# Dell APEX AlOps Infrastructure Observability: A Detailed Review

A Proactive Monitoring and Analytics Application for the Dell Environment

September 2024

H15691.10

# White Paper

Abstract

This white paper details Dell APEX AlOps Infrastructure Observability, the cloud-based AlOps 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, hypercoverged infrastructure, data protection, and network health, performance, and capacity.

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### **Executive summary**

#### **Overview**

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

Infrastructure Observability 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>
- One workday saved per week on average<sup>1</sup>

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

As a Software-as-a-Service solution, Infrastructure Observability delivers frequent, dynamic, nondisruptive content updates for the user. Infrastructure Observability 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 Infrastructure Observability features and how to monitor the following Dell systems:

- APEX Block Storage for Public Cloud
- APEX Cloud Platform for Microsoft Azure
- APEX Cloud Platform for Red Hat OpenShift
- APEX File Storage for Public Cloud
- APEX Hybrid Cloud Services
- APEX Private Cloud Services
- Connectrix
- PowerEdge
- PowerFlex
- PowerMax (including VMAX)
- PowerProtect Data Manager
- PowerProtect DD series appliances (including DDVE)
- PowerScale (including Isilon)

<sup>&</sup>lt;sup>1</sup> Based on an APEX AlOps Observability User Survey, conducted by Dell Technologies, May-June 2021

- PowerStore
- PowerSwitch
- PowerVault
- SC Series
- Unity XT family (including Dell Unity and Unity XT)
- VxBlock
- VxRail
- 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	Updated to reference support.dell.com and cloudiq.dell.com	
		<ul> <li>Updated with details on enabling Dell Trusted Advisors and Partners</li> </ul>	
		<ul> <li>Updated with Lifecycle Management for Converged Systems</li> </ul>	
May 2021	H15691.2	Updated with support for PowerProtect DD and PowerProtect Data Manager	
		Updated with support for VxRail	
		<ul> <li>Updated with support for custom tags and custom reports</li> </ul>	
July 2021	H15691.3	Updated with support for APEX Offerings	
		Updated with Cybersecurity	
January 2022	H15691.4	<ul> <li>Updated with support for PowerFlex, PowerEdge, and PowerSwitch</li> </ul>	
		Updated with support for Webhooks	
January 2022	H15691.5	Updated template	

#### Executive summary

Date	Part number/ revision	Description	
July 2022	H15691.6	Updated with REST API	
		Updated with Virtualization View	
		Updated with VxRail multisystem 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 Advanced role to DevOps	
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> <li>Terminology table (Observability Collector and SupportAssist definitions)</li> </ul>	
		<ul> <li>Connectrix and PowerSwitch details (Introduction section)</li> </ul>	
		Administration (Collectors section)	

#### Executive summary

Date	Part number/ revision	Description	
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 AIOps Infrastructure Observability	
		Carbon footprint analysis	
		Service Requests	
		VxBlock health score for storage	
		Licenses and entitlements	
September 2024	H15691.10	Rebrand to APEX AIOps Infrastructure Observability	
		Add support for APEX Block Storage for Public Cloud, APEX File Storage for Public Cloud, APEX Hybrid Cloud Services, and APEX Private Cloud Services, APEX Cloud Platform for Microsoft Azure, and APEX Cloud Platform for Red Hat OpenShift	
		Removed references to APEX Data Storage Services	
		Knowledge Base Articles	
		Cybersecurity support for PowerProtect DD	
		Ransomware Incidents	
		Webhooks for Cybersecurity	
		VxBlock CI Code Compare	
		Server Compliance Reports	
		Job scheduling for PowerEdge firmware updates	
		Updated available metrics in Report Browser	
		PowerVault supports Data Protection category in health score	
		More file system details for PowerStore	
		Support for PowerSwitch systems running SONiC	
		More support in mobile app	
		Carbon Footprint support for PowerScale systems	
		Updated custom report wizard	
		Remove references to Secure Remote Services	
		Pools status added on PowerFlex Capacity page	
		Support for SSO Groups	
		Support for Dell XC Appliances	

We value your feedback

Dell Technologies and the authors of this document welcome your feedback on this document. Contact the Dell Technologies team by <u>email</u>.

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

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

Term	Definition
Observability 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 Infrastructure Observability 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.
SupportAssist	Remote connectivity technology that enables SC Series, PowerStore, PowerFlex, and PowerVault systems to connect to Infrastructure Observability 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	Remote connectivity technology replacing Secure Remote Services and SupportAssist Enterprise. It allows Dell devices to securely transfer files such as logs and system telemetry to Dell Support and Infrastructure Observability. It can exist as a centralized stand-alone server or deployed within management platforms as Embedded Service Enabler.
OpenManage Enterprise	Management console for PowerEdge servers. The CloudIQ Plugin and Embedded Service Enabler are required to collect and sent telemetry back to Infrastructure Observability.
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 Infrastructure Observability using Secure Connect Gateway; for SC Series, it connects using SupportAssist.
PowerVault Manager	The graphical management interface for PowerVault storage systems. Connectivity to Infrastructure Observability is established in the Settings section of PowerVault Manager using SupportAssist.
PowerStore Manager	The graphical management interface for PowerStore storage systems. Connectivity to Infrastructure Observability is established in the Settings section of PowerStore Manager using Embedded Service Enabler or external Support Connect Gateway.

Table 1. Terminology

#### Executive summary

Term	Definition
Web UI	The graphical management interface for XtremIO storage arrays. Web UI is part of XMS – XtremIO Management Server, which connects to Infrastructure Observability using Secure Connect Gateway.
DD System Manager	The graphical management interface for PowerProtect DD systems. Connectivity to Infrastructure Observability 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 Infrastructure Observability is established under the Support tab in VxRail Manager.

## **APEX AIOps Infrastructure Observability overview**

#### Introduction

APEX AlOps Infrastructure Observability is a cloud-based AlOps 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. Infrastructure Observability is available at no additional charge for products with a valid ProSupport (or higher) contract. Observability is hosted on Dell Technologies Private Cloud, which is highly available, fault-tolerant, and guarantees a 4-hour Disaster Recovery SLO.

Observability 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 Observability 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 Observability.

The discussion below elaborates on the various features and functionality in Observability. 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 Infrastructure Observability.

#### Key values of Infrastructure Observability

**Reduce Risk –** Infrastructure Observability makes daily IT administration tasks easier by helping you identify potential vulnerabilities before they impact your environment. Leveraging a suite of advanced analytics, Observability 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 cybersecurity configuration risks, applicable Dell Security Advisories, and potential ransomware incidents.

**Plan Ahead** – Infrastructure Observability helps you stay ahead of business needs with short-term Capacity Full Prediction, Capacity Anomaly Detection, and longer-term Capacity Forecasting. Performance forecasting shows trends for key performance metrics and provides indications when resources will become saturated. SAN optical failure forecasting helps users plan ahead to replace failing components and avoid performance degradation and outages. Energy consumption and carbon footprint calculations let users meet their organization's sustainability goals.

**Improve Productivity** – Infrastructure Observability helps users improve the 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
- Sending notifications for health issue changes, job status changes, cybersecurity misconfigurations, and ransomware incidents

- Supporting 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

# InfrastructureInfrastructure Observability is available to all customers with the following DellObservabilityTechnologies systems under a ProSupport or higher contract:requirementsTechnologies systems under a ProSupport or higher contract:

Type of data	Product models	Minimum code version
APEX	Block Storage for Public Cloud AWS systems Cloud Platform for Microsoft Azure Cloud Platform for Red Hat OpenShift File Storage for Public Cloud AWS systems Hybrid Cloud Services systems Private Cloud Services systems	N/A
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, FX Modular chassis, MX Modular sleds and chassis, M Modular compute sleds and chassis, VRTX Series sleds and chassis, XC appliances	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	DD9910, DD9900, DD9410, 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>

<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 is required for performance metrics.

Type of data	Product models	Minimum code version
PowerScale/Isilon	Gen 5, Gen 6, and Gen 6.5	OneFS 8.2 and later <sup>6</sup>
PowerStore	PowerStore T and PowerStore Q	PowerStoreOS 1.0 and later <sup>7</sup>
PowerSwitch	N3248TE-ON, 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, Z9664F-ON, E3224F-ON	OS10 v10.5.3 and later <sup>8,9</sup>
PowerSwitch	N3248PXE-ON, N3248X-ON, N3248TE-ON, E3248P-ON, E3248PXE-ON, S5248F-ON, S5296F-ON, S5448F-ON, S5232F-ON, S5224F-ON, S5212F-ON, Z9664F-ON, Z9264F-ON, Z9332F-ON, Z9432F-ON	Enterprise SONiC 4.1.x and later
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

#### Infrastructure Observability data collection

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

The frequency with which data is updated in Observability 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 Observability updates this information for Unity XT family systems; collection for other systems is comparable:

Type of data Sample update frequency
--------------------------------------

<sup>6</sup> PowerScale 9.4.0.0 or later required for performance impact detection. Monitoring PowerScale backend switches is not supported.

<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 is required for memory utilization metrics.

#### APEX AIOps Infrastructure Observability overview

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

Observability 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
Object level	22 days	90 days	2 years

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

- Centralized monitoring of performance, capacity, system components, configuration, data protection, and carbon footprint. Observability 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. Observability 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 of security misconfigurations. Identification of applicable Dell Security Advisories and associated Common Vulnerability and Exposures (CVEs). Cybersecurity ransomware incidents detect potential ransomware attacks by learning the expected behavior of reducible data and identifying unexpected anomalies.

<sup>&</sup>lt;sup>10</sup> Connectrix, VMware, and PowerStore collect at 5-minute intervals.

<sup>&</sup>lt;sup>11</sup> Daily "all-in" collection.

 Multisystem update feature is implemented for VxRail and PowerEdge, allowing users to perform update pre-checks, code downloads, and system updates from Observability.

#### **Centralized monitoring**

Infrastructure Observability 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**

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

#### Performance anomaly and impact detection

Using machine learning and analytics, Infrastructure Observability 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, Observability goes one step further and identifies performance impacts (supported for PowerMax or VMAX, PowerStore, VxRail, Unity XT family, PowerScale, and PowerFlex systems). Observability 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, Observability also identifies the most likely storage objects causing the workload contention. By differentiating between changes in workloads characteristics and workload contention, Observability enables users to narrow the focus of troubleshooting on when actual impacts to performance may have occurred.

#### Capacity trending and predictions

Infrastructure Observability 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: Observability 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: Observability 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: Observability 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 Infrastructure Observability, relative to other monitoring and reporting tools. Observability 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:

Catego	ory	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
11.	Performance	Storage groups not meeting their SLO
V	Data Protection	Native replication and snapshot schedules are not being met

#### Cybersecurity

Cybersecurity is a set of features in Infrastructure Observability 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 risks by seeing the identified misconfigurations and can address security violations using the recommended remediations. Dell Security Advisories and associated Common Vulnerabilities and Exposures (CVEs) are reported against any applicable systems. This provides users with a notification of the vulnerability and an in-context link to the associated knowledge base article for remediation. Cybersecurity ransomware incidents identify potential ransomware attacks in near real-time. By learning the expected behavior of reducible data, Observability can identify anomalies in this behavior that provide indications of possible encryption attacks.

#### **Multisystem updates**

The multisystem update feature pertains to VxRail clusters and PowerEdge servers. Users can initiate VxRail cluster update pre-checks, software downloads, and system updates from the Infrastructure Observability UI. Users can also initiate PowerEdge firmware updates across their server fleet. This feature provides more operational efficiency while maintaining security and consistency. Infrastructure Observability UI Iayout This section discusses the layout of the user interface.

#### **Navigation pane**

The left navigation bar is designed to provide clear visibility into Infrastructure Observability 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.

*	Home	
4	Monitor	$\sim$
	Manage	$\sim$
Ö	Optimize	$\sim$
8	Reports	~
Ø	Cybersecurity	~
72	Lifecycle	$\sim$
ŝ	Admin	$\sim$

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 drop-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 version, 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 open service requests applicable to the systems monitored by Observability.

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 and relevant knowledge base articles for systems.

**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. View applicable security advisories. Configure and view cybersecurity ransomware incidents for supported platforms.

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. Perform CI code comparisons to identify gaps between running software and firmware versions and target code levels.

Admin – Includes links to various administrative tasks.

The Identity Management section allows Observability administrators to set access controls for standard Observability users and initiate the single sign-on process federating Observability 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 Observability 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 Observability REST API.

The Licenses page shows system license and entitlement details including entitlement type and expiration date for PowerFlex systems, PowerScale virtual edition, and APEX Navigator.

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

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

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

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.

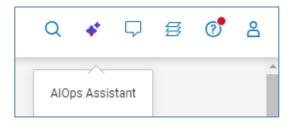
#### **Global Search**

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.



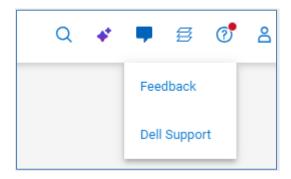
#### **AlOps Assistant**

Access and chat with the GenAI-powered virtual assistant to answer questions about product support. At the time of this publication, the AIOps assistant is in tech preview and available through entitlement.



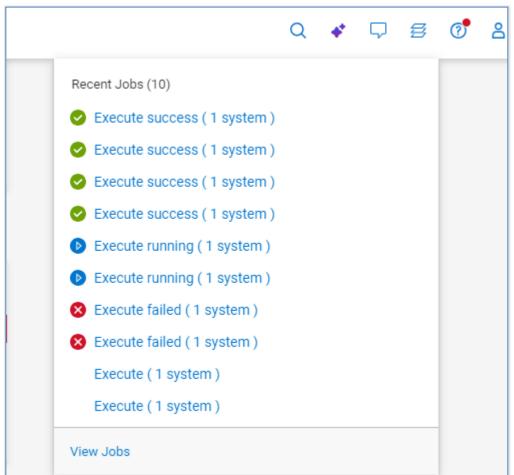
#### Feedback and Dell Support

Selecting the comment icon allows the user to submit feedback to the Infrastructure Observability 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 APEX AlOps Observability

Infrastructure Observability is updated frequently to deliver helpful new content to users. Use the Observability Simulator (<u>https://cloudiq.dell.com/simulator</u>) 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.

Q	*	$\nabla$	₿	<b>?</b>	8
		Help	with H	ome	
		Help			
		What	ťs New	•	

The "What's New in APEX AlOps Observability" 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 Observability since its introduction. This display can be turned off by sliding the **Don't show again until the next update** button.

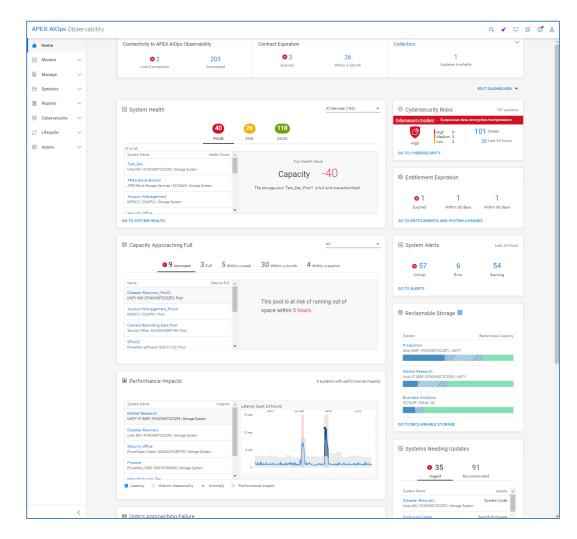
Selecting the user icon allows the user to switch companies if they have access to multiple sites and sign out of the UI.

### 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).

#### Home page



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

- Install Base Issues: Observability cannot display due to Install Base configuration issues.
- Lost Connection: Systems that have lost connection and are no longer sending data to Observability.
- Not Set Up: Systems that are not set up to send data through Secure Connect Gateway to Observability.
- **Connected**: Systems that are successfully sending data to Observability.

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 Observability views.

**Collectors –** Displays the number of Observability Collectors that have:

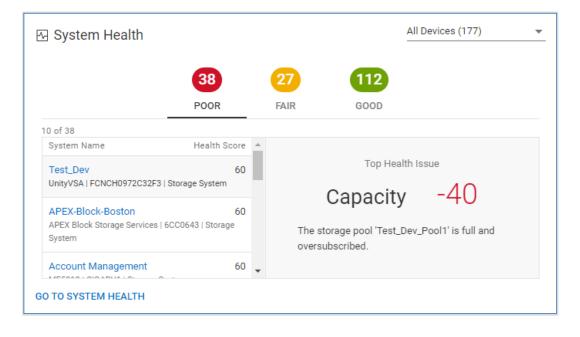
- Issues that need to be resolved
- Available Updates

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, appliances, and subscriptions running out of space. The chart is interactive allowing the user to select each object to display a trend line and forecasting chart of the used capacity. The estimated time range until each entity 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

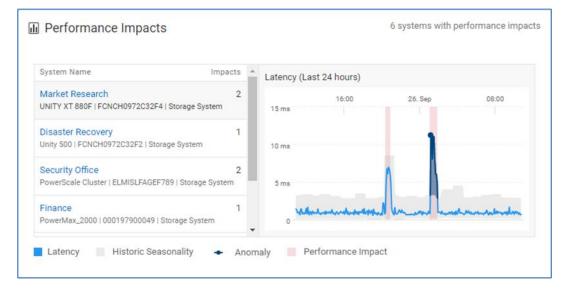
Capacity Approachin	g Full			All
97 Imminent	2 Full	4 Within a week	23 Within a month	<b>3</b> Within a quarter
Name	D	ate to Full		
Disaster Recovery_Pool2 UNITY 400   FCNCH0972C32F2   Po		n 5 hours	This pool is at risk	c of running out
Account Management_PoolA ME5012   CIQAPU1   Pool	Within	19 hours	of space within 5	, i i i i i i i i i i i i i i i i i i i
Camera Recording Data Pool Security Office   ELMISLFAGEF789		n 6 hours		
DR Pool2 ES1	Withi	n 5 hours		

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 APEX Hybrid Cloud Services, APEX Private Cloud Services, Unity XT family, PowerVault, PowerMax/VMAX, PowerStore, PowerScale, and VxRail systems.

Selecting the object name hyperlink directs the user to the Capacity tab on the object details page.

**Performance Impacts –** Supported for APEX Hybrid Cloud Services, APEX Private Cloud Services, PowerMax/VMAX, PowerStore, PowerFlex, PowerScale, and Unity XT family systems. Utilizes Observability 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 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.

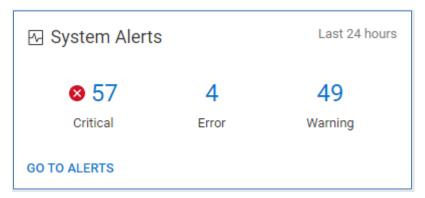


**Optics Approaching Failure** – Uses predictive analytics to provide a list of Connectrix ports with impending optic failures. The measured and predicted Tx power is analyzed and charted along with the working and failure zones. The estimated time to failure is categorized in each of the following timeframes:

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



**System Alerts** – Summarizes the alerts sent to Observability 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 and notifies the user of ransomware incidents. 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.

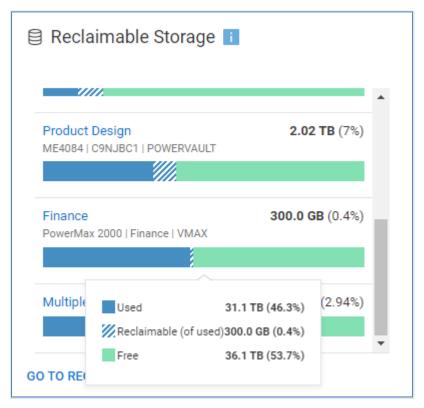


**Entitlement Expiration** – This tile summarizes the licenses and entitlements that are expired, will expire within 30 days, and will expire within 90 days. This content supports

PowerFlex systems, PowerScale Virtual Edition systems, and systems deployed with DELL APEX Navigator for Multicloud Storage. Clicking 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 PowerStore, PowerMax/VMAX, Unity XT family, SC Series, and PowerVault ME 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.



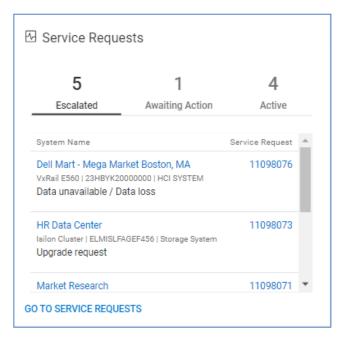
**Systems Needing Updates** – This tile identifies systems that have either Urgent or Recommended system code, firmware, or management software updates available. It shows the system and the type of update. Selecting the "GO TO UPDATES" link opens the System Updates page. This page shows all available 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.

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	MT-ML-LABS-103 je R640   A4TNB0Z   Sen	ver		
SYSMG	MT-ML-LABS-103		1 -	•
GO TO UPD	ATES			

#### **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 Observability or review and update the service request on the Dell support page.

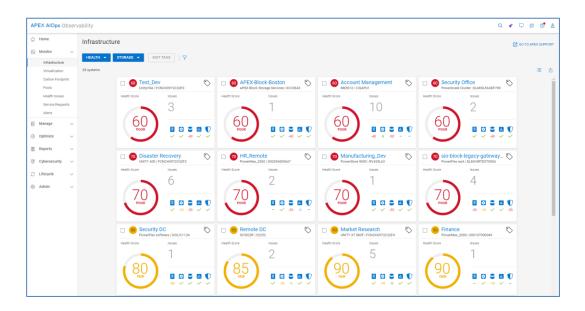


Infrastructure -Health The Infrastructure page is a consolidated multisystem view that can show Health, Inventory, Capacity, and Performance views for each of the supported Dell platforms. The Health page displays the Proactive Health Score for all systems across all products in a consolidated view. 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.

> Infrastructure Observability uses up to five categories to determine the Proactive Health Score presented on the Infrastructure 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. Observability displays a dash (—) for these categories.
- PowerVault systems do not include the Performance or Data Protection categories. Observability displays a dash (—) for these categories.
- VxRail systems, APEX Hybrid Cloud Services, and APEX Private Cloud Services do not include the Data Protection category.
- Connectrix, PowerSwitch, and PowerEdge 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 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 Observability 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 ( $\equiv$ ) 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 <u>Custom Tags</u> section.

Users can also export the data from many of the views in Observability 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, Heath 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 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.

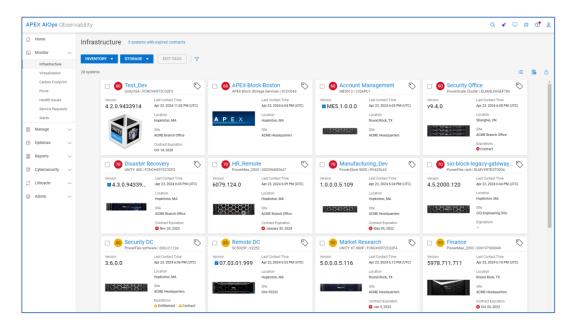
APEX AlOps Ob	bserva	ability									Q 🖸 🖵 🗐 🕑
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Pools		Healt. 1	System	Identifier	Model	Components	Configuration	Capacity	Performance	Data Protection	Tags
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Service Request Alerts	15	. 0	APEX-Block-Boston	6000643	APEX Block Storage _	~	~	-40	~	~	
Manage	~	. 60	Account Management	CIQAPU1	ME5012	-40	-5	-30	~	-30	DataCenter:TX-RR-DC1 BusinessUnit:Sales +2
3 Optimize	~		Security Office	ELMISLFAGEF789	PowerScale Cluster	~	~	-40	~	~	(DataCenter:MA-HOP-DC3) (BusinessUnit:IT) +2
E Reports	~	. 0	Disaster Recovery	FONCH0972C32F2	UNITY 400	~	-10	-30	~	~	(DataCenter:MAHOP-DC3) (BusinessUnit:Sales) +2
3 Cybersecurity	~	. 0	HR_Remote	000296800647	PowerMax_2500	~	~	-30	-5	~	(DataCenter:MA-HOP-DC3) (BusinessUnit:HR) +2
C Lifecycle	~	. 70	Manufacturing_Dev	RV429L60	PowerStore 9000	~	~	-30	~	~	DataCenterMAH0P-DC1 +3
Admin	~	. 70	sio block-legacy-gat	ELM/XRTEST0004	PowerFlex rack	-30	-10	~	~	-30	
			Security DC	SI0LIC1124	PowerFlex software		~	~	~	~	
			Remote DC	92252	9C5020F	~	-15	-5	~	~	(DataCenter:MA-HOP-DC3) +3
			Market Research	FCNCH0972C32F4	UNITY XT 880F	~	-10	-5	~	~	DataCenter:TX-RR-DC1 +3
						~	-10	-10	~	~	(DataCenter.TX-RR-DC1) 43
			Finance	000197900049	PowerMax_2000						
			Research and Devel	MJLZWGR	ME4024	-10	-5	~	~	~	DataCenter:TXHR-DC1 +3
		- 9	ERP Remote	81000174657731	X2-T	~	~	~	~	-6	(DataCenterMAH0P-DC3) +3
		- 9	Manufacturing, Prod	RV429L62	PowerStore 1000X	~	~	~	~	~	(DataCenter:MA-H0P-DC1) +3
		. 9	Finance Data Center	ELMISLFAGEF123	Isilon Cluster	×	-5	~	~	~	DataCenter/MA-H0P-DC3 +3
		. 100	Production	FONCH0972C82F1	UNITY 650F	~	~	~	~	×	(DataCenter:TX-RR-DC1) (BusinessUnit:Sales) +2
			APEXFile-Austin	ELMISLFAGEF876	APEX File Storage S	~	~	~	~	~	
			Durinare Analytics	95149							DataCenter TKRR.0C1 BusinessUnit Finance +2

#### Infrastructure -Inventory

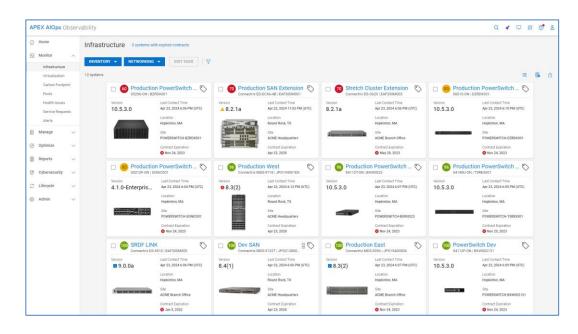
- The **Inventory** page is the multisystem view showing the configuration information for all systems in the environment. There can be up to six types of platforms from which to choose: Converged, Data Protection, HCI, Networking, Servers, and Storage. The information displayed on the Systems pages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

- Version (vCenter Version for Converged) Version of installed software
- Last Contact Time The last time that Infrastructure Observability 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.

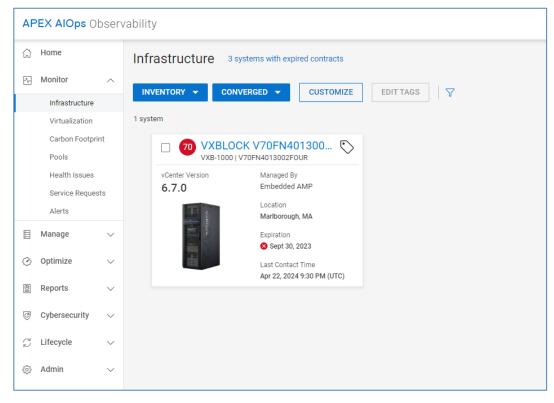
For systems that support the identification of system updates, there will also be an indication when a code update is available. Hovering over the information icon (1) opens a window showing the update version. Clicking the "Learn More" link from within the window opens a dialog with summary information and links to the Release Notes and the software download. The following shows an example of the Storage page.



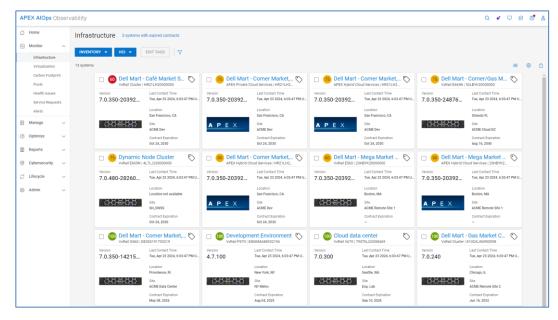
The following example of the Networking page shows similar attributes to those displayed in the Storage page.



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.



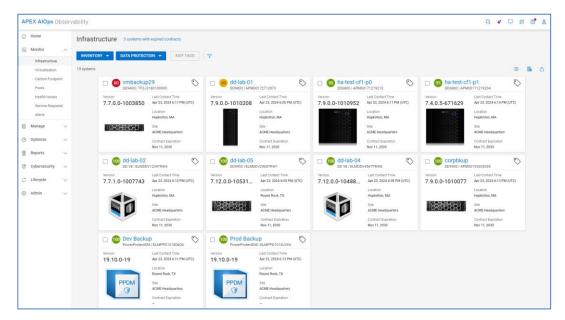
The following example of the HCI page displays the inventory of VxRail systems, APEX Hybrid Cloud Services, and APEX Private Cloud Services.



The following shows an example of the SERVERS page. There is a top banner summarizing the total number of servers by Health Score, Power State, and Contracts Expiring. This banner is provided for compute because of the potential for a large number of servers in Observability.

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⊖ Home		Infrastructure 3 systems with expired contracts															
Monitor	~	_															
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Carbon Footpri Pools Health Issues	nt		e 26 Paor	• 16 Fair	• 86 Good		① <b>28</b> Off		• 100 <sub>On</sub>		Withi	0 n a Month V	0 /ithin a Quarter		<b>128</b> Up to D		
Service Reques Alerts	its	128 systems	-												=	0	
Manage	$\sim$		70 WIN-SYS0     PowerEdge MX	2PE86 840c   AMX18PE		VIN-SYS0	2PE173		PowerEdge MX	2PE77 (840c   A84P5TK	$\bigcirc$	70 WIN-SY PowerEdge	SO2PE80 MX740c   A9WBYWJ		0		
5 Optimize	~		IP Address 198.51.100.86	Last Contact Time Apr 22, 2024 07:04 PM (UTC)	IP Address 198.51.1 © offine	00.173	Last Contact Time Apr 22, 2024 07:04 PM (UTC)	IP Adds 198.	51.100.77	Last Contact Tim Apr 22, 2024 07:		IP Address 198.51.100.80	Last Contact Time Apr 22, 2024 07:04	PM (UT	rc)		
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5 Lifecycle	×			Contract Expiration Wed, 23 Apr 2025 19:04:16 G	т		Contract Expiration Wed, 23 Apr 2025 19:04:16 GM	r -		Contract Expirati Wed, 23 Apr 202			Contract Expiration Wed, 23 Apr 2025		5 OMT		
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			IP Address 198.51.100.205	Last Contact Time Apr 22, 2024 07:04 PM (UTC)	IP Address 198.51.1	00.197	Last Contact Time Apr 22, 2024 07:04 PM (UTC)	IP Adds 198.	51.100.169	Last Contact Tim Apr 22, 2024 07:		IP Address 198.51.100.6	Last Contact Time Apr 22, 2024 07:04	PM (UT	rc)		
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The following example of the Data Protection tab shows both PowerProtect DD systems and PowerProtect Data Manager instances monitored by Observability.

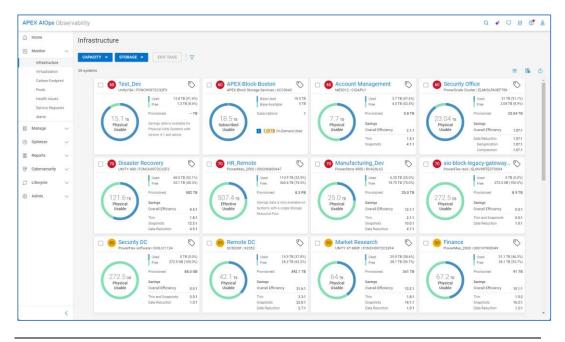


#### Infrastructure -Capacity The Infrastructure Capacity view displays the system level storage capacity for traditional storage systems, APEX Hybrid Cloud Services, APEX Private Cloud Services, VxRail hyperconverged systems, and PowerProtect DD systems. For Connectrix and PowerSwitch, it displays port capacity.

The information for traditional storage systems includes:

- Usable Total disk capacity, which is the sum of Used and Free space. For PowerMax 2500 and 8500 models, this represents the effective usable capacity.
- 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)

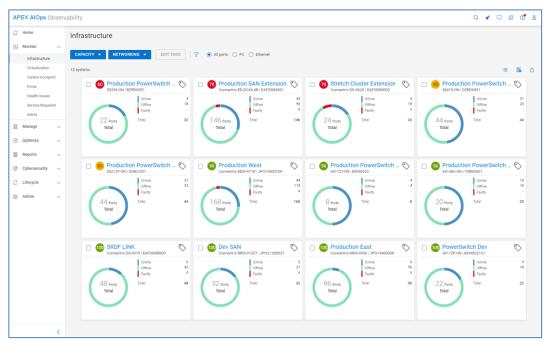


**Note**: For Unity XT family systems running version 4.3 and higher and SC Series running version 7.3 and higher, Data Reduction includes Compression or Deduplication.

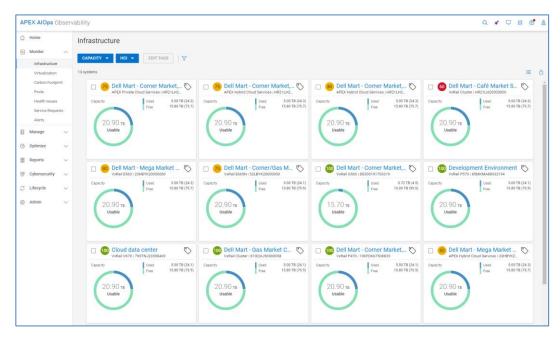
For switches, the user can filter the view to show All ports, FC ports, or Ethernet ports. For each selection, the displayed information includes:

- 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

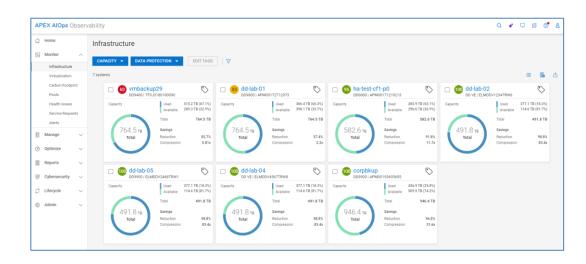
- Offline Number of ports in an offline state
- Faulty Number of ports with one or more faults



For VxRail systems, APEX Hybrid Cloud Services, and APEX Private Cloud Services, Observability 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.

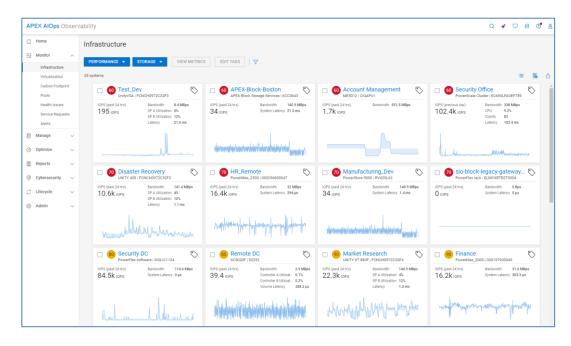


# Infrastructure -The Infrastructure Performance view displays system-level performance metrics acrossPerformanceall systems.

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 object 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:

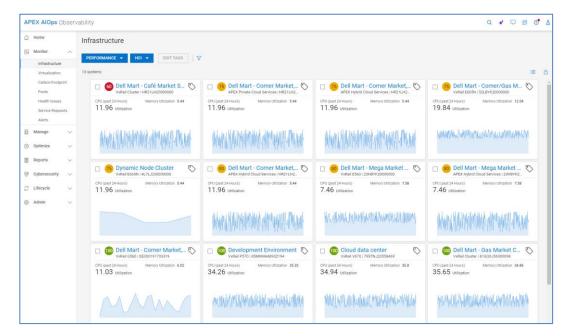
- System Bandwidth Average bandwidth for the switch over the last 24-hour period.<sup>12</sup>
- Utilization >= 80% Number of ports with utilization greater than or equal to 80%<sup>4</sup>
- Congested (Connectrix only) Number of ports with congestion
- Errors Number of ports with errors<sup>1</sup>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

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

ු Home		Infrastructure			
G Monitor	~				
Infrastructure		PERFORMANCE - NETWORKING - VIEW ME	TRICS EDIT TAGS		
Virtualization		12 systems			= 6
Carbon Footp Pools	orint	Production PowerSwitch      S5296-ON   BZRDX001	Connectrix ED-DCX6-48   EAF3001M001	Connectrix DS-G620   EAF300M003	Production PowerSwitch      September 2001     September 2001
Health Issues Service Requi Alerts		System Bandwidth Port Anomalies Ports (Past 24 Hours) Uhltration + 80 - 9.6G bps Congested - Ports with Errors - Ports with Line Reset -	System Bandwidth Port Anomalies Ports (Past 24 Hours) Utilization >= 80 5 7.8G bps Cooperted 0 Ports with Enors 2 Ports with Link Reset 1	System Bandwidth Port Anomalies Ports (Past 24 Hours) Utilization >> 80 1 8.9G bps Conjected 0 Ports with Errors 0 Ports with Inter 80	System Bandwidth Port Anomalies Ports (Past 24 Hours) Utilization >= 80 = 4.5G bps Congested = Ports with Enors = Ports with Liox Reset =
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E Reports	~ ~	Production PowerSwitch      SS212F-ON ISON(COD1	96 Production West     Connectity MD5-9718 UP0194001DK	90 Production PowerSwitch      S4112TON (BXN0023	99 Production PowerSwitch      S4148U-0N1 TEREX001
3 Lifecycle	~	System Bandwidth Port Anomalies Ports (Past 24 Hours) Utilization >= 80 - 4.5G bps Congested - Ports with Brors -	System Bandwidth         Port Accumalies         Ports           (Past 24 Hours)         Utilization >= 80         10           5.5G bps         Congested         0           Ports         Ports         0	System Bandwidth Port Anomalies Ports (Past 24 Hours) Utilization >= 80 - 7.9G bps Conjested - Ports with Errors -	bystem Bandwidth Port Anomalies Ports (Past 24 Hours) Ublization >= 80 - 5.2G bps Congested - Ports with Eners -
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Note: The 24-hour bandwidth chart is displayed for Connectrix only.

VxRail, APEX Hybrid Cloud Services, and APEX Private Cloud Services 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:

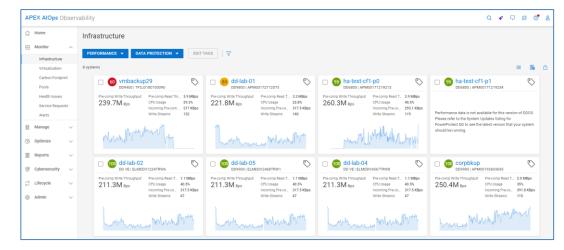
- CPU Usage Percentage of CPU consumed by the server
- Memory Usage Percentage of RAM the server uses based on what is allocated
- System Board IO
- SYS Usage

• Inlet Temp – Temperature reading in Celsius

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Infrastructure		PERFORMANCE SERVERS EDIT TAUS	×.		
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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 Observability Collector.

The left side of the screen shows the vCenter servers, the VMware datacenters, and the VxRail clusters or ESXi clusters. The upper 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 score 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 the **All vCenter Servers** row 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 provides the health score (VxRail and PowerEdge), CPU, Memory, Capacity, number of VMs on each cluster, current version, location (VxRail), 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.

AP	EX AlOps Ob	serv	ability											Q 🖌	Q S	1
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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.

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🗐 Manage 🗸 🗸	Conter4.local	🝸 13 Alerts									Critical(5)	A Warning(8)	
⊘ Optimize ∨	B R&D Datacenter     G DelMart.vCenter5.local	Details Se	verity Acknowledg	ed Clusters		Model	Alert		Description		Time		
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$\odot$ Lifecycle $\sim$	DelMart.vCenter7.local     Northwest Region	6	•	Dell Mart - Mer	ga Market Boston, MA	VxRail E560	0 23HBYK200	000000 ALARM	c3-esx03.racke09.loca	l: Host health - Error. An error was det		4, 5:42:11 PM UTC	þ
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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.

PEX AlOps Observ	ability										α 🔹	D B	C
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Infrastructure	View As 🔚 🚍												
Virtualization	V I All vCenter Servers												
Carbon Footprint	G All vCenter servers     O B DellMart.vCenter1.local	Health   36				Alerts   13				VMs   227			
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		-	ustomer_Membershi	p_Rewards	Powered On	84.0%	96.0%	Development Envir	VxRail - Cluster	DellMart.vCenter4.loca	al 411-esx6		
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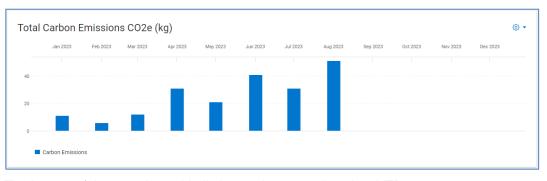
Carbon Footprint The Carbon Footprint page provides summary, system, and workload level metrics for carbon emissions and energy usage. Sustainability has become a key topic in data center infrastructure considerations as companies strive to reach new environmental goals. Infrastructure Observability's carbon emissions feature gives users insights to make the best sustainability decisions for workload consolidation, IT footprint reduction, and energyefficient technology refresh.

> Initial products supported include PowerEdge, PowerScale, 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. Users with the Admin role can override these default values by clicking the Settings button.

Carbon Footprint	Settings		
Carbon Emissions	500 kg ↑ 2.23% 2023 (year to date)	Energy Trend 55 kWh ↓ 5.0% August 2023	2.0% (567 kWh) 2023 (year to date)

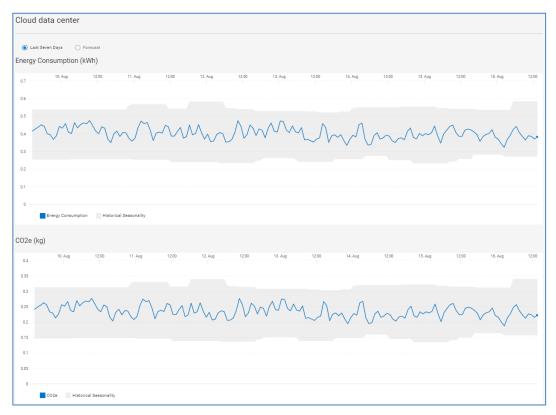
The Total Carbon Emissions chart provides a one-year trend of total carbon emissions based on monthly values. The chart can be displayed as a bar chart or a line chart.



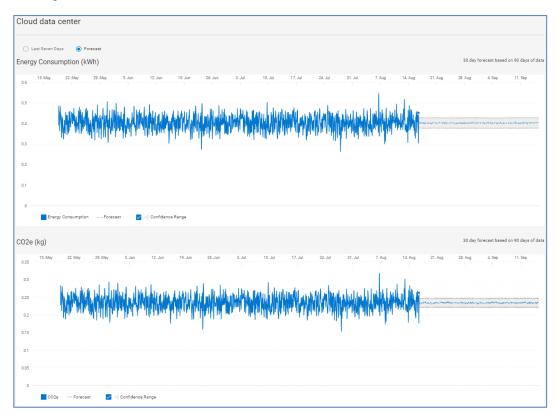
The bottom of the page is a table listing each system, location, YTD energy usage, energy forecast, YTD carbon emissions usage, carbon emissions forecast, and daily power consumption. The system used capacity percentage indicates which systems have available capacity for additional workloads. The filter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

Clear All	Details	Name 个	Product	Site Name	Location	Country	YTD Energy (kWh	Energy Forecast (	YTD CO2e (kg)	CO2e Forecast (k	Power Consumption	Used Ca	Tags
Product >  Unity	0	Cloud data c	VxRail Cluster	Eng. Lab	Q Seatti	US	1,516.667	2,275.0	882	1,323.0	2543.0	24.1	DataCenter:MA-HOP-DC
VxRail	0	Deil Mart - Ca	VxRail Cluster	ACME Dev	🖗 San F	USA	2,222	3,333.0	1,291.333	1,937.0	2345.0	24.3	DataCenter:MA-HOP-DC
PowerEdge     Connectrix	0	Dell Mart - Co	VxRail Cluster	ACME Data C	Provi	US	1,516.667	2,275.0	882	1,323.0	3542.0	4.5	DataCenter:MA-H0P-DC:
Tags	6	Dell Mart - Co	VxRail Cluster	SH Prod.	Q Seatti	US	1,516.667	2,275.0	882	1,323.0	4253.0	24.1	DataCenter:MA-HOP-DC1
Cary .	6	Deil Mart - Co	VxRail Cluster	ACME Cloud	Orlan	US	1,516.667	2,275.0	882	1,323.0	4352.0	24.1	DataCenter:MA-HOP-DC
Value	6	Dell Mart - Ga.	VxRail Cluster	ACME Remot	Q Chica	US	1,516.667	2,275.0	882	1,323.0	4532.0	24.1	DataCenter:MA-HOP-DC1
	6	Dell Mart - M.	VxRail Cluster	ACME Remot	Sosto_	US	1,516.667	2,275.0	882	1,323.0	3245.0	24.3	DataCenter:MA-H0P-DC
	0	Dev SAN	Connectrix	ACME Headq	Q Roun_	US	1,516.667	2,275.0	882	1,323.0	432.0	95.8	
Sibe	6	Development	VxRail Cluster	NY Metro	Q New	US	1,516.667	2,275.0	882	1,323.0	3524.0	24.1	DataCenter:MA-HOP-DC1
	6	Disaster Rec.	Unity	ACME Branc	Q Hopki_	USA	23,444.667	35,167.0	13,631.333	20,447.0	654.0	52.1	DataCenter:MA-HOP-DC3
ocation	6	IDRAC.A42FD	PowerEdge	ACME Headq	Q Hopki	US	1,516.667	2,275.0	882	1,323.0	543.0	96.8	DataCenter:MAHOP-DC1
	6	IORAC ASNY	PowerEdge	ACME Headq	Q Hopki_	US	1,516.667	2,275.0	882	1,323.0	345.0	95.8	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, PowerVault, and PowerFlex. 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.

