffer Errors	X	
Buffer Errors by B2B Credit Zero	X	
Class-3 Discards	X	
Congestion Ratio	X	
CRC Errors	X	
Link Resets	X	X
Link Resets by In/Out	X	X
Physical Layer Errors	X	
Physical Layer Errors by All Physical Layers	X	
Physical Layer Errors by Encoding Errors	X	
Physical Layer Errors by FEC Blocks	X	
Protocol Errors	X	
Protocol Errors by All Protocol Errors	X	
Protocol Errors by Frames Length	X	



Metric	Switchport	System
Protocol Errors by Non Operational Sequence	X	
Protocol Errors by Offline Sequence	X	
Throughput	X	X
Throughput by Rx/Tx	X	
Time at Zero Tx Credit	X	
Utilization	X	X
Utilization by Rx/Tx	X	
B2B Credit Zero/sec		X
Errors		X

## PowerEdge

Available PowerEdge metrics vary based on model, license, and firmware. See the CloudIQ section of the [OpenManage Portfolio Software Licensing Guide](#) for more details.

Chassis
Amount of Energy Consumed (kWh, Avg over last 15 min)
Amount of Energy Consumed (kWh, Max over last 15 min)
Amount of Energy Consumed (kWh, Min over last 15 min)
Inlet Temperature (°C, Avg over last 15 min)
Peak Inlet Temperature (°C, Max over last 15 min)
Peak Inlet Temperature (°C, Min over last 15 min)
Power Consumption (W, Avg over last 15 min)
Power Consumption (W, Max over last 15 min)
Power Consumption (W, Min over last 15 min)
Power Headroom (W, Avg Available power minus peak consumed over last 15 min)
Power Headroom (W, Max Available power minus peak consumed over last 15 min)
Power Headroom (W, Min Available power minus peak consumed over last 15 min)

Drives	
NVMe	Storage Disk
Available Spare Threshold (%)	Command Timeout (Count for last hour)
Composite Temp (°C, Max over last 15 min)	CRC Errors (Count for last hour)
Critical Warnings	Drive Life Remaining (%)
Percentage Used (Max over last 1 hour)	Drive Temperature (°C, Avg over last hour)

Drives	
	Erase Failures (Count for last hour)
	Exception Mode Status (Count for last hour)
	Media Writes (Count for last hour)
	Power On Hours
	Program Fail (Count for last hour)
	Read Error Rate (Count for last hour)
	Reallocated Block (Count for last hour)
	Uncorrectable Error (Count for last hour)
	Uncorrectable LBA (Count for last hour)
	Volatile Memory Backup Source Failures (Count for last hour)

FC Port	
	Invalid CRCs (Count for last 5 min)
	Link Failures (Count for last 5 min)
	Received Bytes (Total over last 5 min)
	Transmitted Bytes (Total over last 5 min)

Network Port	
	Discarded Packets (Count for last 5 min)
	Excessive Collision Packets (Count for last 5 min)
	FCoE Packets Received (Count for last 5 min)
	FCoE Packets Transmitted (Count for last 5 min)
	FCoE/FIP Link Failures (Count for last 5 min)
	FCS Error Packets Received (Count for last 5 min)
	Jabber Packets (Count for last 5 min)
	Multiple Collision Packets (Count for last 5 min)
	RDMA Bytes Transmitted (Total over last 1 min)
	RDMA Packets Received (Count for last 5 min)
	RDMA Packets Transmitted (Count for last 5 min)
	Received Bytes (Total over last 5 min)
	Transmitted Bytes (Total over last 5 min)

Processor (CPU/GPU)	
	CPU Temperature (°C, Avg. over last 5 min)

Processor (CPU/GPU)
GPU: Board Temperature (°C, Avg. over last 15 min)
GPU: DBE Retired Pages (Count for last 15 min)
GPU: Power Consumption (W, Avg. over last 15 min)
GPU: Primary Temperature (°C, Avg. over last 15 min)
GPU: SBE Retired Pages (Count for last 15 min)
GPU: Secondary Temperature (°C, Avg. over last 15 min)

Server
Avg. CPU Usage
Avg. IO Usage
Avg. Memory Usage
Avg. System Usage
Inlet Temperature (°C, Avg. over last 15 min)
Peak Inlet Temperature (°C, Max. over last 15 min)
Power Consumption (W, Avg. over last 15 min)
Power Consumption (W, Max. over last 15 min)
Power Consumption (W, Min. over last 15 min)
System Net Airflow (CFM, Avg. over last 15 min)
Total CPU Power (W, Total over last 15 min)
Total Memory Power (W, Total over last 15 min)

## PowerMax

Metric	FE Dir	FE Port	Host	RDF Dir	RDF Port	RDFA Group	RDFS Group	Storage Group	Storage Resource Pool	System	File System
% Busy	X	X		X	X						
% Hit							X				
% Write							X				
% Read								X	X	X	
Allocated Size								X			
Used Size									X		
Bandwidth	X	X	X	X	X		X	X	X	X	
Bandwidth by Read/Write		X	X	X	X			X	X	X	

Appendix D: Report Browser metrics

Metric	FE Dir	FE Port	Host	RDF Dir	RDF Port	RDFA Group	RDFS Group	Storage Group	Storage Resource Pool	System	File System
Throughput											X
IO Size		X			X			X	X	X	
IO Size by Read/Write		X			X			X	X	X	
IOPS	X	X	X	X	X		X	X	X	X	X
IOPS by Read/Write		X	X		X		X	X	X	X	
Latency		X	X				X	X	X	X	
Latency by Read/Write		X	X				X	X	X	X	
Queue Length								X	X	X	
Queue Length by Read/Write								X	X	X	
Queue Depth Utilization	X										
Read Latency	X										
Write Latency	X										
Read Response Time											X
Write Response Time											X
Avg IO Service Time						X					
Compressed Bandwidth						X					
Compressed Bandwidth by Read/Write						X					
RDF R1 to R2 Bandwidth						X					
RDF R1 to R2 IOPS						X					
RDF R2 to R1 Bandwidth						X					
RDF R2 to R1 IOPS						X					
RDF/A WP Count						X					

## PowerProtect DD

Metric	Data Protection System	Replication
CPU Usage	X	
Incoming Pre-comp Replication	X	X
Incoming Replication Streams	X	X
Outgoing Pre-comp Replication	X	X
Outgoing Replication Streams	X	X
Pre-comp Read Throughput	X	
Pre-comp Write Throughput	X	
Read Streams	X	
Write Streams	X	

## PowerScale

Metric	System	Pool
Configured Size	X	
Free Size	X	
Free Size on 5 mins interval		X
Free Size on one day interval		X
Used Percent	X	X
Used Size	X	
Used Size on 5 mins interval		X
Used Size on one day interval		X

## PowerStore

Metric	Appliance	File System	System	Volume	Volume Group
% Read		X			
Bandwidth	X	X	X	X	X
Bandwidth by Read/Write	X	X	X	X	X
CPU Utilization	X				
Data Reduction Ratio			X		

Appendix D: Report Browser metrics

Metric	Appliance	File System	System	Volume	Volume Group
Free Size		X	X	X	
IO Size		X		X	X
IO Size by Read/Write		X		X	X
IOPS	X	X	X	X	X
IOPS by Read/Write	X	X	X	X	X
Latency	X	X	X	X	X
Latency by Read/Write	X	X	X	X	X
Logical Size			X		
Queue Depth				X	
Total Size		X		X	
Used Size		X	X	X	

## PowerVault

Metric	Controller	Drive	Host	Pool	Pool Backend	System	System Backend	Volume
% Read	X	X	X	X	X	X	X	X
% Read Hits								X
% Write Hits								X
Bandwidth	X	X	X	X	X	X	X	X
Bandwidth by Read/Write	X	X	X	X	X	X	X	X
Free Size				X				
IO Size	X	X	X	X	X	X	X	X
IO Size by Read/Write	X	X	X	X	X	X	X	X
IOPS	X	X	X	X	X	X	X	X
IOPS by Read/Write	X	X	X	X	X	X	X	X
Total Size								X
Used Size				X				X