APEX AlOps O	oserv	ability								Q 💰	Ç 🛭 🕈
습 Home		Pools									
Monitor	^	√ 39 Pools									<b>B</b>
Infrastructure Virtualization		Issues	Name 🔨	System	Model	Total Size (TB)	Used (%)	Subscription (%)	Time To Full		Free (TB)
Carbon Footpri	nt	2	Account Management_Po	Account Management	ME5012	1.0	94.8	130	Imminent		0.05
Health Issues		~	Account Management_Po	Account Management	ME5012	6.7	41.8	67.2	Within a quarter		3.9
Service Reques	ts	~	Business Analytics_Pool1	Business Analytics	SC7020F	85.2	18.7	65.5	Greater than quarter		63.3
Alerts		~	Cache Pool	Finance Data Center	Isilon Cluster	192 TB	82.4	100.0%	Learning		33.8 TB
Manage	$\sim$	1	Cache Pool1	APEX-File-Austin	APEX File Storage Services	192 TB	82.4	100.0%	Learning		33.8 TB
5 Optimize	$\sim$	1	Cache Pool2	APEX-File-Austin	APEX File Storage Services	192 TB	71.0	100.0%	Learning		113.4 TB
Reports	$\sim$	2	Camera Recording Data P	Security Office	PowerScale Cluster	23.04 TB	91.1	100.0%	Within a day		0.46 TB
Cybersecurity	~	~	Disaster Recovery_Pool1	Disaster Recovery	UNITY 400	24.7	45.3	145.5	Unpredictable		13.6
5 Lifecycle	~	1	Disaster Recovery_Pool2	Disaster Recovery	UNITY 400	13.7	54.7	145.5	Imminent		6.2
Admin	~	~	Disaster Recovery_Pool3	Disaster Recovery	UNITY 400	82.5	54.5	145.5	Within a month		37.5
y Autom	~	-	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_2500	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 the 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

ster Red	covery > Disas	ster Recov	ery_Poo	2							ē	LAUNCH UNISP
	Propert	ies 🔋 Ca	pacity 📊	Performance	9							
FAST Cach					Total Issues		1	•	Capacity			1 issue
Туре		aditional		Ξ	Components		~	-30		ne storage pool 'Disa and predicted to ru		
				Ð	Configuration		~					
				-	Capacity		1					
				11.	Performance		~					
				C	Data Protection		~					
STORAGE torage obje	VIRTUAL M	IACHINES	DRIVES									
Issues	Name 个	Туре	Size (GB)	Used (GB)	Allocated (GB)	Thin	Data Reducti	on	Consistency Gr	Host I/O Limit	NAS Server	Time to Full
1	DR_Pool2_FS1	File System	6000	1320	1650	Yes	1.1:1 (5% or 256.0 M	IB)	-	-	NAS_Server_3	Imminen
1	DR_Pool2_FS2	File System	6000	1320	1650	Yes	1.1:1 (5% or 256.0 M	IB)	-	-	NAS_Server_3	Within a week
1.1			4000	-	1100	Yes	1.1:1 (5% or 256.0 M	IB)	ProdApp2CG	10K IOPS	-	-
~	DR_Pool2_LU	LUN	4000									

#### PowerVault:

- Storage
- Drives

Research and D	evelopment >	Research and De	velopment_PoolB		LAUNCH POWERV
Properties	Capacity	III Performance			
Туре	Virtual		Total Issues	1	Configuration 1 iss
			Components	~	2 days ago Pool 'B': A virtual disk group is missing one or more disks.
			Configuration	1	Resolution:
			Capacity	~	Ensure that spare disks are available. Reconstruction should start automatically When the reconstruction is complete, replace the failed disk(a) (a) when the reconstruction is complete, replace the failed disk(a) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b
			Performance	-	disk(s). (Look for event 8 in the event log to determine which disk(s) faile Disk groups that cannot find compatible spares will automatically move of to fault-tolerant components.
			Data Protection	~	to faun-tolerant components.
STORAGE	DRIVES				
storage objects					
Name 个		Туре		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 and Isilon:

Nodes

Finance Data Cente	er > Main Pool						
Properties	Capacity						
Tier	-	Total Issues	0	Total			
Node Count Protection Scheme	8	Components	~				
L3 Cache	Disabled	Configuration	~	All he	ealth checks were su	ccessful.	
		Capacity	~		. /		
		Performance	~		$\sim$		
		Data Protection	~				
NODES							
8 nodes							₫
Issues	Name 个	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 > Fin	ance_SRP1					🔀 LAUNCH UNISPHERE
Inventory	Capacity	III Performance				
Compression	Enabled		Reserved Capacity	12	Description	Storage Resource Pool for Finance Pr

#### PowerFlex

No tabs

Finance DC > SPoc	12			Z LAUNCH POWERFLEX MANA
Properties	Capacity			
Protection Domain	PD2	Total Issues	0	Total
Layout	MediumGranularity			
Inflight Checksum	Disabled	Components	~	
Persistent Checksum	Enabled	Configuration	~	All health checks were successful.
Zero Padding Policy	Enabled	Capacity	~	
Background Device Scanner	Enabled			$\checkmark$
Fix Local Device Errors	Enabled	Performance	~	•
Fix Comparison Errors	Enabled	Data Protection	~	

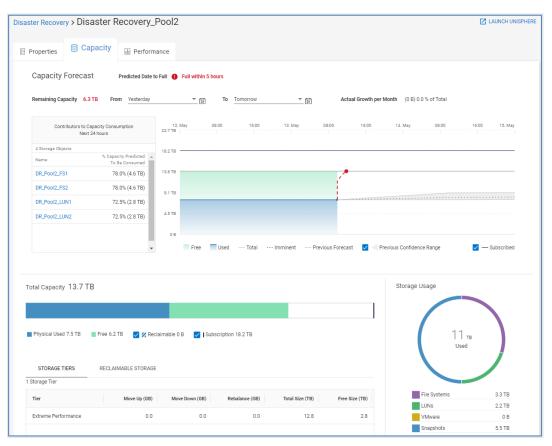
#### **Pool details – Capacity**

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, PowerScale/Isilon, and PowerFlex). 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

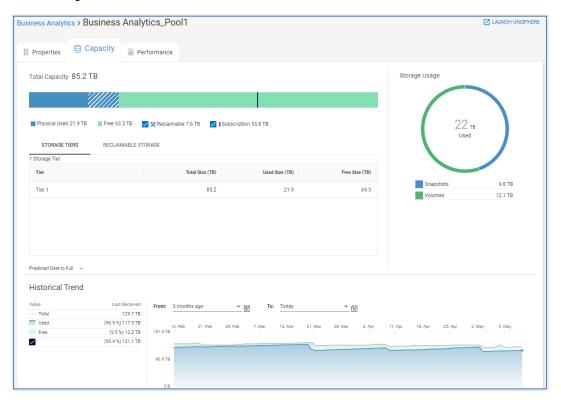
The **Subscribed** checkbox enables the user to view or hide the pool subscription data on the graph.

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

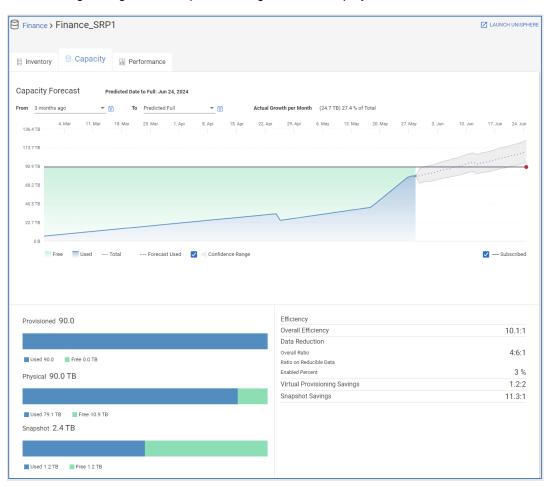
For SC Series, the historical trend of Total, Used, Free, and Subscribed storage is provided along with a Predicted Date to Full. However, the chart does not display forecasting data.



#### PowerMax 2000, 8000, and VMAX3

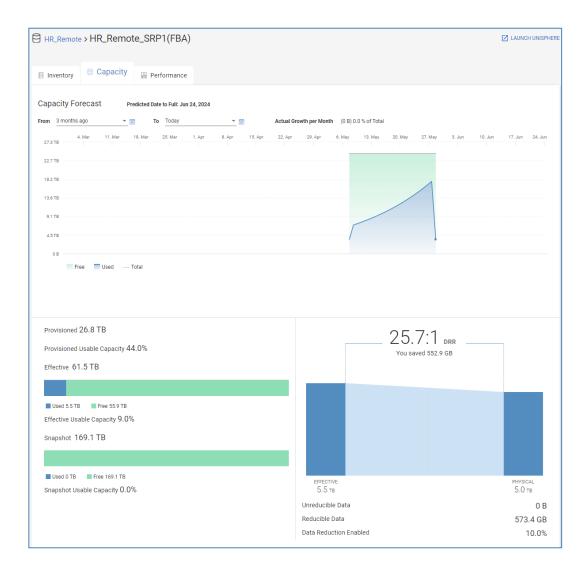
For PowerMax 2000, 8000, and VMAX3 arrays, the Capacity tab displays a capacity forecast chart for storage resource pools. The bottom half of the page shows Used and Free storage in bar charts for Subscribed, Snapshot, and Usable space. It also displays the Overall Efficiency ratio. This ratio is calculated 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.



#### PowerMax 2500 and 8500

For PowerMax 2500 and 8500 systems, the effective capacity is reported as it provides a more realistic measure of available space considering all data reduction components.



#### **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. Observability presents the top five objects associated to the pool. The user can scroll to see additional objects.

Market Researc	h > Market R	esearch_Pool1					🔀 LAU	JNCH UNISPHERE
Properties	Capacity	III Performance						
							Viewing data from th	e last 24 hours
							CREATE REP	ORT
Object Activ	vity							
Latency			IOPS			Bandwidth		
Object	24 Hour Trer	nd Averag	e Object	24 Hour Trend	Average	Object	24 Hour Trend	Average
MR_Pool1_FS1		13 m	s MR_Pool1_LUN1		203 IOPS	MR_Pool1_LUN1		19.4 MBps
MR_Pool1_LUN1		285.4 m	s MR_Pool1_LUN2		202.8 IOPS	MR_Pool1_LUN2		87.8 KBps
MR_Pool1_LUN2		205.4 m	s MR_Pool1_SAN_Datasto		122.5 IOPS	MR_Pool1_SAN_Datasto		52.4 KBps
MR_Pool1_SAN_E	atast	165.4 m	s MR_Pool1_SAN_Datasto		100.5 IOPS	MR_Pool1_SAN_Datasto		51.4 KBps
MR_Pool1_SAN_E	Datast	155.4 m	s MR_Pool2_FS1		94 IOPS	MR_Pool2_FS1		12.7 KBps
					< 1	2 >		

Scrolling down this view provides the user with detailed performance graphs for Latency, IOPS, Bandwidth, and Backend IOPS (one chart per tier). Observability 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.

Latency									
			p 5 most active and best mate r than usual wait time to displ		over that time	Performance	Impact Oct 24	4, 2022 04:05	▼ DETAILS
	ect Activity × - 05:35 Oct 24, 2022	15:00 12.5 ms	18:00	21:00	24. Oct	03:00	06:00	09:00	12:00
MOST ACTIVE	3.7 ms	10 ms							
Object Name	Average	7.5 ms							
MR_Pool1_FS1 MR_Pool1_LUN1	13 ms	2.5 ms							
MR_Pool1_LUN2	205.4 ms	° ~~ ~	hurren	mmm	1 m		hum	Lunn	utundun
MR_Pool1_SAN MR_Pool1_SAN	165.4 ms	Performance	Impacts 2 (1 with anomaly)	← Anomaly ↑ HI	GH				

When the user selects Best Match on the left side of the chart, Observability 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.

Latency								
Click on a point, or drag a region on the graph, to a period. Selecting a time period greater than 8 hou				ver that time	Performanc	e Impact Oct 24	4, 2022 04:05	▼ DETAILS
Object Activity	15:00 12.5 ma	18:00	21:00	24. Oct	03:00	06:00	09:00	12:00
03:50 Oct 24, 2022 - 05:35 Oct 24, 2022					1.			
MOST ACTIVE BEST MATCH	10 ms							
Market Research 3.7 ms					N			
Object Name	7.5 ms			n				
	5 ms							
MR_Pool1_LUN1								
MR_Pool1_FS1	2.5 ms							
MR_Pool1_LUN2	MM	mmm	mmmm	1 m	m	hum	Lunn	mmmm
MR_Pool1_SAN_Datastore1								
MR_Pool1_SAN_Datastore2	Performance Im	pacts 2(1 with anomaly	) + Anomaly 1	GH				

When there are performance impacts detected by Observability, 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.

e Performance Impact	Oct 24, 2022 04:05	▼ DETAILS
03:00 06:	Oct 23, 2022 23:30	12:00
Ĩ.	Oct 24, 2022 04:05	

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 for SPs, Cache, Disk, or Ports.

Latency							
		enerate a list of the top 5 most active and be can result in a longer than usual wait time to		cts over that time	Performance Impact	Oct 24, 2022 04:05	▼ DETAILS
Object Activ 03:50 Oct 24, 2022 - 05:35 MOST ACTIVE		16:00 20:00	24. Oct	04:00 08:00	12:00	Performance Impacts 04:00 6.4 ms 113 us	05:00 06:00
Market Research 3. Object Name	7 ms	7.5 ms	Ŋ			Contention: Top 2 o	_
MR_Pool1_LUN1 MR_Pool1_FS1		2.5 ms				Possible Cause: IOF     MR_Pool1_LUN2     2.7k	2S of top 3 of 6 o
MR_Pool1_LUN2 MR_Pool1_SAN_Datastore1		vulluurururururururururururururururururu	Mud Mun	m hanna Mar	-Anton Maria		2
MR_Pool1_SAN_Datastore2	M	Performance Impacts 2 (1 with anon	naly) 🔸 Anomaly 1	HIGH		MR_Pool1_NAS_Datastore1	

#### **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.

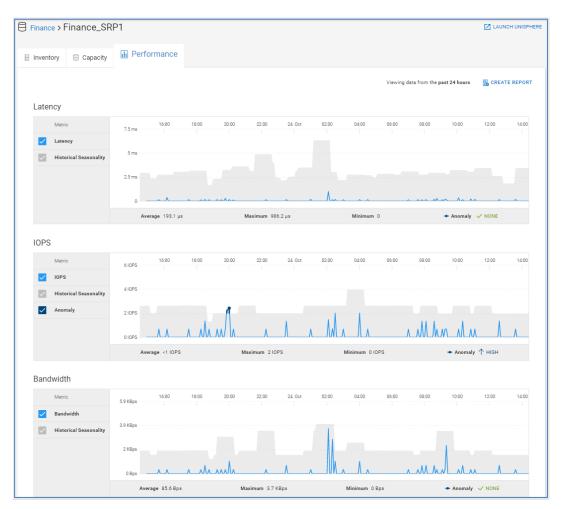
Business Analytic	s > Business Analytic	s_Pool1						LAUNCH UNISPHERE	E
Properties	Capacity	mance							
						Viewing da	ta from the last 24 hours	CREATE REPORT	
Object Activi	ty								
Volume Latency			IOPS			Bandwidth			
Object	24 Hour Trend	Average	Object	24 Hour Trend	Average	Object	24 Hour Trend	Average	
BA_Volume1		16.6 ms	BA_Volume1		1.2k IOPS	BA_Volume1		153.4 MBps	
BA_Volume2		15.6 ms	BA_Volume2		1.2k IOPS	BA_Volume2		143.9 MBps	
BA_Volume3		14.6 ms	BA_Volume3		836.3 IOPS	BA_Volume3		134.3 MBps	
BA_Volume4		13.6 ms	BA_Volume4		836.3 IOPS	BA_Volume4		124.8 MBps	
BA_Volume5		12.6 ms	BA_Volume5		836.3 IOPS	BA_Volume5		115.3 MBps	
	< 1 2 3 >				< 1 2	: 3 >			

Scrolling down provides displays 24-hour performance graphs for IOPS, Bandwidth, and Volume Latency. Observability 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.

IOPS											
	a a region on th	ne graph to r	enerate a list c	of the top 5 mo	ist active storage (	objects over that time peri	od Selectin	n a time period greater th	an 8 hours can res	ult in a longer than us	ual wait time to
display results.	ig a region on a	ie grapit, to g	perference a more o		or active oronage (	objecto oren ener ener pen	ou. oureoung	g a unite period greater un		alt in a longer than os	
08:30 Oct 24, 20	Diject Activity	× 4 2022	300 IOPS	15:00	18:00	21:00	24. Oct	03:00	06:00	09:00	12:00
Business Analyti	39.6 IOPS	~~~~	250 IOPS ···								
Object Name	Average		200 IOPS								
BA_Volume1	1.2k IOPS		150 IOPS								
BA_Volume2	1.2k IOPS		100 IOPS								
BA_Volume3	836.3 IOPS		50 IOPS	MAnna		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	h	M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.M.		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Manahananan
BA_Volume4	836.3 IOPS		0 10 PS								
BA_Volume5	836.3 IOPS		Ave	rage 39.4 IOF	s	Maximum 57.6 IOPS		Minimum 27.9	IOPS	<ul> <li>Anomaly</li> </ul>	V NONE
Bandwidth											
Click on a point, or dra display results.	ag a region on th	e graph, to g	jenerate a list o	of the top 5 mo	st active storage (	objects over that time peri	od. Selecting	g a time period greater th	an 8 hours can res	ult in a longer than us	ual wait time to
14:20 Oct 23, 20	Object Activity 22 - 15:25 Oct 2	× 3, 2022	476.8 MBps	15:00	18:00	21:00	24. Oct	03:00	06:00	09:00	12:00
Business Analyti	29.5 MBps		381.5 MBps ···	T							
Object Name	Average		286.1 MBps								
BA_Volume1	153.4 MBps		190.7 MBps								
BA_Volume2	143.9 MBps										
BA_Volume3	134.3 MBps		95.4 MBps								
BA_Volume4	124.8 MBps		0 Bps								A 1000
BA_Volume5	115.3 MBps		Ave	rage 2.9 MBp	5	Maximum 393.3 MBp	s	Minimum 709.	э кыра	<ul> <li>Anomaly</li> </ul>	т нісн
Volume Laten Click on a point, or dra display results.		ie graph, to g	generate a list o	of the top 5 ma	ist active storage (	objects over that time peri	od. Selecting	g a time period greater th	an 8 hours can res	ult in a longer than us	ual wait time to
23:05 Oct 23, 20	Object Activity 22 - 00:55 Oct 24	× 4, 2022	25 ms	15:00	18:00	21:00	24. Oct	03:00	06:00	09:00	12:00
Business Analyti	349.6 µs		20 ms								
Object Name	Average		15 ms								
BA_Volume1	16.6 ms		10 ms								
BA_Volume2	15.6 ms										
BA_Volume3	14.6 ms		5 ma								
BA_Volume4	13.6 ms		0 -								
BA_Volume5	12.6 ms		Av	erage 358.2 µ	5	Maximum 651.4 µs		Minimum 266	μs	- Anomaly	V NONE

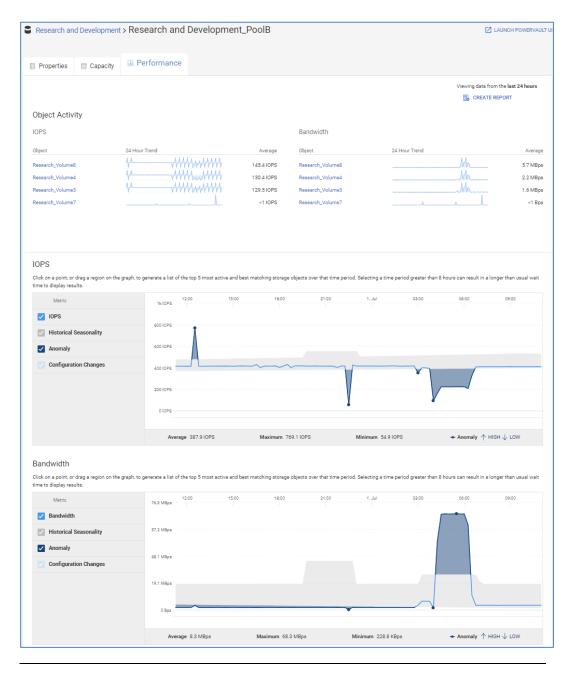
#### **PowerMax**

The Performance tab for PowerMax Storage Resource Pools provides 24-hour charts for Latency, IOPS, Bandwidth, %Read, IO Size, and Queue Length. Observability 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 or PowerFlex pools.

**Health Issues** 

The Health Issues page displays a comprehensive view of all current health issues across the environment grouped by system. Issues can be grouped by system or not grouped. When grouped by system is selected, 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, product type, site, and location. When the user starts typing the name of the system, a prepopulated list of system names is displayed that contains the entered text.

# Service Requests

The **Service Requests** page lists all service requests open against systems monitored by Infrastructure Observability. 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.

	equests					ALL SERVICE REQUEST
Escalation	Request #	Summary	Status	Date	System	Identifier
	11098070	Product problem	Assigning	Sep 24, 2022 6:40:50 AM	Production	FCNCH0972C32F1
0	11098071	Unable to access with admin / service - Technical assistance required	Assigning	Sep 24, 2022 6:32:29 AM	Market Research	FCNCH0972C32F4
0	11098072	Access issue on support platform	Assigning	Sep 24, 2022 6:32:41 AM	Test_Dev	FCNCH0972C32F3
0	11098073	Upgrade request	Assigning	Sep 24, 2022 6:35:28 AM	HR Data Center	ELMISLFAGEF456
-	11098074	Failed hard drive to be replaced	Assigning	Sep 24, 2022 6:41:33 AM	Finance Data Center	ELMISLFAGEF123
-	11098075	Licensing install issue	Working	Aug 2, 2022 4:02:36 AM U	Dell Mart - Café Market S.,	HR21LH2000000
0	11098076	Data unavailable / Data loss	Working	Sep 24, 2022 6:40:54 AM	Dell Mart - Mega Market	23HBYK20000000
-	11098077	Physical installation appointment	Working	Sep 24, 2022 6:32:36 AM	Dell Mart - Comer/Gas M.,	52LBYK20000000
<u> </u>	11098078	Health check / Connectivity	Awaiting action	Sep 24, 2022 6:35:43 AM	Prod with ICDM	SIQ00174657100
0	11096079	Super user not working	Awaiting action	Nov 11, 2022 7:10:18 PM	Production SAN Extension	EAF300M001
	Escalation 	- (2) 11096070 (2) 11096071 (2) 11096073 (2) 11096073 (2) 11096073 (2) 11096073 (2) 11096074 (3) 1096075 (3) 1096076 (3) 1096077 (3) 1096079	Escalation         Report F         Summary           -         (2) 11098770         Product problem           •         (2) 11098770         Unable to access with admin/r service - Technical assistance required           •         (2) 11098771         Unable to access with admin/r service - Technical assistance required           •         (2) 11098772         Access issue on issport platform           •         (2) 11098773         Upgrade request           -         (2) 11098774         Failed hard shive to be replaced           -         (2) 11098775         Licerning install issue           •         (2) 11098776         Data univailable / Data loss           -         (2) 11098777         Physical installation appointment           -         (2) 11098778         Health check / Connectivity	Escalation         Report F         Summary         Statur           -         [2] 1098770         Product problem         Assigning           -         [2] 1098770         Unable to access with admin/r survice - Technical assistance required         Assigning           -         [2] 1098771         Unable to access with admin/r survice - Technical assistance required         Assigning           -         [2] 1098772         Access issue on support platform         Assigning           -         [2] 1098773         Upgrade request         Assigning           -         [2] 1098774         Failed hard drive to be replaced         Assigning           -         [2] 1098775         Licerning install issue         Working           -         [2] 1098776         Data unavailable / Data loss         Working           -         [2] 1098777         Physical installation appointment.         Working           -         [2] 1098778         Health check / Connectivity         Awating action	Escalation         Regret #         Summary         Status         Data           -         2; 1006070         Product problem         Assigning         Bip 24, 2022 64 95 04 AM.           -         2; 1006071         Unable to access with admin/service - Technical assistance required         Assigning         Bip 24, 2022 64 95 04 AM.           -         2; 1006071         Unable to access with admin/service - Technical assistance required         Assigning         Bip 24, 2022 64 95 04 AM.           -         2; 1006072         Access issue on support platform         Assigning         Bip 24, 2022 64 924 AM.           -         2; 1006072         Upgrade requiret         Assigning         Bip 24, 2022 64 923 AM.           -         2; 1006074         Failed hard drive to be replaced         Assigning         Bip 24, 2022 64 923 AM.           -         2; 1006075         Licensing install issue         Working         Bip 24, 2022 64,954 AM.           -         2; 1006076         Data unavailable / Data loss         Working         Bip 24, 2022 64,954 AM.           -         2; 1006077         Physical installition aggointrivent         Working         Bip 24, 2022 64,954 AM.           -         2; 1006078         Health check / Coreectivity         Awaiting action         Bip 24, 2022 64,954 AM. <td>Escalation         Request #         Summary         Status         Date         System           -         (2) 1098070         Product problem         Ansigning         Bip 24, 2022 6.45 0.0.M.         Production           -         (2) 1098070         Unable to access with admin / service - Technical assistance required         Ansigning         Bip 24, 2022 6.32 0.4.M.         Market Research           -         (2) 1098070         Unable to access with admin / service - Technical assistance required         Ansigning         Bip 24, 2022 6.32 0.4.M.         Market Research           -         (2) 1098071         Upgrade request         Ansigning         Bip 24, 2022 6.32 0.4.M.         Hill Data Center           -         (2) 1098073         Upgrade request         Ansigning         Bip 24, 2022 6.32 0.4.M.         Hill Data Center           -         (2) 1098074         Failed hard drive to be replaced         Ansigning         Bip 24, 2022 6.32 0.4.M.         France Data Center           -         (2) 1098075         Lorensing install issue         Working         Bip 24, 2022 6.42 0.4.M.         Biel Mart- Caté Market S.           -         (2) 1098076         Data unvaliable/ Data loss         Working         Bip 24, 2022 0.42 0.4.M.         Biel Mart- Caté Market S.           -         (2) 1098077         Physiscel installation appeint</td>	Escalation         Request #         Summary         Status         Date         System           -         (2) 1098070         Product problem         Ansigning         Bip 24, 2022 6.45 0.0.M.         Production           -         (2) 1098070         Unable to access with admin / service - Technical assistance required         Ansigning         Bip 24, 2022 6.32 0.4.M.         Market Research           -         (2) 1098070         Unable to access with admin / service - Technical assistance required         Ansigning         Bip 24, 2022 6.32 0.4.M.         Market Research           -         (2) 1098071         Upgrade request         Ansigning         Bip 24, 2022 6.32 0.4.M.         Hill Data Center           -         (2) 1098073         Upgrade request         Ansigning         Bip 24, 2022 6.32 0.4.M.         Hill Data Center           -         (2) 1098074         Failed hard drive to be replaced         Ansigning         Bip 24, 2022 6.32 0.4.M.         France Data Center           -         (2) 1098075         Lorensing install issue         Working         Bip 24, 2022 6.42 0.4.M.         Biel Mart- Caté Market S.           -         (2) 1098076         Data unvaliable/ Data loss         Working         Bip 24, 2022 0.42 0.4.M.         Biel Mart- Caté Market S.           -         (2) 1098077         Physiscel installation appeint

#### **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 Cloud Platform
  - APEX Hybrid Cloud Services
  - APEX Private Cloud 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 a 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

Selecting the Details icon opens a window on the right side of the page with additional alert details.

APEX AlOps Obser	rvability									Q 🖸 🗊 🔂 🕹
☐ Home	Alerts									
🖂 Monitor 🔷 🔨										
Infrastructure	Y 220 Alerts									Octical(52) ◆Error(6) ▲Warning(52) ■Information(91) 🗅
Virtualization	Chear All	Details	Severity	Ackes	System	Model	Net	Date and Time $\psi$	ELMSIODEVTSTO	12 ×
Carbon Footprint	Date (UTC)	R			Manufacturing, Prod	PowerStore 1000X	Space Check for Database Backup Notification (exhausted)	Thu, Apr 25 2024, 4:47:19 PM UTC	* System Name	ELMS/00EVTST082
Pools Health Issues	Select date range 👻	R			France	PowerMax_2000	Running Enginuity (978.0.2318 is older than Target Enginuity 5978.142.142	Thu, Apr 25 2024, 3:47:19 PM UTC	Service Tag	ELMBIODEVTST002
Service Requests			-						Model	PowerFire software
Alerts	System	6	•		Production	UNITY 650P	Storage pool Prod, Pool2 has enceeded its user-specified threshold.	Thu, Apr 25 2024, 3:47:19 PM UTC	System Type	Server
E Manage ~	System or ID	۵	<b>A</b>		ELMS/CDEVTST002	PowerFlex software	Device media type mismatch: device /dev/sdb is an SSD device, but its media type has been configur	Thu, Apr 25 2024, 2:47:19 PM UTC	Calagory	SOFTINARE
	Product	œ			ELMS/COEVTS7002	PowerFlex software	Device media type mismatch: device./dev./sda is an SSD-device, but its media type has been configur	This, Apr 25 2024, 2:47:19 PM UTC	Resource Name	/dev/dex1.0
Optimize ~	APEX Block Storage Services	ø	•		ELM9/00EVT87002	PowerFlex software	The disk is near the end of its working life, and should be replaced.	Thu, Apr 25 2024, 2:47:19 PM UTC	Resource ID	7fep998c00010001
🗏 Reports 🤍 🗸	APEX File Biorage Services APEX Hybrid Cloud Services	ø			ELMBIODEVT8T002	PowerFlex software	The disk generated a failed state message at some time in the past, indicating a potential issue or tha	Thu, Apr 25 2024, 2:47:19 PM UTC	Message	The disk is near the end of its working life, and should be replaced.
$\bigcirc$ Cybersecurity $\checkmark$	APEX Private Cloud Services				ELMS/COEVTST002	PowerFlex software	Peer system MDM disconnected	Thu, Apr 25 2024, 2:47:19 PM UTC	Repair Flow	Replace the disk.
	> PowerEdge > PowerFicx	0	•		ELMSICOEVTST002	PowerFire software	Unable to receive rodm events from [10.234.177.27].	Thu, Apr 25 2024, 2:47:19 PM UTC		
⊚ Admin ∨	> PowerMax	e			ELM9/00EVTST002	PowerFlex software	All SDRs are disconnected from all SDRs	Thu, Apr 25 2024, 2:47:19 PM UTC		
	PowerProtect Data Manager     PowerProtect D0	6			Production PowerB	85212F-0N	Minor fault in fan 4 of fan tray 2.	Thu, Apr 25 2024, 2:47:19 PM UT0		
	> PowerScale				Production PowerS_	36010-ON	Minor fault in fan 4 of fan tray 2.	Thu, Apr 25 2024, 2:47:19 PM UTC		
	PowerStore     PowerSwitch	0			Production Power5	56010-ON	One or more fantray fans have mismatching airflow direction	Thu, Apr 25 2024, 2:47:19 PM UTC		
	> C Sc Series	6			Production Power5	55296-ON	Minor fault in fan 4 of fan tray 2.	Thu, Apr 25 2024, 2:47:19 PM UTC		
	> Unity >vatual	0	•		Production PowerS	\$5296-ON	Critical temperature crossed for sensor 'CPU temp' with current value of 75.	Thu, Apr 25 2024, 2:47:19 PM UTC		
	> XitremiO	æ			Production PowerB	\$4149U-DN	fentray 3 has unknown airflow	Thu, Apr 25 2024, 2:47:19 PM UTC		
	Severity	8			Production Power8	\$4149U-ON	Minor fault in fan 4 of fan tray 2.	Thu, Apr 25 2024, 2:47:19 PM UTC		
	Critical	0			Production Power5	641127-0N	fantray 2 is not working correctly	Thu, Apr 25 2024, 2:47:19 PM UTC		
	Error Warring	0			Production Power5	541127-DN	One or more pau fans have mismatching airflow deaction.	Thu, Apr 25 2024, 2:47:19 PM UTC		

#### Note:

- Alerts shown in Infrastructure Observability 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.

# 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.

dlim CloudiQ										Q 🖓 🖻 (
) Home		System Updates								
데 Monitor	~			STORAGE NET	TWORKING HCI	DATA PROTECTION	SERVER			
Manage	$\sim$	Y 14 Updates STAGE TO ARRAY	C As of Aug 16, 2023, 5:34:16	PM (UTC)						
System Update	5	🔲 System 🛧	Identifier	Model	Update Type	Current Version	Update Version	Update Category	Drive Count	Staged
3 Optimize	×									
E Reports	~	₩ 000194900732	000194900732	VMAX-2SE	Mgmt Software	V9.0.2.12	₫ V9.2.3.20	Latest		
Cybersecurity	×	Release Summary			E, VMAX 10K, VMAX 20K, and VMA	- AD4				
Lifecycle	0	V9.2.3.15 is the latest Unispine Release Notes	re for PowerMax release version for	Dell EMC VMAX Models: VMAX 5	SE, VMAX TOK, VMAX 20K, and VMA	( 40K,				
Admin	~									
y Politiki	~									
		<ul> <li>Business Analytics</li> </ul>	95148	SC7020F	System Code	07.03.01.999	J. 07.03.05	Recommended	1.71	
		Disaster Recovery	FCNCH0972C32F2	Unity 400	System Code	4.2.0.9433914	£ 4.2.1.951234	O Urgent	10	
		<ul> <li>Disaster Recovery</li> </ul>	FCNCH0972C32F2	Unity 400	Drive Firmware	C332,C333	.∰ C334	Recommended	4	
		> Finance	000197900049	PowerMax_2000	System Code	5882.309.401	ي 5978 221 221	Recommended		
		> Finance	000197900049	PowerMax_2000	Mgmt Software	V9.0.2.5	V9.0.2.10	Recommended	-	
		> me4csr64	C3MN55M	ME4084	System Code	GT280R006-02	🛓 GT280R009	Recommended	1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	
		> Production	FCNCH0972C32F1	Unity 650F	System Code	4.2.0.9433914	<u>a</u> 4.4.0,15347	Recommended	180 - C	¥
		<ul> <li>Remote DC</li> </ul>	92252	SC5020F	System Code	07.03.01.999	₫, 07.03.05	Recommended	1	
		> Replication-2	EXGMDV2	ME4012	System Code	GT280R006-02	A GT280R010	Latest	()-()	

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

#### Networking

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

ystem Updates	ST	DRAGE NETWO	DRKING HCI	DATA PROTECTION	SERVER		
5 Updates STAGE TO ARRA	AY C <sup>4</sup> As of Apr 25, 2024, 6:	58:24 PM (UTC)					đ
System $\downarrow$	Identifier	Model	Update Type	Current Version	Update Version	Update Categ Drive Count	Staged
✓ SRDF LINK	EAF300M000	Connectrix DS-6510	Switch Firmware	9.0.0a		Recommend	_
Release Summary Target version 9.0.1c is a Release Notes	wailable now.						
> Production West	JPG194001DK	Connectrix MDS-9718	3 Switch Firmware	8.3(2)	8.3(2a)	🕒 Urgent —	-
> Production SAN Extensio	EAF300M001	Connectrix ED-DCX6-	4B Switch Firmware	8.2.1a	v8.2.2a	Recommend	-
> Production East	JPG194000DK	Connectrix MDS-9396	5 Switch Firmware	8.3(2)	يل 8.3(3)	Recommend	-
> Production East	JPG194000DK	Connectrix MDS-9396	5 Switch Firmware	8.3(2)	<u>4</u> 8.5(1)	Recommend	-

# HCI

The **HCI** tab allows users to initiate multisystem updates from Infrastructure Observability. 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. Observability 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.

	Jpdates		STORAGE	NETWORKING	HCI DATA PROTECTIO	ON SERVER			
								GO TO HC	I CREDENTIALS
elect the avi	alable intelligent multi-system up	viates tasks, and then select t	he systems (VxRail clusters)	8 Systems	XRail Current Versions 7.0.240 7.0.300 6.0.010 Other Ply updates, you must have vCenter-based	50.0% 25.0% 12.5% 12.5% access control enabled. Click	to Learn More		
🖓 8 Syste	ms Available Tasks:	PRE-CHECK DOWNLD	DAD UPDATE R	UN TASK(S)					
Details	Cluster Name	Status $\downarrow$	Current	Target	vCenter	Estimated Time	Development Environ	ment	-
Details	Cluster Name Dell Mart - Corner Market, RI	Status 🔱	Current 8.0.010	Target 8.0.100 -	vCenter DellMart.vCenter1.local	Estimated Time		ment	÷
							Development Environ	ment View Release	
۵	Dell Mart - Corner Market, Ri	i Not Supported	8.0.010	8.0.100 👻	DellMart.vCenter1.local		Update available.		Notes
@ @	Dell Mart - Corner Market, RI Dell Mart - Mega Market B	Not Supported     Not Supported	8.0.010	8.0.100 -	DellMart.vCenter1.local		Update available.	View Release	Notes
0 0 0	Dell Mart - Corner Market, RI Dell Mart - Mega Market B Dell Mart - Corner/Gas Ma	Not Supported     Not Supported     Not Supported     Not Supported	8.0.010 7.0.240 7.0.240	8.0.100 - 7.0.300 7.0.320	DellMart.vCenter1.local DellMart.vCenter1.local DellMart.vCenter2.local		Update available.	View Release Wed, Nov 17 2021,	Notes 9:53:27 AM U
0 0 0	Dell Mart - Corner Market, RI Dell Mart - Mega Market B Dell Mart - Corner/Gas Ma Dell Mart - Café Market Sa	Not Supported     Not Supported     Not Supported     Not Supported     Not Supported	8.0.010 7.0.240 7.0.240 7.0.240	8.0.100 ▼ 7.0.300 7.0.320 7.0.320	DellMart.vCenter1.local DellMart.vCenter1.local DellMart.vCenter2.local DellMart.vCenter2.local		Update available. Current VxRail Version Installed On: File Size (Available): Of Witness Hostname: Component	View Release Wed, Nov 17 2021, 9.2 GB voluster440-witnes Current	9:53:27 AM U ss.vv003.local Target
0 0 0 0	Dell Mart - Corner Market, RI Dell Mart - Mega Market B Dell Mart - Corner/Das Ma Dell Mart - Café Market Sa Development Environment	Not Supported Not Supported Not Supported Not Supported Not Supported Available	8.0.010 7.0.240 7.0.240 7.0.240 7.0.240	8.0.100 × 7.0.300 7.0.320 7.0.320 8.0.100 ×	DellMart.vCenter1.local DellMart.vCenter1.local DellMart.vCenter2.local DellMart.vCenter3.local DellMart.vCenter3.local		Update available. Current VaRail Version Installed On: File Size (Available): CURRENT Witness Hostname:	View Release Wed, Nov 17 2021, 9.2 OB vcluster440-witnes	. <u>Notes</u> 9:53:27 AM U is.vv003.local <b>Target</b> → 8.0.100
2 2 2 2 2 2 2 2 2 2 2 2	Deil Mart - Corner Market, Ri Deil Mart - Mega Market R Deil Mart - Corner/Das Ma Deil Mart - Café Market Ba Development Environment Cioud data center	Not Supported     Not Supported     Not Supported     Not Supported     Not Supported     Not Supported     Available     Available	8.0.010 7.0.240 7.0.240 7.0.240 7.0.300 7.0.300	8.0.100 × 7.0.300 7.0.320 7.0.320 8.0.100 × 7.0.350 ×	DellMart s/Center 1 Jocal DellMart s/Center 1 Jocal DellMart s/Center 2 Jocal DellMart s/Center 2 Jocal DellMart s/Center 4 Jocal DellMart s/Center 4 Jocal		Update available.     Current VaRail Version     Installed On:     File Size (Available):     Witness Hostname:     Component     VaRail Manager	View Release Wed, Nov 17 2021, 9.2 08 voluster 440-witnes Current 4.7.510	9:53:27 AM U

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 Infrastructure Observability 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.

vstem Updates	STORAG	E NETWORK		DATA PROTECTION	SERVER			
7 3 Updates STAGE TO ARRA	Y C As of Aug 16, 2023, 5	:47:30 PM (UTC)						I
System 🔨	Identifier	Model	Update Type	Current Version	Update Versi	Update Cate	Drive Count	Staged
<ul> <li>dk-ppdm-prod1</li> </ul>	ELMPPD0620H1DN	PowerProtectDM	System Code	19.8.0-5	19.11.0-14 🕁	Latest	-	
Release Summary	atest undate to the PowerProtect	t Data Manager software. I	PowerProtect Data Manager	is an enterprise solution that prov	ides software defin	ed data protectio	on dedunlication	
This 19.11 release, is the la operational agility, self-sen backup and recovery self-s	vice, and IT governance. PowerP service operations from native ap rom the Dell Technologies suppo	rotect Data Manager key fo pplications that are combin	eatures include the following red with central IT governand	is an enterprise solution that pro 9: Software-defined data protectio 5:e. Prease refer to release notes a 6 deployed the reporting engine, s	n with integrated de nd deployment guid	duplication, replices prior to install	cation, and reuse Data ation or update. These	
This 19.11 release, is the la operational agility, self-ser- backup and recovery self-s guides are now available fr Guide for reporting engines	vice, and IT governance. PowerP service operations from native ap rom the Dell Technologies suppo	rotect Data Manager key fo pplications that are combin	eatures include the following red with central IT governand	g: Software-defined data protectio ce. Please refer to release notes a	n with integrated de nd deployment guid	duplication, replices prior to install	cation, and reuse Data ation or update. These	

### 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 OpenManage Enterprise. Also, users must have the Server Admin role in Observability to initiate updates. See Identity Management for more information about Observability roles.

The user first creates a compliance report choosing a baseline of target firmware and driver versions based on the latest or recent Lifecycle Controller Catalogs for Enterprise Servers. By default, a compliance report is created for all servers against the latest available versions exists and cannot be edited or deleted.

eate Compliance Re	F	
Report Information 🗸	Baseline	
Baseline	Choose baseline of target firmware/driver versions	
Target Devices	Baseline	
	April 2024 Lifecycle Controller Catalog for Enterprise Servers	
	O March 2024 Lifecycle Controller Catalog for Enterprise Servers	
	O February 2024 Lifecycle Controller Catalog for Enterprise Servers	

After selecting the baseline, the user chooses a set of target devices. To simplify the selection process, a filter is available to choose target devices based on System name, Product, OpenManage Enterprise Collector, Site, Location, and Custom Tags.

leport Information 🗸	Target Devices									
laseline 🗸	Select servers to be compared to	the chosen	baseline of firmware/	driver versions.						
arget Devices										
	Filtered: 44 of 128 Systems,	23 Selecter	d							
	Clear All X		System	Identifier	Model	Location	Collector	Site	Tags	
	System		WIN-SYS02PE1	ATY7D85	PowerEdge M	Round Roc	RR-Site-OME	ACME Round R	DataCenter TX-RR-DC3 BusinessUnit Sale	8) +1
	System or ID		SYSMGMT-ML	AF27HTH	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter:MA-H0P-DC3 +3	
	Product		IDRAC AJHQK3	AJHQK39	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter/MA-HOP-DC1 +3	
	> PowerEdge		IDRAC.AM3YN	AM3YNJH	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R_	(DataCenter/MA-HOP-DC1) +3	
	Collector Name		IDRAC.AWPFS	AWPESK1	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter/MA-H0P-DC1 +3	
	RR-Site-OME ×		IDRAC.AG86F1	AG86F1R	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R.	DataCenter/MA-H0P-DC1 +3	
	Collector Name		IDRAC.A585S8	A585S8Z	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter/MA-HOP-DC1 +3	
	Site		IDRAC.ADCG48	ADCG488	PowerEdge R7	🕅 Round Roc	RR-Site-OME	ACME Round R	(DataCenter/MA-HOP-DC1) +3	
	Site		IDRAC.A6TDFG	A6TDFGM	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter/MA-H0P-DC1 +3	
	Location		IDRAC.A8T4GS	A8T4GSY	PowerEdge R7	🖓 Round Roc	RR-Site-OME	ACME Round R	(DataCenter/MA-HOP-DC1) +3	
	Location		SYSMGMT-ML	AXCXD6R	PowerEdge R6	🖓 Round Roc	RR-Site-OME	ACME Round R	DataCenter:MA-HOP-DC3 +3	
	Tags		IDRAC.A8CM0	ABCMOTT	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R_	DataCenter/MA-HOP-DC1 +3	
	Key		IDRAC.AN44M_	AN44MPB	PowerEdge R7	🔗 Round Roc	RR-Site-OME	ACME Round R	DataCenter/MA-HOP-DC1 +3	
	Value		IDRAC.A3WWK	A3WWK62	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter.MA-HOP-DC1 +3	
	ADD	-	IDRAC.ATOMF1	ATOMF1K	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter/MA-HOP-DC1 +3	
			IDRAC.A12JP4	A12JP40	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R	DataCenter MA-H0P-DC1 +3	
			IDRAC.A65GDH	A65GDHK	PowerEdge R7	Round Roc	RR-Site-OME	ACME Round R_	DataCenter:MA-HOP-DC1 +3	

Once the compliance report is created, the user can see a bar chart showing a summary of urgent, recommended, optional, and up to date upgrades.

ystem Updates					
	STORAGE NETWORKIN	G HCI DATA PROTECTIO	N SERVER		
Server firmware and driver updates work by comparing versions currently installed on hardware to of that compliance report and make any necessary updates.	baseline versions through compliance reports. The de	fault baseline is all of the latest versions available on the	dell.com online catalog. Select a compliance report to see	all versions installed on servers that are part	3
OREATE COMPLIANCE REPORT DELETE					
2 Compliance Reports					۵
2 Compliance Reports FNUChiver Compliance Report 🔶 Compliance Summary 🚺	FW/Driver Baseline	# Devices	Description		۵
		# Devices retroller Catalog for Enterprise Servers 26	Description Legacy Systems	✓ EDIT	đ
FW(Driver Compliance Report 1 Compliance Summary	March 2024 Lifecycle Co				۵

Clicking the name opens the compliance report. The Group by pull-down menu lets the user group the updates by System or by none. When they are not grouped, they are ordered by severity and then service tag. After the user selects which updates they want to perform, the Update button becomes selectable.

PDA	те	Group by System						
/ste	em Co	ompliance   128						
		36 Urgent	▲ 6 Recommended		86 O O	O Up To Date	O Not Available	
Syste	ems, 8 i	updates across 2 systems selected						
	Sys	stem Name	Update Severity 🔱	Model	Service Tag	Management IP	OME IP Address	
	Ý	WIN-SYS02PE86	Urgent	PowerEdge MX84	Dc AMX18PE	198.51.100.86	198.51.100.201	
		Component Name	Update Severity	Current Version	Baseline Version	Category	Software Type	
	~	iDRAC with Lifecycle Controller	Urgent	5.1	4.27	Firmware	FRMW	
	1	iDRAC with Lifecycle Controller	Not Available	5.1	-	-	BIOS	
	~	iDRAC with Lifecycle Controller	Urgent	4.26	5.1	Firmware	BIOS	
	~	Internal Dual SD Module Firmware	A Recommended	1.6.11	2.1	BIOS	BIOS	
	~	PowerEdge BIOS	Optional	1.0.2	1.5.0	SAS RAID	BIOS	
	v	WIN-SYS02PE173	Urgent	PowerEdge MX74	ac ATY7D85	198.51.100.173	198.51.100.104	
		Component Name	Update Severity	Current Version	Baseline Version	Category	Software Type	
	~	Backplane 0	Urgent	4.26	4.10	Firmware	FRMW	
	~	PowerEdge BIOS	Urgent	1.6.11	1.1.0	BIOS	BIDS	
		PowerEdge BIOS	Urgent	1.0.2	2.1	BIOS	BIOS	
	~	iDRAC with Lifecycle Controller	Downgrade	3.0.2	2.1	IDRAC with Lifecycle Controller	BIOS	
	>	SYSMGMT-ML-LABS-150	Urgent	PowerEdge R750	AF27HTH	198.51.100.150	198.51.100.104	
		SYSMOMT-ML-LABS-96	Urgent	PowerEdge R640	AQ3YESS	198.51.100.96	198.51.100.201	

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

- Graceful reboot with forced shutdown
- Graceful reboot without forced shutdown
- Power cycle

pdate Devices			×
Schedule Update	Schedule Update		
Server Options	How would you like to apply updates?		
Summary	<ul> <li>Update Now</li> <li>Updates will be applied immediately which may cause selected servers to reboot.</li> </ul>		
	<ul> <li>Update on Next Reboot</li> <li>Updates will be staged to iDRAC and will be applied the next time the selected servers are rebooted.</li> </ul>		
	<ul> <li>Schedule Update</li> <li>Updates will be applied at the selected date and time and then selected servers will reboot.</li> </ul>		
	Choose date and time Apr 30, 2024, 2:10:48 PM		
	Reboot Type		
	Graceful Reboot With Forc 💌		
	Graceful Reboot With Forced Shutdown		
	Graceful Reboot Without Forced Shutdown		
	Power Cycle		
	CANCEL	BACK	NEXT

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

Update Devices		×
Schedule Update 🗸 🗸	Server Options	
Server Options	These options only affect firmware updates on capable devices. For driver updates, these selections are ignored.	
Summary	<ul> <li>Reset iDRAC This option will reboot the iDRAC prior to updating it.</li> <li>Clear Job Queue This option clears any active or pending jobs on the server prior to updating it.</li> </ul>	

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 <u>Jobs</u> 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 PowerStore, 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 frontend I/O activity in the past week or longer
- File Objects with no frontend 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 frontend 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.

29 T	otal Storage Objects 41.0 TB Total Re	claimable Space Grou	up by System	·								
	System Storage Objects Reclaimable Space Block Objects with no front end I/O activity in at least the past week											
	Production (Unity 650F)	10	23.0 TB									
۵	Block Objects with no front en	5	10.0 TB	Object	Reclaimable Sp	Pool	Last IO Time	Host				
0	Block Objects with no Hosts A	2	2.0 TB	Prod_Pool1_LUN1	2.0 TB	Production_Pool1	Tue, Jul 18 20	ProdApp1_Host1				
0	File Objects with no front end I	1	7.0 TB	Prod_Pool1_LUN2	1.0 TB	Production_Pool1	Tue, Jul 18 20	ProdApp1_Host2				
0	File-based virtual machines th	1	2.0 TB	Prod_Pool2_LUN1	3.0 TB	Production_Pool2	Tue, Jul 18 20	÷.				
0	Block-based virtual machines t	1	2.0 TB	Prod_Pool2_LUN2	2.0 GB	Production_Pool2	Tue, Jul 18 20	ProdApp2_Host2				
	Market Research (Unity XT 88	4	7.0 TB	Prod_Pool2_SAN_Dat	2.0 GB	Production_Pool1	Tue, Jul 18 20	LocalESX2				
	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									

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.

29	29 Total Storage Objects 41.0 TB Total Reclaimable Space Group by Rule Type												
	Rule Storage Objects Rectainable Space Production												
<b>~</b>	Block Objects with no front end I/O activity in at least the past week	13	14.0 TB										
۵	Production	5	10.0 TB	Object	Reclaimable Sp_	Pool	Last IO Time	Host					
0	Market Research	1	1.0 TB	Prod_Pool1_LUN1	2.0 TB	Production_Pool1	Tue, Jul 18 20	ProdApp1_Host1					
0	Business Analytics	2	1.63 TB	Prod_Pool1_LUN2	1.0 TB	Production_Pool1	Tue, Jul 18 20	ProdApp1_Host2					
0	Product Design	3	1.7 TB	Prod_Pool2_LUN1	3.0 TB	Production_Pool2	Tue, Jul 18 20	-					
0	Finance	2	200.0 GB	Prod_Pool2_LUN2	2.0 GB	Production_Pool2	Tue, Jul 18 20	ProdApp2_Host2					
	Block Objects with no Hosts Attached	12	14.0 TB	Prod_Pool2_SAN_Det	2.0 GB	Production_Pool1	Tue, Jul 18 20	LocalESX2					
÷.	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 leas	2	4.0 TB										
s:	File-based virtual machines that have been shut down for at least t	1	2.0 TB										

#### Knowledge Base Articles

The Knowledge Base Articles page parses the KB article database and provides details and links to articles that may be applicable to the systems monitored in Infrastructure Observability. Matching criteria could include version, model, and configuration. The Details icon opens a window with details of the issue and the affected versions and models. The Systems tab lists the potentially impacted systems associated with the issue identified in the article. The Article ID is a link to the article on the Dell support page.

APEX AlOps Observabl	lity								Q # 5	
2 Home 2 Monitor ~ 8 Manage ~ 3 Optimize ~	This list of a	ecommended Roowk	Articles Recommendations edge flose articles is based on your specific entrormeri, con- or systems' configurations and convectivity to other systems.						View Attracts on Set	L OVEROWL MERSIN
Reclamativ Rompe	Krawi	edge Base Articles Re ying capabilities do no	commendations is a new feature in APEX AXOps Observability that it apply yet to all Del I infrastructure products. Use the feedback for rotative will be in feach.							
E Reports ~ © Cybersecurity ~ C Ufecycle ~	Produc	т Туре	13 througe			4 Nationali		3	2 Data Postocice	
Admin v	₩ 23 Fe	commended Articles								0
	Details	Article (D	78+	Product Type	inpacted Systems	Publiced Date 4	Matohing Differia	000216757 - Dell VxRail Plugin slowness at 7.0.450-7.0.460 and 8.0.100-8.0.110		×
	8	2 000316757	Dell Voltal Plugin situeness at $7\pm450.7\pm460$ and $8\pm$ .	на	8	September 14, 2023.	Version, Mudei, Config	DETALS INSTEMS		
	8	Ø 000216676	PowerMax 2503: FAM links may be degraded during a	Storage	11	Beptember 12, 2023.	Vertion, Model	Summary Dell VxRail Flugin slowness at 7.0.450-7.0.460 and 8.0.100-8.0.110.		
	8	000539530     0	Dell VXRail, EDX 35H is loft enabled on primary VXRail	HO	100	September 7, 2023,	Version, Model	Versions		
	8	C 000216400	PowerMax 2005 and 8500. Blow PDP clean up after a t	Storage	1	August 26, 2023, 8	Version, Model	7.0.350-24876330, 8.0.010-27768308		
	8	2 000233685	PPDM Digilizate Microsoft Windows cluster name in A.	Data Protection	2	August 25, 2023, 8	Version, Model, Config	Models VuRail E05IN, VuRail 0500		
	8	000216713	PowerProtect Data Manager (PPDM) - VMeane Virtual	Data Protection	2	August 14, 2023, 8	Version, Mudel			
	8	2 000216603	Bell Vulkail LCM to 7.0.410 or above failed due to host.	H0	2	August 10, 2023, 8	Vertion, Model			
	8	000215371	PowerStore: Metro Volume is not available for host IO .	Storage	2	July 27, 2023, 1:00	Version, Model			
	8	Ø 000235879.	Connectrix Cloco: Switch upgrade failed with service 's.,	Network	3	July 21, 2023, 8 16.	Version, Model			
	8	Ø 000319223	whpp Manager for etitlanagement Unable to download	Storage	31/2	July 20, 2023, 8 16	Version, Model			
	8	Ø 000235854	Corrects Brocade DWCM III, correction rol coming .	Network.	1	July 19, 2023, 8 16	Version, Model			
	8	C 000212540	Dell OSFP28 Transolver 028-1280FC-3W4 Part Numb.	Network	4	June 22, 2023, 816	Version, Model +			

# **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 combination 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.

AP	EX AlOps Ob	servabi	ity	Q	*	Q	g	đ	å
ណ	Home		Report Browser						
	Monitor	$\sim$	CREATE REPORT						
B	Manage	$\sim$							
3	Optimize	~	Quick Tips: To create a report, you can						
	Reports	~	Click the 'Create Report' button at the top of this page						
	Create/View My	Reports	<ul> <li>Start from the context of an existing view in APEX AlOps Observability by selecting "Create Report" from the view menu</li> </ul>						
	Manage My Rep	orts	To open an existing report click. + at the top of this page						
•	Cybersecurity	~							
C	Lifecycle	$\sim$					E		
0	Admin	~							
		<							

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.

Report Browser	
CREATE REPORT	
Report ADD CONTENT	

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 dropdown menus to define the content including the format. The remaining menus differ based on the selected format.

Add Content			×
Step 1 Step 2 Step 3	Choose A Title And A Format Title Example Format * Anomaly Chart Line Chart Table		
		CANCEL	BACK NEXT

# **Tables**

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

- Data Protection System
- Filesystem
- Host
- MTree
- Network System
- Pool
- Replication
- Server
- Server Firmware
- Storage System
- Virtual Machine
- Volume
- Volume Group
- HCI System
- PowerFlex Host
- PowerFlex Protection Domain
- PowerFlex SDS
- PowerFlex Storage Pool
- PowerFlex Device
- PowerFlex Fault Set

Add Content		
Step 1 Title: Example Format: Table	~	Choose Your Columns Category
Step 2		Network System
Step 3		Pool
		Replication
		Server
		Server Firmware
		Storage System
		Virtual Machine

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

d Content					
Step 1	~	Choose Your Columns			
Title: Example Format: Table		Category Storage System 👻			
Step 2					
		Drag And Drop Or Double Click to Add A Column			
Step 3					
Step 3		All 👻 🔍 Search Columns			
Step 3		All   Available Columns		Selected columns (9)	
Step 3				Selected columns (9) Health	
Step 3		Available Columns	# #		
Step 3		Available Columns Bandwidth		Health	
Step 3		Available Columns Bandwidth BusinessUnit		Health System Name	8
Step 3		Available Columns Bandwidth BusinessUnit Capacity Impact		Health System Name Version	:
Step 3		Available Columns Bandwidth BusinessUnit Capacity Impact Components Impact	*	Health System Name Version IOPS	

The next step shows a preview of the content and allows the user to sort and filter the results. The user can select in the "Filter by" 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.

Step 1 🗸	Sort And Fi	ilter							
Title: Example	Filter by								
Format: Table	Product Mo	del: PowerMax X Q	ADD FILTER	Clear all Filters					
Step 2 🗸		Unity							
Category: Storage System Columns: 9	He	APEX File Storage Services	Version	IOPS	Latency	Provisioned	Used (%)	Free	Data Reduct
	<b>€</b> > □	SC Series	4.2.0.9433914	195	21.5	-	91.4%	1.3	=
Step 3	🧧 ~ 🗹	PowerMax	4.3.0.9433914	10.6	1.1	582	52.1%	53.1	4.5:1
	9	PowerMax_2000     VMAX-1SE	5.0.0.5.116	22.3	1.3	341	38.6%	38.1	1.0:1
	٥	PowerMax_2500	4.3.0.9433914	195	21.5	724	72.1%	21.5	2.7:1
		XtremIO *	v9.1.1	102.4k	102.4	-	55%	405	
	100	Business Analytics	07.03.01.999	39.4	358.2	529.2	24.1%	69.3	2.3:1
	85	Remote DC	07.03.01.999	39.4	358.2	492.1	37.8%	26.2	2.7:1
	90	Finance	5978.711.711	16k	0.3	91	46.3%	36.1	1.2:1
	100	Software_Dev	5876.309.401	1.8k	2.8	60.5	51.0%	20.0	
	70	HR_Remote	6079.124.0	16k	0.2	121	23.5%	360.4	
	100	Prod with iCDM	4.0.26-10	90k	0.8	2620	65.0%	47	2.1:1
	100	ERP Production	6.2.0-81	15k	0.8	2411	70.0%	74	2.3:1
	94	ERP Remote	6.2.0-81	65k	0.8	518	79.7%	11	2.2:1
	95	Manufacturing_Prod	2.0.0.0-1371720	34	21.5	25.0	25.0%	18.75	4.7:1
	70	Manufacturing_Dev	1.0.0.0.5.109	34	1.4	25.0	25.0%	18.75	4.7:1
	60	APEX-Block-Boston		34	21.5	-	44.0%	0	-
	100	Product Design	GT280R006-01	6.5k	-	29.0	42.5%	16.7	-
	90	Research and Development	GT280R006-02	5.5k	_	36.3 TB	19.0%	53.6	_

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 <u>Custom Tags</u> section for more information.

Sorting is performed by clicking the column name on which to sort. Once the user has the table as they want it, clicking Add Content will add the table to the report.

#### Line charts

A line chart requires the user to select the Product and Category. Once those are selected, a table with available objects in that category is presented.

The user chooses which objects to include and clicks Next. The following example shows PowerMax storage groups "Finance\_SG\_11" and "Finance\_SG\_12" selected.

#### Reports

Step 1 🗸 🗸	Choose A Product And A Cate	egory					
Title: example Format: Line Chart	Product PowerMax 👻	Category Storage Group 👻					
Step 2	Filter by						
Step 3		Q ADD FILTER	Clear all Filters				
	36 items (Selected 2 / 36)						
	Name	Compliance	SRP	Service Level Name	Emulation	Subscribed	Used
	Finance_SG_11	Critical	Finance_SRP1	Diamond	FBA	100.0	10.2
	Finance_SG_12	Marginal	Finance_SRP1	Bronze	CKD	100.0	10.2
	Finance_SG_13	Stable	Finance_SRP1	Diamond	FBA	100.0	10.2
	Finance_SG_14	None	Finance_SRP1	Diamond	CKD	100.0	10.2
	Finance_SG_21	Stable	Finance_SRP2	Diamond	FBA	100.0	10.2
	Finance_SG_22	Stable	Finance_SRP2	Bronze	CKD	100.0	10.2
				-			

After choosing the objects, the final step is to choose the metrics.

The following example shows the Bandwidth, IOPs, and Latency metrics. Clicking Add Content adds the line charts to the reports.

Metrics available for line charts are shown in Appendix D: Report Browser metrics.

Step 1 🗸	Metrics				
Title: example Format: Line Chart	15 Metric	s Q Search Metrics			
Step 2 🗸	Ξ	Metrics (Selected 3)	Metrics Description		
Product: PowerMax Category: Storage Group		% Read	The % read of a PowerMax Storage Group.		^
Systems: 1		Allocated Size	The allocated size of the PowerMax storage group in bytes.		
Step 3 Metrics: 3 Charts: 3		Bandwidth	The bandwidth of a PowerMax Storage Group.		
		Bandwidth by Read/Write	The bandwidth by read/write of a PowerMax Storage Group.		_
		IO Size	The io size of a PowerMax Storage Group.		
		IO Size by Read/Write	The io size by read/write of a PowerMax Storage Group.		_
		IOPS	The lops of a PowerMax Storage Group.		- 1
		IOPS by Read/Write	The lops by read/write of a PowerMax Storage Group.		
		Latency	The latency of a PowerMax Storage Group.		
		Latency by Read/Write	The latency by read/write of a PowerMax Storage Group.		

# **Anomaly charts**

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

- Connectrix
- PowerFlex
- PowerMax
- PowerScale
- PowerStore

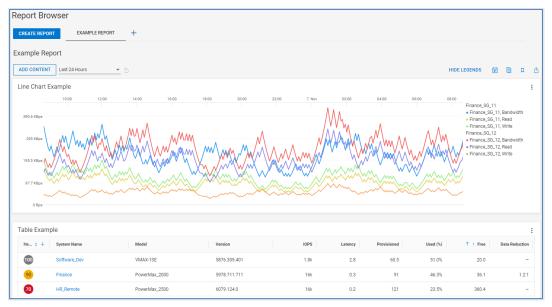
- PowerVault
- SC Series
- Unity XT
- VMware

Anomaly charts provide both the value of the metric and the historic seasonality. By plotting the historic seasonality, users can 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: Schedule the report. Choose an initial runtime and one of the following intervals: Daily, Weekly, Biweekly, Monthly, or Quarterly. Choose a format of PDF or CSV. Enter email addresses for recipients.
- Duplicate: Create 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: Add or remove 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: Export 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.

#### Reports

Example Repo	ort
ADD CONTENT	Last 24 Hours 🔹 🕤
Line Ob est Fo	Last 3 Hours
Line Chart Ex	Last 12 Hours
	Last 24 Hours
390.6 KBps	Last 3 Days
293 KBps	Last 7 Days
Loo Kopa	Last 30 Days
195.3 KBps	Custom Range

## Chart and table options

For each individual chart or table, the user is presented with 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 Export the individual chart or table in PDF format.
- Export CSV Base Units. Export the individual table in CSV format.
- Export CSV Units as Displayed. Export the individual chart or table in CSV format using scaled values shown in the table.
- Remove Delete the chart or table.

	:
F	Edit
	Duplicate
	Export PDF
5:	Export CSV - Base Units
3	Export CSV - Units as Displayed
2	Remove

# 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 Observability. The CREATE REPORT button directs the user to the Report Browser to create a report.

All	Reports			
С	REATE REPORT			
Q	search			
	Title	Last Modified	Next Scheduled $\ \downarrow$	
Д	PowerProtect DD	Oct 28, 2022, 9:50:06 AM	Nov 10, 2022, 2:35:00 PM	:
Д	Storage Systems & Hosts	Nov 3, 2022, 11:17:40 AM	-	:
D	All LUNs & Filesystems	Oct 27, 2022, 1:58:27 PM	-	:
D	Unity - Capacity & Workload	Oct 27, 2022, 1:58:29 PM	-	:
Д	Virtual Machines	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.

	÷
Schedule Repo	rt
Remove Report	t

# Cybersecurity

# Introduction

Cybersecurity is a feature within Infrastructure Observability that adds the ability to monitor Dell resources for security risks. Observability 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, PowerEdge Server and Modular Chassis, and PowerProtect DD systems and will continue to expand coverage to other Dell systems.

**Note**: To gain access to Cybersecurity, users must be given a Cybersecurity-related role. An Admin user must assign these roles to users, including themselves. See <u>Identity Management</u> and <u>KB#000205045</u> 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. For systems that have an active ransomware incident, Observability displays a red ransomware incident banner in the card view. 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.
  - The 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.

3 Home	Cybersecurity Syster	n Risk											
🗄 Monitor 🗸 🗸													
Manage ^	1	Introducing your Cybersecurity Risk Level.										×	
System Updates	Ŷ	Your risk indicates your security weaknesses based on best practices. Cybersecurity issues combined with how many tests you have selected in your evaluation plan will affect your system risk until actions are taken towards remediation.											
5 Optimize $\checkmark$									Don't	show again LEARN F	AORE		
🛛 Reports 🗸 🗸													
5 Cybersecurity	Filtered: 11 of 108 Systems												
System Risk	Clear All ×	Finance PowerMax_2000   000			Software_De	v		Manufacturin	ng_Prod		dd-lab-04		
Cybersecurity Issues	System		nt - Suspicious data	encryption/compr	vnAU0-1SE   0001949	ural.		Powerstore 1000X   F	194291.02		UD VE   ELMODV456	11010	
Policy Security Advisories	System or ID	Risk Level	Evaluation Plan	Issues	Risk Level	Evaluation Plan	issues	Risk Level	Evaluation Plan	Issues	Risk Level	Evaluation Plan	Issues
Cybersecurity Incidents	Product	C	100%	High 1 Medium 2	()	100%	Medium 1	()	86%	Medium 4 Low 1	C	100%	High 4 Medium 6
5 Lifecycle 🗸	PowerEdge Chassis     PowerEdge Server	<b>•</b>	Selected	Low 1	Medium	Statut	Meanann	Medium	tion of	Total 5	High	taking	Low 1
Admin ^	> PowerMax	High		Total 4	MPC diam			Median			rigi		Totai 11
Identity Management	PowerProtect DD     PowerStore	dd-lab-05				H.publicnet.u	•	WIN-SYS02P	E179		WIN-SYS02P	506	
Settings		009900   ELM00V24	SETRW1		PowerEdge MX7000	AMX18CH	5	PowerEdge MX740c	ATY7D85		PowerEdge MX740c	AMIX18PE	
Customization	System Risk	Risk Level	Evaluation Plan	Issues	Risk Level	Evaluation Plan	Issues	Risk Level	Evaluation Plan	lissues	Risk Level	Evaluation Plan	Issues
Licenses	V S Low				_	$\frown$	Medium 10	_	$\frown$	High 1	_	$\sim$	Medium 18
Connectivity	Second	0	73% Selected	Low 1	Ø	100% Selected	Low 5	O	(100% selected	Medium 22 Low 5	Ó	(100% Selected	Low 5
Jobs	Tags	Low	$\smile$		High	$\smile$	Total 15	High	$\smile$	Total 28	High	$\smile$	Total 23
HCI Settings	Key												
Audit Log Tags	Value	SYSMGMT-M PowerEdge R750   AF			SYSMGMT-N PowerEdge R540   Ad			IDRAC.A5NY PowerEdge R740   A5					
	ADD												
	Site	Risk Level	Evaluation Plan	Issues	Risk Level	Evaluation Plan	Issues	Risk Level	Evaluation Plan	Issues			
	Site	O	94%	Low 2	O	94%	Low 5	O	84%	Medium 4 Low 3			
	Location	Low	$\bigcirc$		Medium			Medium		Total 7			
	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.

APEX AlOps Observab	ility			Q 🖸 📮 🛱 🕑 8
☐ Home	Cybersecurity Issues			
🖸 Monitor 🗸 🗸	AC	CTIVE (101) RESOLVED (39)		
Manage  V	102 issues on 11 systems			
Optimize      V     Reports      V	Severity 1 $\psi$	Issue	System	Created 1 个
	> 🛕 High	PowerMax system requires a software up	Finance	50 days ago
Cybersecurity ^	👻 🛕 High	WIN-SYS02PE173	13 hours ago	
Cybersecurity issues Policy Security Advisories C Lifecycle ~ S Admin ~	Peoplysion: This lets' writes that Secure Boot is enabled. UREI Secure Boot is a student as a major security work that may occur during a handoff between the the chain is validated and student age application as peoplic certificate before It can load or run. Secure Boot removes the timement, choice that, mich of Bookard and the student as the student as people the student as the student and the student and the student and the student as the student and the student and the student and the student as			Centrel Mary 15 2024, 12:11:53 AMU/UTC Security Control Family Security Control Family Securit Education Integration Securit Education Integration
		Security Officer role is disabled	dd-lab-04 dd-lab-04	9 days ago
		TLSv1.2 is disabled	dd-lab-04	15 days ago
	> 🛦 High	Replication encryption is not set	dd-lab-04	16 days ago
	> 🔶 Medium	FIPS mode is disabled	MX-AMX18CH.publicnet.us	19 days ago
	> 🚸 Medium	LCD PIN is disabled	MX-AMX18CH.publicnet.us	18 days ago
<	4			•

## **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 the associated template, status of the evaluation, number of selected tests, custom tags, 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 the product category and select "No" under "Using a template". They can then assign a template to all systems that are not associated with a template.

APEX AIOPS Observ	ability											Q 📌	₽ Ø	0
3 Home	Policy	/												
Monitor /							SYSTEMS (1	07) TEMPI	LATES (6)					
Infrastructure Applications Virtualization		-,	ASSIGN	UNASSIGN	Plan: ENAB									
Carbon Footprint	Clear A			System 个	Template	Plan Enabled	Tests Selected	Identifier	Model	Tags	Location	Last Update Ti	Plan	
Pools	System			dd-lab-04	PPDD Templ	~	11 out of 11	ELMDDV456	DD VE	DataCenter/MA-HOP-DC1 +3	🕈 Hopkinton,	May 23 2024,	/ EDI	т
Health Issues Service Requests	System or	ID		dd-lab-05	-	~	11 out of 11	ELMDDV246	DD9900	DataCenter/MA-H0P-DC3 +3	Round Roc	Apr 13 2024,	🖉 EDI	r
Alerts	Product			Finance	-	~	12 out of 12	000197900049	PowerMax_2	DataCenter:TX-RR-DC1 +3	Round Roc	Apr 8 2024, 0	🖉 EDI	т
Manage /		werEdge Chassis werEdge Server		IDRAC.A02D	BU_Engineeri	~	26 out of 31	A02DHCS	PowerEdge R	DataCenter:MA-H0P-DC1 +3	🕅 Hopkinton,	Apr 15 2024,	/ EDI	π
System Updates	> _ Pov			IDRAC.A12JP	BU_Engineeri	$\checkmark$	26 out of 31	A12JP40	PowerEdge R	DataCenter.MA-H0P-DC1 +3	Round Roc	Apr 20 2024,	🖉 EDI	π
Optimize \		werProtect DD		IDRAC.A2SP	BU_Engineeri	~	26 out of 31	A2SPMRK	PowerEdge R.,	DataCenter/MA-H0P-DC1 +3	Hopkinton,	May 13 2024,	🥒 EDI	т
Reports	_			IDRAC.A2Z5B	BU_Engineeri	~	26 out of 31	A2Z5B3H	PowerEdge R	DataCenter:MA-H0P-DC1 +3	Hopkinton,	May 8 2024,	🖉 EDI	π.
Cybersecurity	Template			IDRAC.A3PP	BU_Engineeri	~	26 out of 31	A3PP8MR	PowerEdge R	DataCenter:MA-H0P-DC1 +3	Hopkinton,	Apr 21 2024,	🥒 EDI	т
System Risk	Enter a Ter	mplate Name		IDRAC.A3558	BU_Engineeri	~	26 out of 31	A3S58RT	PowerEdge R	DataCenter:MA-H0P-DC1 +3	Hopkinton,	May 8 2024,	🖉 EDI	т
Cybersecurity issues	Using a te	mplate		IDRAC.A3TH	BU_Engineeri	~	26 out of 31	A3TH4WR	PowerEdge R	DataCenter:MA-H0P-DC1 +3	🖗 Hopkinton,	Apr 9 2024, 0	🖉 EDI	т
Policy	Ves No			IDRAC.A3WW	BU_Engineeri	~	26 out of 31	A3WWK62	PowerEdge R.,	DataCenter/MA-H0P-DC1 +3	Round Roc	May 6 2024,	🖉 EDI	т
Security Advisories				IDRAC.A42FD	BU_Engineeri	~	26 out of 31	A42FDBY	PowerEdge R	DataCenter/MA-H0P-DC1 +3	🕅 Hopkinton,	Apr 17 2024,	🖉 EDI	m
Cybersecurity incidents	Plan State			IDRAC.A4FXB	BU_Engineeri	~	26 out of 31	A4FXB5Z	PowerEdge R	DataCenter/MA-H0P-DC1 +3	🖲 Hopkinton,	Apr 30 2024,	🖉 EDI	π
	Disabl			IDRAC.A585S	BU_Engineeri	~	26 out of 31	A585S8Z	PowerEdge R	DataCenter:MA-H0P-DC1 +3	Round Roc	May 23 2024,	🖉 EDI	л
Admin 🕓	/	÷												

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. The possible evaluation tests are 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.

A	PEX AlOps Obse	ervabi	lity	Edit	Evaluation Plan - Finance			×
					Enable 11 out of 12 evaluation tests selected			
				Sec	curity Control Family 🔨		Evaluation Test	LDAPS based authentication enabled $ \times$
				×	Access Control	Details	3 out of 3 selected	This test verifies whether LDAP based authentication
							II All	is enabled on Unisphere. A centralized authentication solution such as Active Directory should be deployed
			Sy			e	LDAPS based authentication enabled	to enable the close monitoring and control of user
						۵	Role Base Access Control (RBAC) enabled	access and to ensure uniform enforcement of the
						۵	System using SNMP v3	organization's authentication policies. The LDAP over SSL should be used when setting up Active Directory
				×	Audit and Accountability	Details	0 out of 1 selected	options for storage systems.
							All	
						6	Remote Syslog enabled	
				×	Configuration Management	Details	1 out of 1 selected	
							🗸 All	
						0	Determine if any SNMP trap destination is configured	
				×	Identification and Authentication	Details	2 out of 2 selected	
							II All	
						e	LDAP server certificate verification enabled	
						۵	The administrator user's default password was changed	
				>	System and Communications Protection		3 out of 3 selected	
				>	System and Information Integrity		2 out of 2 selected	
								CANCEL SAVE

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.

APEX AlOps (	bservab	illity	Edit Evaluation Plan - Finance			×
						LDAPS based authentication enabled $ \times$
						This test verifies whether LDAP based authentication
						Is enabled on Unisphere. A centralized authentication solution such as Active Directory should be deployed
						to enable the close monitoring and control of user
						access and to ensure uniform enforcement of the organization's authentication policies. The LDAP over
						SSL should be used when setting up Active Directory options for storage systems.
			Audit and Accountability			options for storage systems.
			🛕 Ar	re you sure?	×	
			Modifying	the evaluation tests will unassign the 1	Femplate from the system	
				en assigned. isues that are associated with any rem	oved tests will be deleted.	
					CANCEL SAVE	
			<ul> <li>Identification and Authentication</li> </ul>		CANCEL DAVE	
					Al S	
	ζ.					CANCEL SAVE

Users will be notified in the What's New section when new tests are added to the product.

## **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.

APEX AlOps Obs	ervab	lity				Q 🖌 5	) s (	8
습 Home		Policy						
Monitor	~			SYSTEMS (107) TEMPLA	ATES (6)			
Manage	~	ADD TEMPLATE						
Optimize	~	AUDTEMPEATE						
Reports	~	Template Name	Tests Selected	Product	Systems Using Template	Last Update Time		
Cybersecurity	^	modular-chassis-template	18 out of 18	PowerEdge Chassis	1	May 14 2024, 01:38:44 PM UTC	:	
System Risk Cybersecurity Issu		BU_Sales	31 out of 31	PowerEdge Server	18	May 14 2024, 01:38:44 PM UTC	:	
Policy	20	BU_Engineering	26 out of 31	PowerEdge Server	74	May 14 2024, 01:38:44 PM UTC	:	
Security Advisorie		BU_Manufacturing_and_Finance	29 out of 31	PowerEdge Server	9	May 14 2024, 01:38:44 PM UTC	:	
Cybersecurity Inci	dents	Powerstore	10 out of 10	PowerStore	0	May 14 2024, 01:38:44 PM UTC	:	
	~	PPDD Template	11 out of 11	PowerProtect DD	1	May 14 2024, 01:38:44 PM UTC	:	
Admin	~							
	<							

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.

Add Template					$\times$
Template Info Template Evaluation Plan	Template Info Template Name * Demo Template	Product * PowerMax PowerStore PowerEdge Server PowerEdge Chassis PowerProtect DD			
			CANCEL	BACK	π

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.

Add Template				>
Template Info 🛛 🗸	Template Evaluation Plan			
Template	31 out of 31 evaluation tests selected			
Evaluation Plan	Security Control Family		Evaluation Test	
	<ul> <li>Access Control</li> </ul>	Details	7 out of 7 selected	
			✓ All	
		٩	IP Blocking is enabled	
			Quick Sync Read Authentication to the server is enabled	
			SSH is disabled	
		٩	The SNMP agent is configured for SNMPv3	
		٩	User Active Directory authentication on iDRAC is enabled	
			User Generic LDAP authentication on iDRAC is enabled	
		٩	VNC server Disabled	
	> Audit and Accountability		3 out of 3 selected	
	> Configuration Management		4 out of 4 selected	
	> Identification and Authentication		5 out of 5 selected	
	> System and Communications Protection		10 out of 10 selected	
	<ul> <li>System and Information Integrity</li> </ul>	Details	2 out of 2 selected	
			III	
		A	SecureBoot is enabled	
		۵	✓ iDRAC configuration on Host system is disabled	
			CANCEL BACK	FINISH

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, a synopsis, component, number of impacted systems, and publish date. Clicking the **View Article** hyperlink opens the article details on the Dell 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.

APEX AlOps Obs	ervab	iiity								۹ 🖌	~ 8	0
금 Home 더 Monitor	~	← DSA-202	23-134								🔀 Viev	Article
Manage		Impact 🛕 High	Published May 23, 2023 3:59	10 PM UTC Upd	ated Jun 30, 2023 12:00:00 AM	UTC						
) Optimize	~	Synopsis CVSSv3 Range CVEs	DSA-2023-134: Security Update for 7.4 CVE-2022-4304, CVE-2023-0215, C									
Reports	~	102 Component										
⑦ Cybersecurity	^	Component 🛧	Instance	Current Version	System	Identifier	Model	Location	Tags			
System Risk Cybersecurity Issu		BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.A5NY8KG.local	ASNYBKO	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-HOP-DC1	BusinessUnitEngine	ering +	2
Policy		BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.AMNPM61.local	AMNPM61	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-HOP-DC1	BusinessUnitEngine	ering) +	2
Security Advisories		BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.AJHQK39.local	AJHQK39	PowerEdge R740	P Round Rock, TX	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2
Beta Cybersecurity Incid	ents	BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.AM3YNJH.local	AM3YNJH	PowerEdge R740	Q Round Rock, TX	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2
C Lifecycle	~	BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC ASPCYHT.local	ASECYHT	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnit Engine	ering) +	2
Admin	~	BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.AHMR03S.local	AHMR03S	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2
		BIOS	DCIM:INSTALLED#741	1.6.11	iDRAC.AFSZGP9.local	AFSZGP9	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnit Engine	ering) +	2
		BIOS	DCIM:INSTALLED#741	1.6.11	iDRAC.A91BNKJ.local	A91BNKJ	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2
		BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.ABYXXYF.local	ABYXXYF	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2
		BIOS	DCIM:INSTALLED#741	1.6.11	IDRAC.A42FDBY.local	A42FDBY	PowerEdge R740	P Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2
		BIOS	DCIM:INSTALLED#741	1.6.11	iDRAC.AHGXRF9.local	AHGXRF9	PowerEdge R740	Q Hopkinton, MA	DataCenter:MA-H0P-DC1	BusinessUnitEngine	ering) +	2

# Ransomware Incidents

Ransomware Incidents enables users to monitor for cybersecurity ransomware incidents in near real time. At the time of publication, ransomware incidents is supported on PowerMax systems. Coverage will continue to expand to other platforms. This feature is also considered Beta at the time of this publication, meaning support and feedback for this feature is accomplished through the **Feedback Form** link in the Observability UI.

In the event of a ransomware attack, the attackers encrypt the data which requires an encryption key to essentially unlock the data. One of the effects of encryption is that the data becomes uncompressible or irreducible. By establishing an expected range of the reducible data, and then continuously monitoring the level of it, one can identify variances outside of normal patterns which are referred to as anomalies. Through various algorithms and analysis, Observability can then identify potential ransomware incidents in near real time.

The **Ransomware Incidents** page is accessed from the Cybersecurity menu on the left side of the Infrastructure Observability user interface. This page shows all identified incidents and puts them in one of three categories: New, Investigate, or Closed. When an incident is first identified, it appears in the New tab. Each incident has an incident ID, a confidence level, the system identifier, the location, the number of affected storage groups, and the created and updated times. There is also the ability to add notes to each incident. When the incident is ready to be analyzed, the user selects it and clicks **Acknowledge & Investigate**.

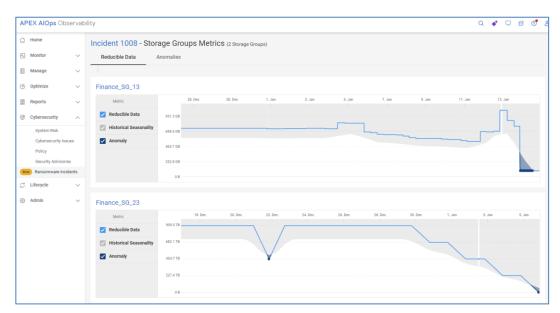
API	EX AlOps Obs	ervabi	ility									Q	*	₽ ₫	3 (	5
â	Home		Ransomwar	e Incider	nts 🐵 Sett	ings										
4	Monitor	~	A Beta Relea													
	Manage	~	Ransomware I	incidents is a ne			currently part of a beta pr									
O	Optimize	~	and above; and	d PowerMax V3	models with PowerMa		.0.1.3 and above, managed above, managed by Unisphe tative will be in touch.									
	Reports	~														
7	Cybersecurity	^					NEW (1)	INVESTIGATE (	3) CLOSED (2)							
	System Risk Cybersecurity Issue		√ 1 Incident	ACKNOWLE	DGE & INVESTIGAT	E CLOSE 🔻	0 Incidents Selected									
	Policy	15	Incident ID	ψ	Incident	Confidence Level	System	Identifier	Location	Storage Gr	Created	Updated	Act	ion		
	Security Advisories		1011		Suspicious d	High	Finance	000197900049	Round Rock, TX	4	May 22, 2022	May 22, 2022		Note		
	Ransomware Incide															
	Lifecycle	~														
0	Admin	~														

At this point, this incident is "frozen" and moved under the Investigate tab. Any new anomalies will trigger a new incident. While in the investigate state, the user can look at the potentially affected hosts and applications to determine if the incident is a true ransomware attack. If so, they can take appropriate action to isolate and recover.

To help investigate, the user can click the incident ID link and see the details of which storage groups experienced anomalies and when the anomalies were created and last updated.

APEX AlOp	Observat	bility						Q 🗳
ු Home		← Incident 1008	- Suspicious data	encryptio	n/compression			
Monitor	~	CLOSE -						
Manage	$\sim$						100 Aug 2014 - 100 Aug	
Optimize	~	Status Investiç Confidence Level Low	pate		Created Jun 7 2024, 03:51 Updated Jun 29 2024, 08:0		System Final Identifier Final	
Reports	~						Location Rour	nd Rock, TX
⑦ Cybersecuri	ty ^	Description Suspicious da	ata encryption/compression wa	as detected, which n	night indicate exposure to ranson	nware.	Note Note	
System Ri Cybersecu Policy Security A	rity Issues	Select up to 3 storage groups 1		DRAGE GROUP ME	TRICS SG Sensitivity Level	Description	Created	Updated
Beta Ransomw	are Incidents	Finance_S6_13	High	191	High	Storage Group unreducibl	Dec 28, 2023 1:17:54 PM	Jan 15, 2024 10:22:53 PM
C Lifecycle	~	Finance_SG_23	High	200	High	Storage Group unreducibl	Dec 18, 2024 17:35:51 PM	Jan 6, 2024 22:12:51 PM
Admin	$\sim$	Finance_SG_33	High	112	High	Storage Group unreducibl	Nov 24, 2023 9:35:12 PM	Dec 12, 2023 14:19:22 PM

Users can select up to three storage groups at a time to see charts of the reducible data, the historical seasonality, and the anomalies.



The Anomalies tab provides a list of anomalies, also called logs, with their timestamps.