## SC Series

Metric	Drive	FC, SAS, iSCSI	Pool	Pool Backend	System	System Backend	Volume
% Read	X	X	X	X	X	X	X
Bandwidth	X	X	X	X	X	X	X
Bandwidth by Read/Write	X	X	X	X	X	X	X
CPU Utilization					X		
Free Size			X				
IO Size		X	X	X	X	X	X
IO Size by Read/Write		X	X	X	X	X	X
IOPS	X	X	X	X	X	X	X
IOPS by Read/Write	X	X	X	X	X	X	X

Appendix D: Report Browser metrics

Metric	Drive	FC, SAS, iSCSI	Pool	Pool Backend	System	System Backend	Volume
Latency	X	X	X	X	X	X	X
Latency by Read/Write	X	X	X	X	X	X	X
Queue Length	X	X	X	X	X	X	X
Total Size							X
Used Size			X				X

Unity XT family

Metric	Block	Drive	Ethernet	Fibre Channel	File	iSCSI	Pool	Pool Backend	System	System Backend	System-Cache
% Read	X	X			X		X	X	X	X	
Allocated Size	X				X						
Bandwidth	X	X	X	X	X	X	X	X	X	X	
Bandwidth by In/Out			X								
Bandwidth by Read/Write	X	X		X	X	X	X	X	X	X	
Bandwidth by SP	X	X			X		X	X	X	X	
Bandwidth by SP and Read/Write	X	X			X		X	X	X	X	
CPU Utilization									X		
Errors			X								
Errors by In/Out			X								
Free Size							X		X		
IO Size	X				X		X	X	X	X	
IO Size by Read/Write	X				X		X	X	X	X	
IO Size by SP	X				X		X	X	X	X	
IO Size by SP and Read/Write	X				X		X	X	X	X	



Metric	Block	Drive	Ethernet	Fibre Channel	File	iSCSI	Pool	Pool Backend	System	System Backend	System-Cache
IOPS	X	X			X		X	X	X	X	
IOPS by Read/Write	X	X			X		X	X	X	X	
IOPS by SP	X	X			X		X	X	X	X	
IOPS by SP and Read/Write	X	X			X		X	X	X	X	
Latency	X						X		X		
Latency by Read/Write	X						X		X		
Latency by SP	X						X		X		
Latency by SP and Read/Write	X						X		X		
Packets			X								
Packets by In/Out			X								
Queue Length	X						X		X		
Requests				X		X					
Requests by Read/Write				X		X					
Total Size	X				X						
Used Size					X		X		X		
vVol Latency							X		X		
Total Link Errors				X							
Total Link Errors by Link Error				X							
% Clean											X
% Dirty											X
% Free											X
Flushed											X

**VMware**

Metric	ESXi	Virtual Machine	Datastore
Active Memory	X	X	
Bandwidth per Datastore		X	
CPU Readiness		X	
CPU Usage	X	X	
IOPS per Datastore		X	
Latency per Datastore		X	
Storage Latency		X	
Capacity			X
Free Space			X
Uncommitted			X

**VxRail**

Metric	Host
CPU Hertz	X
CPU Ready Summation	X
CPU Utilization (%)	X
Disk Latency	X
Disk Utilization	X
Memory Consumed Average	X
Memory Overhead Average	X
Memory SwapInRate Average	X
Memory SwapOutRate Average	X
Memory Utilization (%)	X
Memory VM Control Average	X
Networking Utilization	X

**XtremIO**

Metric	Initiator	System	Target	Volume
Bandwidth	X	X	X	X
Bandwidth by Read/Write	X	X	X	X
Block Latency	X	X	X	X
Block Latency by Read/Write	X	X	X	X

Metric	Initiator	System	Target	Volume
CPU Utilization		X		
Free Size		X		
IOPS	X	X	X	X
IOPS by Read/Write	X	X	X	X
Logical Size		X		
Used Size		X		