APEX AlOps Obs	servab	ility			Q 💉 🖓 😫
∯ Home		Incident 1008 - Storage	Groups Metrics (2 S	lorage Groups)	
Monitor	~	Reducible Data Anom	alies		
Manage	~				
Optimize	~	Finance_SG_13 191 Ano	nalies		
gy optimize	Ý				
Reports	$\sim$	Created	Significance	Log	
		Jan 14, 2024, 12:25:00 PM	High	A reducible data anomaly has been detected.	
Cybersecurity	^	Jan 14, 2024, 12:20:00 PM	High	A reducible data anomaly has been detected.	
System Risk		Jan 14, 2024, 12:15:00 PM	High	A reducible data anomaly has been detected.	
		Jan 14, 2024, 12:10:00 PM Jan 14, 2024, 12:05:00 PM	High	A reducible data anomaly has been detected. A reducible data anomaly has been detected.	
Cybersecurity Issu	ues	Jan 14, 2024, 12:00:00 PM	High	A reducible data anomaly has been detected. A reducible data anomaly has been detected.	
Policy		Jan 14, 2024, 12:00:00 PM	High	A reducible data anomaly has been detected.	
Security Advisorie	25	Jan 14, 2024, 11:50:00 AM	High	A reducible data anomaly has been detected.	
Bata Ransomware Incid	lante	Jan 14, 2024, 11:45:00 AM	High	A reducible data anomaly has been detected.	
nanooniware incic	Jento	Jan 14, 2024, 11:40:00 AM	High	A reducible data anomaly has been detected.	
C Lifecycle	$\sim$	001114, 2024, 11.40.00 Mill	i ngn	A requiring data a formary rate sear developed.	
le Admin	~	Finance_SG_23 200 Ano			
		Created	Significance	Log	
		Jan 05, 2024, 08:50:00 PM	High	A reducible data anomaly has been detected. A reducible data anomaly has been detected.	
		Jan 05, 2024, 08:45:00 PM Jan 05, 2024, 08:40:00 PM	High High	A reducible data anomaly has been detected. A reducible data anomaly has been detected.	
		Jan 05, 2024, 08:40:00 PM	High	A reducible data anomaly has been detected. A reducible data anomaly has been detected.	
		Jan 05, 2024, 08:35:00 PM	High	A reducible data anomaly has been detected. A reducible data anomaly has been detected.	
		Jan 05, 2024, 08:30:00 PM	High	A reducible data anomaly has been detected.	
		Jan 05, 2024, 08:20:00 PM	High	A reducible data anomaly has been detected.	
		Jan 05, 2024, 08:15:00 PM	High	A reducible data anomaly has been detected.	
			High		
		Jan 05, 2024, 08:10:00 PM		A reducible data anomaly has been detected.	

Once the investigation is complete, the user determines if the incident was a valid ransomware attack that was resolved or a false incident. Selecting an incident and then clicking Close gives the user the option to close it with either of these two options.

ු Home		Ransomware I	ncidents 🛛 🕲 Set	tings			
Monitor	$\sim$						
Manage	$\sim$		lents is a new feature in APEX A				
3 Optimize	~	and above; and Po	only to PowerMax 2500 and 8500 werMax V3 models with PowerM form to identify any issues that yo	axOS 5978.711.711 and at	oove, managed by Unisph		
Reports	$\sim$						
Cybersecurity	^				NEW (1)	INVESTIGATE (3)	) CLOSED (2
System Risk		√ 3 Incidents	CLOSE  1 Incident Select	ed			
Cybersecurity	Issues	- Incident D	Close - Incident Resolved	Confidence Level	System	Identifier	Location
Policy			Jose - Palse Incident	Low	Finance	000197900049	Round Rock, TX
Policy Security Advis	ories	1008					
		1008	Suspicious d	Medium	Finance	000197900049	Round Rock, TX

Ransomware incident monitoring is enabled from the **Settings** link on the **Cybersecurity Incidents** page. The Cybersecurity Incidents Settings page lists the supported systems for ransomware incident monitoring.

APEX AlOps Obse	rvabi	lity							Q	*
ු Home		← Ransomware I	ncidents Detection	Settings						
Monitor	~			oottiingo						
E Manage	~	7 1 System								
③ Optimize	~	System 🛧	Identifier	Location	Storage Groups Enabled	Incident Ser	isitivity Level		Configure	
图 Reports	~	Finance	000197900049	Round Rock, TX	8 of 12 Enabled	High: 4	Medium: 4	Low: 4	Configure	
Cybersecurity	^									
System Risk										
Cybersecurity Issue	s									
Policy										
Security Advisories Ransomware Incide										
C Lifecycle	~									
Admin	~									

Clicking **Configure** on one of the systems opens the **Configure Cybersecurity Incidents** window. In this window, the user can choose to enable or disable any of the storage groups and can set an Incident Sensitivity Level. Users can also see the detection mode, either Learning or Detecting. Learning occurs when the storage group is first enabled or after an incident is closed as a valid incident. During this mode, Observability learns the expected range of reducible data to establish normal behavior. Once the expected behavior is established, the mode switches to detecting and Observability starts monitoring the storage group for ransomware incidents. The sensitivity level lets users tune the detection algorithm. A low sensitivity level results in a lower likelihood of triggering an incident. A high sensitivity level results in a higher likelihood of triggering an event. Users may want to set a sensitivity level of low for less critical applications or for applications that have a higher variation of reducible data. Users may set a sensitivity level of high for more critical applications or applications that have a lower variation of reducible data.

	Confi	gure Ransomv	are Incidents	Detection - Finance					3
	<b>V</b> 12	Storage Groups	Incident Detection	ENABLE DISABLE	Incident Sensit	ivity Level 🔻			2 Storage Groups Select
	Ξ	Storage Group ↑	Enabled	Mode	High	SRP	Service Level	Capacity (G	Incident Sensitivity Level
		Finance_SG_11	~	Learning	Medium	Finance_SRP1	Diamond	100	Medium
		Finance_SG_12	$\checkmark$	Learning	1	Finance_SRP1	Bronze	100	Low
		Finance_SG_13	$\checkmark$	Detecting		Finance_SRP1	Diamond	100	High
		Finance_SG_14				Finance_SRP1	Diamond	100	Low
		Finance_SG_21				Finance_SRP2	Diamond	100	High
		Finance_SG_22	~	Learning		Finance_SRP2	Bronze	100	Medium
		Finance_SG_23	~	Detecting		Finance_SRP2	Bronze	100	Low
		Finance_SG_24				Finance_SRP2	Diamond	100	Medium
		Finance_SG_31	~	Detecting		Finance_SRP1	Diamond	100	High
		Finance_SG_32	~	Learning		Finance_SRP1	Bronze	100	Low
		Finance_SG_33				Finance_SRP1	Diamond	100	High
		Finance_SG_34	$\checkmark$	Detecting		Finance_SRP1	Diamond	100	Medium

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

- Components
- Configuration
- Capacity
- Performance
- Data Protection

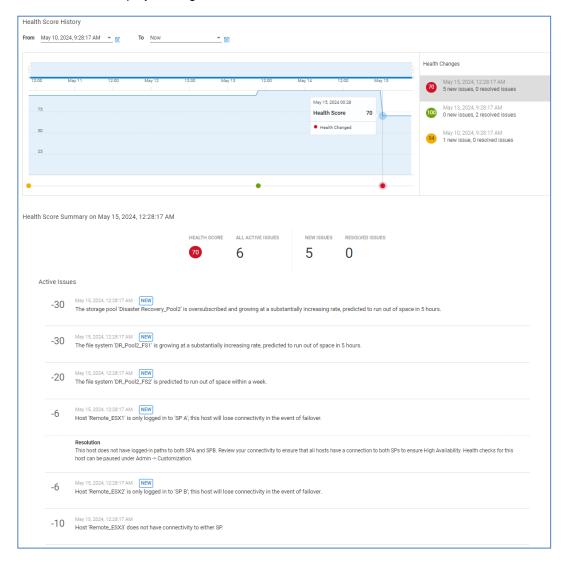
Disaster	r Recovery	UNITY 400   FCNCH	10972C32F2		Z LAUNCH UNISPH
Health	Inventory	Capacity	i Performance		
	70 POOR	Capacity	is the top healt	h check category impacting Disaster Recover	ry's health score.
ealth Issues	s				
ealth Issues Total Issi			б	Scapacity	3 issues
	ues		6	Capacity     about 10 hours ago The storage pool Disaster Recovery_Pool     substantially increasing rate, predicted to run out of space in 5	12' is oversubscribed and growing at a
Total Iss	nents			-30 about 10 hours ago The storage pool 'Disaster Recovery_Pool	12' is oversubscribed and growing at a
Total Issi	ues ments uration		~	-30 about 10 hours ago The storage pool 'Disaster Recovery_Pool substantially increasing rate, predicted to run out of space in 5	I2' is oversubscribed and growing at a hours.
Total Issu	ues inents uration ty		-10	-30 about 10 hours ago. The storage pool Disaster Recovery.Pool substantially increasing rate, predicted to run out of space in 5 Resolution:	12 is oversubscribed and growing at a hours.

In this example there are six issues, three 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.
- The health score of VxBlock converged systems based on the health of the associated storage systems.

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 the 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 for the Unity XT family and Entitlement information for APEX Block Storage for AWS).

Disaster I	Recovery	UNITY 400   FCNCH	0972C32F2						🖸 LAU	INCH UNISPHEI
Health	Inventory	Capacity	🕕 Perfo	rmance						
IPv4 IPv6 Contract Expiration Contract Number Service Plan	on 😵 No 7 31578	:170:7430:260:1600: v 24, 2020		Version A recommend available.	ded target version 4.2.1.9	.9433914 51234 is now LEARN MO	1	Last Contact Time Location Site Name Site ID	about 1 hour ago Hopkinton, MA ACME Branch Office ACME Branch Office 01	
POOLS	STORAGE	VIRTUAL MACHIN	ES	DRIVES	HOSTS					₾
Issues	Name 1	Туре			Total Size (TB)	Used (%)	Subscription	(%) Time To Full		Free (TB)
~	Disaster Recover	y_Pool1 Trac	litional		24.7	45.3	14	15.5 Unpredictable		13.6
1	Disaster Recover	y_Pool2 Trac	litional		13.7	54.7	14	15.5 🕕 Imminent		6.2
~	Disaster Recover	Pool3 Trac	litional		82.5	54.5	14	15.5 Within a month		37.5

As noted earlier, Observability 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, PowerScale/Isilon, APEX File Storage for AWS) / Storage Resource Pools (PowerMax/VMAX)
- Storage (Unity XT family, PowerStore, SC Series, and PowerVault) / Volumes (XtremIO) / Storage Groups (PowerMax/VMAX)
- Virtual Machines (Unity XT family, PowerStore, SC Series, XtremIO, and PowerMax/VMAX)
- Drives (Unity XT family, PowerStore, SC Series, and PowerVault)

- Hosts (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 and APEX File Storage for AWS)
- Appliances (PowerStore)
- Storage Containers (PowerStore)
- Quotas (PowerScale/Isilon and APEX File Storage for AWS)
- Block (PowerFlex and APEX Block Storage for AWS)
- Resources (PowerFlex and APEX Block Storage for AWS)
- Gateways (PowerFlex, PowerScale/Isilon, APEX Block Storage for AWS, APEX File Storage for AWS)
- Cloud Infrastructure (APEX Block Storage for AWS and APEX File Storage for AWS)

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 the 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: 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.

<sup>&</sup>lt;sup>13</sup> Host information for PowerMax requires Unisphere 9.2 or later.

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 the PowerScale Node Details section for additional information.

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.

The **Quotas** tab lists each quota path, quota type, threshold size, efficiency, advisory limit, soft limit, and hard limit. See the 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 Secure Connect Gateways in use by the PowerFlex or PowerScale 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.

ELMAPL7396LG0				Z LAUNCH SECURE CONNECT	GATEW
Properties					
Serial Number	ELMAPL7396LG0		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	57 minutes ago				
SYSTEMS					
ystems System	Identifier	Model	Remote Support	API Access	
ystems	Identifier SIOLIC1124	Model PowerFlex software	Remote Support	API Access	
ystems System					
systems System Security DC	SIOLIC1124	PowerFlex software	Configured	Configured	
ystems System Security DC slo block-legacy-gateway-rack	SIOLIC1124 ELMVXRTEST0004	PowerFlex software PowerFlex rack	Configured	Configured	
System System Security DC slo-block-legacy-gateway-rack scalelo-block-legacy-gateway-ap	SIOLIC1124 ELMVXRTEST0004 ELMVXFTEST0004	PowerFlex software PowerFlex rack PowerFlex appliance	Configured Configured	Configured	
systems System Security DC sio-block-legacy-gateway-rack scaleio-block-legacy-gateway-ap Finance Data Center	SIOLIC1124 ELMVXRTEST0004 ELMVXFTEST0004 ELMISLFAGEF123	PowerFlex software PowerFlex rack PowerFlex appliance Isilon Cluster	Configured Configured Configured Configured Configured	Configured Configured Configured Configured	

The **Cloud Infrastructure** tab lists information about the cloud environment such as AWS instance information, IP addresses, instance state, availability zone, product version, and protection domain.

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

PowerMax:

## Storage system details

Cybersecurity Inciden	it - Suspicious da	ta encryption/compress	ion							
Health	nventory	Capacity	III Performar	nce 🖲 Cy	bersecurit	y				
Unisphere Version	V9.2	1		Connection		Local	Last Cont	act Time 5	i7 minutes ago	
PowerMax OS	1		1	Embedded		NO	Location	R	tound Rock, TX	
Contract Expiration	Oct 2	4, 2022		System Health C	heck	😣 Wed, Jul 3 2019, 2:54:37 PM UT	C Site Name	e A	CME Headquarters	
Contract Number	3177	8817IS	1	IOPS Remaining	Headroom	259992.3	Site ID	А	CME Branch Office 01	
Service Plan	ProS	upport 4HR/Mission C	ritical	Alternate Serial		HK197900049				
STORAGE RESOURC	E POOLS	STORAGE GROUP	S SERVI	CE LEVELS	HOSTS	VIRTUAL MACHINES	SYSTEM HEA	LTH CHECKS		
storage resource poo	ls									
Name 个		% Effective U	sed Total Usab	le Capacit	Used Usabl	e Capacity(TB) Total Subscribe	ed Capacity(TB)	Total Allocated Capa	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	y Office Po	owerScale Cluster   ELMI	SLFAGEF789						🔀 Launch OneFS Web
🕢 Health	Invento	ry 📄 Capacity	III Performanc	e					
Contract Exp		Oct 14, 2022		ersion	v9.4.0		Last Contact Time	1 hour ago	
Contract Nu Service Plan		31678017IS PREMIUM		ode Count line Dedupe Status	3 Disabled		Location Site Name	Shanghai, CN ACME Branch Offic	ce
			In	line Compression Status	Enabled		Site ID	INITIAL_SITE_ID	
POOLS	NODES	QUOTAS G	ATEWAYS						
1 pool									凸
Iss	ues	Name 个		1	otal Size(TB)	Used(%)		Time To Full	Free (TB)
:	2	Camera Recording Data Po	lol		23.04 TB	91.1		Within a day	0.46 TB

# Dell Unity XT:

Disaster	Recovery	UNITY 400   FCNCH	10972C32F2					🔀 LAU	NCH UNISPH
Health	Inventory	Capacity	I Performance	2					
IPv4	10.0	.0.3	Ver	sion	4.3.0.9433914	La	ast Contact Time	51 minutes ago	
IPv6	262	0:0:170:7430:260:160	00:3c2c:32f1 Hot	tfixes	4.3.0.9433914.0.1.008, 4.	3.0.9433914 Lo	ocation	Hopkinton, MA	
Contract Expi	iration 😣 N	lov 24, 2020	SPA	A Up Time	about 1 month	Si	te Name	ACME Branch Office	
Contract Num	nber 315	78817BR	SPE	B Up Time	about 1 month	Si	te ID	ACME Branch Office 01	
Service Plan	ProS	Support 4HR/Mission	Critical						
POOLS	STORAGE	VIRTUAL MACHI	NES DRIVES	HOSTS					
pools									
Issues	Name 个	т	уре	Total Size (TE	I) Used (%)	Subscription (%)	Time To Full		Free (TE
~	Disaster Recove	ry_Pool1 T	raditional	24.	7 45.3	145.5	Unpredictable		13.
1	Disaster Recove	ry_Pool2 T	raditional	13.	7 54.7	145.5	Imminent		6.
	Disaster Recove								

PowerFlex:

#### Storage system details

Security DC Po	werFlex software   SIOLIC1	124					LAUNCH POWERFLEX I	MANAG		
A Health C Inventory Capacity Performance										
Presentation Server IP	10.234.220.14	PowerFlex Ma	nager SWID	ELMVXFRENG001		Last Contact Time	about 1 hour ago			
Entitlement Type	Subscription	Version		3.6.0.0		Location	Hopkinton, MA			
Entitlement Expiration	Jun 04, 2024	Storage Node	Count	2		Site Name	ACME Headquarters			
Entitlement ID	DLF67890	MDM Count		3		Site ID	ACME Headquarters 01			
Contract Expiration	Jun 04, 2024									
Contract Number	ABC123									
Service Plan	ProSupport HR									
BLOCK RESOUR	CES GATEWAYS									
iew Hosts	*									
hosts								Ľ		
Name 个	Operating System	Network Address	Protoc	D	Identifier	Version	Host IP			
14b1e48500000000	Linux	192.168.177.28	SDC		-	3.6.0.0	192.168.177.28			
14b1e4840000000	Linux	192.168.177.47	SDC		-	3.6.0.0	192.168.177.47			
14b1e48600000000	Linux	192.168.177.27	SDC		-	3.6.0.0	192.168.177.27			

# APEX Block Storage for AWS:

HR DC APEX Block Storage for AWS   ELMSIOPRODTST004												
Health 📴	nventory	Capacity	Performa	ance								
PowerFlex Manager	IP 10.	55.139.192		PowerFlex Manager SWID		1	Last Contact Time	54 minute	es ago			
Entitlement Type	-		,	Version	4.5.0.250	I	Location	Hopkintor	n, MA			
Earliest Entitlement Expiration - Storage Node Count 3 Site Name CIQ Engineering Site												
Entitlement ID - MDM Count 3 Site ID INITIAL_SITE,JD												
Service Plan	-						Cloud Provider	AWS				
						1	Region	US-East2				
									-			
							VPC Name	Cirrus VP	С			
							VPC Name VPC ID		C ecc20135dfd24			
BLOCK RE	SOURCES	GATEWAYS	CLOUD INF	RASTRUCTURE								
	SOURCES	GATEWAYS	CLOUD INF	RASTRUCTURE					ecc20135dfd24			
nstances	SOURCES		CLOUD INF	RASTRUCTURE Public IP Address	State		VPC ID		ecc20135dfd24			
nstances Instance ID	Instance	Туре			State RUNNING		VPC ID /Zone Pro	vpc-050c4	ecc20135dfd24			
Instances Instance ID i-4545008291c2e6c	Instance t3.2xlarg	Type e	Private IP Address	Public IP Address		Availability	VPC ID / Zone Pro 2 4.5	vpc-050c4	ecc20135dfd24 Protection Domain			
BLOCK RE nstances	Instance c t3.2xlarg 7 t3.2xlarg	Type e e	Private IP Address	Public IP Address	RUNNING	Availability us-east-11	VPC ID (Zone Pro 5 4.5 4.5	vpc-050cr duct Version	ecc20135dfd24			

# 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, PowerFlex, APEX Block Storage for AWS, or APEX File Storage for AWS)
- 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).

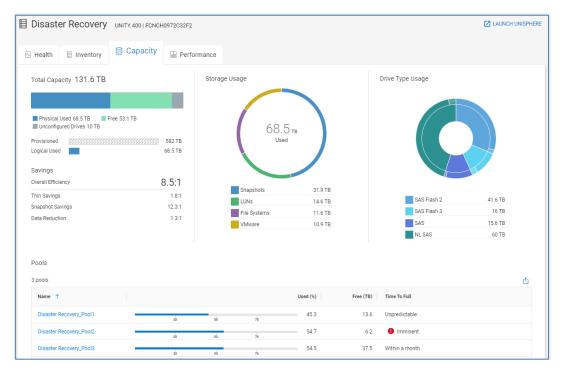
Savings includes a breakdown of the Logical and Used capacity of the total storage visible to the hosts, and the Efficiency Savings explained previously.

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 and APEX File Storage for AWS)
- User data (PowerScale/Isilon and APEX File Storage for AWS)
- 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.



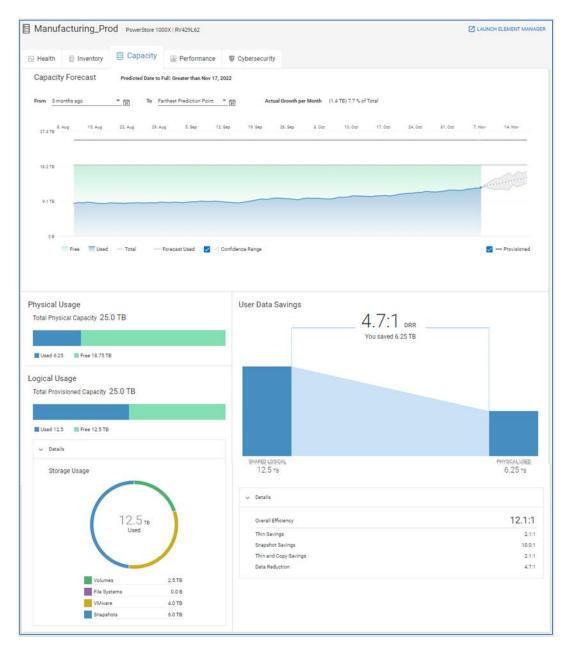
XtremIO systems show the Capacity Forecast chart on the top of the page. The bottom of the page shows the total capacity broken down by used and free along with a detailed data reduction chart.

### Storage system details

目 Prod wi	ith iCDM	X1   SIO00174	4657100										Ľ	LAUNCH WEB U
🕢 Health	Inventory	, 🗎 Cap	acity	🕕 Perform	ance									
Capacity F	orecast	Predicted I	Date to Full	: Aug 30, 2024										
From 3 month	is ago	• 51	To Predi	cted Full	• 🗊	Actu	al Growth per Mo	nth (14 TB	) 10.4 % of Total					
727.6 TB	26. Feb	11. Mar	25. Mar	8. Apr	22. Apr	6. May	20. May	3. Jun	17. Jun	1. Jul	15. Jul	29. Jul	12. Aug	26. Aug
545.7 TB														
363.8 TB														
181.9 TB														
0 B														
	Free Used	— Total	····· For	ecast Used	🖌 < Confiden	ce Range							<b>-</b>	- Provisioned
Total Capacit	y 134 TB									6.7:	1			
											DRR			
Physical Use	ed 87 TB E	ree 47 TB												
- njolodi obo														
Provisioned Logical Used						2.5 PB 87 TB								
Savings Overall Efficiency	v					30:1								
Thin and Copy S						4.5:1								
Data Reduction	9-					6.7:1								
Deduplication	n					3.2:1								
Compression	n					2.1:1	logical 587 tb		deduplication 3.2:1			pression 2.1:1		<sup>инузісаl</sup> 87 тв

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.

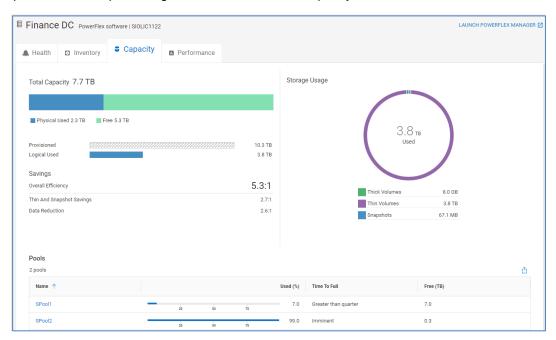
#### Storage system details



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. PowerMax 2500 and 8500 displays effective capacity.

E Finance PowerMax_2000   000197900049		
Sybersecurity Incident - Suspicious data encryption/compression		
Health		
System Usage	Efficiency	
Physical Capacity	Overall Efficiency	10.1:1
Physical 67.2 TB	Data Reduction	
Used 31.1 TB Free 36.1 TB	Overall Ratio Ratio on Reducible Data Enabled Percent	2.6:1 8 %
Provisioned Capacity	Virtual Provisioning Savings	1.5:2
Provisioned 91 TB		
Used 33.2 TB Free 57.8 TB	Snapshots Savings	16.3:1
Provisioned Physical Capacity 106 %		
Snapshot Capacity		
Snapshot 5.6 TB		
Used 3.2 TB Free 2.4 TB		
Storage Resource Pools		≙
Name 1	Used (%) Effective Used (%) Time To Full	
Finance_SRP1 23 20 75	88.0 8.0% Within a month	
Finance_SRP2	51.0 3.0% Greater than quarter	

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. The bottom of the page provides a listing of pools with used percentage, time to full, and free capacity.



PowerScale and APEX File Storage for AWS provides a capacity forecast chart at the top of the page. The bottom of the page breaks down total capacity by used, free, and

unprovisioned. Virtual hot spare (VHS), efficiency, and data reduction information is also provided. Used storage is broken down by snapshots, VHS, and user data.

Security Office PowerScal	le Cluster   ELMISLFAGEF789	🔀 Launch OneFS
Health 🗏 Inventory 🗎 🕻	Capacity M Performance	
Capacity Forecast Pre	redicted Date to Full:	
Remaining Capacity 613.4 GB From	Yesterday         To         Tomorrow         Tomorrow         Actual Growth per Month         (58.9 TB) 255.7 % of	of Total
Contributors to Capacity Consump Next 24 hours	pton 23. May 08:00 16:00 29. May 08:00 16:00 30. May 08:00	0 16:00 31. May
	22.7 TB	
	acity Predicted	
101	Be Consumed 18.2 TB 00% (960 GB)	
	13.6 TB	
	9.1 TB	
	4.5 TB	
	08	
	🔰 Free 🧮 Used — Total 🛛 Previous Forecast 🛛 🗸 < Previous Confidence Range	
otal Capacity	23.04 TB	
otal Capacity	23.04 TB Storage Usage	
	Storage Usage	
l Used (Userdata + VHS)	21 TB	
Used (Userdata + VHS) Free	21 TB	
Used (Userdata + VHS) Free Unprovisioned Capacity	21 TB 2.04 TB 2.04 TB TB	
Used (Userdata + VHS) Free Unprovisioned Capacity irtual Hot Spare(VHS)	21 TB 2.04 TB 0.8 4 TB Subtract the space reserved for the virtual hot spare	
Used (Userdata + VHS) Free Unprovisioned Capacity irtual Hot Spare(VHS) abled	21 TB 2.04 TB 0.8 4 TB Subfract the space reserved for the virtual hot spare when calculating available free space	
Used (Userdata + VHS) Free Unprovisioned Capacity irtual Hot Spare(VHS) abled	21 TE 2.04 TB 0.8 4 TB Subtract the space reserved for the virtual hot spare when calculating available free space Deny data writes to reserved disk space	41
Used (Userdata + VHS) Free Unprovisioned Capacity irtual Hot Spare(VHS) nabled	21 TB 2.04 TB 0.8 4 TB Subfract the space reserved for the virtual hot spare when calculating available free space	4
I Used (Userdata + VHS) Free I Unprovisioned Capacity Irtual Hot Spare(VHS) nabled nabled avings ficiency Ratio	21 TB 2.04 TB 0.8 4 TB Subtract the space reserved for the virtual hot spare when calculating available free space Deny data writes to reserved disk space 1.07.1	41
Used (Userdata + VHS) Free Unprovisioned Capacity intual Hot Spare(VHS) nabled nabled avings fficiency Ratio ata Reduction	21TB 2.04TB 2.04TB 0.8 4.TB Subtract the space reserved for the virtual hot spare when calculating available free space Deny data writes to reserved disk space 1.07.1 1.07.1	91 41 81
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Used (Userdata + VHS) Free Unprovisioned Capacity irtual Hot Spare(VHS) nabled avings ficiency Ratio ata Reduction Deduplication Compression	21TB 204TB 08 4TB Subtract the space reserved for the virtual hot space when calculating available free space Deny data writes to reserved disk space 1.07.1 1.07.1 1.07.1	41
otal Capacity Used (Userdata + VHS) Free Upprovisioned Capacity Intual Hot Spare(VHS) nabled nabled avings fficiency Ratio ata Reduction Deduplication Compression POOLS Name ↑	21TB 204TB 08 4TB Subtract the space reserved for the virtual hot space when calculating available free space Deny data writes to reserved disk space 1.07.1 1.07.1 1.07.1	41

# Storage system details – Performance

The **Performance** tab is supported for all storage systems and APEX storage for AWS. 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 that 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), Volume Latency (SC Series)
- IOPS (all platforms)

Bandwidth (all platforms)

#### Note:

- For PowerMax or VMAX systems, Infrastructure Observability displays these performance metrics at the Storage Group level.
- For PowerStore, the Object Activity charts show data for File Systems and either Individual Volumes or Volume Groups.
- Top Object Activity is not displayed for PowerScale or Isilon, PowerFlex, or APEX Storage for AWS.

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

- Latency (all platforms except PowerVault)
- 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 for AWS)
- Client (PowerScale or Isilon and APEX File Storage for AWS)
- Protocol: Latency (PowerScale or Isilon and APEX File Storage for AWS)
- Protocol: IOPS (PowerScale or Isilon and APEX File Storage for AWS)
- Protocol: Bandwidth (PowerScale or Isilon and APEX File Storage for AWS)

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

Observability identifies performance anomalies on all system level performance charts for all system types. A shaded blue area identifies performance anomalies. For Unity XT family, PowerStore, PowerMax, PowerScale, and PowerFlex systems, Observability identifies areas of performance impact 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.

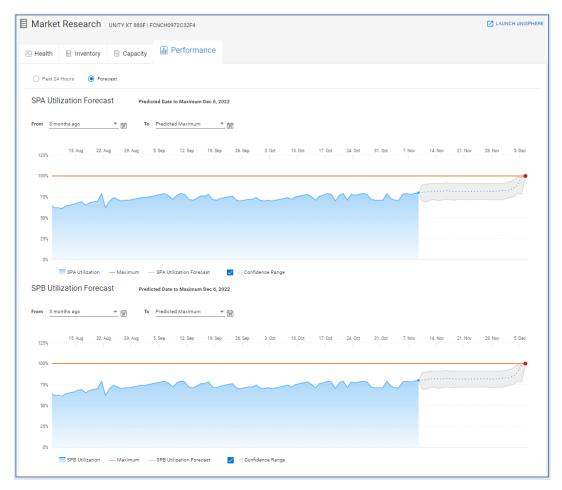
For APEX File Storage for AWS, Unity XT family, PowerStore, PowerScale, and PowerVault systems, configuration changes are identified as rectangles along the X-axis of the charts. Selecting the configuration change rectangle opens the Storage Configuration Changes window which contains details of the changes. By identifying when configuration changes occur, Observability helps the user potentially correlate configuration changes in the environment to performance impacts. Selecting any area in the Latency, IOPS, and Bandwidth charts for any system type (except APEX Block Storage for AWS 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 file systems for Unity XT family, volumes or file systems for PowerStore, volumes for SC Series, PowerVault and XtremIO, storage groups for PowerMax or VMAX, and nodes for PowerScale and APEX File Storage for AWS. 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 PowerStore, Unity XT family, and PowerVault, Observability 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, PowerEdge, and PowerProtect DD 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.

#### Storage system details

Finance PowerMax_20	000   000197900049							
🕢 Health 🗏 Inventory	Capacity Derformance Cybersecurity							
SECURITY ASSESSMENT	SECURITY ADVISORIES							
System Risk Leve	Cybersecurity Issues	Evaluation Plan						
4 Total     4 Total     4 Migh 1     100%     12 of 12 ter     100%     10 ter     100%     10%     10%     10%     10%     10%     10%     1								
High	1 Last 24 hours Low 1	Selected						
CYBERSECURITY ISSUES	EVALUATION PLAN							
4 issues								
Severity	Issue	Creation Time						
> 🛕 High	PowerMax system requires a software upgrade	1 week ago						
✓ ♦ Medium	Data At Rest encryption is disabled	3 hours ago						
Description: This test verifies whether Data	at Rest Encryption (D@RE) is enabled.	Created May 27 2022, 10:15:29 AM UTC						
D@RE prevents data visibility in	n the event of its unauthorized access or theft. Learn More1, Learn More2.	Security Control Family						
	tallation of the PowerMax system.	System and Communications Protection Evaluation Test						
Contact Dell Technical Support for help. Data At Rest encryption enabled								
> 🔶 Medium	LDAP server certificate verification is disabled	2 months ago						
> 🚺 Low	SNMP trap destination is not configured	2 months ago						

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.
- Not Applicable Test is for a capability that depends on another capability that is disabled.
- Not Supported Test is not supported for the system version.
- Not Evaluated Test is for a system where the Evaluation Plan is disabled, or the test has not yet been run.

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	12 Evaluation Tests										
Evaluation Tests	Status	Last Detected	Details	Determine if any SNMP trap destination is configured $\qquad$							
> Access Control				This test verifies whether an SNMP destination is configured according to the							
<ul> <li>Audit and Accountability</li> </ul>				organizational policy.							
Remote Syslog enabled	ок	Wed, Feb 10 2021, 1	0	Issue:							
✓ Configuration Management	1 Deviation			<ul> <li>SNMP trap destination is not configured</li> </ul>							
Determine if any SNMP trap destination is configured	Deviation	Wed, Feb 10 2021, 1	ø	This test verifies whether an SNMP destination is configured according to the organizational policy.							
> Identification and Authentication	1 Deviation			Remediation:							
> System and Communications Protection	1 Deviation			Configure the SNMP trap by following the instructions in the "Configure SNMP Notifications" topic of the Uniphere online help.							
> System and Information Integrity	1 Deviation			· · · · · · · · · · · · · · · · · · ·							

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

	Financ	PowerMax_20	00   00019790004	)								
Ð	Health	Inventory	Capacity	III Performance	Cybersecurity							
	SECURITY ASSESSMENT SECURITY ADVISORIES											
	Impact Type											
		2 Critical	A 2 High	◆ 0 Medium	0 Low	2 Storage		2 Hypervisor				
		onticur	rigi	Moduli	Lon	oronge		Typerior				
	Details	Advisory ID	h	npact	Synopsis	Туре	Impacted Systems	Published				
	<b>.</b>	VMSA-2021-0014		High	VMware ESXi updates address	Hypervisor	1	07-13-2021				
	ē	VMSA-2021-0010	•	Critical	VMware vCenter Server updat	Hypervisor	1	05-25-2021				
	<b>ø</b>	DSA-2021-134	4	High	Dell EMC Unisphere for Power	Storage	1	07-22-2021				
	ē	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 PowerStore, SC Series, XtremIO, PowerFlex, and PowerVault. They can be accessed from the Storage listing for individual systems and pools and can also be found using global search. PowerFlex and APEX Block Storage for AWS volumes are accessed from the Volumes view under the Block tab.

Block object<br/>details –The Properties tab for a block object displays attributes for the object and any health<br/>issues associated with this object. The bottom of the page varies slightly depending on<br/>storage type. It displays the Hosts (for Unity XT family, PowerStore, PowerFlex, and<br/>XtremIO systems), Servers (for SC Series), or Initiators (for PowerVault) associated to the<br/>object. The Virtual Machines tab lists information for VMs residing on the object and is<br/>available for Unity XT family, SC Series, and XtremIO objects. The Consistency Groups<br/>tab is available for XtremIO volumes listing consistency group information to which the<br/>volume belongs. The VTree tab lists the volume trees for PowerFlex along with the type,<br/>provisioned and used space, and creation time. PowerFlex block objects also have a<br/>Snapshots tab that lists each snapshot, size, creation time, parent ID, and VTree ID.

#### Block object details

S Market Resear	ch > MR_Poc	bl1_LUN1							LAUNCH UNISPHERE
Properties	Capacity	I Performance	Data Protection						
Pool Type FAST Cache FAST VP Policy Consistency Group Thin SP Owner CLI ID WWN	Ype LUN AST Cache – SAST VP Policy Start High Then Auto-Tier Consistency Group MRApp1CG Thin Yes SP Owner SP A		<ul><li>Configuration</li><li>Capacity</li><li>Performance</li></ul>	Components Configuration		0 Total CALL All health checks were sur		hecks were successf	ul.
Data Reduction	On - Advanc	:0A:30:3E:00:AB:2D:48:5							
HOSTS VI	RTUAL MACHINES								
2 hosts									đ
Issues Name 🔨 Network Address		ess (	Operating System		nitiator Protocol		Initiators (#)	Total Size (TB)	
1 MRApp1_Host1 10.0.20		١	Windows Server 2012		с		2	5.8	
1 MRAp	p1_Host2	10.0.0.21	١	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.

B Market Rese	earch > MR_Poo	ol1_LUN1						LAUNCH UNISPHERE
Properties	Capacity	III Performance	Data Protection					
		III renormance	Data Protection					
Size		3 TB			Non-base Space Used	990 GB		
Data Reduction Sav	vings	1.1:1 (5% or 256.0 MB	)		Total Pool Space Used	1.8 TB		
Allocated		825 GB						
Total Capacity	3 ТВ				Tier Distribution			
					_			
					Tier	Data Distribution (%)		
Allocated 825 0	βB				Extreme Performance	100.0		
Historical Tr	end							
Value	Last Re	eceived From: 3 mor	nths ago 🔹 🛐	To: Toda	y 👻 🛐			
— Total		29.7 TB	31		. [3]			
Allocated	(90.5%) 11	17.3 TB 8. Aug 181.9 TB	15. Aug 22. Aug	29. Aug 5. Sej	p 12. Sep 19. Sep	26. Sep 3. Oct 10. 0	Oct 17. Oct 24. 0	let 31. Oct 7. Nov
		90.9 TB						
		90.915						
		0 B						

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

#### Block object details

Manufacturing_F	Nolumo	0.001					LAUNCH ELEMENT MANAGER
Manufacturing_F		5-001					EADINGH ELEMENT MANAGER
	P. Consoity						
Properties	Capacity	III Performance	Data Protection				
Logical Used Cap	pacity	427 MB			Snapshot/Thin Clone Space Used	0	
Free Capacity		597 MB			Thin Saving Ratio	10.5:1	
Provisioned		1 GB			Snapshot Saving Ratio	10.5:1	
Total Capacity	IGB						
Physical Used 42	27 MB 📃 Free 597	мв					
Capacity Fore	ecast Pred	licted Date to Full: Learning	3				
From 3 months ag	<u>ات</u> اً ۲ مر	To Today	· [3]	Actual Grov	vth per Month (459.3 MB) 44.9 % o	of Total	
	( <u>a</u> )		[8]		• • • •		
8. Aug 1.2 GB	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
953.7 MB							
715.3 MB							
476.8 MB							
238.4 MB							
0 B							
	e 🗖 Used — To	tal					

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.

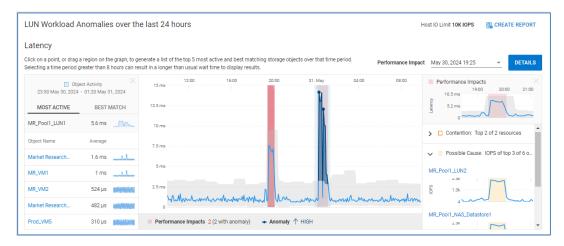
Prod with iC	ом > iCDM-Vol1-Copy1
Properties	Capacity
Total Capacity	'50.0 GB
Physical Used 68	0.0 GB Free 70.00 GB

# Block object details – Performance

The **Performance** tab for block objects (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, Observability identifies performance anomalies for each performance metric. For Unity XT family systems and PowerStore, Observability 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 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.

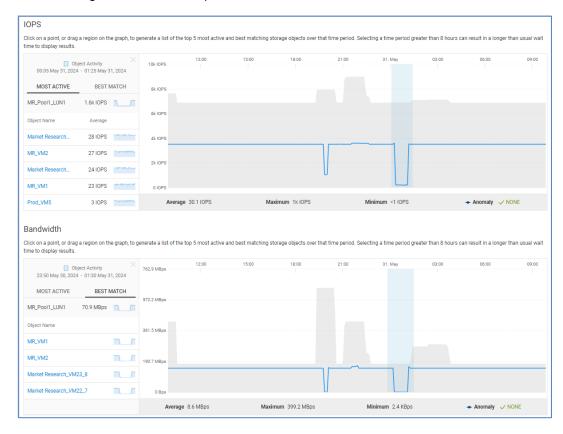
The following shows two performance impacts on a Unity XT block latency chart. The first is an impact only, the second is an impact with a performance anomaly. Selecting the Details button opens a window in the right side of the chart identifying storage objects whose IOPS are correlated with the rise in latency for the impacted LUN. These objects are the most likely candidates causing workload contention and the performance impact. Observability 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, PowerStore, and PowerVault)
- Queue Length (Unity XT family)
- Queue Depth (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 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

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.

	arch > MIR_P	pol1_LUN1							LAUNCH UNISPH
Properties	Capacity	Derformance	Data Protection	ı					
eplication									
Session Name		rep_async		1/0 4					
Mode		Asynchronous (6	0 minutes)	Q	A	to Sync Configured	F	2	
Local Role		Source					ightarrow  2	コ	
Sync State		Idle		Market Research	h		Disaster	Recovery	
Sync Progress		80% complete, at	oout 30 minutes remaining	MR_Pool1_LUN1			DR_Poo	bl3_LUN1	
Sync Transfer Rate	9	395.2 MB/Sec							
Time of Last Sync		Mon, Oct 17 2016	5, 5:50:21 PM UTC						
Rule 1 Ev			urday, and Sunday at 11:00 PM	, retain for 14 days					
Rule 1 Evi ote: Schedule times pol Deletion Policy art deleting snapsh onsumption reaches art deleting snapsh	ery Tuesday, Wednes are in UTC displaye ots when the total p s 85%	d in 12-hour format. ool consumption reaches onsumption by the snapsl	urday, and Sunday at 11:00 PM 95%, and continue deleting unt nots reaches 25%, and continue	ii the total pool					1
Rule 1 Evi ote: Schedule times pol Deletion Policy tart deleting snapsh onsumption reaches art deleting snapsh pol consumption by	ery Tuesday, Wednes are in UTC displaye ots when the total p s 85% ots when the pool c	d in 12-hour format. ool consumption reaches onsumption by the snapsl	95%, and continue deleting unt nots reaches 25%, and continue	ii the total pool	Attach	Last Writable Time	Modified	Auto Del	Creation Time
Rule 1 Evi ote: Schedule times ool Deletion Policy ard deleting snapsh onsumption reaches arat deleting snapsh ool consumption by snapshots	ery Tuesday, Wedne: are in UTC displaye ots when the total p : 85% ots when the pool c the snapshots react	d in 12-hour format. ool consumption reaches onsumption by the snapsi hes 20%	95%, and continue deleting unt nots reaches 25%, and continue e Taken	il the total pool deleting until the	Attach No	Last Writable Time Sun, May 5 2024,	Modified	Auto Del No	
Rule 1     Evi       Rule 1     Evi       oote: Schedule times     sool Deletion Policy       ard deleting snapsh     nammethin reaches       ard deleting snapsh     snapshots       Name	ery Tuesday, Wedner a rae in UTC displaye ots when the total p 85% ots when the pool c the snapshots reach Source	d in 12-hour format. ool consumption reaches onsumption by the snapst es 20% Stat 1 Rea	95%, and continue deteting unit of the second secon	ii the total pool deleting until the Taken By					Creation Time
Rule 1 EW ote: Schedule times of Deletion Policy art deleting snapsh ool consumption by snapshots Name ↑ mySnap-17168	ery Tuesday, Wedner are in UTC displaye ots when the total p 85% ots when the pool of the snapshots reach Source MR_Pool1_LUN	d in 12-hour format. ool consumption reaches onsumption by the snapsi hes 20% <b>Stat</b> 1 Rea 1 Rea	95%, and continue deteting unit nots reaches 25%, and continue e Taken dy Thu, May 9 2024, dy Thu, May 9 2024,	li the total pool deleting until the Taken By Snap Schedule all rules	No	Sun, May 5 2024,	No	No	Creation Time Thu, May 9 2024,
Rule 1         Evo           ote: Schedule times bool Deletion Policy and deleting snapsh onsumption reaches snapshots         Snapshots           Name ↑	ery Tuesday, Wedner are in UTC displaye ofs when the total p is 85% ofs when the pool of the snapshots react Source MR_Pool1_LUN	d in 12-hour format. ool consumption reaches onsumption by the snapsl hes 20% 1 Rea 1 Rea 1 Rea	95%, and continue deleting unt nots reaches 25%, and continue e Taken dy Thu, May 9 2024, dy Thu, May 9 2024, dy Sat, Apr 27 2024,	ii the total pool deleting until the Taken By Snap Schedule all rules Snap Schedule all rules	No No	Sun, May 5 2024, Sun, May 5 2024,	No Yes	No No	Creation Time Thu, May 9 2024, Thu, May 9 2024,
Rule 1     Eve       Pule 1     Eve       ote: Schedule times     times       poil Deletion Policy     ard setting snapsh       onsumption reaches     ard deleting snapsh       snapshots     mySnap-17168       mySnap-17168     mySnap-17168	ery Tuesday, Wedner are in UTC displaye ots when the total p is 85% of when the pool of the snapshots reach Source MR_Pool1_LUN MR_Pool1_LUN	d in 12-hour format. ool consumption reaches onsumption by the snapsl nes 20% <b>Stat</b> 1 Rea 1 Rea 1 Rea	95%, and continue deleting unt nots reaches 25%, and continue e Taken dy Thu, May 9 2024, dy Thu, May 9 2024, dy Sat, Apr 27 2024, dy Sat, Apr 13 2024,	II the total pool deleting until the Taken By Snap Schedule all rules Snap Schedule all rules	No No No	Sun, May 5 2024, Sun, May 5 2024, Thu, Apr 25 2024,	No Yes Yes	No No No	Creation Time Thu, May 9 2024, Thu, May 9 2024, Sat, Apr 27 2024,
Rule 1     Eve       Rule 1     Eve       ote: Schedule times     Eve       soid Deletion Policy     ard deleting snapsh       nonsumption reachess     ard deleting snapsh       snapshots     mySnap-17168       mySnap-17168     mySnap-17168       mySnap-17168     mySnap-17168	ery Tuesday, Wedner are in UTC displaye ots when the total p 85% 50 when the pool of the snapshots reach MR_Pool1_LUN MR_Pool1_LUN MR_Pool1_LUN	d in 12-hour format. cool consumption reaches consumption by the snapsl tes 20% <b>Stat</b> 1 Rea 1 Rea 1 Rea 1 Rea	95%, and continue deleting until the teaches 25%, and continue           e         Taken           dy         Thu, May 9 2024,           dy         Thu, May 9 2024,           dy         Sat, Apr 27 2024,           dy         Sat, Apr 13 2024,           dy         Sat, Apr 13 2024,           dy         Sun, Mar 24 2024	II the total pool deleting until the Taken By Snap Schedule all rules Snap Schedule all rules Snap Schedule all rules	No No No	Sun, May 5 2024, Sun, May 5 2024, Thu, Apr 25 2024, Tue, Apr 9 2024,	No Yes Yes Yes	No No No	Creation Time Thu, May 9 2024, Thu, May 9 2024, Sat, Apr 27 2024, Sat, Apr 13 2024,

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

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

🗎 Market Resea	rch > MR_Poo	ol1_FS1								
Properties	Capacity	III Performance	🛡 Da	ta Protection						
Pool	🝙 Market I	Research_Pool1							PAUSE CAPACITY HEA	LTH CHECKS
Туре	File System									
Thin	Yes	s		Total Issues		0	Total			
FAST Cache				Componen	ts	~				
FAST VP Policy	Start High 1	Start High Then Auto-Tier		Configuration		<i></i>		All health check	s were successful.	
NAS Server	NAS_Server	_5		Capacity		<u>_</u>				
CLI ID	sv_910					Ť				
Protocol	Linux/Unix	Shares (NFS)		Performance		~			×	
Data Reduction	On - Standa	rd		🜓 Data Prote	ction	~				
VIRTUAL MACHINE	IS									
1 Virtual Machine										Ċ
Name ↑	Export P	ath N	letwork Add	iress	Operating System	vCente	r	ESXi	Cluster	
MR_VM2	10.1.2.3	:/nfs_share 1	0.0.1.2		Red Hat Enterprise Lin	ux 10.0.0.	.100	LocalESX1	Research Clus	ster

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.

Anufacturing_	_Dev > fs_0							Z	LAUNCH ELEMENT MANAGER
Properties	Capacity	🕕 Performance	10 D	ata Protection					
Appliance Type Description NAS Server Name Protocol	Manufactu File Systen test file sy: NasCCT_d NFS	stem		Total Issues Components Configuratio Capacity Performance Data Protect	n 9	0	Total	All health checks were succ	xessful.
NFS EXPORT	SMB PATH	VIRTUAL MACHINI	S rver Name			NFS Export Path		Local Path	۵
Export One			rver Name			/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 percentage used 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. Observability's 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 total, used, and free values for that selected point in time.

Market Research > MR_Poo	bl1_FS1					
Properties Capacity	Derformance 🖤	Data Protection				
Capacity Forecast Pr	edicted Date to Full: Nov 28, 202:	2				
From 3 months ago 👻 🛐	To Predicted Full	₩ <u>31</u> A	ctual Growth per Month (96.8	TB) 19.7 % of Total		
8. Aug 15. Aug 22. A 727.6 TB	ig 29. Aug 5. Sep	12. Sep 19. Sep 26. S	ep 3. Oct 10. Oct	17. Oct 24. Oct	31. Oct 7. Nov 14. I	Nov 21. Nov 28. Nov
545.7 TB						
363.8 TB						
181.9 TB						
0 B						
Free Used -	Fotal Forecast Used	Confidence Range				<ul> <li>Subscribed</li> </ul>
Size	4 TB		Snapshot Space Used		0.8 TB	
Allocated	1.1 TB		Total Pool Space Used	i	1.9 TB	
Used	33%		Data Reduction Savin	js	1.1:1 (5% or 256.0 MB)	
Total Capacity 4 TB				Tier Distribution		
				Tier	Data Distribution (%)	
Physical Used 880 GB 🗸 Alloca	ted 1.1 TB			Extreme Performa	ance 1.5	

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

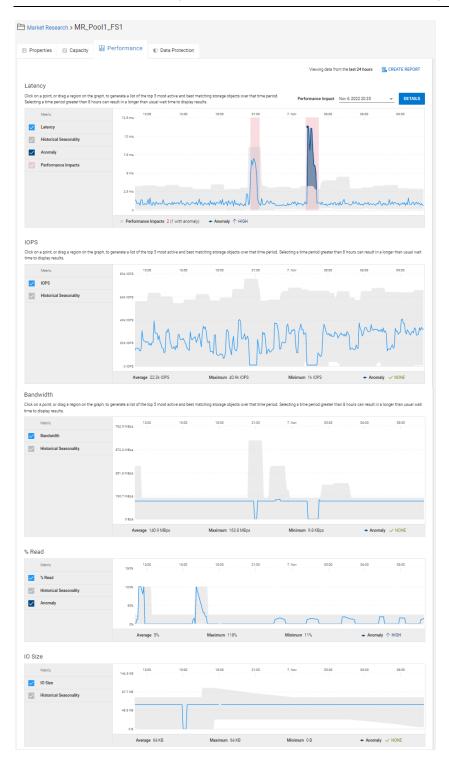
Anufacturin	g_Dev > fs_0			A 1 S	UNCH ELEMENT MANAGER
Properties	Capacity	Derformance	Data Protection		
Used Logical		427 MB		Total Capacity 1 GB	
Free Logical Total Logical		597 MB 1 GB			
Total Logical		108		Used 427 MB Free 597 MB	

# File object details – Performance

The Performance tab provides 24-hour performance charts for the following metrics for both Unity XT and PowerStore with the noted exceptions:

- Latency
- IOPS
- Bandwidth
- %Read (Unity XT only)
- IO Size
- Queue Length (Unity XT only)

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 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

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.

Manufacturing_	_Dev > fs_0					Z LAUNCH ELEM	ENT MAN
Properties	Capacity	🖟 Performance	Data Protection	n			
Protection polic	cy protection	nPolicyName					
Replication							
Source System		Manufacturing_D	ev-2		1/0		
Destination System		Manufacturing_D	ev-1		$\stackrel{\vee}{\frown}$	Operating Normally	
Replication Session	Status	Operating Norma	lly		turing_Dev-2	Manufacturing_Dev-1 testAsync	
Last Synchronization	n Details						
Destination Lag	Time of Last	Sync Last Sync D	uration Time of Next S	Sync			
02:04:35	5/31/24, 8:11	AM 00:20:30	5/31/24, 2:04	PM			
Replication Rules							
Name		RPO	RPO Alert Threshold	Destination System			
rule1_Manufacturir	ng_Dev-appliance-1	5 minutes	10 Minutes	Manufacturing_Dev-1			
rule2_Manufacturir	ng_Dev-appliance-1	10 minutes	5 Minutes	Manufacturing_Dev-1			
napshots							
Rule	Schedule				Timezone		
Rule myRuleName1	Every Tuesday		riday, Saturday, and Sunday at		EST		
Rule	Every Tuesday		riday, Saturday, and Sunday at esday, Wednesday, Thursday ri				
Rule myRuleName1	Every Tuesday				EST		
Rule myRuleName1 myRuleName2	Every Tuesday				EST	Created	
Rule myRuleName1 myRuleName2 snapshots	Every Tuesday		esday, Wednesday, Thursday n	etain for 4 hours	EST	Created October 13, 2016, 11:32:27 AM	
Rule myRuleName1 myRuleName2 snapshots Name 个	Every Tuesday		esday, Wednesday, Thursday re	etain for 4 hours	EST		

# 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 <b>Inventory</b> 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.

Finance > Fit	nance_SG_1	1				🗹 LAUN	CH UNISPHER
Inventory	Capacity	Derformance					
SRP	Finance_	SRP1	Compliance	Critical	Service Level	Diamond	
Volumes	10		Masking Views	5	Emulation	FBA	
Compression	Yes		SRDF	Yes	Snapshots	1	
VIRTUAL MACHIN 3 Virtual Machines	ES						₫
Name ↑	Ne	etwork Address	Operating System	vCenter	ESXi	Cluster	
Finance_VM1	10	0.0.1.1	Red Hat Enterprise Lir	ux 5 (64 10.0.0.100	DistESX1	Research Cluster	
Finance_VM1_8	10	0.186.1.8	Red Hat Enterprise Lir	шх 5 (64 10.0.0.100	Finance1 ESX	Finance Cluster	
Finance_VM2	10	0.0.1.2	Red Hat Enterprise Lir	ux 6.8 (6 10.0.0.100	DistESX1	Research Cluster	

# 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.

Finance > F	Finance_SG_1	1				LAUNCH UNISPHER
Inventory	Capacity	II Performance				
Usage Subscribed 10	0					
Allocated 10.2	Free 90.8					
VP Saved			10.2			
Compression			Yes			
Compression Ratio			10.5:1			

## 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. Observability identifies performance impacts on the Latency chart as pink-shaded areas. Observability identifies performance anomalies on all storage group performance charts as blue-shaded areas. A sample of charts is shown below.



# **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.

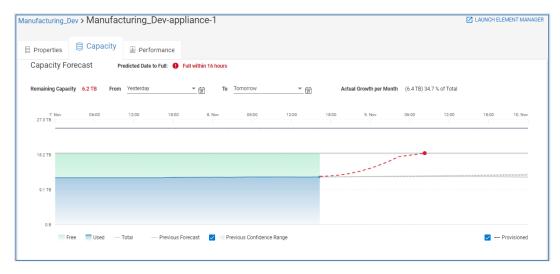
Appliance details
 - Properties
 - Properties

#### PowerStore appliance details

Manufacturing_Dev	> Manufac	turing_Dev-ap	pliance-1			Z LAUNCH ELEMENT MANAGER	
Properties	Capacity	I Performance					
Parent Cluster Name	Manufactur	ring_Dev ring Dev-appliance-1	Total Issues	1	🛢 Capacity	1 issue	
Model	PowerStore		Components	~	-30 9 hours ago The Appliance 'Manufacturing_Dev-appliance-1' is g substantially increasing rate, predicted to run out of space within		
Mode	Unified		Configuration	~	Resolution:		
Dell Service Tag #	RV429L63		Capacity	1		deletions and snapshot expirations, consider or migrating data to another Appliance.	
Location	Hopkinton,	MA	Performance	~			
Site	CIQ Enginee	ering Site					
SW Version	1.0.0.0.5.01	12	Data Protection	~			
IPv4 address	10.0.0.201						
IPv6 address	-						

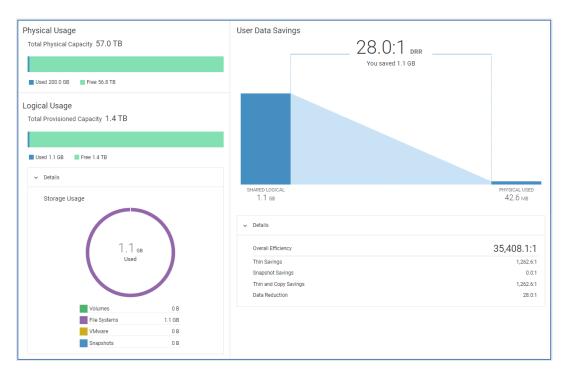
# - Capacity

Appliance details 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.

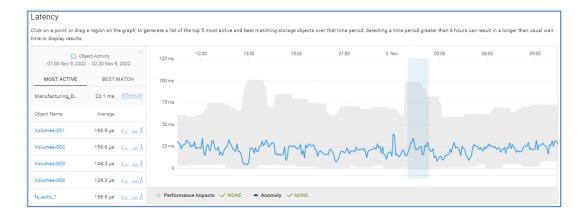
#### PowerStore appliance details



Appliance details - Performance of the page lists the top object activity charts for Latency, IOPS, and Bandwidth.

Properties	Capacity III Perform	mance						
,						Viewing da	a from the last 24 hours 🛛 🚯 CREATI	E REPORT
Dbject Activi	ty		IOPS			Bandwidth		
Dbject	24 Hour Trend	Average	Object	24 Hour Trend	Average	Object	24 Hour Trend	Averag
olumes-001	and the second s	166.9 µs	fs_auto_2	La Altonarti Totanandi Itana ila botani eleman.	1.6 IOPS	fs_auto_2		14.7 KBp
olumes-002	descendent and a second second	156.6 µs	fs_auto_1	La Moner Westman Mitma Libration Corner	1.4 IOPS	fs_auto_1		4 KBp
olumes-003	and the second statement of th	146.3 µs	Volumes-004	La Altone Westmone Altone de Mareto este	1.3 IOPS	Volumes-004		12.8 KBp
olumes-004	and the second sec	136.3 µs	Volumes-003	La dimenti orana di mada kada metera d	1.1 IOPS	Volumes-003		9.9 KBp
auto_1	and the second	156.6 µs	Volumes-002	La. Aldeman Microsoma ที่มีการกระด้างการกระด	1.4 IOPS	Volumes-002		13.8 KBp

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. The Best Match identification identifying the objects with the most closely matching performance shape is also supported. An example of the Latency chart is shown below.



# **Node details**

For PowerScale, Isilon, and APEX File Storage for AWS, Infrastructure Observability provides node details. To begin, select a node hyperlink from the Nodes tab on the system details page.

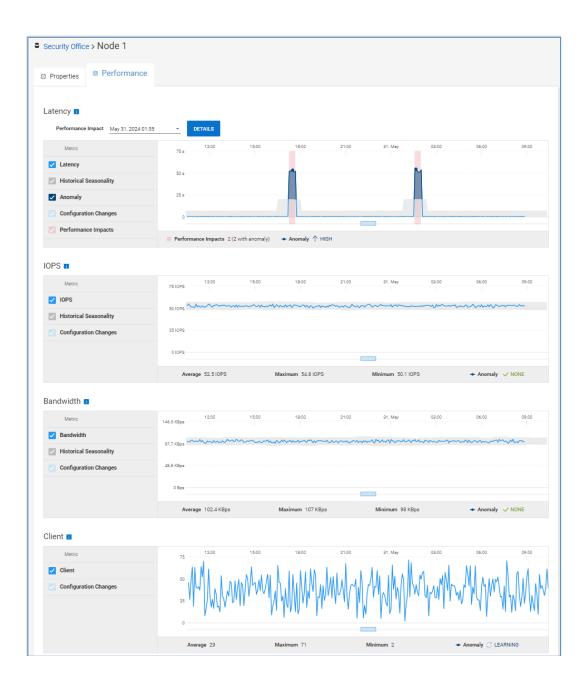
# Node details -The Properties tab for a node provides various information associated to the nodePropertiesincluding the pool, logical node number, model, smart failed state, node state, and<br/>contract end date.

Finance Data	Center > Node 1			
Properties	Performance			
Pool	S Main Pool	Total Issues	0	Total
LNN	1	Components	00	
Model Serial Number	H500 SV200-004EIH-OZL8			
Read Only Mode	No (Read/Write)	Configuration	00	All health checks were successful.
Smart Failed State	No	Capacity	00	
Node Down State	No	Performance	00	$\sim$
Contract End Date	-	Data Protection	00	

## Node details -Performance

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

#### Node details



#### Quota details



# **Quota details**

Quota details for PowerScale and APEX File Storage for AWS are available by selecting the quota hyperlink from the **Quotas** tab on the system details page.

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

Finance Data Center > Quo	ta /ifs/data default-	group
Properties		
Quota Type	default-group	Threshold and Storage
Quota Path	/ifs/data	
Include Snapshots Data	No	Physical
Enforce Limits	Yes	
Is as Container	Yes	FS Logical
Notification	default	
Number of INodes	213	
Number of shadow references	-	App Logical
		and
		Used 📕 Free 🖡 Advisory Limit 🖡 Soft Limit 🖡 Hard Limit

# **Host details**

Host detail drill downs are available for Unity XT family, PowerStore, PowerMax, 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.

	esearch > Loca									🗹 LAUNCH UN	IISPH
Propertie	es 🛢 Capacity	y 🕕 Performa	ance								
escription	_								PAUSE CON	NECTIVITY HEALTH CH	ECK
perating System	VMware ESXi 5.5.	0		Ter	tal issues	0	Total				
etwork Address	10.0.0.14			101	ai issues	0	rotai				
itiator Protocol	FC				Components	~		All heal	th checks were succes	sful.	
					Configuration	~					
				3	Capacity	~					
					Performance	~					
				0	Data Protection	×					
STORAGE V	/IRTUAL MACHINES	INITIATORS								4 Storage Objects	Û
Issues 🔺	Name	Туре	Thin		Size (GB)	Alloca	ated (GB)	Pool	Consistency Group	Host I/O Limit	
~ MI	R_Pool1_SAN_Dat	VMware VMFS	Yes		1000		275	Market Research_Pool1	MRApp2CG	10K IOPS	
<ul> <li>Мі</li> </ul>	R_Pool1_SAN_Dat	VMware VMFS	Yes		1500		412.5	Market Research_Pool1	MRApp2CG	5K IOPS	
<ul> <li>Мі</li> </ul>	R_Pool2_SAN_Dat	VMware VMFS	Yes		4000		1100	Market Research_Pool2	-	10K IOPS	
~ м	R_Pool2_SAN_Dat	VMware VMFS	Yes		4000		1100	Market Research_Pool2	-	5K IOPS	

## 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.

#### Host details

Market Re	search > Local	ESX1									Z	LAUNCH UNISPHERE
Properties	Capacity	Performa	ance									
Total Size			10.2 TB	Allocated S	lize			2.6 TB				
Historical Trer										١	/iewing data fro	m the last 6 months
Value	L	ast Received	Apr	r '22	May '22	Jun '22	Jul '22	Aug '22	Sep '22	Oct '22	Nov '22	Dec '22
Total		129.6 TB										
Allocated	(90.49	%) 117.3 TB	8 100k									
			() 100k									

# 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 on 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 PowerStore. Latency is not supported for PowerVault initiators.

Market Research >	LocalESX1					Z	LAUNCH UNISPHER
Properties Capa	city III Performance						
\$ Storage Objects						Viewing data from the la	ist 24 hours
Name	Pool	Other Hosts			▼ Latency (ms)	IOPS (K)	Bandwidth (MBps)
MR_Pool1_SAN_Datastore1	Market Research_Pool1	LocalES	and 2 others	LocalESX3 LocalESX4	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

Host details – Inventory

The host details page for PowerMax systems only has an **Inventory** tab. This tab provides information about the associated storage groups, initiators, port groups, masking views, and PowerPath hosts.

HR_Remote > HO	st1					🔀 LAUNCH UNISP
Inventory						
Host Group(s)	HostHG1	Capacity	30.0 GB	Consistent LUN	No	
Initiator Protocol	FC	PowerPath Host	No			
STORAGE GROUPS	INITIATORS MASKING	VIEWS PORT GROUPS	POWERPATH HOSTS			
2 storage groups						ć
Name 个	Compliance	Srp	Provisioned (GB)	Effective Used (GB)	Emulation	
HR_Remote_SG_11	<b>A</b>	-	100,000.0	9.2 TB	FBA	
HR_Remote_SG_12	<b>A</b>	-	100,000.0	9.2 TB	CKD	
HR_Remote_SG_13	<b>A</b>	-	100,000.0	9.2 TB	FBA	
HR_Remote_SG_14	<b>A</b>	-	100,000.0	9.2 TB	CKD	
HR_Remote_SG_21	<b>A</b>	-	100,000.0	9.2 TB	FBA	
HR_Remote_SG_22	<b>A</b>	-	100,000.0	9.2 TB	FBA	
HR_Remote_SG_23	<b>A</b>	-	100,000.0	9.2 TB	FBA	
HR_Remote_SG_24	A	-	100,000.0	9.2 TB	FBA	

# **Connectrix and PowerSwitch details**

#### Introduction

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

Selecting the switch hyperlink in the home 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 Observability 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.

#### Connectrix and PowerSwitch details

Product	tion SAN Ext	ension Conr	ectrix ED-DCX6-4B   EAF300M	001	🔀 Launch Switch Element Manag
Health	Inventory	Capacity	III Performance		
	70 POOR	Compon score.	ents is the top hea	alth check category impacting Production SAN Ex	tension's health
Health Issu	les				
Health Issu			2	Components	1 issue
	es		2 -30	Components     -30 1 day ago One or more components in the SAN system Production SAN	
Total Issue	es ients			-30 1 day ago One or more components in the SAN system Production SAN Resolution:	N Extension has a health status of marginal.
Total Issue	es ents ration			-30 1 day ago One or more components in the SAN system Production SAN	N Extension has a health status of marginal.
Total Issue	es ents ation			-30 1 day ago One or more components in the SAN system Production SAN Resolution: Ensure the condition degrading switch health is resolved. For additional detail	N Extension has a health status of marginal.

Observability 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, Observability displays the number of congestion spreading events.

Product	tion West ca	onnectrix MDS-9718	JPG194001DK	🔀 Launch	Switch Element Mana
Health	Inventory	Capacity	III Performance		
(	96	Compon	ents is the top he	ealth check category impacting Production West's health score.	
ealth Issu	Jes				
ealth Issu			4	Performance	2 issues
	Jes		-4	Performance 2 hours ago A high port utilization on port fc2/37 on switch Production West and severe congestion ratio or was detected.	
Total Issu	ues nents			2 hours ago A high port utilization on port fc2/37 on switch Production West and severe congestion ratio or	n switch SRDF LINK
Total Issu	ues nents ration			2 hours ago A high port utilization on port fc2/37 on switch Production West and severe congestion ratio or was detected.     2 hours ago Severe congestion spreading was detected on switch Production West due to Link Reset errors	n switch SRDF LINK
Total Issu	ues nents ration y			Aburs ago A high port utilization on port fc2/37 on switch Production West and severe congestion ratio or was detected.     Aburs ago Severe congestion spreading was detected on switch Production West due to Link Reset errors Discards on switchport fc5/10.	n switch SRDF LINK and C3 Tx Timeout

## 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.

Produc	tion SAN	Extension con	nectrix ED-DCX6-4B   EA	F300M001				🔀 Launch Swite	ch Element Mar
🖫 Health	Invente	Dry 🗎 Capacity	II Performance						
Management	IP Address	10.0.12.1	Switc	h Model EOL/EO	SL 8 Nov 30, 20	24	Last Contact Time	20 hours ago	
Collector		ciqc.conn.emc.com	Firmw	vare Version	🛕 8.2.1a		Location	Round Rock, TX	
Contract Expi	iration	May 31, 2028	Swite	h Up Time	14 days		Site Name	ACME Headquarters	
Contract Num	nber	32678017TM	Switc	h WWN	10:00:C4:F5:7	C:2D:AA:01	Site ID	ACME Headquarters 01	
Service Plan		ProSupport MC	Chase	sis WWN	10:00:C4:F5:7	C:2D:AA:02			
FABRICS	VFABRIC	ZONES	ATTACHED DEVICES	VIRTUAL	MACHINES	COMPONENTS 8	LICENSES		
fabrics									C
Principal Swite	ch WWN 个	Principal Switch IP	Address	Partition ID	Total Switches		Monitored Switches	Total End Devices	Used (%
10:00:C4:F5:7	7C:2D:11:A1	10.0.12.1		8		1	1	0	0.

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.

	verSwitch North 841					
Health 📙 Inven	tory 📄 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			
Component Objects	ITACHED DEVICES (ETHERNET POR				- · · · ·	
Component Objects	ITACHED DEVICES (ETHERNET POR		Part Number		Serial Number	Ć
Component Objects	ITACHED DEVICES (ETHERNET POR	Slot/Unit State	Part Number		Serial Number	Ć
Component Objects Type ↑ FANTRAY	TTACHED DEVICES (ETHERNET POR	Slot/Unit State	70-1003226	i-09	DZD3208M012	Ĺ
Component Objects	TTACHED DEVICES (ETHERNET POR	Slot/Unit State		i-09		Ć
Component Objects Type ↑ FANTRAY	TTACHED DEVICES (ETHERNET POR	Slot/Unit State	70-1003226	5-09 5-10	DZD3208M012	Ć
Component Objects Type  FANTRAY FANTRAY	TTACHED DEVICES (ETHERNET POR	Slot/Unit State 1 ONLINE 2 ONLINE	70-1003226 70-1003226	5-09 5-10 5-11	DZD3208M012 DZD3208M01M	Ĺ
Component Objects Type  FANTRAY FANTRAY FANTRAY	TTACHED DEVICES (ETHERNET POR	Slot/Unit State 1 ONLINE 2 ONLINE 3 ONLINE	70-1003224 70-1003224 70-1003224	<ul> <li>609</li> <li>610</li> <li>611</li> <li>612</li> </ul>	DZD3208M012 DZD3208M01M DZD3208M01M	Ĺ
Component Objects Type  Type FANTRAY FANTRAY FANTRAY FANTRAY FANTRAY	TTACHED DEVICES (ETHERNET POR	Slot/Unit State           Slot/Unit         State           1         ONLINE           2         ONLINE           3         ONLINE           4         ONLINE	70-1003224 70-1003224 70-1003224 70-1003224	5-09 5-10 5-11 5-12 5-13	DZD3208M012 DZD3208M01M DZD3208M01M DZD3208M01M	Ĺ
Component Objects Type  Type  FANTRAY FANTRAY FANTRAY FANTRAY FANTRAY POWER_SUPPLY_UNIT	TTACHED DEVICES (ETHERNET POR	Slot/Unit         State           1         ONLINE           2         ONLINE           3         ONLINE           4         ONLINE           1         ONLINE	70-1003224 70-1003224 70-1003224 70-1003224 70-1003155	5-09 5-10 5-11 5-12 5-13	DZD3208M012 DZD3208M01M DZD3208M01M DZD3208M01M DZD3208M01M GQV9247LL08	Ĺ

#### **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
  - B-Series: 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.
  - MDS: 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 Observability.
- Used % Percentage of ports in this fabric that are in use.

FABRICS VFABRIC	ZONES ATTACHE	D DEVICES VIRTUAL I	MACHINES COMPONENTS 8	LICENSES		
fabrics						đ
Principal Switch WWN 个	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	-

#### VSAN/VFabric

The **VSAN** tab (Connectrix MDS) and **VFabric** tab (Connectrix B-Series) provides information about VSANs and Virtual Fabrics.

- Partition ID
  - B-Series: If Virtual Fabrics (VF) is enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - MDS: 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	VFABRIC Z	ONES ATTACHED	DEVICES VIRTUAL MACHINES	COMPONENTS 8	LICENSES	
2 partitions						۵
↑ Partition ID	Switch Name	Management IP	Number of sy	witches	Total End Devices	End devices, this switch only
8	Production SAN Exte	m 10.0.12.1		1	0	0
128	Production SAN Exte	m 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
  - B-series: 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.
  - MDS: This field shows the VSAN ID.

FABRICS	VFABRIC	ZONES ATTAC	CHED DEVICES VIRTUA	L MACHINES COMP	PONENTS 8 LI	CENSES		
32 zone members								ć
Active Configurat	ion 个	Zone Name	Symbolic Name	Member Name	Alias	Is Logged In	Interface	Partition
PRDConfig		PrdSQL_IOP063182_VM	[61] "Emulex LPe12002-E	10:00:00:00:C9:9D:E0:	PrdSQL_182_hba0	Yes	3/0	128
PRDConfig		PrdSQL_IOP063182_VM	[98] "SYMMETRIX::00019	50:00:09:73:98:03:C5:	VMAX_240_FA_1D_1	Yes	3/16	128
PRDConfig		PrdSQL_IOP063182_VM	[61] "Emulex LPe12002-E	10:00:00:00:C9:9D:E0:	PrdSQL_182_hba1	Yes	3/1	128
PRDConfig		PrdSQL_IOP063182_VM	[98] "SYMMETRIX::00019	50:00:09:73:98:03:C5:	VMAX_240_FA_1D_2	Yes	3/17	128
PRDConfig		PrdSQL_IOP063182_VM	[61] "Emulex LPe12002-E	10:00:00:00:C9:9D:E0:	PrdSQL_182_hba2	Yes	3/2	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
  - B-series: If Virtual Fabrics (VF) is enabled, this field displays the VF ID for each VF defined on the switch. If not enabled, this field is set to 128.
  - MDS: This field shows the VSAN ID.

#### Connectrix and PowerSwitch details

FABRICS	VFABRIC	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS 8	LICENSES			
I attached device	es								
WWPN 个	5	Symbolic Name				Zoned	Interface	Speed (Gbps)	Partition ID
10:00:00:00:C9:	9D:E0:31 [	61] "Emulex LPe120	02-E FV1.11A5 DV12.0.0.2. HN:id	p063182. OS:Linux.		Yes	3/0	32	128
10:00:00:00:C9:	9D:E0:32 [	61] "Emulex LPe120	02-E FV1.11A5 DV12.0.0.2. HN:io	p063182. OS:Linux.		Yes	3/1	32	128
10:00:00:00:C9:	9D:E0:33 [	61] "Emulex LPe120	02-E FV1.11A5 DV12.0.0.2. HN:io	p063182. OS:Linux.		Yes	3/2	32	128
10:00:00:00:C9:	9D:E0:34 [	61] "Emulex LPe120	02-E FV1.11A5 DV12.0.0.2. HN:io	p063182. OS:Linux.		Yes	3/3	32	128
10:00:00:00:C9:	9D:E1:31 [	50] "Emulex LPe120	02-E FV1.00A12 DV7.2.32.002 IC	P063182		Yes	3/4	32	128
10:00:00:00:C9:	9D:E1:32 [	50] "Emulex LPe120	02-E FV1.00A12 DV7.2.32.002 IC	P063182		Yes	3/5	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					Ċ
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:29ff:fe54: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.

#### Connectrix and PowerSwitch details

FABRICS	VFABRIC	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS 8	LICENSES		
1 virtual machines								Ê
Name 个		Network Address	Operating System		vCenter	ESXi	Cluster	
Market Research	_VM16_1	10.1.16.1	Red Hat Enterprise L	inux 5 (64-bit)	10.0.0.100	LocalESX4	Market Research Cluster	
Market Research	_VM20_1	10.1.20.1	Red Hat Enterprise L	inux 5 (64-bit)	10.0.0.100	LocalESX4	Market Research Cluster	
Test_VM0_1		10.178.0.1	Red Hat Enterprise L	inux 5 (64-bit)	VC-Test-27T42L.ir	fra.lab TD_ESX_2	Test Cluster	
Test_VM1		10.0.7.243	Red Hat Enterprise L	inux 5 (64-bit)	VC-Test-27T42L.ir	nfra.lab TD_ESX_1	Test Cluster	
Test_VM1_2		10.178.1.2	Red Hat Enterprise L	inux 5 (64-bit)	VC-Test-27T42L.ir	nfra.lab TD_ESX_1	Test Cluster	
Test_VM2_7		10.178.2.7	Red Hat Enterprise L	inux 5 (64-bit)	VC-Test-27T42L.ir	nfra.lab TD_ESX_2	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	VFABRIC	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES COMPONENT	ICENSES		
components							
Туре 个		Slot/Unit	State	Part Number	Serial Number	EOSL Date	
Blade (sw blade)		3	enabled	60-1003200-09	FDU3243N00J	-	
Blade (sw blade)		8	enabled	60-1003584-07	GQV9247LL1B	8 May 5, 2025	
Fan		1	ok	60-1003203-04	D) This module will rea 2025.	ch EOSL (End of Support Life) by May 5,	
Fan		2	ok	60-1003203-04	2025. D	LEARN MORE	
Fan		3	Faulty	60-1003203-04	DYL3009M02M	_	
Power Supply		1	ok	23-0000161-01	DUC2M51L0WA	_	

#### Licenses

The Licenses tab (Connectrix) provides information about the licenses on each switch.

- License features List of features for each license for B-Series and name of the license feature for MDS.
- License key (B-Series) Key used to install the license.
- Expiration date Expiration date of the license.
- Capacity (B-Series) Count of the additional ports that are allowed.
- Count (MDS) Sum of base license ports and additional assigned ports if smart license is disabled. The additional ports that are assigned to the switch if smart license is enabled.

 Licenses used – applicable for Ports on Demand switch port licenses for B-Series. Applicable only for PORT\_ACTIV\* or FC\_PORT\_ACTIV\* switch ports for MDS.

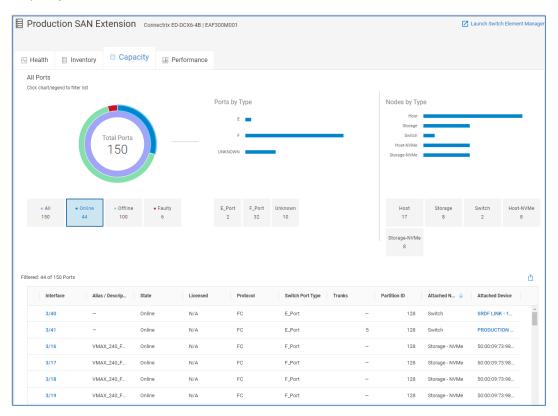
FABRICS	VFABRIC	ZONES	ATTACHED DEVICES	VIRTUAL MACHINES	COMPONENTS 8	LICENSES		
licenses								Ċ
License Feature	s 个	License	Кеу	Expiry Date	Capacity		Licenses Used	
Trusted FOS (T	ruFOS) Certificate	FOS-8	-0-04-11210730	Nov 29, 2022		-		-
Extended Fabri	c, Trunking, FICON_CU	IP, P7NK9	FF7YLWNmKSSDCEF7BRZKT4	-		-		-
Inter Chassis Li	ink (ICL)	gL93W	M7QKLMHYFAYLB3tQHaSNXm	-		64		-
Integrated Rout	ing Ports on Demand	gPfQZ	DLSD9KaXtF4N9K97RHaN9GM	-		100		-

## 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.
- Trunks (B-Series)/Simple Channel (MDS) 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:

📼 Produ	ction Power	Switch South	S4148U-ON   TSREX	001					
🖅 Health	Inventory	Capacity	i Performance						
All Ports Click chart/l	egend to filter list								
					Ports by Type	е			
					E_PORT				
		Total Ports			F_PORT				
		20			Unknown				
• Al	Online	Offline			E_PORT	F_PORT	Unknown		
20		10			2	8	10		
20 Ports									凸
Interface		Alias/Description	n Sta	te	Protocol		Port Type	Port Mode	
ethernet	1/1/31	Not Available	OFI	FLINE	Ethernet		Unknown	ACCESS	A
ethernet	1/1/32	Not Available	OFI	FLINE	Ethernet		Unknown	ACCESS	
ethernet	1/1/33	Not Available	OF	FLINE	Ethernet		Unknown	ACCESS	
ethernet	1/1/34	Not Available	ON	LINE	Ethernet		Unknown	ACCESS	
ethernet	1/1/35	toSBETH	ON	LINE	Ethernet		Unknown	TRUNK	
ethernet	1/1/36	toSBETH	ON	LINE	Ethernet		Unknown	TRUNK	

## 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.

#### Connectrix and PowerSwitch details

Health 🔛 Inv	entory Capacity	ılı	Perform	lance						
							Viewing data fr	om the last 24 hours	GO TO ALL MET	$rrics \rightarrow$
Object Activity	/									
Utilization				Errors			Congestion			
Object	24 hour Trend	A	verage	Object	24 hour Trend	Average	Object	24 hour Trend	Ma	kimum
PrdSQL_182_hba0	And Manager and Andrew and a	0	99.1 %	PrdSQL_182_hba0	And a loss of the second se	A 3 Errors/s	PrdSQL_182_hba0			0.201
PrdSQL_182_hba1	halin king han	0	95.9 %	PrdSQL_182_hba1	the and an in the second second	A 2.9 Error	PrdSQL_182_hba1	l	<b>A</b>	0.192
PrdSQL_182_hba2	halista han han han han han han han han han ha		92.2 %	PrdSQL_182_hba2	the and an and the second stands and the	A 2.7 Error	PrdSQL_182_hba2	l	🔺	0.184
PrdSQL_182_hba3	halista anna an anna an an an an an an an an a	<b>A</b>	89.9 %	PrdSQL_182_hba3	And And Market Market Market	A 2.6 Error	PrdSQL_182_hba3	<u> </u>	<b>A</b>	0.176
PrdSQL_182_hba4	town the second s		86.2 %	PrdSQL_182_hba4	And the state of the second second	A 2.5 Error	PrdSQL_182_hba4	<u> </u>	<b>A</b>	0.169

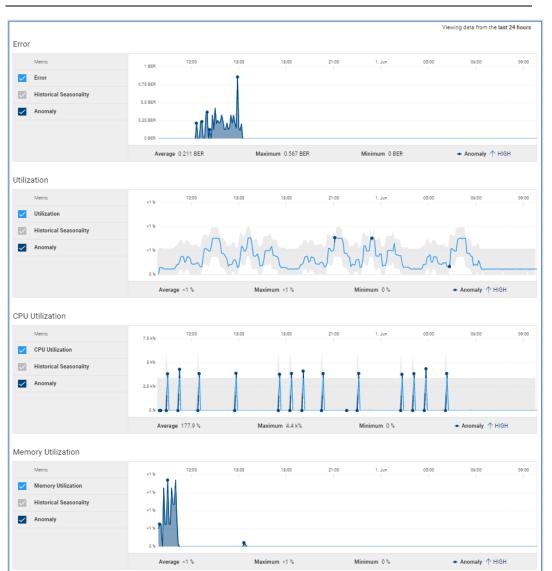
Highlighting an area in any of these performance charts shows the top five port contributors to that performance metric during that time period in the Most Active tab on the left side of the chart. The Best Match tab lists the ports with the most closely matched shape during the selected period. The 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

Production SAN Extension > PrdSQL\_182\_hba3



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

Production PowerSwitch East > ethe	ernet1/1/31			
II Performance				
Past 24 Hours				
Utilization				
Metric	15:00 18:00 1%	21:00 22. Aug	03:00 06:00	09:00 12:00
Utilization	<1%			
Historical Seasonality	<15 MARIA ///////////////////////////////////	MANADAN IN T	աներություններ	
Anomaly	1 Martin manhan	MARAMAN MAN	marches Marchester	MARIAN A MARIANA AND AND AND AND
	0.2 A . 1 • A • A M A P. A. A A		*******	ANAMANA A ANAMAMAA
	Average <1%	Maximum <1%	Minimum <1%	+ Anomaly 个 HIGH
Bit Errors				
Metric	15:00 18:00 30 M/s	21:00 22. Aug	03:00 06:00	09:00 12:00
Bit Errors				
<ul> <li>Historical Seasonality</li> </ul>	20 M/s			• •
Anomaly	10 M/s			
	Average 248.564 k/s	Maximum 14.317 M/s	Minimum 5.187 /s	+ Anomaly 1 HIGH
Throughput				
Metric	15:00 18:00 <1 bps	21:00 22. Aug	03:00 06:00	09:00 12:00
Throughput	<1 bps	•		
Historical Seasonality	<1 bps	AND	and the second	
Anomaly	1 bps 1 MM MA MAAAAA	In non allana hall	marken Marken Markenster	MARIAN MA MARIA ANALANT
				MANANA A ANA MANANA
	Average <1 bps	Maximum <1 bps	Minimum <1 bps	← Anomaly 个 HIGH

# 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.



# Hyperconverged infrastructure systems details

#### Introduction

Infrastructure Observability supports VxRail HCI systems, APEX Private Cloud Services, and APEX Hybrid Cloud Services. 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 an HCI 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.

#### HCI system details – Health tab for HCI 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 HCI clusters.

0ell Mart - Mega Market	Boston, MA VxRail E560   23HBYK20000000		LAUNCH VCENT
Health 🖸 Inventory 😂 🕻	Capacity  Performance		
	Components is the top health c MA's health score.	heck category impacting Dell Mart - M	lega Market Boston,
FAIR FAIR	MAS health scole.		
FAIR	4 Comp	ponents	4 issues
alth Issues	4 🖬 Comp	status in vCenter Server.	4 issues
alth Issues	4 € Comp -20 -2 -2	, , , , , , , , , , , , , , , , , , ,	
Alth Issues Total Issues Components	4 € Comp -20 -2 -2 -2	status in vCenter Server. 2 days ago c3-esx03.racke09.local: Host health - Error. An error was detec	

# HCI 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.

🗄 Dell Ma	art - Mega Ma	arket Boston,	MA VxRail E560   2	3HBYK20000000	1				LAUNCH VCENTER
🕢 Health	Inventory	Capacity	Performance						
Identificat	ion		Location				Management		
Serial # / PSI	NT 23HBYK200	00000	Location	Provider	nce, RI		vCenter Server	vcluster935-vc	sa
Cluster ID	523f5813-0	ea6-eeff-e5a9-84	Site Name	ACME R	lemote Site 1		FQDN vCenter Server	vcluster935-vcsa.ra	acke
Total Hosts	з		Site ID	ACME R	lemote Site		vCenter License Type	Standard	
Cluster Type	vSAN 2 nod	e Stretched cluster					vSAN Datastore Sharing	None	
							vSAN License Type	Enterprise	
Version In	formation		Status						
vCenter Vers	ion 8.0.0-2051	9528	Contract Ex	piration Oct 24, 2	2030				
VxRail Syster	m Version 7.0.350-203	392956	Last Conta	ct Time Fri, May	31 2024, 3:38:46 PM				
HARDWARE	DATASTORES								
View Hosts	*								
3 Host									ů
Hostname ↑	Appliance Seria	I Model	Service Tag	Version	Capacity Disk Type	Location	Site Name	Site ID	Chassis Serial #
c3-esx01.rac	k 23HBYK20000	VxRail E560	23HBYK4	7.0.3-19193900	-	🖗 Boston, N	IA ACME Remote	-	C400JFK
c3-esx02.rac	k 23HBYK20000	VxRail E560	23HBYK5	7.0.3-19193900	-	🖗 Boston, N	ACME Remote	-	C400JFK
c3-esx03.rac	k 23HBYK20000	VxRail E560	23HBYK5	7.0.3-19193900	-	-	-	-	C400JFK

## Hardware – Hosts

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

HARDWARE DATAS	TORES				
View Hosts	Ŧ				
3 Hosts					Ċ
Hostname 1	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	Ŧ								
6 Disks									₫
Hostname ↑	Slot	Enclosure	Protocol	Model	Serial Number	Version Number	Manufacturer Ca	pacity (GB) Datastore	
c3-esx01.rac	0	0	SAS	PX06SMB070X	25HB56G3	AS10	TOSHIBA	3481.6 VxRail-Virtual	^
c3-esx01.rac	1	0	SAS	PX06SMB071X	25HB56G4	AS10	TOSHIBA	3481.6 VxRail-Virtual	
c3-esx02.rac	0	0	SAS	PX06SMB072X	25HB56G5	AS10	TOSHIBA	VxRail-Virtual-SAN-Datastore-3 9c13-41d8-8247-16448a48738	
c3-esx02.rac	1	0	SAS	PX06SMB073X	25HB56G6	AS10	TOSHIBA	3481.6 VxRail-Virtual	Т
c3-esx03.rac	0	0	SAS	PX06SMB074X	25HB56G7	AS10	TOSHIBA	3481.6 VxRail-Virtual	
		0	010	DVOCOMPOZEV	05005400	4010	TOOLIDA	outer annellational	*

#### Hardware - Power Supplies

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

HARDWARE DATAST	DRES					
View Power Supplies	•					
4 Power Supplies						Ċ
Appliance Serial # / PSNT 1 1	Power Supply 2 1	Slot	Serial Number	Part Number	Version Number	
23HBYK2000000	Power Supply 1	1	V074103PSUSN000	0CMPGMA01	04.08.26	
23HBYK20000000	Power Supply 2	2	V074103PSUSN001	0CMPGMA01	04.08.26	
23HBYK20000001	Power Supply 1	1	V074203PSUSN000	0CMPGMA01	04.08.26	
23HBYK20000001	Power Supply 2	2	V074203PSUSN001	0CMPGMA01	04.08.26	

## **Hardware - Version Information**

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

HARDWARE	DATASTORES									
View Version Informa	ation 💌									
3 Hosts										₾
Hostname 1	ESXi	Dell PTAgent	BIOS	BMC	BOSS	Boot Device	Expanded Back	CPLD	НВА	
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	

#### Hardware – Data Processing Unit

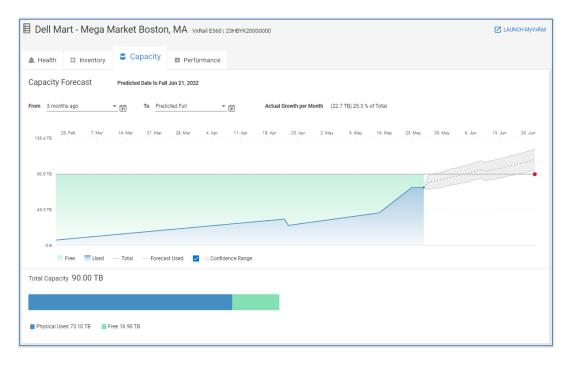
The Data Processing Unit view displays the DPU details of each node in the system.

#### **Datastores**

The **Datastores** tab provides capacity utilization information for each of the datastores on the cluster.

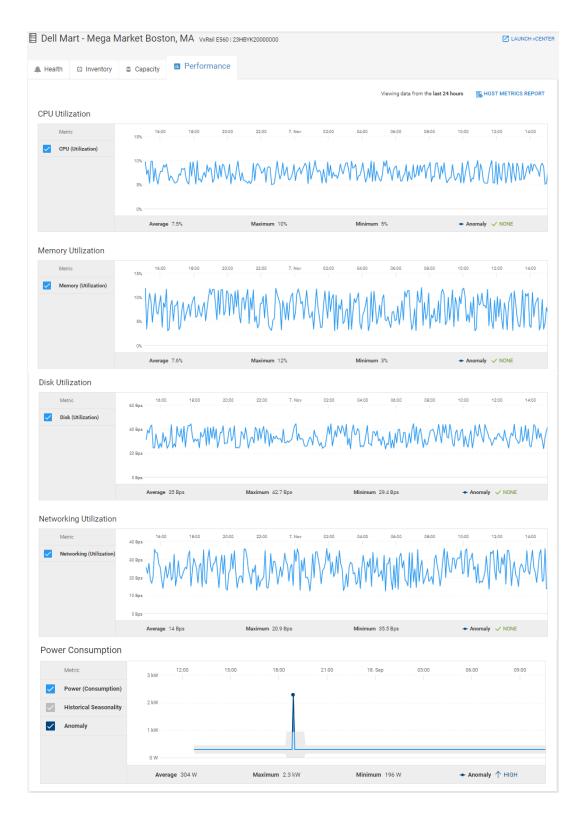
HARDWARE DATASTORES				
1 Datastore				đ
Name	Туре	↓ Used (%)	Free	Capacity
VxRail-Virtual-SAN-Datastore-330f7fea-9c13-41d8-8247-16448a487384	VSAN	24.3	15.8 TB	20.9 TB

HCI 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.



# HCI 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

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

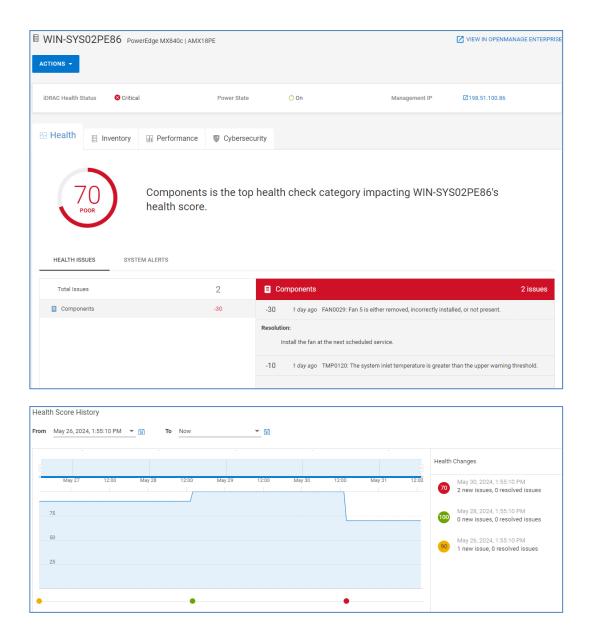
have been discussed earlier in this paper. This section documents the available information in the system details page for a PowerEdge server. Each server has the Health, Inventory, and Performance tab, and will have a Cybersecurity tab if that feature is enabled. Each tab provides a link to view the server in OpenManage Enterprise. The details of each tab are described in the following sections.

Each tab also provides an **Actions** menu. If remote operations are enabled in OpenManage Enterprise, and the Observability 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.

WIN-SYS02PE86			
ACTIONS -			
Blink LED			
LED On			
LED Off			
Power Control			
Power On			
Power Off			
Power Cycle System (Cold Boot)			
System Reset (Warm Boot)			
Graceful Shutdown			
Other Actions			
Sync Device			

# PowerEdge system details – Health

Observability provides the Proactive Health Score for each server monitored by Observability. Only the Components category is used to calculate the health score for servers. As with other systems, each health issue identified in Observability has a corresponding recommended remediation. Servers also have a System Alerts tab to allow the user to quickly see any alerts that are potentially impacting the system health. The Health Score History is tracked at the bottom of the page to help identify recurring issues.



# 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 目 Inver	ntory 📊 Performance 🦁 C	bybersecurity			
Status		Identification		Location	
iDRAC Health Status	8 Critical	Asset Tag	MI-Research-173	Site Name	ACME Round Rock
Power State	① off	Service Tag	ATY7D85	Site ID	ACME Round Rock
Contract Expiration	Nov 7, 2025	iDRAC DNS Name	idrac-aty7d85.devops.acme.com	Datacenter	Round Rock, TX
Last Contact Time	Nov 6, 2022	Express Service Code	12349876184	Location Details	Marketing Analytics Lab, 42, 18, 31
		MAC Address	01:00:5E:90:10:42		
Management		OS Information		Hardware	
Management IP	2198.51.100.173	OS Name	Windows Server 2012 R2	Model	PowerEdge MX740c
OME IP Address	2198.51.100.104	OS Version	6.3	Processor Summary	2 Processors: Intel(R) Xeon(R) CPU E5-263
OME Collector	RR-Site-OME	Hostname	WIN-02PE173	Total Memory	16.0 GB
Chassis Information					
Chassis Health	💙 Ok				
Chassis Name	ML Research Chassis 02				
Chassis Service Tag	AMX70PE				
Chassis Slot Name	Slot 1				
Chassis Slot	1				

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 Observability Collector. See Appendix A: Enabling Infrastructure Observability at the system for additional details.

#### Hardware

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

- All Hardware
- Device Card Information
- FC Ports
- FRU
- Memory Information
- Network Devices
- Physical Drives
- Power Supplies
- Processors
- Storage Controllers
- Storage Enclosures
- Virtual Flash

HA	RDWARE	FIRMWARE	LICENSES	CONTRACI
View	All Hardware	-		
St	All Hardware			Details
	Device Card Ir	nformation		
Δ	FC Ports			16.0 GB total (
٢	FRU		s	1 Storage Enc
9	Memory Infor	mation		2 Power Supp
•	Network Devi	ces	Drives	2 Physical Driv
٩	Physical Drive	s	<b>▼</b> S	1 Storage Con
0	Ok	Processors		2 processors,
- N/	/A	Device Cards		3 Device Card
- N/	/A	FRU		1 Field Replac

#### **Firmware**

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

HARDWARE	FIRMWARE	LICENSES	CONTRACT	MANAGEMENT IN	FO		
4 firmware entries						VIEW IN SYSTEM UPDATES	₫
Component Name		Software Type		Version	Install Date Raw	Compliance Message	
Backplane 0		FRMW		4.26	May 31, 2023, 2:04:00 PM	<b>1</b> 4.10	
BIOS		BIOS		1.6.11	March 2, 2024, 1:04:00 P	1.1.0	
BIOS		BIOS		1.0.2	May 31, 2023, 2:04:00 PM	2.1	
BIOS		BIOS	:	3.0.2	May 31, 2023, 2:04:00 PM	<b>0</b> 2.1	

#### 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.

HARDWARE	FIRMWARE	LICENSES	CONTRACT	MANAGEMENT INFO			
1 license							₫
Status		Туре		Description	Expiration	Entitlement ID	
② Unknown		Perpetual		iDRAC7 Express License	-	FN-1504441295	

## 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	
1 contract					VIEW ON DELL SUPPORT SITE
Status			Service Level Description	Start Date	Expiration
Active			Prosupport Plus	Wed, 31 May 2023 18:03:59 GMT	Sat, 31 May 2025 18:03:59 GMT

## **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 agen	it					۵
IP Address	N	MAC Address	Name		Management Url	DNS Name
198.51.100.150	0	01:00:5E:90:10:53	SYSMGN	IT-ML-LABS	D https://198.51.100.150/	idrac-af27hth.devops.acme.com

## **Virtual Machines**

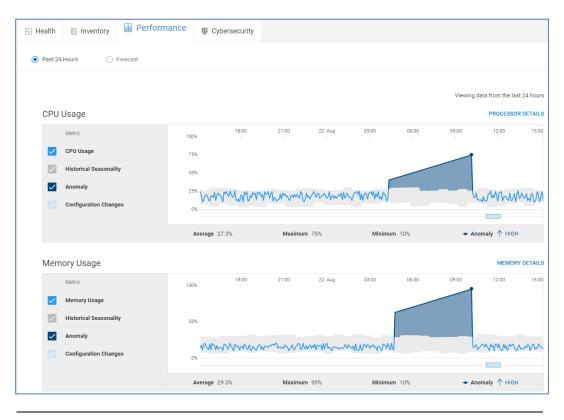
The **Virtual Machines** tab is visible for servers running ESXi and lists out various information about each VM including name, IP address, operating system, vCenter name, and ESXi Cluster.

HARDWARE	FIRMWARE	LICENSES	CONTRACT	MANAGEMENT INFO	VIRTUAL MACHINES		
1 virtual machine							Ċ
Name		Network Address	c	Operating System	vCenter	Cluster	
Prod_VM3		10.0.2.1	F	Red Hat Enterprise Linux 5 (64-bit)	10.0.0.100	iDRAC.AP4BXN	R.local

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.

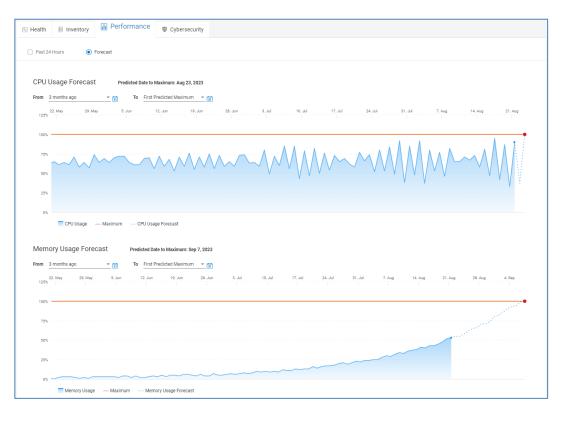


**Note**: Available metrics vary based on license type, hardware, and firmware levels. See the CloudIQ for PowerEdge section of the <u>OpenManage Portfolio Software Licensing Guide</u> for additional details.

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

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

Observability 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 used, Observability helps with workload planning, allowing users to plan to add additional resources to a server or migrate certain workloads to lesser used 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.

Health 📄 Inventory 🕕 Performance	Cybersecurity		
SECURITY ASSESSMENT SECURITY ADVISORIES	I		
System Risk Level	Cybersecurity Issues	Evalua	tion Plan
High	23 Total ↑ Medium 0 Last 24 hours Low	18 5 (1) Se	00% 31 of 31 tests
CYBERSECURITY ISSUES EVALUATION PLAN	I		
23 issues Severity		Issue	Creation Time
> 🔶 Medium		Active Directory Certificate validation is di	1 hour ago
<ul> <li>Medium</li> </ul>		iDRAC Web Server is not using TLS 1.2 or	5 hours ago
Description: IDRAC offers three TLS protocol versions for secure web possible. TLS 1.0 is discouraged and is available only for		figuration and should be used whenever	Created Aug 22 2023, 02:18:46 PM UTC
Note: TLS 1.0 is removed from iDRAC firmware 4.40.00.00 and use any of the following: • TLS 1.0 and higher (old firmware) • TLS 1.1 and higher • TLS 1.2 and higher • TLS 1.2 and higher	ater. By default, iDRAC is configured to use TLS 1.1	and higher. You can configure iDRAC to	Security Control Family System and Communications Protection Evaluation Test DRAC Web Server has TLS 1.2 or TLS 1.3 enabled
Learn More1, Learn More2, Learn More3 Remediation: The TLS protocol can be configured as part of the Web Se	rver settings through the IDRAC interfaces.		

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 run.

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

evaluation tests					
Evaluation Tests	Status	Last Detected	Details	IP Blocking is enabled	
✓ Access Control	4 deviations			Issue: Wed, Oct	t 28 2020, 08:12:55 PM U
IP Blocking is enabled	Deviation	Wed, Oct 28 2020, 08:12:55 PM	0	IP Blocking is disabled	
Quick Sync Read Authentication to the server is enabled	Deviation	Wed, Oct 28 2020, 08:12:55 PM	ø	This test verifies that IP Blocking is enabled on iDRAC.	
SSH is disabled	Deviation	Wed, Oct 28 2020, 08:12:55 PM	-	IP blocking dynamically determines when excessive logi	in failures occur from an
The SNMP agent is configured for SNMPv3	ок		ø	address, and block or prevent the IP address from loggin preselected time span.	ig into the iDRAC for a
User Active Directory authentication on iDRAC is enabled	ок		ø		
Jser Generic LDAP authentication on iDRAC is enabled	ок		ø	All consecutive login failures from a specific IP address counter.	are tracked by an intern
VNC server Disabled	deviation		ø	When the user logs in successfully, the failure history is a	closed and the internet
> Audit and Accountability	2 deviations			counter is reset. Enabling this feature is a recommended	d security best practice.
> Configuration Management	4 deviations			automatically detecting potential malicious actions bein preventing unauthorized access to iDRAC through brute hardens iDRAC network security resilience. Learn More	
> Identification and Authentication	5 deviations				
> System and Communications Protection	10 deviations			Remediation: Go to iDRAC Settings > Connectivity > Advanced Network Enabled - Enabled	k Settings > IP Blocking
> System and information integrity	2 deviations			IP blocking can be configured as part of the Advanced N	
				IP blocking can be configured as part of the Advanced N the iDRAC interfaces.	etwork settings throug
				(For example, in the iDRAC UI, you can search for or local settings.)	ite the IP Blocking
				For additional configuration information, refer to the iDR/ appropriate iDRAC manuals and refer to the documentat Security Configuration guides.	

The Security Advisories tab lists any Dell Security Advisories that are applicable to the server or chassis. Selecting the View Article link directs the user to the corresponding knowledge base article for the DSA.

Health	Inventory	III Performance	Cybersecu	rity				
SECURITY ASSI	ESSMENT	SECURITY ADVISORI	ES					
Impact								
	0 Critical		A 10 High		<ul> <li>◆ 4</li> <li>Medium</li> </ul>		1 0 Low	
Advisory ID		Impact 2 🗸	Synopsis	Туре	Component	Updated 1 $\downarrow$	Action	
DSA-2023-014	1	🚹 High	DSA-2023-014: Dell P	Server	BIOS	Jul 18, 2023 12:00:00	View Article	
DSA-2023-134	ı	🛕 High	DSA-2023-134: Secur	Server	BIOS	Jun 30, 2023 12:00:0	View Article	
DSA-2023-097	7	🔶 Medium	DSA-2023-097: Secur	Server	BIOS	Jun 26, 2023 12:00:0	View Article	
DSA-2022-161		🔶 Medium	DSA-2022-161: Dell P	Server	BIOS	Jun 23, 2023 9:08:01	View Article	
DSA-2023-096	ò	🚹 High	DSA-2023-096: Secur	Server	BIOS	Jun 19, 2023 12:00:0	View Article	
DSA-2022-204	1	🚹 High	DSA-2022-204: Dell P	Server	BIOS	Mar 14, 2023 4:51:32	View Article	
		·						

# **Data protection details**

Introduction Infrastructure Observability includes 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 at least four tabs available on the system details page for PowerProtect DD: Health, Inventory, Capacity, and Performance. The Cybersecurity tab is available for those PPDD systems that have cybersecurity collections enabled in DD System Manager. 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.

Image: Health     Image: Needed     Image: Needed        Capacity is the top health check category impacting dd-lab-01's health score.     Health Issue     Image: Total Issue </th <th>I DD SYSTEM MANA</th>	I DD SYSTEM MANA
Vester Issues         Total Issues       1       Capacity         Components       -       -20       15 hours ago       Capacity         Configuration       -       -20       15 hours ago       Capacity         Configuration       -       -       -20       15 hours ago       Capacity         Performance       -	
Total Issues       1       Capacity         Components       -       -20       15 hours ago Capacity threshold has exceeded 80% of the total cloud lier capacity         Configuration       -       -20       15 hours ago Capacity threshold has exceeded 80% of the total cloud lier capacity         Configuration       -       -       -       -         Capacity       -       20       15 hours ago Capacity threshold has exceeded 80% of the total cloud lier capacity         Configuration       -       -       -       -       -         Capacity       - <t< td=""><td></td></t<>	
Configuration Compared on the specified tier or unit by deleting unneeded items and running cleaning on the tier. If you need as sistance recovering space, com celeted, strage must be added to the appropriate tier. If you need as sistance recovering space, com celeted, strage must be added to the appropriate tier. If you need as sistance recovering space, com celeted, strage must be added to the appropriate tier. If you need as sistance recovering space, com celeted, strage must be added to the appropriate tier. If you need as sistance recovering space, com celeted, strage must be added to the appropriate tier. If you need as sistance recovering space, com celeted, strage must be added to the appropriate tier. If you need as sistance recovering space, com celeted, strage additional storage, please contact your Dell EMC sales rep channel partner.  Health Score History From May 14, 2024, 9:09:39 AM  To Now	1 issue
Capacity     -20       Performance        Data Protection    Health Score History From May 14, 2024, 9:09:39 AM - fr) To Now - fr)	
Capacity Ca	6 ib
Performance <ul> <li>channel partner.</li> <li>channel partner.</li> </ul> <ul> <li>Data Protection</li> <li>May 14, 2024, 909:39 AM              <ul> <li>max</li> </ul>            Health Score History         max               From             May 14, 2024, 909:39 AM               max             max               max</li></ul>	ntact your
Health Score History From May 14, 2024, 9:09:39 AM v 前 To Now v 前	resentative or
From May 14, 2024, 9.09:39 AM + 前 To Now + 前	
Health Changes	
May 16 May 18 May 20 May 22 May 24 May 26 May 28 May 30 Jun 1 Jun 3 Jun 2, 2024, 6,09.39 PM 1 new issue, 0 resolved is	sues
75 May 19, 2024, 9:09:39 AM D new issues, 1 resolved it	
59 May 14, 2024, 9.09.39 AM 1 new issue, 0 resolved is	
• •	

#### **PowerProtect DD system details – Inventory**

The top portion of the **Inventory** 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.

dd-lab-01 DD9800   AI	PM00172712073			🔀 LAUNCH DD SYSTEM MANAGER
🛛 Health 🗎 Inventory	Capacity Derformance	Cybersecurity		
Contract Expiration Nov Contract Number 1	lab-01.hopkinton.dell.com Version v 11, 2030 Support 4HR/Mission Critical	7.9.0.0-1010208	Last Contact Time Location Site Name Site ID	Jun 3 2024, 12:13:45 PM UTC Hopkinton, MA ACME Headquarters ACME Headquarters 01
SERVICES REPLICATIO	DN MTREES DISKS			9 services 📫
Service 🔨		Status		
CIFS		Senabled		<u>ـ</u>
Cloud		🕗 Enabled		
DDBoost		🕗 Enabled		
Encryption		😔 Enabled		
File System		Enabled		
High Availability		Enabled		
NFS		< Enabled		

## **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	Û
Service 个			Status		
CIFS			Enabled		-
Cloud			Enabled		
DDBoost			Senabled		L
Encryption			Senabled		
File System			Senabled		
High Availability			Senabled		
NFS			Senabled		•

### 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	Ů
Source 个			Destination	State	Synced As Of Time	Remaining(GB)	
mtree://dd-lab-0	1.hopkinton.dell.com/dat	a/col1/finance	mtree://corpbkup.hopkinton.dell.com/data/col1/repl_dest_finance	🗢 Normal	Fri, Dec 18 2020, 9:55:00 PM UTC	12.4	
mtree://dd-lab-0	1.hopkinton.dell.com/dat	a/col1/payroll	mtree://corpbkup.hopkinton.dell.com/data/col1/repl_dest_payroll	🕗 Normal	Fri, Dec 18 2020, 9:48:00 PM UTC	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/finan	ce			217.6	308.3	0
/data/col1/payro				120.1	198.5	0
/data/col1/back	dı			2.8	1.1	2.5

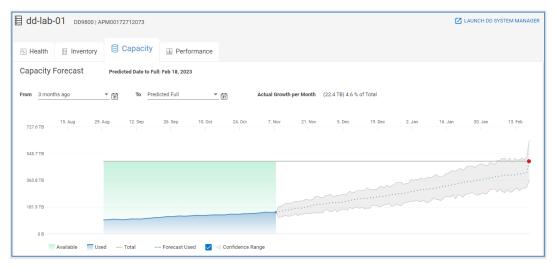
#### Disks

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

SERVICES	REPLICATION	MTREES	DISKS				139 disks 🖞
Disk 个	Slot		Manufacturer/Model	Firmware	Serial Number	Capacity(TB) Type	
1.1	0		M500DC400-MTFDBAK4	0154	1711164A8586	0.3 SATA-S	SD
1.2	1		M500DC400-MTFDBAK4	0154	1711164A5B00	0.3 SATA-S	SD
1.3	2		M500DC400-MTFDBAK4	0154	1711164A5656	0.3 SATA-S	SD
1.4	3		M500DC400-MTFDBAK4	0154	1711164A5B25	0.3 SATA-S	SD
2.1	0		HITACHI H4SMR328_CL	S142	74V0J17X	0.7 SAS-SS	D
2.10	9		HITACHI H4SMR328_CL	S142	74V0LB0X	0.7 SAS-SS	D
2.11	10		HITACHI H4SMR328_CL	S142	74V0H11X	0.7 SAS-SS	D

#### **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.

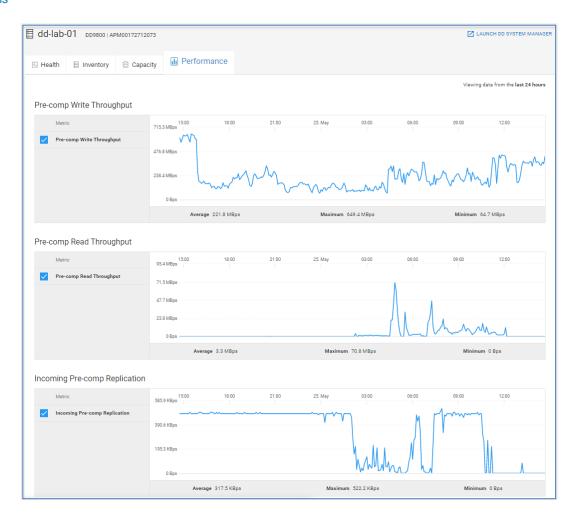
Active Tier Capacity 491.8 TB	Storage Usage	Logical Storage 679.7 TB
Physical Used 145.5 TB Available 346.3 TB Cleanable 0 B Reduction 83.6% Compression 6.1x Cloud Tier Capacity 272.7 TB	6	079.7 тв Total
Physical Used 220.9 TB Available 51.8 TB Cleanable 0 B Reduction 15% Compression 1.1x	Local	419.7 TB 260.0 TB
Total Capacity 764.5 TB		
Physical Used 366.4 TB Available 398.1 TB Cleanable 0 B Reduction 57.4% Compression 2.3x		

## **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 DD system details – Cybersecurity**

The **Cybersecurity** tab provides the cybersecurity risk level for the PPDD system. When a cybersecurity issue is identified, the recommended remediation is provided for each issue. The **Evaluation Plan** tab lists out the status of each of the possible configuration tests.

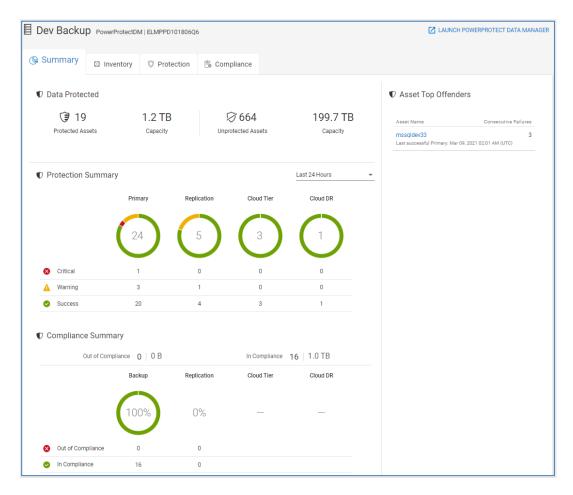
dd-lab-05 dd9900   ELMDDV2468TRW1					IAUNCH DD SYSTEM MANAGE
Health	I Performance	Cybersecurity			
SECURITY ASSESSMENT					
System Risk Level 🥫	с	ybersecurity Issues		Evaluation Plan	
Low	1 Total 0 Last 2	▲ High ♦ Medium 4 hours <mark>1</mark> Low	- 1	73% Selected	8 of 11 tests
CYBERSECURITY ISSUES EVALUATIO	N PLAN				
Severity			Issue	Creation Ti	me
Y Low			External key manager is not us	sed 7 hours ag	0
Description: The DD system supports external key managers by centralized platform. When applicable, keys will be pre-created on the key Remediation:				Security C	4, 06:33:23 AM UTC
Enable external key manager. For details on how to configure external key mana	ger, please refer to the "Setting up	KMIP key manager* section o	f the Admin Guide and the "KMIP Int	egration Guide" Evaluation Use extern	v Test hal key manager

## PowerProtect Data Manager

In addition to PowerProtect DD, Observability can monitor instances of PowerProtect Data Manager. This allows users to see reports from Data Manager directly in the Observability 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.

t Name	mssqldev33		Syste	m	ppdmdev		Active Policy	Bronze 💿 B	Inabled
t Туре	VM		Asse	t Host	sqldev33.****				
tection Summ	nary								
Asset masqldev33									
Last successfu	: 3/29/21, 3:19 PM U	pr of pr	loud Tier admdev.**** ast backup: none	(B)	Replication ppdmrepl.**** Last backup: none				
tection Histor	у								
		Details	Protection Type	Status	Start Time	Completion Ti	Duration	Initiated By	Transfer Rate
Filtered: - of 1	0 Activities	Details	Protection Type Primary	Status Scritical	Start Time Thu, Apr 1 20	Completion Ti Thu, Apr 1 20	Duration 00:00:03	Initiated By ADHOC	
Filtered: – of 1	0 Activities								Transfer Rate
Filtered: - of 1	0 Activities	Ø	Primary	🗴 Critical	Thu, Apr 1 20	Thu, Apr 1 20	00:00:03	ADHOC	Transfer Rate
Filtered: – of 1 Clear All Time Range (UTC)	0 Activities	6 6 6	Primary Primary	Critical	Thu, Apr 1 20 Thu, Apr 1 20	Thu, Apr 1 20 Thu, Apr 1 20	00:00:03	ADHOC	Transfer Rate
Filtered: - of 1 Clear All Time Range (UTC) Click to select a date	0 Activities	۹ ۹ ۹	Primary Primary Primary Primary	Critical Critical Critical Critical Critical	Thu, Apr 1 20 Thu, Apr 1 20 Thu, Apr 1 20 Thu, Mar 4 20	Thu, Apr 1 20 Thu, Apr 1 20 Thu, Apr 1 20 Thu, Mar 4 20	00:00:03 00:00:03 00:00:03 00:00:03	ADHOC ADHOC ADHOC POLICY	Transfer Rate  
<ul> <li>Filtered: - of 1:</li> <li>Clear All</li> <li>Time Range (UTC)</li> <li>Click to select a date</li> <li>Status</li> <li>Critical</li> <li>Success</li> </ul>	0 Activities	9 9 9 9 9	Primary Primary Primary Primary Primary	Critical Critical Critical Critical	Thu, Apr 1 20           Thu, Feb 16 2	Thu, Apr 1 20 Thu, Apr 1 20 Thu, Apr 1 20 Thu, Mar 4 20 Tue, Feb 16 2	00:00:03 00:00:03 00:00:03 00:00:03 00:00:03	ADHOC ADHOC ADHOC POLICY POLICY	Transfer Rate
<ul> <li>Filtered: - of 1</li> <li>Clear All</li> <li>Time Range (UTC)</li> <li>Click to select a date</li> <li>Status</li> <li>Critical</li> <li>Success</li> <li>Activity</li> </ul>	0 Activities	۹ ۹ ۹	Primary Primary Primary Primary	Critical Critical Critical Critical Critical	Thu, Apr 1 20 Thu, Apr 1 20 Thu, Apr 1 20 Thu, Mar 4 20	Thu, Apr 1 20 Thu, Apr 1 20 Thu, Apr 1 20 Thu, Mar 4 20	00:00:03 00:00:03 00:00:03 00:00:03	ADHOC ADHOC ADHOC POLICY	Transfer Rate
<ul> <li>Filtered: - of 1:</li> <li>Clear All</li> <li>Time Range (UTC)</li> <li>Click to select a date</li> <li>Status</li> <li>Critical</li> <li>Success</li> </ul>	0 Activities	9 9 9 9 9	Primary Primary Primary Primary Primary	Critical Critical Critical Critical	Thu, Apr 1 20           Thu, Feb 16 2	Thu, Apr 1 20 Thu, Apr 1 20 Thu, Apr 1 20 Thu, Mar 4 20 Tue, Feb 16 2	00:00:03 00:00:03 00:00:03 00:00:03 00:00:03	ADHOC ADHOC ADHOC POLICY POLICY	Transfer Rate
Time Range (UTC) Click to select a date Status Critical Success Activity Primary	0 Activities	8 8 8 9 8 8	Primary Primary Primary Primary Primary Primary Primary Primary	Critical	Thu, Apr 1 20           Thu, Apr 1 20           Thu, Apr 1 20           Thu, Apr 1 20           Thu, Mar 4 20           Tue, Feb 16 2           Sat, Feb 13 2	Thu, Apr 1 20           Thu, Apr 1 20           Thu, Apr 1 20           Thu, Apr 1 20           Thu, Mar 4 20           Tue, Feb 16 2           Sat, Feb 13 2	00:00:03 00:00:03 00:00:03 00:00:03 00:00:03 00:00:03	ADHOC ADHOC ADHOC POLICY POLICY POLICY	Transfer Rate
<ul> <li>Filtered: - of 1</li> <li>Clear All</li> <li>Time Range (UTC)</li> <li>Click to select a date</li> <li>Status</li> <li>Critical</li> <li>Success</li> <li>Activity</li> <li>Primary</li> <li>Replicate</li> </ul>	0 Activities	ର ର ର ର ର ର	Primary Primary Primary Primary Primary Primary Primary	Critical Critical Critical Critical Critical Critical Critical	Thu, Apr 1 20           Thu, Feb 16 2           Sat, Feb 13 2           Fri, Feb 5 202	Thu, Apr 1 20           Thu, Apr 1 20           Thu, Apr 1 20           Thu, Apr 1 20           Thu, Mar 4 20           Tue, Feb 16 2           Sat, Feb 13 2           Fri, Feb 5 202	00:00:03 00:00:03 00:00:03 00:00:03 00:00:03 00:00:03 00:00:03	ADHOC ADHOC ADHOC POLICY POLICY POLICY	Transfer Rate           -

## **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 Bac	CKUP PowerProtect	OM   ELMPPD1018JVI	K6			LAUNCH POWERPROTEC	CT DATA MANA	
Summary	Inventory	Protection	🖹 Compliance					
IPv4	10.0.40.2	5	Version	19.10.0-19	Last Contact Time	e about 1 hour ago		
Protected As	sets 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 Cor	mpliance							
Assets in Cor ASSET 4 Assets	STORAGE	AUDIT					đ	
ASSET		AUDIT Asset Type	Active Policy	Primary Status	Replication Status C	iloud Tier Status Cloud DR Sta		
ASSET 4 Assets	STORAGE	Asset Type	Active Policy GoldPolicy	Primary Status	Replication Status C	cloud Tier Status		
ASSET 4 Assets Asset 1	STORAGE	Asset Type		Primary Status - -	Replication Status C	iloud Tier Status Cloud DR Sta 		
ASSET 4 Assets Asset ↑ mssql17.hr.p	STORAGE Host rd sqisrv17.***	Asset Type ** VM *** VM	GoldPolicy	Primary Status  		Cloud Tier Status Cloud DR Sta		

#### 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 Syst	tems					凸
Storage Sys	tem 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-	рО	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.

Audit Logs							
Audit Type 个	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	

#### **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.

E P	rod Backup	PowerProtectDM   El	.MPPD1018JVK6	ò			🔀 LAUNCH POV	VERPROTECT DATA MANAGER
	Summary Dinventory Protection							
	Y 4 Assets							۵
	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.

1.	Prod B	ackup Power	ProtectDM   ELMPPD101	8JVK6				🔀 LAUNCH POW	ERPROTECT DATA MANAGER
0	穿 Summary	Inventor	ry 🗇 Protection	붆 Compliar	nce				
	8 Ac	tivities							۵
	Details	Asset	Host	Asset Type	Active Policy	SLA Name	Activity	Status	Failed Object 🤟
	ø	TestVM12	ldpdb016.*****	VM	59Policy	59BackupSLA	Protect	Failed	1
	ø	TestVM13	ldpdb016.****	VM	59Policy	59BackupSLA	Protect	Failed	1
	<b>ø</b>	TestVM12	ldpdb016.*****	VM	59Policy	59CloudTierSLA	Cloud Tier	Success	0
	<b>&gt;</b>	TestVM12	ldpdb016.*****	VM	59Policy	59PromotionSLA	Promotion	Success	0
	<b>ø</b>	TestVM12	ldpdb016.****	VM	59Policy	59ReplicationSLA	Replicate	Success	0
	<b>&gt;</b>	TestVM13	ldpdb016.****	VM	59Policy	59CloudTierSLA	Cloud Tier	Success	0
	ē	TestVM13	ldpdb016.*****	VM	59Policy	59ReplicationSLA	Replicate	Success	0
	<b>ø</b>	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.

Failed Objectives for TestVM12	
Failed Objective	
Recovery Point	
Error Code	
CPLE0002	
Reason	
No copies found for protection stage between [Mar 21, 2021 08:00:00 PM UTC] and [Mar 23, 2021 12:00:00 AM UTC].	
Remediation	
.Please check whether protect job succeed and copies generated for this asset.	

# **Converged Systems details**

### Introduction

Infrastructure Observability can monitor VBlock and VxBlock Converged Systems. Converged Systems component information is displayed in the Health and Inventory views under the CONVERGED tab. The Health category is available for the storage components of the system and only if the storage component is registered in Observability.

The **Lifecycle** menu provides the various milestone dates for each of the components in the Converged System. It also has a **Service Contracts** page and a **CI Code Compare** page. Each of these areas is described in the following sections. Selecting the Converged System hyperlink from either the Health or Inventory multisystem view opens the system details page.

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 up to seven tabs: Health, 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 Observability features described in this document.

Converged System - Health

The Health tab provides a proactive health score for the system. The health score is determined by the storage in the system. The health score is based on the lowest health score of all the storage systems associated to the converged system. The storage systems must be configured to send data back to Observability independently from the

Converged System. As with other systems, recommended remediations and health score history are available.

VABLOCK V	70FN4013	002FOUR v	XB-1000   V70FN4	013002FOUR				LAUNCH CONVERCE	SED MANAGEMENT S	OFT
anaged By	Embedded /	AMP	vCent	ter Version	6.7.0		Last Contact Time	Thu, May 30 2024,	10:26:47 PM UTC	
piration	Sept 30, 202	23					Location	Marlborough, MA		
							Site Name	ACME Headquarte	ers	
							Site ID	ACME Headquarte	ers 01	
🔔 Health	B Overview	🗊 Compute	E Storage	문 Networking	C Virtualization	Ø Managemer	t			
70 POOR		Capacity is score.	the top hea	alth check ca	tegory impactii	ng VXBLOCk	V70FN40130	)02FOUR's hea	llth	
						ng VXBLOCk	: V70FN40130	002FOUR's hea		311
Total Issues			the top hea	•	Capacity				1 ist	
Total Issues			2	-30	Capacity ) 12 hours ago % Ef		V70FN4013C			
Total Issues			2	-3C Resolution	Capacity ) 12 hours ago % Ef	fective Used Capacity	hreshold exceeded for SF	PR SRP_1.	1 ist PowerMax_2500	0
Components Configuration			2	-3C Resolution	Capacity ) 12 hours ago % Ef ution: Please Check your SRP Ef	fective Used Capacity	hreshold exceeded for SF	PR SRP_1.	1 ist PowerMax_2500	0

## Converged Systems – Overview

The **Overview** tab 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).

#### Converged Systems details

lanaged By	Embedded AMP	vCenter Versio	n 6.7.0	Last Contac	t Time Thu, May 30 2024, 10:26:	47 PM UTC
piration	Sept 30, 2023			Location	Marlborough, MA	
				Site Name	ACME Headquarters	
				Site ID	ACME Headquarters 01	
A Health	Overview 💮 Compute	E Storage	Networking 🕞 Virtualization	Management		
CS Domain All Don	nains -			>	COLLAPSE ALL V EXPAND ALL	〕€
Storage	~					
	Model	Unity 650F	XtremIO HW >	K2-R	PowerMax_2500	
	Name	Production	X2R-3Brick		HR_Remote	
	Version	4.2.0.9433914	6.2.0-81		6079.124.0	
品 Networkin	g 🗸					
	Function	SAN	SAN	OOB-LAN	00B-LAN	LAN
	Model	MDS-9132T	DS-C9396T-K9	N3K-C31108TC-V	N3K-C31108TC-V	N9ł
	Name	Dev SAN	/XB-FRA21-M-9396T-B.qa.lab.dell.com	VXB-FRA21-N-31108-A.lab.dell.cr	om VXB-FRA21-N-31108-B.lab.dell.com	VXE
	Version	8.4(1)	3.3(2)	7.0(3)17(6)	7.0(3)17(6)	9.3(
						•
	Version	8.4(1)	3.3(2)	7.0(3)17(6)	7.0(3)17(6)	

## Converged Systems -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.

A Health	B Overview	📳 Compute	E Storage	居 Networking	🗇 Virtualiz	ation 💿 Man	agement	
SERVER PROFILE	S FABRIC	NTERCONNECT	CHASSIS					
ICS Domain Al	l Domains	Ψ						
Server Types					Co	nnection Models		
	6 B200 M	3 5 B200 M4	3 C220 M4S				9 3 Blades Direct-Connect Rack Mounts	
Details	Profile	Servers $\downarrow$	Model	Version	Profile 1 Detai	ls		)
P	Profile 1	3	UCSB-B200-M5	6.7.0	SUMMARY	SERVERS		
þ	Profile 2	3	UCSB-B200-M4	6.7.0		-		
ø	Profile 3	3	UCSC-C220-M	6.7.0	<ul> <li>Overview</li> <li>Servers</li> </ul>		3	
٩	Profile 4	3	UCSB-B200-M5	6.7.0	Model		3 UCSB-B200-M5	
					Server Ve	rsion	4.0(4e)	
					Ethernet	/ersion	1.0.29.0-10EM.650.0.0.4598673	
					Fibre Cha	nnel Version	Version 1.6.0.50, Build: 2494585, Interface: 9.2 Built on: Mar 14 2019	
					~ Operating	g Environment		
					Operating	Environment	VMware ESXi	
					Operating	Environment Build	13004448	
					Operating	Environment Ver	6.7.0	

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

### 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.

🌲 Health	B Overview	Compute	E Storage	居 Networking	🗋 Vir	tualization	Mana	agement
Array Types								
					3 All Flash	0 Hybrid	0 Virtual	
Details	Name 个	Model	Version	Serial #/Service	tag	Production I	Details	
٩	HR_Remote	PowerMax_2500	6079.124.0	000296800647		CONFIGURA	TION	
٩	Production	Unity 650F	4.2.0.9433914	FCNCH0972C3	2F1			
٥	X2R-3Brick	XtremIO HW X2-R	6.2.0-81	UNI8210160		Version		4.2.0.9433914
_						Capacity Av	ailable (GB)	9869
						Capacity Us	ed (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

🌲 Health	B Overview	Compute	E Storage	器 Networking	<u>ا</u> ا	/irtualization	Management	1		
Details	Role 个	Name		Model		Dev SAN Deta	ails			
٩	LAN	VXB-FRA21-N-9336C-F	K2-A.qa.lab.dell.com	N9K-C9336C-FX2		OVERVIEW	PORTS	HARDWARE		
٩	LAN	VXB-FRA21-N-9336C-F	K2-B.qa.lab.dell.com	N9K-C9336C-FX2				Speed 1	Connected To	
٩	OOB-LAN	VXB-FRA21-N-31108-A	lab.dell.com	N3K-C31108TC-V		Port		speed 1	Connected To	
م	OOB-LAN	VXB-FRA21-N-31108-B	lab.dell.com	N3K-C31108TC-V		fc1/1		16 Gbps	FRA21-FI-6332/switch-A - fc1/1	
م	SAN	Dev SAN		MDS-9132T		fc1/8		16 Gbps	FRA21-FI-6332/switch-A - fc1/2	
2	SAN	VXB-FRA21-M-9396T-B	.qa.lab.dell.com	DS-C9396T-K9		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.

🌲 Health	B Overview	Compute	🗎 Storage	음 Networking	🕞 Vii	rtualization	Mar	agement			
vCenter All vC	enters -										
Clusters				Hosts					Datast	ores	
	4 Clusters					12 Hosts				1 Datas	
SUMMARY	CLUSTERS										
Details	Name 个	vCenter		Data Center		Cluster2-B200	M4 Detail:	3			
A	Cluster2-B200M4	fra21psc02	-a.qa.lab.dell	FRA21PROD-DC		SUMMARY	HOST	'S DATAST	ORES		
٩	Cluster3-B200M5	fra21psc02	-a.qa.lab.dell	FRA21PROD-DC		Cluster	-				
۵	NSX_Compute	fra21psc02	-a.qa.lab.dell	FRA21PROD-DC		vCenter		fra21psc02-a.qa.lab	.dell.com		
Þ	NSX_Edge	fra21psc02	-a.qa.lab.dell	FRA21PROD-DC		Data Center		FRA21PROD-DC			
						Cluster		Cluster2-B200M4			
						HA/DRS					
						Proactive HA		Off			
						vSphere DRS		On			
						DRS Automatic	on Level	FULLY_AUTOMATED			

### 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.

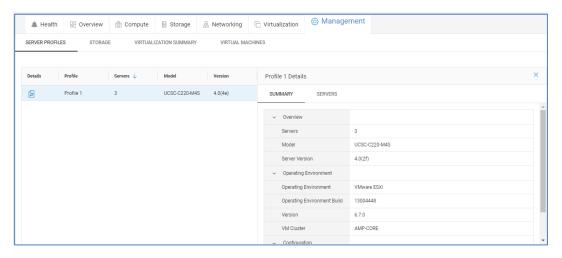
- Summary Hardware and software information about the server profile including the operating environment, storage, and MLOMs and mezzanines.
- Servers Displays the serial number, hostname, and memory for each server in the server profile.

**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 Observability 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.

} Home		Milestones Outl	ook				000	urring 🙁 0 to 6 months	A 7 to 12 months	13+ m
Monitor			000				000			101111
		<ul> <li>System Lifecycle</li> </ul>	<ul> <li>Component Lifecycle</li> </ul>							
Manage	$\sim$									
5 Optimize	~			Milestones Out	tlook	Compo	nent Outlook			
Reports	<u> </u>	Total Number	End of Primary Support			Storage (2)				
	Ť	Components								
Cybersecurity	$\sim$	2								
j Lifecycle	~									
Milestones Outlo	ook									
Service Contract	Is	27 models								
CI Code Compar					Ready to Ship		End of Primary		End of	
	e	Component	Model	Unit	(General Availability)	End of Life	Support	End of Renewal	Service Life	
Admin	~				(General Availability)	0				
Admin		> Storage	Model XtremI0 XIOS 6.2.0-85_X2	Unit 1			Support	End of Renewal	Service Life	
Admin		> Storage	XtremIO XIOS 6.2.0-85_X2	1	(General Availability) Dec 2, 2018	♥ TBD	Support		Service Life	
3 Admin					(General Availability)	♥ TBD	Support	0	Service Life  Sep 28, 2022  Nov 18, 2023	
3 Admin		> Storage	XtremiO XIOS 6.2.0-85_X2 VMware ESXi 6.7 U1	1	(General Availability) Dec 2, 2018 Mar 27, 2019	<ul> <li>♥ ○</li></ul>	Support		Service Life	
ğ Admin		<ul> <li>Storage</li> <li>Virtualization</li> </ul>	XtremIO XIOS 6.2.0-85_X2	1	(General Availability) Dec 2, 2018	<ul> <li>♥</li></ul>	Support		Service Life Sep 28, 2022 Nov 13, 2023 Nov 13, 2023	
Admin		Storage     Virtualization     Virtualization	XtremiO XIOS 6.2.0-85_X2 VMware ESXI 6.7 U1 vCenter Appliance 6.7 U1	1	(General Availability) Dec 2, 2018 Mar 27, 2019	•         •	Support Sep 28, 2020 Nov 13, 2021 ©		Service Life Sep 28, 2022 Nov 13, 2023	
Admin		<ul> <li>Storage</li> <li>Virtualization</li> </ul>	XtremiO XIOS 6.2.0-85_X2 VMware ESXi 6.7 U1	1 10 2	(General Availability) Dec 2, 2018 Mar 27, 2019	•         •	Support Sep 28, 2020 Nov 13, 2021 ©		Service Life	
Admin		Storage     Virtualization     Virtualization	XtremiO XIOS 6.2.0-85_X2 VMware ESXI 6.7 U1 vCenter Appliance 6.7 U1	1 10 2	(General Availability) Dec 2, 2018 Mar 27, 2019	•	Support Sep 28, 2020 Nov 13, 2021 Nov 13, 2021 Nov 13, 2021		Service Life	
Admin		<ul> <li>Storage</li> <li>Virtualization</li> <li>Virtualization</li> <li>Compute</li> </ul>	XtremiO XIOS 6.2.0-85_X2 VMware ESXi 6.7 U1 vCenter Appliance 6.7 U1 Intel(R) Xeon(R) CPU E5	1 10 2 6	(General Availability) Dec 2, 2018 Mar 27, 2019 Oct 15, 2018 –	•	Support Sep 28, 2020 Nov 13, 2021 Nov 13, 2021 Nov 13, 2021		Service LIFe	
ð Admin		<ul> <li>Storage</li> <li>Virtualization</li> <li>Virtualization</li> <li>Compute</li> </ul>	XtremiO XIOS 6.2.0-85_X2 VMware ESXi 6.7 U1 vCenter Appliance 6.7 U1 Intel(R) Xeon(R) CPU E5	1 10 2 6	(General Availability) Dec 2, 2018 Mar 27, 2019 Oct 15, 2018 –	V         -	Support  Support  Support  Rep 28, 2020  Nov 13, 2021  Nov 13, 2021  Nov 11, 2019		Service Life	

## 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.

APEX AlOps O	bserva	bility					Q 💰 🗅 🗟 💽 .
습 Home	~	Service Contracts				Occurring 0 to 6 month	is 🔺 7 to 12 months 🗢 13+ months
Manage	~	⊖ Systems	ponents				
Optimize	~						Ċ
Reports	~	System	Component	Model	Serial Number	Name	Expiration
Cybersecurity	$\sim$	VXBLOCK V70FN4013002F	Storage	Unity 300	UN300ABC	vxb-storagevb1-ampun1mgmt	Sep 28, 2023
C Lifecycle	~	VXBLOCK V70FN4013002F	Storage	Unity 650F	FCNCH0972C32F1	Production	Sep 28, 2023
Milestones Out	look	VXBLOCK V70FN4013002F	Storage	XtremI0 HW X2-R	UNI8210160	X2R-3Brick	Sep 28, 2023
Service Contrac	ts	VXBLOCK V70FN4013002F	Network	N9K-C9336C-FX2	LAN123	VXB-FRA21-N-9336C-FX2-A.qa.lab.d	Sep 28, 2023
CI Code Compa	ire	VXBLOCK V70FN4013002F	Network	N9K-C9336C-FX2	LAN321	VXB-FRA21-N-9336C-FX2-B.qa.lab.d	Sep 28, 2023
Admin	~	VXBLOCK V70FN4013002F	Network	N3K-C31108TC-V	008123	VXB-FRA21-N-31108-A.lab.dell.com	Sep 28, 2023
		VXBLOCK V70FN4013002F	Network	N3K-C31108TC-V	008321	VXB-FRA21-N-31108-B.lab.dell.com	Sep 28, 2023
		VXBLOCK V70FN4013002F	Network	MDS-9132T	JP02128002T	Dev SAN	Sep 28, 2023
		VXBLOCK V70FN4013002F	Network	DS-C9396T-K9	SAN321	VXB-FRA21-M-9396T-B.qa.lab.dell.co	Sep 28, 2023
		VXBLOCK V70FN4013002F	Compute	UCS-FI-6332-16UP	FI63ABC	FRA21-FI-6332/switch-A	Sep 28, 2023
		VXBLOCK V70FN4013002F	Compute	UCS-FI-6332-16UP	FI63ZYX	FRA21-FI-6332/switch-B	Sep 28, 2023
		VXBLOCK V70FN4013002F	Compute	UCSB-B200-M5	B2M5ABC	FRA21-FI-6332/chassis-1/blade-1	Sep 28, 2023

## Converged Systems – Cl Code Compare

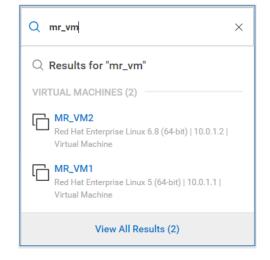
The **CI Code Compare** page allows users to compare the current state of the code and firmware with the selected target Converged Code Matrix (CI certified) and highlights the differences. This helps users identify which components of the system need to be upgraded.

CI Code	e Compare							LAUNCH RCM P
Code C		mpare the current state			Matrix (Cl certified) and highlights the	differences.		Don't show this aga
This wi	rill help you assess if the	e is a need to make a cl	lange or upgrade to your s	ystem.				Don't show this again the second s
Select system i	name and target version	from the drop down to	run analysis					
System Name VXBLOCK V7	e* 70FN4013002F	Target Version * VxB1k_7.0.11.2	<b>()</b>	UN ANALYSIS				
	Thu, Aug 10 2023, 1:17:4	4 PM UTC						
√ 19 Cor	mponents							
Ƴ 19 Cor	19 All Components	м	anagement	 Software	8 Compute	C 4 Storage	C 5 Networking	2 Virtualization
V 19 Cor Details	19	м	anagement Component Type				Networking	
	19 All Components	М			Compute	Storage	Networking Target	Virtualization
Details	19 <u>All Components</u> Component Group	М	Component Type		Compute	Storage Running Version	Networking Target 5.3.0.0	Virtualization CI Code Matrix Version
Details	19 All Components Component Group Storage	М	Component Type Unity 650F	R	Compute Status Upgrade Available	Storage Running Version 4.2.0.9433914	Networking Target 5.3.0.0	Virtualization Cf Code Matrix Version 0.5.120 36 (6.4.0-36)
Details	19 All Components Component Group Storage Storage	М	Component Type Unity 650F XtremIO HW X2-	R 2	Compute Status Oupgrade Available Oupgrade Available	Storage Running Version 4.2.0.9433914 6.2.0-81	Networking Target 5.3.0.0 6.4.0-3	Virtualization CI Code Matrix Version 0.5.120 36 (6.4.0-36) ))F
Details P P P	19 All Components Component Group Storage Storage Networking	М	Component Type Unity 650F XtremI0 HW X2- N9K-C9336C-FX	R 2 2	Compute Status Upgrade Available Upgrade Available Upgrade Available	Storage Running Version 4.2.0.9433914 6.2.0-81 9.3(1)	Networking Target 5.3.0.0 6.4.0-3 10.3(3	Virtualization CI Code Marks Version 0.5.120 36 (6.4.0-36) 0)F 

## VMware details

Infrastructure Observability 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 Observability 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

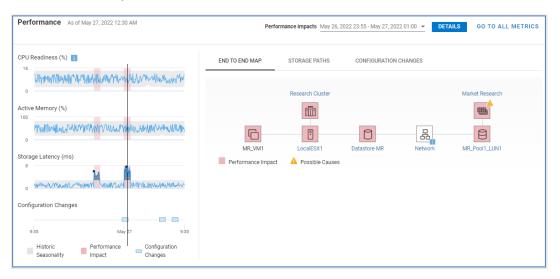
- vCenter
- ESXi Server
- ESXi Cluster
- Datacenter

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.

C MR_VM	11				🔀 LAUNCH VSPHER	۶E
Virtual Machine	MR_VM1	vSphere Status	0	vCenter	10.0.0.100	~
IP Address	10.0.1.1	Power State	Powered On	Datacenter	Round Rock Datacenter	
Allocated Capacity	18.1 GB	Operating System	Red Hat Enterprise Linux 5 (64-bit)	Cluster	Research Cluster	
Used Capacity	12.6 GB	OS State	Running	ESXi	LocalESX1	
		Guest Tools State	Running	Collector	ciqc.prod.emc.com	
					As of Apr 29, 2021 3:30 AM	

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. Observability identifies performance impacts on the storage latency chart with pink shading. There is also a 24-hour chart that identifies 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	TORAGE PATHS CON	FIGURATION CHANGES
Datastore	Type Storage	System
Datastore MR	VMFS MR_I	Pool1_LUN1 90 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 infrastructurerelated configuration changes over that last 24-hour time period.

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

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

# **Custom Tags**

Introduction Users can enhance the collected data in Infrastructure Observability with customerspecific 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. A second tag may be BusinessUnit:Finance. This example allows users to assign different business units to various assets.

Accessing tags System level tags can be 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 upper right corner of each card, the user can see the defined tags for the system.

#### **Custom Tags**

습 Home		Infrastructure						
Monitor	^	CAPACITY - STORAGE -						
Infrastructure								
Virtualization		28 systems						
Carbon Footp Pools	rint	60 Test_Dev UnityVSA   FCNCH09	72C32F3	60 APEX-Block-Bo		60 Account Man ME5012   CIQAPU1	agement	$\bigcirc$
Health Issues Service Requ Alerts		15.1 19	Used Free Provisioned Savings data	<sup>ices</sup> 18.5 тв	Base Used 18.5 TB Base Available 0 TB Subscriptions 1	7.7 тв		3.7 TB (47.6% 4.0 TB (52.4% 5.8 TE
Manage	~ ~	Physical Usable	Physical Unit version 4.1 and apove	r Subscribed Usable	i 1.25 TB On-Demand Used	Physical Usable	Overall Efficiency Thin Snapshots	y 2.1: 1.5: 4.1:
<ul> <li>Reports</li> <li>Cybersecurity</li> </ul>	×	70 Disaster Reco		70 HR_Remote PowerMax_2500   000	1296800647	70 Manufacturin PowerStore 9000   R		$\bigcirc$
C Lifecycle	$\sim$	$\frown$	Used 68.5 TB (52.1%) Free 53.1 TB (40.3%)	$\frown$	Used 110.9 TB (23.5%) Free 360.4 TB (76.5%)	$\frown$		6.25 TB (25.0% 8.75 TB (75.0%
(ۇ) Admin	~	121.6 тв Physical Usable	Provisioned 582 TB Savings Overall Efficiency 8.5:1 Thin 1.8:1 Snapshots 12.3:1 Data Reduction 4.5:1	507.4 TB Effective Usable	Provisioned 8.3 PB Savings data is only available on Systems with a single Storage Resource Pool.	25.0 TB Physical Usable	Provisioned Savings Overall Efficiency Thin Snapshots Data Reduction	25.0 TE y 12.1: 2.1: 10.0: 4.7:

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

nfrastruc	ture													
apacity values re	eflect Subscribed Capacity	for APEX Offerings and Pf	sical Capacity or Effective	Capacity for all oth	ver storage produc	ts								
CAPACITY -	▼ STORAGE ▼	<b>V</b>												
8 systems											(		22	
Health Sco	System	Identifier	Model	Used (TB)	Free (TB)	Usable (TI	Provisione	Data Reduc	Overall Eff	On-Deman	Subscriptio	Tags 个	BusinessUnit:Services Environment:Dev ServiceLevel:Silver	
60	Test_Dev	FCNCH0972C32F3	UnityVSA	13.8	1.3	15.1	-	-	-	-	-	DataCenter:MA-H	IOP-DC3 +3	
60	Account Managem	CIQAPU1	ME5012	3.7	4.0	7.7	5.8	-	2.1:1	-	-	DataCenter:TX-RI	R-DC1 BusinessUnit:Sale	6) +2
60	Security Office	ELMISLFAGEF789	PowerScale Cluster	21	2.04	23.04	23.04	1.07:1	1.07:1	-	-	DataCenter:MA-H	IOP-DC3 BusinessUnit IT	) +2
70	Disaster Recovery	FCNCH0972C32F2	UNITY 400	68.5	53.1	121.6	582	4.5:1	8.5:1	-	-	DataCenter:MA-H	IOP-DC3 +3	
70	HR_Remote	000296800647	PowerMax_2500	110.9	360.4	507.4	121	-	-	-	-	DataCenter:MA-H	IOP-DC3 BusinessUnit.H	R +2
70	Manufacturing_Dev	RV429L63	PowerStore 9000	6.25	18.75	25.0	25.0	4.7:1	12.1:1	-	-	DataCenter:MA-H	IOP-DC1 +3	
70	sio-block-legacy-gat	ELMVXRTEST0004	PowerFlex rack	0	272.5	272.5	8.9	1.0:1	0.0:1	-	-			

## **Editing tags**

Custom 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 tags, delete existing tags, and perform the assigning and unassigning of tags to various assets.

#### **Custom Tags**

APEX AlOps Obs	ervab	ility							Q mr_vm		× 🖓 🖻 🕻	ۍ ک
☐ Home		Tags	0									
Monitor	~	Y 29			E Show Hidden Svs	iems 🕥 🔍 Search Tags						Ċ
Manage	$\sim$			Tag Source	Systems	Volumes	Hests	File Systems	VMs	Storage Groups	Storage Pools	C
<ul> <li>Optimize</li> </ul>	~		ApplicationEnvironment:DEV	APEX AlOps Observability	oystems 0	4	1	2	25	a corage croups	4	
Reports	$\sim$		ApplicationEnvironment:INT	APEX Alops Observability	0	•	2	2	11	2	2	
Cybersecurity	~		ApplicationEnvironment:PRD	APEX AlOps Observability	0	3	4	1		2	2	
C Lifecycle	~		ApplicationName:AIML_Pip	APEX AlOps Observability	0	3	а	2	16	2	2	
Admin	~		ApplicationName:ERP_A	APEX AlOps Observability	0	2	2	2	13	2	3	
Identity Manageme	nt		ApplicationName:ERP_B	APEX AlOps Observability	0	3	0	1	12	2	2	
Settings			ApplicationName:Ordering_C	APEX AIOps Observability	0	2	2	0	3	1.00	1	
Customization			BusinessUnit:Engineering	APEX AIOps Observability	109	0	٥	0	0	0	0	
Licenses			BusinessUnit:Finance	APEX AlOps Observability	10	0	0	0	٥	0	0	
Connectivity			BusinessUnit:HR	APEX AlOps Observability	2	0	0	0	0	0	0	
Collectors			BusinessUnit:IT	APEX AlOps Observability	1	0	0	0	0	0	0	
HCI Settings			BusinessUnit:Manufacturing	APEX AlOps Observability	8	0	0	0	0	0	0	
Audit Log			BusinessUnit:Sales	APEX AlOps Observability	36	0	0	0	0	0	0	
Tags			BusinessUnit:Services	APEX AlOps Observability	2	0	0	0	0	0	0	
			DataCenter:MA-H0P-DC1	ome 🔒	89	0	0	0	0	0	0	

Clicking **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.

Create								
Tags								
Key	Value							
Dwner	Jim		$\oplus$					
Assign Tags								
Assign a resource to a tag in order	to create a	tag						
Storage Groups 👻								
36 Storage Groups							5 storage groups	s selected
Clear All X	-	Name	Compliance	SRP	Service Level	Capacity	Emulation	
> PowerMax		Finance_SG_31	CRITICAL	Finance_SRP1	Diamond	100		^
		Finance_SG_32	MARGINAL	Finance_SRP1	Bronze	100	CKD	
lags		Finance_SG_33	STABLE	Finance_SRP1	Diamond	100	FBA	
Key		Finance_SG_34	NONE	Finance_SRP1	Diamond	100	CKD	- 1
/alue		HR_Remote_SG_11	MARGINAL	HR_Remote_SRP1	None	100	FBA	
ADD		HR_Remote_SG_12	MARGINAL	HR_Remote_SRP1	None	100	CKD	
System Name		HR_Remote_SG_13	MARGINAL	HR_Remote_SRP1	None	100	FBA	
Enter a system name		HR_Remote_SG_14	MARGINAL	HR_Remote_SRP1	None	100	CKD	
		HR_Remote_SG_21	MARGINAL	HR_Remote_SRP2	None	100	FBA	
Site								
Site							CANCEL	CREATE

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.

Assign	
Tags ApplicationName:ERP_A Assign	
Systems	-
Volumes	
Hosts	
VMs	
File Systems	
Storage Groups	
Storage Pools	-

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.

7	52 Hosts				
Ξ	Name	System Name	Network Address	Operating System	Initiator Protocol
	MRApp1_Host2	Market Research	10.0.0.21	Windows Server 2012	FC
	MRApp1_Host3	Market Research	10.0.0.22	Windows Server 2012	FC
	MRApp1_Host4	Market Research	10.0.023	Windows Server 2012	FC
~	ProdApp1_Host1	Production	10.0.0.10	Windows Server 2012	FC
~	ProdApp1_Host2	Production	10.0.0.11	Windows Server 2012	FC
	ProdApp2_Host1	Production	10.0.0.12	Windows Server 2012	FC
	Produnn2 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 Admin > Settings > Sites and Systems. See the <u>Infrastructure Observability administration</u> 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 Observability. For example, the multisystem views can be filtered using the tags.

Filtered: 5 of 28 systems
Clear All ×
System
System or ID
Product
APEX Block Storage for Public Cloud
APEX Block Storage Services
APEX File Storage for Public Cloud
APEX File Storage Services
>  PowerFlex
> DewerMax
>  PowerScale
> PowerStore
>  PowerVault
> SC Series
> Unity
> XtremIO
Health Score
POOR
FAIR
6000
Tags
BusinessUnit:Engineering ×
Key
BusinessUnit
DataCenter
Environment
ServiceLevel

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.

## Infrastructure Observability administration

#### Identity Management

The Identity Management section allows Observability 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. When single sign-on is enabled, users can also use SSO groups that map Observability roles to customers' active directory groups. This gives customers control over all Observability roles including the Standard and Admin roles.

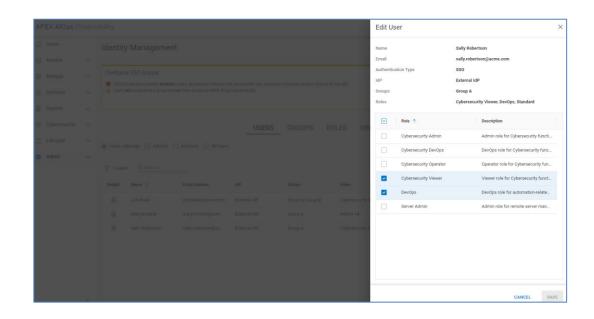
The administrator of an organization uses MyService360 to define the organization profile. See <u>KB#000183704</u> for details about using MyService360 for company administration. See <u>KB#000191817</u> for details about determining Admins for a company in the Dell Support portal.

**Note**: When SSO groups are not enabled, MyService360 users with a company admin role are automatically mapped to the Observability Admin role. Other users are mapped to the Observability Standard role.

Administrators will see four tabs in the Identity Management page: The USERS tab provides several views of users. The Users | Manage view lists users who have logged into Observability at least once and can be managed by the current admin user. This view shows the username, email address, IdP, Groups, assigned roles, authentication type, and last login. Selecting the Details icon for an individual user provides details about the user profile and assigned roles and permissions.

onfigure	SSO Groups									
		Users, groups and roles are not sy not have access to APEX AlOps Ot		Directory groups (shared by the in	IP).					
										ENABLE SSO (
					USERS GROUP	PS ROLES	SINGLE SIGN-ON			
dsers I Ma	anage () Admins (	Advisors () All Users								
3 users	Q Search									
etails	Name 🔨	Email Address	idP.	Groups	Roles	Authentication Type	Last Login	Actions	Jim Blake	
8	Jim Blake	jim.blake@acme.com	External IdP	Group A, Group B	Cybersecurity Vie +2	550	Jan 18, 2024 6:46:54	🖉 Edt	PROFILE	USER ACCESS
8	Mary Kimball	marykimball@acma	External IdP	Group A	Admin +4	550	May 17, 2024 6:59:01	/ Edit	-	
8	Sally Robertson	sally robertson@acm	External IdP	Group A	Cybersecurity Vie +2	\$90	Jan 9, 2024 7:38:51 P	/ Edt	IdP	Groups
									External IdP	<ul> <li>Group A</li> <li>Group B</li> </ul>
									Permissions	
									Roles	Permissions
									DevOps	Webhooks
										<ul> <li>Manage Webhooks</li> <li>View Webhooks</li> </ul>
										REST API - View API Keys
										<ul> <li>Manage API Keys</li> </ul>
									Standard	User Access
										<ul> <li>Allow user to configure tags/labels</li> <li>Allow user to configure tags/labels</li> </ul>
										APEX AlOps Observability
										<ul> <li>View APEX AlOps Observability commit</li> <li>Manage APEX AlOps Observability com</li> </ul>
										- Download APEX AlOps Observability of
										<ul> <li>View customer support data</li> <li>Add connectivity data</li> </ul>
										- View APEX AlOps Observability collects
										<ul> <li>Manage system update data</li> <li>Modify tenant nickname</li> </ul>
										- View connectivity data
										<ul> <li>View system update data</li> <li>Manage customer support data</li> </ul>

When SSO groups are not enabled, Administrators can select the Edit button to assign roles to a user. In this case, the Admin and Standard user roles are not managed through the Observability UI but are determined by their status in MyService360.

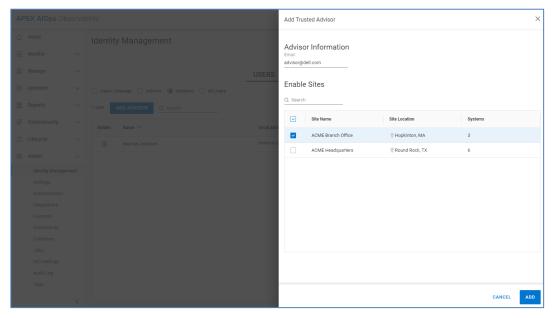


The Admins view provides a list of users with the Admin role. This allows users to see who they may need to contact in order to request different levels of access to Observability.

The Advisors view shows a list of all Advisors who have been given access to Observability. Both Admins and Standard Users can view, add, and remove advisor access to Infrastructure Observability. Dell Advisors are members of the account team or other Dell employees or partners whom customers want to proactively and routinely view their systems in Observability. The purpose of this role is to assist and make recommendations to customers to help them optimize their storage usage. Dell employees and Partners must explicitly be provided access to Observability from the customer. See the following KB article for details:

#### https://www.dell.com/support/kbdoc/000020659

To add an advisor, users click the **Add Advisor** button. In the Add Trusted Advisor window, enter the advisor email address and select which site or sites to give the advisor access, and click Add.



To remove access to an existing advisor, the user clicks the Edit link under the Actions column for the advisor they want to remove and clicks Remove Advisor.

Edit Advisor		×
Advisor Information Email marcus.johnson@dell.com		
Enable Sites		
Q Search		
Site Name 🔨	Site Location	Systems
✓ ACME Branch Office	Hopkinton, MA	3
ACME Headquarters	Round Rock, TX	6
Chicago Datacenter	Chicago, IL	25
	CANCEL	REMOVE ADVISOR SAVE

The All Users view lists all users with access to Observability, including those users who are not managed by the existing user logged in to the UI.

The GROUPS tab is visible to Admin users and allows the admin to assign Observability roles to SSO groups after SSO has been enabled. The listed SSO groups are imported from the Dell Identity Portal and were shared by the company's identity expert when performing the federated IdP configuration.

onfigure SSO Groups				
	isabled. Users, groups and roles are not synced with your cor up will not have access to APEX AlOps Observability.	npany's Directory groups (shared by the IdP).		ENABLE SSO GRO
	USERS	GROUPS ROLES SIN	IGLE SIGN-ON	
When SSO groups are ena	es to SSO Groups			×
assignments would then b	need, fore assignments for dates signing in or activition in replaced by SSO group assignments upon each user's		be configured through SSO group mappings. Existing role	LEARN MORE
-			be configured through SSD group mappings. Existing role	LEARN MORE
6 groups			be configured through SSO group mappings. Existing role	
6 groups oup ↑	e replaced by SSO group assignments upon each user's	next SSO sign in.		
6 groups oup ↑	e replaced by SSO group assignments upon each user's	next SSO sign in.	① Actions	
6 groups oup ↑ oup A oup B	e replaced by SSO group assignments upon each user's IdP External IdP	next SSO sign in. Roles DevOps, Standard	Actions     Manage Assignments     Manage Assignments	
6 groups roup ↑ roup A roup B roup C	e replaced by SSO group assignments upon each user's IdP External IdP External IdP	next SSO sign in. Roles DevOps, Standard Admin	Actions     Manage Assignments     Manage Assignments	
assignments would then b 7 6 groups Group A Group B Group C Group D Group E	le replaced by SSO group assignments upon each user's IdP External IdP External IdP External IdP	next SSO sign in.  Roles  DevOps, Standard  Admin  Cybersecurity Admin, Cybers	Actions     Manage Assignments     Manage Assignments ecurity Viewer +1 Manage Assignments	

Clicking the Manage Assignments link for each group allows the Observability Admin to assign one or more roles to the group.

APEX AlOps Obs			Manag	je Assignments		×
<ul><li>☆ Home</li><li>✓ Monitor</li></ul>			Group IdP	Group A External IdP		
Manage	Configure SSO Groups  SSO Groups are currently disabled		2 of 8 role	s assigned Role 1	Description	
Optimize		ervability.		Admin	Admin role for all APEX AIOps	Obs
Reports				Cybersecurity Admin	Admin role for Cybersecurity fu	ncti
Cybersecurity		GROUPS R		Cybersecurity DevOps	DevOps role for Cybersecurity f	unc
				Cybersecurity Operator	Operator role for Cybersecurity	fun
्हे Admin				Cybersecurity Viewer	Viewer role for Cybersecurity fu	inct
Identity Managem				DevOps	DevOps role for automation-rela	ate
Settings				Server Admin	Admin role for remote server m	ian
Customization				Standard	Default role for APEX AIOps Ob	ser
Licenses		Roles				
Connectivity		DevOp				
Jobs		Admin				
HCI Settings		Cybers				
		Admin			CANCEL	SAVE

Note that the Enable SSO Groups button is not active until the Admin role is assigned to at least one group. Group role assignments are aggregated so if a user is a member of more than one group, that user receives the roles from all groups.

The ROLES tab lists out the available roles with their description and the number of assigned users. There are nine roles in Observability: Admin, Advisor, Cybersecurity Admin, Cybersecurity DevOps, Cybersecurity Operator, Cybersecurity Viewer, DevOps, Server Admin, and Standard. If SSO Groups are not enabled, users with a Company Administrator role in an organization are automatically assigned the Admin role. Users who are not Company Administrators are automatically assigned the Standard role. These

roles are automatically assigned based on the user's role in their organization. This behavior changes when single sign-on is configured and SSO Groups are enabled. When SSO Groups are enabled, the user has full control over these roles and can assign them to a group just like all other roles. It is important to mention that a user must have either the Admin or the Standard role to access Observability.

The Advisor role is another role that is not managed within Observability. It is assigned to any user that has been invited and accepted the invitation to be an advisor for the company.

The Cybersecurity Admin role gives users access to cybersecurity related features in Observability. These include viewing and editing policies, viewing and editing security incident email preferences, viewing and editing ransomware incidents, viewing Security Advisories, and viewing security status data.

The Cybersecurity DevOps role gives users access to the Integrations menu to view and configure cybersecurity-related Webhooks, including the Cybersecurity Ransomware Incident, Cybersecurity Misconfigurations, and Cybersecurity Configuration Webhooks.

The Cybersecurity Operator role is designed to give a user access to edit and view cybersecurity ransomware incidents. The permissions include viewing and editing security incident email preferences, viewing and editing ransomware incidents, viewing policies, viewing Security Advisories, and viewing security status data.

The Cybersecurity Viewer role is a view-only role for cybersecurity features with the additional permission of editing their security incident email preferences. Permissions include viewing policies, viewing Security Advisories, viewing ransomware incidents, and viewing security status data.

The DevOps role allows users access to the Integrations menu to view and configure Webhooks and REST API credentials. A user with DevOps role can view and configure Health Issue Change webhooks.

The 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.

APE	EX AlOps Ob	serval	oility				c	Q MR_VM	× *	Q	ß	0
â	Home		Identit	y Management								
29	Monitor	~										
1	Manage	~	Configu	re SSO Groups								
	Optimize	~			groups and roles are not synced with your ve access to APEX AlOps Observability.	company's Directory groups (shared by t	he ldP).					
									E	NABLE	e sso g	ROU
	Reports	~										
0	Cybersecurity	~				USERS GROUPS	ROLES SINGLE SIGN-0	N				
S	Lifecycle	~	9 roles			-						
0	Admin	^	Details	Role 个	Description	Total Assigned	Actions	Cybersecurity Admin				
	Identity Manage	ment	8	Admin	Admin role for all APEX AIOp	1 user	Managed by MyService360.					
	Settings		e	Advisor	Advisor role for APEX AlOps	-	Cannot be managed.	PERMISSIONS USERS I M	IANAGE (1)			
	Integrations		0	Cybersecurity Admin	Admin role for Cybersecurity	1 user	Manage Assignments	Edit policy     Edit CyberSecIQ Security Incident Em	ail Preferenci			
	Licenses		0	Cybersecurity DevOps	DevOps role for Cybersecurit	1 user	Manage Assignments	Edit CyberSecIQ Security Incidents     View policy				
	Connectivity		0	Cybersecurity Operator	Operator role for Cybersecuri	17.1	Manage Assignments	<ul> <li>View Security Advisories data</li> <li>View CyberSecIQ Security Incident Er</li> </ul>	mail Preferen	ce		
	Jobs		0	Cybersecurity Viewer	Viewer role for Cybersecurity	2 users	Manage Assignments	View CyberSecIQ Security Incidents     View security status data				
	HCI Settings		6	DevOps	DevOps role for automation-r	3 users	Manage Assignments					
	Audit Log Tags		Ø	Server Admin	Admin role for remote server	1 user	Manage Assignments					
			e	Standard	Default role for APEX AlOps	2 users	Default role. Cannot be managed.					

Note that Admins must assign themselves any of the additional roles to gain those privileges.

The Manage Assignments link is used to assign roles to either users (when SSO Groups are not enabled) or to groups (when SSO Groups are enabled).

APEX AlOps Ob	serva	bility		Mana	ge Assignments		×
🗇 Home				Role: C	ybersecurity Admin		
Monitor				1 of 3 us	ers assigned Q Search	 View Only Assigned Users	
E Manage				Ξ	User 个	Roles	
🥝 Optimize					Jim Blake	Standard, Cybersecurity Viewer	
🗵 Reports					Mary Kimball	Admin, DevOps, Standard, Cyber	security Admin, Cybersecurit
G Cybersecurity					Sally Robertson	DevOps, Standard	
$\bigcirc$ Lifecycle							
💮 Admin							
Identity Manager							
Settings							
Customization							
Licenses							
Connectivity							
Collectors Jobs							
HCI Settings							
Audit Log							
Tags				4			÷
						CANCEL	SAVE ASSIGNMENTS

The Single Sign-On tab allows Observability Admins 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' Observability authorization using their IdP. After the Identity Admin federates their IdP, the IdP is listed under the IdPs tab. Clicking 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 <u>KB#000212047</u>.

APEX	AlOps Obs	erval	bility		Q MR_VM		×	<b>*</b> (	⊋ £	0	8
습 Hor	me		Identity Management								
Moi Moi	nitor	$\sim$									
⊟ Mar	inage	~	Configure SSO Groups								
⊘ Opt	timize	$\sim$	SSO Groups are currently disabled. Users, groups and roles are not synced with your company's Dire     Users net assigned to a group will not have access to APEX AlOps Observability.	ctory groups (shared by the IdP).				-	ILE SSO	00000	
🕅 Rep	ports	~						ENAE	ILE SSO	GROUP	
⊚ cyb	bersecurity	~	USERS	GROUPS ROLES SINGLE SIGN	ON						
℃ Life	ecycle	~	Setting Up Single Sign-On (SSO) 3 Associated Domains: acme.com, acmetechnol	logies.com, acmecorp.com 🕕							>
Adr	min identity Managem	~	INVITE DELL IDENTITY ADMIN								
c	Settings Customization Integrations		MP Group: Acme-Org								
	Licenses Connectivity		IdP Name 个 De	emains		Groups					
c	Collectors		🖸 Delta IdP ac	mecorp.com, acme.net		Group D, Group E, Group F					
	Jobs HCI Settings		🖸 External IdP ac	me.com, acmetechnologies.com		Group A, Group B, Group C					
٨	Audit Log Tags										

The Identity Management page for Standard users displays a subset of the Users tab. Standard users can see Team Members, Admins, and Advisors. The Admins button allows users to identify their Admins from the Observability UI to contact them if they need additional roles and permissions. The Advisors tab allows users to add and remove advisors.

AF	PEX AlOps Observability (								ø	7	8
ධ	Home		Identity Management								
ß	Monitor	$\sim$	Team Members Admins Advisors								
B	Manage	$\sim$	T 11 users Q Search								₫
3	Optimize	$\sim$									
2	Reports	~	Details Name 个	Email Address	Roles						
	Cybersecurit	v	Sally Robertson	sally.robertson@acme.com	DevOps, Standard						Î
~	ojourocouri	,									
٠	Admin	$\sim$									

#### **Settings**

The **Settings** section allows users to control asset visibility, set up email notifications, and enable access to Dell 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 the Observability UI and the Observability mobile app. 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 PowerStore. 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 > Sites and Systems.

AFEA Alops Of	bservabi	ility					1	Q mr_vm		× 🖓	50
ු Home		Settings						Mary Kimball	• Logged in as	ACME 🧷 🕴 Def	ault Custor
Monitor	~										
Manage	~	SITES AND S	YSTEMS NOT	TIFICATIONS	APEX AIOPS OBSER	VABILITY SETTINGS	CUSTOMER SUPP	DRT			
Optimize	~	Monitor ar	nd Manage Pref	erences in AP	EX AlOps Obse	rvability					
Reports	~	Choose which p	roducts, sites and syste	ems you wish to moni	tor and manage in APE	X AIOps Observability an	id APEX AlOps Observabili	ty mobile.			
Cybersecurity	~										$\sim$
C Lifecycle	~		0 Systems Disa	abled		0 Sites Disal	bled		0 Products Di	isabled	
Admin	~										
		View 💿 Syst	tems 🔿 Sites 🔿 Pro	oducts							
Identity Manage			tems 🔿 Sites 🔿 Pro								
Identity Manage Settings		Disabling a syst	em below will hide it fro								
			em below will hide it fro								۵
Settings		Disabling a syst	em below will hide it fro		Туре	Identifier	Connectivity Status	Site Name	Site ID	Location	۵
Settings Customization Integrations Licenses		Disabling a syste	em below will hide it fro ms	om all views.	Type Storage	Identifier FCNCH0972C3	Connectivity Status	Site Name ACME Headqu	Site ID 12345555	Location Round Rock,	
Settings Customization Integrations		Disabling a syste	em below will hide it fro ms Name	om all views. Model							rx ^
Settings Customization Integrations Licenses Connectivity		Disabling a syste	em below will hide it fro ms Name Production	m all views. Model Unity 650F	Storage	FCNCH0972C3	0	ACME Headqu	12345555	Round Rock,	rx
Settings Customization Integrations Licenses Connectivity Collectors Jobs HCI Settings		Disabling a syste	em below will hide it fro ms Name Production Market Research	Model Unity 650F Unity XT 880F	Storage Storage	FCNCH0972C3	0	ACME Headqu	12345555 12345555	Round Rock,	rx rx
Settings Customization Integrations Licenses Connectivity Collectors Jobs HCI Settings Audit Log		Disabling a syste	em below will hide it fro ms Name Production Market Research Test_Dev	Model Unity 650F Unity XT 880F UNITY VSA	Storage Storage Storage	FCNCH0972C3 FCNCH0972C3 FCNCH0972C3	0	ACME Headqu ACME Headqu ACME Branch	12345555 12345555 67895555	Round Rock, Round Rock, Hopkinton, M	TX Î
Settings Customization Integrations Licenses Connectivity Collectors Jobs HCI Settings		Disabiling a syst	em below will hide it fro ms Name Production Market Research Test_Dev Disaster Recov	m all views. Model Unity 650F Unity XT 880F UNITY VSA UNITY 400	Storage Storage Storage Storage	FCNCH0972C3 FCNCH0972C3 FCNCH0972C3 FCNCH0972C3		ACME Headqu ACME Headqu ACME Branch ACME Branch	12345555 12345555 67895555 67895555	Round Rock, Round Rock, Hopkinton, M	ГХ Î ГХ А, А,
Settings Customization Integrations Licenses Connectivity Collectors Jobs HCI Settings Audit Log		Disabiling a syste Tisabiling a syste Tisabi	em below will hide it fro ms Name Production Market Research Test_Dev Disaster Recov Test_Dev2	m all views. Model Unity 650F Unity XT 880F UNITY VSA UNITY 400 UNITY VSA	Storage Storage Storage Storage Storage	FCNCH0972C3           FCNCH0972C3           FCNCH0972C3           FCNCH0972C3           FCNCH0972C3	0 0 0	ACME Headqu ACME Headqu ACME Branch ACME Branch ACME Branch	12345555 12345555 67895555 67895555 67895555	Round Rock, Round Rock, Hopkinton, M Hopkinton, M	ΓX

## **Notifications**

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

#### Infrastructure Observability administration

APEX AlOps O	bservab	ility			Q mr_vm ×	Q S	đ
ධ Home		Settings			Mary Kimball 🔋 • Logged in as ACME 🧷	Default Cust	tom
Monitor	~						
Manage	~	SITES AND SYSTEMS NOTIFICATIONS	APEX AIOPS OBSERVABILITY SETTINGS	CUSTOMER SUPPORT			
Optimize	~	✓ Subscribe to email digest					
Reports	~	How often would you like to receive emails? <ul> <li>Daily</li> </ul>					
Oybersecurity	~	O Weekly					
C Lifecycle	~						
Admin	~	Subscribe to system health change notification Maximum number of emails a day per system	24				
Identity Manag	ement	Subscribed Categories					
Settings			apacity 🔽 Performance 🔽 Data Protection				
Customization		Components Configuration C	apacity 🔽 Performance 🗹 Data Protection				
Licenses Connectivity Collectors		Subscribed Systems 34 Systems UPDATE SELECTED SY	STEMS				
Jobs		System Name	Identifier	Tags	Site		
HCI Settings Audit Log		Account Management	CIQAPU1	DataCenter:TX-RR-DC1 BusinessUnit:Sales +2	ACME Headquarters	^	
Tags		ACP Azure Cluster	8Q10001		ACME Branch Office		
		APEX Hybrid Cloud Services	ELMISLFAGEF876		ACME Branch Office		
		APEX Private Cloud Services	ELMISLFAGEF876		ACME Branch Office		
		APEX-Block-Boston	6000643		ACME Headquarters		
		APEX-File-Austin	ELMISLFAGEF876		ACME Branch Office		
		block-legacy-gateway	ELMSIODEVTST002		ACME Branch Office		
		Business Analytics	95148	DataCenter:TX-RR-DC1 BusinessUnit:Finance +2	Site-95148		
		Disaster Recovery	FCNCH0972C32F2	DataCenter:MA-H0P-DC3 BusinessUnitSales +2	ACME Branch Office		
		Cybersecurity Subscribe to Cybersecurity risk notification NOTE: Cybersecurity information for PowerEdge sp	ystems is inclused in Digest emails, but not in the Syst	tem Risk Change emails.			

## **APEX AIOps Observability Settings**

Users can set their language preference under the APEX AlOps Observability Settings tab.

#### **Customer Support**

Users can enable and disable Observability access for Dell Customer Support. They can enable specific sites or, by selecting the Edit link for a specific site, enable specific systems within a site. This is useful for sharing the view of the system with Dell Support when troubleshooting an issue in Observability or for using the information in the Observability UI to help troubleshoot other issues.

APEX AlOps Of	bservabi	ility			Q mr_vm	×	Q Ø	ۍ ک		
☐ Home		Setti	ings	Mary Kimball	Logged in as ACME	Default	Customer			
Monitor	~									
E Manage	~	SITES	S AND SYSTEMS NOTIFICATIONS	APEX AIOPS OBSERVABILITY SETTINGS	CUSTOMER SUPPORT					
Optimize	~		) Enable Support View							
Reports	~		Site Name 🕎	Site ID	Location	# of Syster	ns Viewing Enabled	Actions		
Cybersecurity	~		ACME Branch Office	67895555	O Hopkinton, MA		11 11	/ EDIT		
$\mathcal{G}$ Lifecycle	~		ACME Headquarters	12345555	© Round Rock, TX		24 21	/ EDIT		
Admin	^									
identity Manag	ement									
Settings										
Customization										
Integrations Licenses										

#### Customization

Infrastructure Observability 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 and PowerMax systems.

Integrations The Integrations section allows users with the DevOps or Cybersecurity DevOps role to configure Webhooks. Users with the DevOps role can configure REST API credentials. Users must have the role of DevOps or Cybersecurity 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 Observability 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 Observability. 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.

API	EX AlOps Ob	serval	bility					Q	*	<b>Q</b> 4	3 (	9
ŵ	Home											
-	Monitor	$\sim$	Integrations	ntegrations								
E	Manage	$\sim$		API WEBHOOKS								
O	Optimize	~	API keys allow you to access your APEX AIOps Ob	servability data from external services using the endp	oint below.							
	Reports Cybersecurity	~	Endpoint https://cloudig.apis.dell.com/	Documentation								
	Lifecycle	~		API Terms of Use 🛃								
٢	Admin	^	Keys									
	Identity Manager Settings	ment	CREATE API KEY									
	Customization		Name	Description	API Key	Created By	Created On 🤟					
	Integrations Licenses		Observability-API-Key	APEX AlOps Observability Public A	View Key 🖸	Mary Kimball	May 18, 2021, 2:44:42 PM	Ċ				
	Connectivity											
	Jobs											
	HCI Settings											
	Audit Log											
	Tags											

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

Create API Key	>	<
Enter a Name (Maximum 40 characters) Observability - demo		
Enter a Description This is a test of the API.		
	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 <a href="https://developer.dell.com/apis/products/analytics/cloudiq">https://developer.dell.com/apis/products/analytics/cloudiq</a>. Use these links to developer blogs access examples for <a href="https://www.postman">Postman</a> and <a href="https://www.python.and.upyter">Python and Jupyter</a>.

#### **Webhooks**

Webhooks is a push mechanism to integrate with third-party applications such as ServiceNow and Slack. The following Webhook notifications are supported:

- Cybersecurity Ransomware Incident Delivered when Observability identifies a potential ransomware incident.
- Cybersecurity Misconfiguration Issue Delivered when Observability identifies a security configuration deviation.
- Cybersecurity Configuration Delivered when a change is made to an evaluation plan.
- Health Issue Change Delivered when Observability identifies a health issue change.

A brief tutorial for ServiceNow and Slack integration can be found <u>here</u>. Other examples can be found by searching for CloudIQ at the <u>Dell Developer Community</u>.

Configuration of Webhooks requires the user to enter an Event Type, a Name, the Payload URL (destination to send the Webhook), a Secret, and Server Authentication. 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 Web	hook			$\times$
	Event Type	nt to which you want to add Webhook Ransomware Incident	<u>*</u>		
	Name				
	Payload URL				
	Secret		۵		
	Server Authenti No	cation	<b>•</b>		
	TEST WEB	ноок			
•	Whenever Cyb 42 of 42 syste	ersecurity Ransomware Incident cha m selected	nges, a POST request is sent to the U	RL you specified above.	
		System 🔨	Identifier	Model	
		APEX-Block-Boston	6CC0643	APEX Block Storage Services	
		APEX-File-Austin	ELMISLFAGEF876	APEX File Storage Services	
		Account Management	CIQAPU1	ME5012	
		Business Analytics	95148	SC7020F	
		Dev SAN	JPG2128002T	Connectrix MDS-9132T	-

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

egratio	Ins					
			API WEBHOOKS			
bhooks allo	w external services to be notified whenever a	n event occurs, such as changes to health iss	ues or cybersecurity events, by sending a POS	T request to a defined URL.		
ADD WEBH	юок					
	Name 1	Event Type	URL	Last Delivery	Delivery Status Errors (Rece	nt deliveries)
› <b>i</b>	Configurations updates to SOC dashb	Cybersecurity Configuration	https://www.webhookmgr.acme.com	Mon, Jan 1 2024, 12:00:35 PM UTC	0	1
~ <b>I</b>	Health Change Webhook	Health Issue Change	https://www.webhookmgr.acme.com	Tue, May 21 2019, 1:39:04 PM UTC	0	0
Event (Re	cent deliveries)			Delivered $\downarrow$	Delivery Status	
Health s	core change: Production			Tue, May 21 2019, 1:39:04 PM UTC	•	
Health s	core change: Disaster Recovery			Mon, Apr 22 2019, 3:12:12 PM UTC	0	
› <b>i</b>	Misconfigurations to local server	Cybersecurity Misconfiguration Issue	https://www.webhookmgr.acme.com	Mon, Jan 1 2024, 12:00:35 PM UTC	0	0
	Potential Ransomware incidents notifi	Cybersecurity Ransomware Incident	https://www.webhookmgr.acme.com	Sun. Dec 24 2023, 1:39:04 AM UTC	0	0

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. Due to the potential sensitivity of cybersecurity information in the payload, users will only see header information in the Observability UI.



#### Licenses

The **Licenses** page shows license and entitlement details. Supported for PowerFlex, PowerScale, and APEX Navigator for Multi-Cloud, this page allows users to see 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.

APEX AlOps Ob	serval	bility									Q 🖓	ß	0
☆ Home		Entitlem	nents and System Lic	enses									
Monitor	~	View and m	Vew and manage your system license inventory. View details to manage explication dates, associated systems, and more. Only entitlement IDs associated with one or more systems appear in the table below.										
Manage	~	🔥 You h	You have 50 T8 of rectainable license. View details below. Manage licenses at Software Licensing Central.										1
<ul> <li>Optimize</li> <li>Reports</li> </ul>	č			tional licenses, get renewals, reclaim licen de support. Purchase a separate contract									
Cybersecurity	č		tion licenses include support. on licenses do not include support. Upg	rade to a subscription license or perpetua	l license for support options.								
3 Lifecycle	~	√ 7 ent	titlement IDs										
Admin	^	Details	① Entitlement ID	Product	① Entitlement Type	Purchased (TB)	Activated (TB)	Available (TB)	Start Date	End Date		Licer	
Identity Manager Settings	sent	۵	DLF00123	APEX Navigator for MultiCl	Subscription	0.9	0.9	0.0	Dec 20, 2023	🛕 Jul 8, 2024			
Customization		۵	DLF12345	PowerFlex	Perpetual	10.0	1.0	9.0	Feb 7, 2022	-			
Integrations		۵	A DLF96580	PowerScale	Evaluation	10.0	5.0	5.0	Oct 2, 2023	8 Nov 1, 2023			
Connectivity		۵	DLF67890	PowerFlex	Subscription	5.0	2.0	3.0	May 24, 2024	🔷 Jun 23, 2024			
Collectors		۲	A DLF24680	PowerFlex	Evaluation	10.0	5.0	5.0	Nov 30, 2022	8 Mar 13, 2023			
Jobs HCI Settings		۵	DLF7854	PowerScale	Perpetual	10.0	1.0	9.0	Mar 17, 2022	😣 Jan 2, 2023			
Audit Log		2	A DLF96453	PowerScale	Evaluation	10.0	5.0	5.0	Oct 2, 2023	🙁 Nov 1, 2023			
Tags													

#### Connectivity

The **Connectivity** page shows customers all systems that are connected, have lost connection, or need additional configuration work before Infrastructure Observability 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 Observability to complete the onboarding process.

#### Collectors

The **Collectors** page lists each Observability Collector, OpenManage Enterprise installation, and Converged Management Software system associated to Infrastructure Observability. The Observability Collector is used to collect VMware, Connectrix, and PowerSwitch data and sends that data back to Observability using Secure Connect Gateway. OpenManage Enterprise is required for PowerEdge collections. CMS is used for VxBlock collections. This page 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. Offline collectors can be removed from Observability using the delete icon on the right side of the page.

Collecto	rs								
7 Insta	illed Collectors	DOWNLOAD A COLLECTOR	CONNECT OPENM	IANAGE ENTERPRISE					凸
Issues	Connectivity Sta	Name 1	CONNECT OPENN Collector Type	Technology	Secure Remote	Configure	Collector Config	Update Status	
1	Connected	ciqc.conn.emc.com	CloudIQ	Connectrix	Centralized	6	🖸 Launch	<b>2</b> 1.2	
~	😣 Lost Conne	ciqc.lab.emc.com	CloudIQ	VMware	Centralized	0	🗹 Launch	<b>v</b> 1.2	Î
~	Connected	ciqc.prod.emc.com	CloudIQ	VMware	Centralized	2	🗹 Launch	1.1	
3	Connected	ciqc.test.emc.com	CloudIQ	VMware	Integrated	1	🗹 Launch	<b>2</b> 1.2	
~	Connected	ML-Research-OME	OpenManage Enterp	Servers	Integrated	84	🗹 Launch	3.7.0	Ē
1	Connected	RR-Site-OME	OpenManage Enterp	Servers	Integrated	44	🖸 Launch	3.7.0	Ē
-	Connected	vxblock-cms.lab.com	CMS	Converged	Direct Connect	4	🖸 Launch	<b>v</b> 1.0	

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 devices for which it is configured.

#### Infrastructure Observability administration

→ cio	qc.conn.emo	c.com				IAUNCH COLL	LECTOR CONFIGURATI
Serial N	Number	CIQC-ELMCIQ	Total Issue	s ()	Total		
SRS Ty		Centralized	Performan	ce 🗸			
SRS ga	teway Serial Number	ELMESRCON			All I	ealth checks were su	ccessful
Update	Policy	Download Only			7.011		
Last Up	pdate	Feb 4, 2020				$\sim$	
Connec	ctivity Status	Connected					
Last Co	ontacted	Feb 6, 2020 9					
VM	WARE CON	ECTRIX				6 cc	ollected Switches
St	Switch Name	Serial	Number	Firmware	Version	Management IP Address	Last Contact Time
8	Production SAN Ex	tens EAF30	0M001	v8.2.1a		10.0.12.1	about 20 hours
~	Stretch Cluster Ext	ension EAF30	0M003	v8.2.1a		10.0.12.3	12 minutes ago
~	SRDF LINK	EAF30	00000	v8.2.1a		10.0.12.4	6 minutes ago
~	Dev SAN	JPG21	28002T	8.3(2)		10.0.12.2	11 minutes ago
~	Production East	JPG19	4000DK	8.3(2)		10.0.12.5	11 minutes ago

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

IP Address	198.51.100.104	Total Issues		1	Components		1 iss
Version	3.7.0				about 20 hours ago 2 ou	t of 44 devices have not been	sending data
SRS Type	Integrated	Components		1	a long time.		
Software ID	OME5123ar123457	Configuration		~			
Site ID	ACME Round Rock						
Last Update	Jun 1, 2022						
Connectivity Statu	s Connected						
Last Contacted	Jun 1, 2022 2:58 PM UTC						
SERVER 44 collected Server							đ
	rs System	IP Address	Service Tag		Model	Last Contact Time	đ
44 collected Server		IP Address 198.51.100.173	Service Tag ATY7D85		Model PowerEdge MX740c	Last Contact Time 30 minutes ago	Ċ
44 collected Server Status	System		-				1
44 collected Server Status	System WIN-SYS02PE173	198.51.100.173	ATY7D85		PowerEdge MX740c	30 minutes ago	e 
44 collected Server Status & X	System WIN-SYS02PE173 SYSMGMT-ML-LABS-150	198.51.100.173 198.51.100.150	ATY7D85 AF27HTH		PowerEdge MX740c PowerEdge R750	30 minutes ago 30 minutes ago	( 
44 collected Server	System WIN-SYS02PE173 SYSMGMT-ML-LABS-150 IDRAC.AJHQK39.local	198.51.100.173 198.51.100.150 198.51.100.209	ATY7D85 AF27HTH AJHQK39		PowerEdge MX740c PowerEdge R750 PowerEdge R740	30 minutes ago 30 minutes ago 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.

Home	Job	s											
] Monitor $\checkmark$		'o subscribe to	all job email notification	n, visit the Settings pag	e. Learn More								_
Manage $\checkmark$	-												
) Optimize 🗸	Viewing	data from:	Last Month	*									
Reports v	<b>Y</b> 2	1 Jobs											
Cybersecurity 🗸		2	1	<b>6</b>	<b>A</b> 0		<b>8</b>		Ø 0	• 5		© 2	
Lifecycle $\checkmark$		Total		Failed	Warnin	9	Success		Canceled	Running		Scheduled	
Admin ^													
Identity Management	Detai	ils	Job Name	Job Type	Product Type	Status	Total	Syst	Start Date a 🔱	Firmware Update		ACTIONS	•
Settings Customization	~	۵	Firmware Upda	Execute	PowerEdge	C Scheduled		1	Jun 10 2024, 05:	Job Created by	a@a.com		
Integrations	St	atus		Description		Target System				Job Type	Execute		
Licenses	C	Scheduled		Update sch		IDRAC.ASFCYH	IT.local			Job ID	GJDH0G		
Connectivity										Status	C Schedule	ed	
Collectors	>	۵	Cybersecurity	Execute	PowerEdge	C Scheduled		1	Jun 10 2024, 05:	Start Date and Time		05:20:42 PM U	лтс
Jobs	>	ø	Blink LED ON	Execute	PowerEdge	Success		1	May 28 2024, 10	End Date and Time	-		
HCI Settings	>	ø	Blink LED OFF	Execute	PowerEdge	Success		1	May 28 2024, 10	Duration	5.5 Hours		
Audit Log Tags	>	ø	Power On	Execute	PowerEdge	Success		1	May 28 2024, 10	Estimated Job Time	5.5 Hours		
	>	۵	Power Off	Execute	PowerEdge	Success		1	May 28 2024, 10	Progress	0% Complete Total Errors		
	>	ø	Power Cycle S	Execute	PowerEdge	0	30%	1	May 28 2024, 10				
	>	۵	System Reset (	Execute	PowerEdge	0	504	1	May 28 2024, 10				

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.

	Rail									
Pre-Check - GJDGXW										EXPORT JOB RESULTS
Report Generated:	May 30 2022, 04:09:07 AM UTC		Outcome			Top Error Codes			Top KB Articles Refere	nced
Job Initiated by:	mary.kimball@acme.com.com								KB536978 1	
Job Type:	Pre-Check			Failed	1		VXR310SRS0002	1	1000070	
Job ID:	GJDGXW			A Warning	0		Other	0		
Status:	Failed (1)			_						
Total Number of System	s: 2			<ul> <li>Success</li> </ul>	110	Total 1				
Start Date and Time:	May 30 2022, 03:39:07 AM UTC		1	Canceled	0					
End Date and Time:	May 30 2022, 04:09:07 AM UTC		I							
Duration:	0.5 hour		Total 111							
Estimated Job Time: Filtered: 1 of 111 Sev Clear All	0.5 hour rerity Outcome	Sub Task	Error Code	Error Details	Reco	mmended Action Cl	luster Name Ho	istname	vCenter Server	Location
Filtered: 1 of 111 Sev	erity Outcome	Sub Task	Error Code	Error Details	Reco	mmended Action Cl	luater Name Hc	istname	vCenter Server	Location
Filtered: 1 of 111 Sev Clear All System	erity Outcome	Sub Task Pre-Check	Error Code VXR310SRS0002				luster Name Hc ell Mart - Gas Mark	istname	vCenter Server DellMart vCenter4.1o	Location Chicago, IL
Filtered: 1 of 111 Sev Clear All System	severity Uutcome							istriame		
Filtered: 1 of 111 Sev Clear All System System or ID	severity Uutcome							stname		
Filtered: 1 of 111 Sev Clear All System System or ID Hostname	severity Uutcome							stname		
Filtered: 1 of 111 Sev	severity Uutcome							isthame		
Pittered: 1 of 111 Sev Citear All System System or ID Host Severity	severity Uutcome							sfname		
Filtered: 1 of 111 Sev Clear All System System or ID Hostname Host Severity Falled Falled	severity Uutcome							stname		
Fiteed: 1 of 111 See Clear All System System System or ID Hostname Host Seerity Seerity Field Wanning	severity Uutcome							stname		
Filtered: 1 of 111 See Clear All  Clear All  System  System  Hostname  Hostname  Seenfy  Filted  Value	severity Uutcome							stname		
Fitnered: 1 of 111 Sev Clear All System System Host Host Severity     Field     Warning     Success	severity Uutcome							sthame		
Filtered: 1 of 111 Sev Clear All System System or ID Hostname	severity Uutcome							strame		

#### **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 tab is described below.

#### **Access Control**

The **Access Control** tab allows users to enable vCenter-based role-based access controls for intelligent multisystem 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
- Run health check: Performs an on-demand pre-update health check on the cluster
- Run cluster update: Initiates the cluster update operation on the cluster
- Manage update credentials: Modifies the VxRail infrastructure credentials used for active management

	Observal	ollity					Q 🖵 🕫 🕑
2 Home		HCI Settings					
Monitor	~						
Manage		Getting Started 🔺					~
		Perform the following steps to enable vCenter-base license. Click to Learn More.	ed access control for intelligent mult	i-system updates on your VxRail clu	sters. Performing multi-cluster updates req	ires an intelligent multi-system updates VxRail HCI System Software	Contact Dell Technologies
Optimize	×	Incerse, Circle to Learn More.					Oet help with intelligent multi-system updates.
E Reports	×.	Enable vCenter Access				ge Credentials	Dell Support
3 Cybersecurity	~	<ol> <li>Review and acknowledge the group of the enabling intelligent multi-system updates.</li> </ol>	st practices and guidelines before			tinue to <u>of enter and verify</u> your VxRail infrastructure credentials for intelligent system updates features.	Chat with Support
C Lifecycle		2. Enable vCenter access control for intelligent multi-sy	rstem updates features.				Open Service Request
		To enable vCenter acces	is control:				
Admin	^		ESS CONTROL				
Identity Mana	agement						
Settings Customizatio		BOBAAAAAAA	headed	heaanea	A1164A116	fanefanenefan	hadadaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
	201 - E						
Integrations							
Integrations Licenses				ACCESS	CONTROL CREDENTIALS	LICENSE	
						LICENSE	
Licenses Connectivity Collectors		In order to perform intelligent multi-system updates for a	II the VxRai clusters, make oure to enable			LICENSE	
Licenses Connectivity Collectors Jobs				«Center-based access control. Learn More		LICENSE	
Licenses Connectivity Collectors Jobs HCI Settings		In order to perform intelligent multi-system updates for a Wew whether vCenter-based access control for intellig		«Center-based access control. Learn More		LICENSE	
Licenses Connectivity Collectors Jobs				«Center-based access control. Learn More	sability. Learn More		
Licenses Connectivity Collectors Jobs HCI Settings Audit Log				«Center-based access control. Learn More	ability: Leam More		
Licenses Connectivity Collectors Jobs HCI Settings Audit Log				«Center-based access control. Lean More	Nability Learn More		
Licenses Connectivity Collectors Jobs HCI Settings Audit Log				«Center-based access control. Learn More	solity Learn Mare	Control	
Licenses Connectivity Collectors Jobs HCI Settings Audit Log				«Center-based access control. Learn More	Nability Learn More	Control	٥
Licenses Connectivity Collectors Jobs HCI Settings Audit Log		Vew whether vCenter based access control for intention		«Center-based access control. Learn More	Nability Learn More	Control	
Licenses Connectivity Collectors Jobs HCI Settings Audit Log		Verwahether «Centerbased access control for intention © 8 Charters	ert mull-system uppates is enabled fo	Center-based access current, Laws More	Notify Least Nov Vomter Based Access Control Datable	Control 100%	
Licenses Connectivity Collectors Jobs HCI Settings Audit Log		Verwinkelter vCenterbased access control for intention ✓ 8 Causters Cleater News. ↓	ert multi-system updates is enabled fo enabled for Tickel Number of Hosts	-Center Based Access Carted	vCenter Based Access	Control 100%	York, NY

#### **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. Infrastructure Observability does not store passwords and credentials.

#### Infrastructure Observability administration

DellMart.vCenter2.loc	al				×
Use this page to enter and verify o	credentials for your vCenter and	VxRail cluster. Click to Lean	n More.		
vCenter		VxRail Manager		Dell Mart - Mega Mar	ket Boston, MA
Root Username		Root Username	root	Location	Boston, MA
Root Password		Soot Password	****	Location	boston, wike
Administrative Username	administrator@vsphere.local	_		VxRail HCI System Software License	HSS & intelligent multi-system updates
Administrative Password	****	<u>©</u>			
					VERIFY CANCEL SAVE

#### License

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

ACCESS CONTROL CREDENTIALS LICENSE									
🛕 The	ere is 1 cluster where hosts have differ	ent Licenses .Certain fe	atures and functions are disabled. <u>View Cl</u>	lusters					
	8       VxRail HCI System Software License         9       VxRail HCI System Software       25%         1       VxRail HCI System Software & Intelligent multi-system updates       75%         1       VxRail HCI System Software & Evaluation       –								
<b>7</b> 8	3 Clusters								
	Cluster Name								
	oldster Hame	Total Number of H	License	Expires 个	vCenter	Datacenter	Location		
<b>&gt;</b>	Dell Mart - Corner/Gas	Total Number of H	License	Expires	vCenter DellMart.vCenter2.local	Datacenter Southeast Region	Orlando FL		
<b>`</b>	Dell Mart - Corner/Gas	4	HSS	Never	DellMart.vCenter2.local	Southeast Region	Orlando FL		
>	Dell Mart - Corner/Gas Cloud data center	4	HSS HSS (Mixed)	Never     Never	DellMart.vCenter2.local DellMart.vCenter7.local	Southeast Region	Orlando FL Seattle, WA		
> >	Dell Mart - Corner/Gas Cloud data center Dell Mart - Mega Marke	4 4 2	HSS A HSS (Mixed) HSS & intelligent multi-system up	Never     Never     Never     Never	DellMart.vCenter2.local DellMart.vCenter7.local DellMart.vCenter1.local	Southeast Region Northwest Region Northeast Region	Criando FL Seattle, WA Boston, MA		
> > >	Dell Mart - Corner/Gas Cloud data center Dell Mart - Mega Marke Dell Mart - Corner Mark	4 4 2 5	HSS HSS (Mixed) HSS & Intelligent multi-system up HSS & Intelligent multi-system up	<ul> <li>Never</li> <li>Never</li> <li>Never</li> <li>Never</li> <li>Never</li> </ul>	DellMart vCenter2.local DellMart vCenter7.local DellMart vCenter1.local DellMart vCenter1.local	Southeast Region Northwest Region Northeast Region Northeast Region	Criando FL Casettie, WA Boston, MA Providence, Ri		
> > > > > >	Dell Mart - Corner/Gas Cloud data center Dell Mart - Mega Marke Dell Mart - Corner Mark Dell Mart - Café Market	4 4 2 5 3	HSS HSS (Mixed) HSS & intelligent muti-system up HSS & intelligent muti-system up	<ul> <li>Never</li> <li>Never</li> <li>Never</li> <li>Never</li> <li>Never</li> <li>Never</li> <li>Never</li> </ul>	DellMart vCenter2.local DellMart vCenter7.local DellMart vCenter1.local DellMart vCenter1.local DellMart vCenter3.local	Southeast Region Northwest Region Northeast Region Northeast Region Southwest Region	Orlando FL     Seattle, WA     Boston, MA     Orvovidence, RI     San Francisco, CA		

#### Audit Log

The **Audit Log** tracks activities performed in the Observability UI. It includes the time of the activity, the type of action, the user who initiated the action, the status, and a status message. The Audit Log is only visible to users with the Admin role.

#### Tags

For information about tags, see the Custom Tags section in this document.

## **Mobile application**

#### Introduction

Infrastructure Observability 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 Observability team.

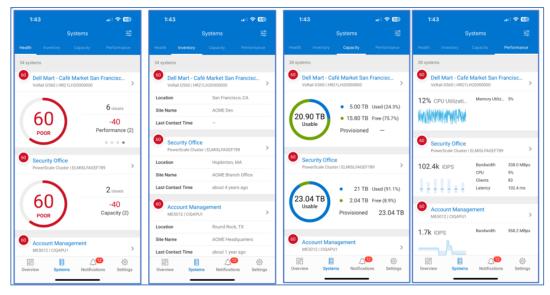
All storage platforms are supported except PowerFlex. HCI systems and Connectrix switches are also supported. Data Protection, Converged, Servers, and PowerSwitch devices are not supported at the time of this publication.

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 Observability. Selecting items in the Overview screen will show additional details. The following images show the Overview screen 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, Inventory, Capacity, and Performance.



#### System details

The user can analyze single system details for Health, Inventory, 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.

1:43 🔐 🕫 🚯	1:43 al 🕈 🚯	1:44 al 🗢 🚳	1:44 .nii 🗢 🖽
く System Details ①	System Details	System Details	< System Details
Health Inventory Capacity Performance	Health Inventory Capacity Performance	Health Inventory Capacity Performance	Health Inventory Capacity Performance
Disaster Recovery UNITY 400   FCNCH0972C32F2	Disaster Recovery UNITY 400   FCNCH0972C32F2	Disaster Recovery UNITY 400   FCNCH0972C32F2	Disaster Recovery UNITY 400   FCNCH0972C32F2
Newest Severity Issues (6)  Swipe left to share	Identifier Disaster Recovery Location Hopkinton, MA	• 68.5 TB Used (52.1%) • 53.1 TB Free (40.3%)	Block Latency  Block Latency HIMAGES Lesend HIMAGES HI
Capacity 9h The storage pool 'Disaster	Site Name         ACME Branch Office           Version         4.2.0.9433914	Usable Provisioned 582 TB	7.8 ms
Recovery_Pool2' is oversubscribed and growing at a substantially increasing rate, predicted to run out of space in 5	Last Contact Time about 15 minutes ago Contract Expiration 1606194000000	Overall Efficiency 8.5:1	5.2 ms
hours.	Service Plan	Pools Disaster Recovery, Pool2	How when the menunder
Capacity 9h		54.7% Used 6.2 TB Free	0 µs
The file system 'DR_Pool2_FS1' is growing at a substantially increasing rate, predicted to run out of space in 5 hours. $~~30$		Disaster Recovery_Pool3 54.5% Used 37.5 TB Free Disaster Recovery_Pool1	IOPS Levend 10.6k IOPS Max: 46.8k IOPS MIN: 1k IOPS
Capacity 9h		45.3% Used 13.5 TB Free	Last 24hrs
The file system 'DR_Pool2_FS2' is predicted to run out of space within a $-20$ $\sim$ week.			58.18
Cverview Systems Notifications Settings	Cverview Systems Notifications Settings	Cverview Systems Notifications Settings	Cverview Systems Notifications Settings

# Appendix A: Enabling Infrastructure Observability 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 Infrastructure Observability data collection. This configuration must be enabled successfully on each individual Dell storage system before users can send data to Infrastructure Observability. Once the secure connection has been configured within the Element Manger interface, Observability 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 or higher, go to Settings > Management > CloudIQ and select I agree to send data to CloudIQ for local systems, and then click Apply.
  - For Cybersecurity, in Unisphere 9.2.1 or higher, go to Settings > Management > CloudlQ Cybersecurity and select I agree to send data to CyberSecIQ.
- PowerScale/Isilon
  - For PowerScale/Isilon systems, connectivity to Secure Connect Gateway and Observability 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 v3.7
  - Log in to PowerFlex Manager and go to Settings > Virtual Appliance Management
  - Click Add Alert Connector
  - Under Device Registration section, enter Device Type, ELMS Software ID, Solution Serial Number
  - Check SRS box
  - Check Enable CloudIQ box
  - Under Connector Settings section, enter Secure Connect Gateway information
- PowerFlex Appliance with PowerFlex Manager v4.0 or higher
  - 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 <u>KB#000180688</u>), device type, ELMS software unique ID, solution serial number, and site ID
  - Enter Support contact information

The user can then go to <u>https://cloudiq.dell.com</u> and log in with their valid service account credentials to view their systems in Observability. The amount of time it takes for a system to appear in Observability 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 Observability 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. Verify that the **Connect to CloudIQ** box is checked. For PowerStore 4.0 and above:

Go to **Settings > Support > Support Connectivity**. Click the **Connection Type** tab. Configure the remote connectivity for either Connect Directly or Connect via Secure Connect Gateway. Verify that the **Connect to CloudIQ** box is checked.

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

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

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 Observability:

- System Serial Number
- Service Tag
- Storage Center Version

Log in to the Observability 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: <u>https://www.dell.com/support/kbdoc/000155957</u>.

**Dell PowerVault** The Dell PowerVault systems use SupportAssist for Observability 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 Observability:

- WWN
- Service Tag
- Firmware Version

Alternatively, login to the system and use the CLI to collect the above information.

Log in to the Observability 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: <a href="https://www.dell.com/support/kbdoc/000022224">https://www.dell.com/support/kbdoc/000022224</a>.

DellDell Converged systems use Secure Connect Gateway/Dell Technologies ServicesVxBlock/VBlockconfigured in Converged Management Software (CMS) for data collection.

To configure Observability data collection, log in to CMS using administrator privileges. Select **Settings > Configure Dell Technologies services**. Enter the Access Key and PIN. If you do not have an access key and PIN, you can request a new one from the link on the screen. Enter the **Software ID** (SWID) and click **Save**.

Collect the following information from CMS as it is required to complete the onboarding process in Observability:

- System Serial Number
- Network Switch Serial Numbers

Log in to the Observability 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: <a href="https://www.dell.com/support/kbdoc/0000208967">https://www.dell.com/support/kbdoc/0000208967</a>.

Dell VxRailStarting with v 7.0.350, VxRail Hyper-Converged Infrastructure systems require Secure<br/>Connect Gateway for Observability Data Collection. See the appropriate VxRail<br/>Administration Guide for the correct procedures.

V7.0.x – VxRail Administration Guide

V8.0.x - VxRail Administration Guide

Alternately, see Solve Online for VxRail.

Telemetry must also be enabled for Observability collections. This is accomplished by enabling 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 needed to collect data from PowerEdge servers and sends the data to Observability. For versions below 4.0, the CloudIQ plug-in is required to be installed in OpenManage Enterprise to enable the flow of data to Observability.

- 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.
- 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 <u>000180688.</u>
- 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 Infrastructure Observability.
- 6. Select **Next** to see the summary of the configuration and click **Finish** to complete the configuration.

Note: Starting with OpenManage Enterprise 4.0, the CloudIQ Plugin is installed by default.

For detailed information about onboarding PowerEdge servers to Observability, see: <u>https://www.dell.com/support/kbdoc/000189403.</u>

# Dell PowerProtect DD systems use Secure Connect Gateway for Observability data collection. PowerProtect DD 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: <a href="https://www.dell.com/support/kbdoc/000183656">https://www.dell.com/support/kbdoc/000183656</a>

DellPowerProtect Data Manager uses Secure Remote Services or Secure Connect GatewayPowerProtectfor Observability data collection. To configure Secure Remote Services in PowerProtectData ManagerData 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: <a href="https://www.dell.com/support/kbdoc/000184014">https://www.dell.com/support/kbdoc/000184014</a>

 
 Connectrix
 Connectrix switches use the Observability Collector to collect the data from the switches and send the data back to Observability using Secure Connect Gateway. The collector is a vApp that is downloaded from the Admin > Collectors menu in the Observability userinterface or from <a href="mailto:support.dell.com">support.dell.com</a>. 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: <a href="https://www.dell.com/support/kbdoc/000157620">https://www.dell.com/support/kbdoc/000157620</a>.

PowerSwitch PowerSwitch devices use the Observability Collector to collect the data from the switches and send the data back to Observability using Secure Connect Gateway. The collector is a vApp that is downloaded from the Admin > Collectors menu in the Observability userinterface or from <u>support.dell.com</u>. 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
```

Note: For SONiC, RESTCONF API is enabled by default.

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 Observability Collector to communicate to vCenter and send data back to Observability using Secure Connect Gateway. The collector is a vApp that is downloaded from the Admin > Collectors menu in the Observability user-interface or from <a href="https://support.dell.com">https://support.dell.com</a>. 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 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: <a href="https://www.dell.com/support/kbdoc/000021264">https://www.dell.com/support/kbdoc/000021264</a>.

# **Appendix B: APEX AlOps Infrastructure Observability security**

## Infrastructure Observability Security summary

Infrastructure Observability takes numerous steps to protect your information in transit and at rest. In addition, Observability 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 <u>Security</u> white paper for more information.

## Infrastructure Observability data in transit to Dell

Infrastructure Observability 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 <u>Secure Connect Gateway</u> <u>Security</u> 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, Infrastructure Observability stores data relating to those systems which have Observability management enabled in its own Dell IT-managed infrastructure.

## Infrastructure Observability data at rest

Infrastructure Observability 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 Infrastructure Observability is stored on infrastructure hosted in the 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, expect for members of the 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 Infrastructure Observability data

Infrastructure Observability access requires that each user has a valid Dell support account. Customers use their existing support account to log in to Observability. Authentication is handled by the Dell Single-Sign-On (SSO) infrastructure, and multifactor authentication is enforced.

Infrastructure Observability 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.

Infrastructure Observability 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 Observability. Each user can only see those systems in Observability 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**

	Performance	Capacity	Configuration
PowerMax/VMAX	5 minutes	1 hour	1 hour
PowerStore	5 minutes	5 minutes	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
VxRail <sup>15</sup>	5 minutes	5 minutes	24 hours
PowerProtect DD	5 minutes	1 hour	1 hour

The following chart provides the data collection frequency per system type.

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 <u>Report Browser metrics</u> for a full list of individual performance metrics collected for each component type.

<sup>&</sup>lt;sup>14</sup> Some PowerScale performance charts provide 24-hour interval metrics.

<sup>&</sup>lt;sup>15</sup> VxRail sends the 5-minute performance and capacity data to Observability at 30-minute, 60minute, or 24-hour intervals. The telemetry setting in VxRail Manager determines the upload interval.

#### Appendix C: Data collection frequencies and samples

	Sys	tem	Node Appl	e / liance	Poo	bl	Volu LUN	me /	File Sys	tem	Stora Grou		Driv	es	Hos Initi	st / ator
	Ρ	С	Р	С	Ρ	С	Р	С	Ρ	С	Р	С	Ρ	С	Ρ	С
PowerMax / VMAX	~	~			~	~					~	~				
PowerStore	~	$\checkmark$	$\checkmark$	~			~	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$		~	$\checkmark$
PowerScale / Isilon	~	~	~	~		~										
PowerVault	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	~	$\checkmark$					$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
PowerFlex	$\checkmark$	$\checkmark$														
Unity XT family	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
XtremIO	$\checkmark$	~					$\checkmark$	$\checkmark$								
SC Series	$\checkmark$	$\checkmark$			$\checkmark$		$\checkmark$	$\checkmark$					$\checkmark$	~	~	$\checkmark$

## **Connectrix Switches**

	Switch		Partition		Zone		Attached Devices		Interface	
	Perf	Сар	Perf	Сар	Perf	Сар	Perf	Сар	Perf	Сар
Connectrix	$\checkmark$	$\checkmark$							$\checkmark$	
PowerSwitch		$\checkmark$								

#### VMware

	ESXi Cluster		ESXi Server		Datastor	e	Virtual Machine	
	Perf Cap		Perf	Сар	Perf Cap		Perf	Сар
VMware	$\checkmark$		$\checkmark$		$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

# **Appendix D: Report Browser metrics**

The following charts provide the time series metrics available in Report Browser.

## Connectrix

Fibre Channel only

Metric	Switchport	System
Buffer Errors	х	
Buffer Errors by All Buffer Errors	х	
Buffer Errors by B2B Credit Zero	х	
Class-3 Discards	х	
Congestion Ratio	х	
CRC Errors	Х	
Link Resets	Х	Х
Link Resets by In/Out	Х	Х
Physical Layer Errors	Х	
Physical Layer Errors by All Physical Layers	X	
Physical Layer Errors by Encoding Errors	Х	
Physical Layer Errors by FEC Blocks	Х	
Protocol Errors	х	
Protocol Errors by All Protocol Errors	Х	
Protocol Errors by Frames Length	х	
Protocol Errors by Non Operational Sequence	Х	
Protocol Errors by Offline Sequence	Х	
Throughput	х	Х
Throughput by Rx/Tx	х	
Time at Zero Tx Credit	Х	
Utilization	х	Х
Utilization by Rx/Tx	х	
B2B Credit Zero/sec		Х
Errors		Х
Daily Carbon Footprint		X

Metric	Switchport	System
Daily Energy		Х
Power Consumption		Х

## PowerEdge

Available PowerEdge metrics vary based on model, license, and firmware. See the CloudIQ section of the <u>OpenManage Portfolio Software Licensing Guide</u> 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)				
	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)				

Drives				
	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)
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

Server
Avg. CPU Usage
Avg. IO Usage
Avg. Memory Usage
Avg. System Usage
Daily Carbon Footprint
Daily Energy
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)

## **PowerFlex**

Metric	Device	Fault Set	Host	Protection Domain	SDS	Storage Pool	System
% Read	х		Х	х	Х	х	х
% Write	х		Х	х	Х	х	х
Bandwidth	х		Х	х		х	х
Bandwidth by Read/Write	х		х	Х		х	Х
Capacity in Use	х			х		х	х
IOPS	х		Х	х		Х	х
IOPS by Read/Write	х		х	Х		Х	Х
Latency	х		Х	х	Х		х
Latency by Read/Write	х		х	Х	х		Х
Unused Capacity	х			х			Х
Spare Capacity						х	х
Compression Ratio		Х		Х	х	Х	Х
Provisioned				х		х	х
Total Capacity				х		Х	Х
Net Thin Capacity Provisioned							X
Used Thick Capacity							Х
Used Thin Capacity							x

## **PowerMax**

Metric	FE Dir	FE Port	Host	RDF Dir	RDF Port	RDFA Group	RDFS Group	Storage Group	Storage Resource Pool	System	File System
% Busy	Х	Х		Х	Х						
% Hit							Х				
% Write							Х				
% Read								х	х	х	
Allocated Size								х			
Used Size									х		
Bandwidth	Х	Х	Х	Х	Х		Х	х	х	х	х
Bandwidth by Read/Write		х	х	x	х			х	х	х	
IO Size		Х			Х			х	х	х	
IO Size by Read/Write		х			х			х	х	х	
IOPS	Х	Х	Х	Х	Х		Х	х	х	х	х
IOPS by Read/Write		х	х		х		х	х	х	х	
Latency		х	Х				Х	х	х	х	
Latency by Read/Write		х	х				х	х	х	х	
Queue Length								х	х	х	
Queue Length by Read/Write								х	х	х	
Queue Depth Utilization	x										
Read Latency	х										х
Write Latency	х										х
Reducible Data								х			
Total Size								х			
Unreducible Data								х			
Avg IO Service Time						х					
Compressed Bandwidth						Х					
Compressed Bandwidth by Read/Write						Х					

Metric	FE Dir	FE Port	Host	RDF Dir	RDF Port	RDFA Group	RDFS Group	Storage Group	Storage Resource Pool	System	File System
RDF R1 to R2 Bandwidth						Х					
RDF R1 to R2 IOPS						Х					
RDF R2 to R1 Bandwidth						Х					
RDF R2 to R1 IOPS						х					
RDF/A WP Count						Х					

## **PowerProtect DD**

Metric	Data Protection System	Replication
Average CPU Utilization	X	
Incoming Pre-comp Replication	Х	х
Incoming Replication Streams	Х	х
Outgoing Pre-comp Replication	Х	х
Outgoing Replication Streams	Х	х
Pre-comp Read Throughput	Х	
Pre-comp Write Throughput	Х	
Read Streams	Х	
Write Streams	X	

## **PowerScale**

Metric	Node	System	Pool
Active Client Number	Х	х	
Bandwidth	Х	х	
Configured Size		х	
CPU	Х	х	
Daily Carbon Footprint		х	
Daily Energy		х	
Free Size		х	
Free Size on 5 mins interval			Х

#### Appendix D: Report Browser metrics

Metric	Node	System	Pool
Free Size on one day interval			Х
IOPS	Х	х	
Latency	Х	х	
Power Consumption		Х	
Used Percent		х	Х
Used Size		х	
Used Size on 5 mins interval			Х
Used Size on one day interval			Х

## **PowerStore**

Metric	Appliance	Ethernet	Fibre Channel	File System	iSCSI	Node	System	Volume	Volume Group
% Read				х					
Bandwidth	Х	х	х	х	Х	х	х	х	х
Bandwidth by Read/Write	x		х	x	х	x	x	x	х
Bandwidth by Received/Trans mitted		x							
CPU Utilization	Х					х			
Data Reduction Ratio							x		
Errors		х							
Errors by Type		х							
Free Logical Size							x		
Free Size				х			х	х	х
Invalid Count Errors			х						
Invalid Counts by Type			х						
IO Size	Х		х	х	Х	х		х	х
IO Size by Read/Write	х		х	х	х	x		х	x
IOPS	Х		х	х	Х	Х	х	х	х
IOPS by Read/Write	x		х	х	х	х	х	х	х

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Metric	Appliance	Ethernet	Fibre Channel	File System	iSCSI	Node	System	Volume	Volume Group
Latency	х		х	х	Х	х	х	х	х
Latency by Read/Write	x		x	x	х	x	х	x	х
Logical Size							х		
Loss Errors			х						
Loss Errors by Type			х						
Packets		х							
Packets by Received/Trans mitted		x							
Queue Depth	Х					х		х	
Total Size				х			х	х	х
Total Used Logical Size							х		
Unique Physical Used Size								х	
Used Size				х			х	х	х

## **PowerVault**

Metric	Controller	Drive	Host	Pool	Pool Backend	System	System Backend	Volume
% Read	х	х	х	х	х	х	х	х
% Read Hits								х
% Write Hits								х
Bandwidth	Х	х	х	Х	х	х	х	Х
Bandwidth by Read/Write	x	x	x	x	X	X	X	x
Free Size				х				
IO Size	х	х	х	х	х	х	х	х
IO Size by Read/Write	Х	Х	Х	X	Х	х	х	х
IOPS	Х	х	х	Х	х	х	х	Х
IOPS by Read/Write	х	Х	х	х	x	Х	Х	х
Total Size								х
Used Size				х				х

## **SC Series**

Metric	Drive	FC, SAS, iSCSI	Pool	Pool Backend	System	System Backend	Volume
% Read	Х	Х	Х	х	Х	х	х
Bandwidth	Х	Х	Х	х	Х	х	х
Bandwidth by Read/Write	x	x	x	x	x	x	х
CPU Utilization					Х		
Free Size			Х				
IO Size		Х	Х	х	Х	х	Х
IO Size by Read/Write		Х	Х	Х	Х	Х	Х
IOPS	Х	Х	Х	х	Х	х	Х
IOPS by Read/Write	х	х	х	Х	х	Х	х

Metric	Drive	FC, SAS, iSCSI	Pool	Pool Backend	System	System Backend	Volume
Latency	Х	Х	Х	Х	Х	Х	Х
Latency by Read/Write	Х	Х	Х	Х	Х	х	Х
Queue Length	Х	Х	Х	Х	Х	Х	Х
Total Size							Х
Used Size			Х				Х

## **Unity XT family**

Metric	Block	Drive	Ethernet	Fibre Channel	File	iSCSI	Pool	Pool Backend	System	System Backend	System- Cache
% Read	Х	Х			х		Х	Х	х	Х	
Allocated Size	х				x						
Bandwidth	Х	Х	Х	х	Х	Х	Х	Х	х	Х	
Bandwidth by In/Out			х								
Bandwidth by Read/Write	х	Х		х	х	х	х	х	х	x	
Bandwidth by SP	х	Х			x		х	х	х	х	
Bandwidth by SP and Read/Write	х	Х			х		х	X	X	x	
CPU Utilization									х		
Daily Carbon Footprint									x		
Daily Energy									х		
Errors			Х								
Errors by In/Out			х								
Free Size							Х		х		
IO Size	Х				х		Х	х	х	х	
IO Size by Read/Write	х				х		х	х	х	х	

#### Appendix D: Report Browser metrics

Metric	Block	Drive	Ethernet	Fibre Channel	File	iSCSI	Pool	Pool Backend	System	System Backend	System- Cache
IO Size by SP	х				х		х	х	х	Х	
IO Size by SP and Read/Write	х				х		х	х	x	х	
IOPS	Х	Х			Х		Х	х	х	х	
IOPS by Read/Write	х	х			х		х	х	х	х	
IOPS by SP	х	х			х		х	х	х	х	
IOPS by SP and Read/Write	х	х			х		х	Х	х	Х	
Latency	Х				Х		Х		х		
Latency by Read/Write	х				х		х		х		
Latency by SP	х				х		х		х		
Latency by SP and Read/Write	х				х		х		x		
Packets			Х								
Packets by In/Out			х								
Power Consumpti on									x		
Queue Length	х				х		х		х		
Requests				х		Х					
Requests by Read/Write				Х		х					
Total Size	Х				х						
Used Size					х		Х		Х		
vVol Latency							х		х		
Total Link Errors				х							
Total Link Errors by Link Error				х							

Metric	Block	Drive	Ethernet	Fibre Channel	File	iSCSI	Pool	Pool Backend	System	System Backend	System- Cache
% Clean											х
% Dirty											Х
% Free											х
Flushed											Х

#### **VMware**

Metric	ESXi	Virtual Machine	Datastore
Active Memory	х	х	
Bandwidth per Datastore		x	
CPU Readiness		х	
CPU Usage	Х	Х	
IOPS per Datastore		х	
Latency per Datastore		x	
Storage Latency		х	
Capacity			Х
Free Space			Х
Uncommitted			Х

#### **VxRail**

Metric	HCI System	Host
CPU Hertz		Х
CPU Ready Summation		Х
CPU Utilization (%)		Х
Daily Carbon Footprint	Х	
Daily Energy	Х	
Disk Latency		х
Disk Utilization		Х
Memory Consumed Average		х
Memory Overhead Average		х
Memory SwapInRate Average		х
Memory SwapOutRate Average		Х
Memory Utilization (%)		х
Memory VM Control Average		х
Networking Utilization		Х

Metric	HCI System	Host
Power Consumption (Avg W over last hr)	Х	

**XtremIO** 

Metric	Initiator	System	Target	Volume
Bandwidth	х	х	х	х
Bandwidth by Read/Write	x	x	x	х
Block Latency	х	х	х	х
Block Latency by Read/Write	x	x	x	х
CPU Utilization		х		
Free Size		х		
IOPS	х	х	х	х
IOPS by Read/Write	x	x	x	х
Logical Size		х		
Used Size		Х		