Dell EMC VCE Vision™ Intelligent Operations
Version 3.5.0
Technical Overview

Document revision 1.0
November 2016
## Revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Document revision</th>
<th>Description of changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2016</td>
<td>1.0</td>
<td>New release of product.</td>
</tr>
</tbody>
</table>
# Contents

**Introduction** ........................................................................................................................................... 5

**Dell EMC VCE Vision Intelligent Operations** ......................................................................................... 6
  - System requirements .............................................................................................................................. 6
  - VCE Vision software overview ........................................................................................................ 7
  - Product architecture ............................................................................................................................ 8
  - Data center architecture ...................................................................................................................... 14

**Features** .................................................................................................................................................... 16
  - Introduction to System Library .......................................................................................................... 16
  - Discovery .............................................................................................................................................. 17
  - Data collection .................................................................................................................................... 18
  - Identification ....................................................................................................................................... 20
  - Health monitoring ............................................................................................................................... 20
  - Logging and events .............................................................................................................................. 22
  - Configuration backup and recovery .................................................................................................... 23
  - User security ....................................................................................................................................... 27
  - Data federation .................................................................................................................................... 27
  - Compliance management ................................................................................................................ 28
    - Compliance overview ....................................................................................................................... 28
    - RCM Compliance ............................................................................................................................ 30
    - RCM content prepositioning .......................................................................................................... 31
    - Security Hardening compliance ..................................................................................................... 32
    - VCE Security Alert or VCE Technical Alert compliance ................................................................. 32
  - Search functionality ............................................................................................................................. 33
  - Key performance indicators .............................................................................................................. 35
  - VM resource monitoring .................................................................................................................... 36
  - Working with EMC Secure Remote Services (ESRS) ......................................................................... 38

**VCE Vision user interfaces** ................................................................................................................... 39
  - VCE Vision dashboard overview ...................................................................................................... 39
  - VCE Vision shell ................................................................................................................................. 39
  - Plug-in for vCenter ............................................................................................................................... 40

**Software modules** ................................................................................................................................ 41
  - VCE Vision RCM Compliance Module ............................................................................................. 41
  - VCE Vision Security Compliance Module .......................................................................................... 41

**Application programming interfaces** .................................................................................................. 42
  - MSM API for Multi-System Services ................................................................................................. 42
  - MSM API for Compliance .................................................................................................................. 43
  - MSM API for Security Web ............................................................................................................... 43
  - MSM API for shell commands .......................................................................................................... 43
  - MSM API for Tech Support .............................................................................................................. 44
  - Vision Core API for System Library ................................................................................................. 44
  - Vision Core API for Compliance Checker .......................................................................................... 44
Introduction

This document provides a high-level technical overview of the Dell EMC VCE Vision™ Intelligent Operations software. The target audience for this document includes customers and partners.

The VCE Glossary provides terms, definitions, and acronyms that are related to VCE™ Systems.
System requirements

The system requirements specify the minimum support required for the VCE Vision Core VM, the multisystem management (MSM) VM, and the multisystem prepositioning (MSP) VM.

<table>
<thead>
<tr>
<th>VM</th>
<th>Memory requirement (GB)</th>
<th>vCPUs</th>
<th>Disk size (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCE Vision Core VM</td>
<td>8</td>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td>MSM VM</td>
<td>12</td>
<td>4</td>
<td>250</td>
</tr>
<tr>
<td>MSP VM</td>
<td>1</td>
<td>2</td>
<td>250</td>
</tr>
</tbody>
</table>

The VCE Vision Core VM, MSM VM, and MSP VMs can be installed on the following Advanced Management Platforms (AMP) and storage types:

- Logical AMP - Vblock System storage array
- HA-AMP version 1 - EMC VNXe 3100
- HA-AMP version 2 - EMC VNXe 3150
- AMP-2V - Vblock System storage array
- AMP-2P - C-Series local storage
- AMP-2RP - C-Series local storage
- AMP-2HA - EMC VNXe 3200
- AMP-2LP - C-Series local storage
- AMP-2S - VNXe storage

**NOTE:** VCE Vision software supports only the Cisco UCS C220 Servers on AMP-2S that were configured in the factory. Configure AMP-2S through the attended configuration tool on the following VCE Systems:

- Vblock® System 240
- VxBlock™ System 240
- Vblock® System 350 and VxBlock™ System 350
- Vblock® System 540 and VxBlock™ System 540
- Vblock® System 740 and VxBlock™ System 740
• AMP-3V - Vblock System storage array
• AMP-3P - C-Series local storage
• VxRack Controller - Management servers local storage

You must consider the following when deploying the VCE Vision Core VM, MSM VM, and MSP VMs:

• When deploying on AMP, the RAM size must be greater than or equal to 128 GB. If the RAM is less than 128 GB, the AMP must be upgraded to have a minimum of 128 GB of RAM. Contact VCE Sales and Support for assistance when upgrading the AMP: https://support.vce.com/
• It is recommended to use NFS mount from the storage array for the MSP VM, where available.
• For AMP, EMC VNXe-3100 and 3150 leverage the local storage capacity. Storage can be added and is documented by Cisco but this may add downtime.

Depending on the VCE System, the VCE Vision Core, MSM, and MSP VMs can be installed on either a logical or physical AMPs as described below:

<table>
<thead>
<tr>
<th>VCE System</th>
<th>Logical AMP</th>
<th>Physical AMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vblock® System 100</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Vblock® System 200</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vblock® System 240</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>VxBlock™ System 240</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vblock® System 300 series</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VxBlock™ System 340</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VxBlock™ System 350</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Vblock® System 540</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VxBlock™ System 540</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Vblock® System 700 series</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VxBlock™ System 740</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VxRack™ System with FLEX</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Related information

Product architecture (see page 8)
Data center architecture (see page 14)

VCE Vision software overview

VCE Vision software provides health and lifecycle management capabilities embedded in VCE Systems. VCE Vision software provides standardized, repeatable processes that enable a system administrator to ensure an optimized, secure, and functional data center or hybrid-cloud environment.
VCE Vision software enables you to know about one or more VCE Systems in a data center, where they are located, and what components they contain. It reports on the health or operating status of all VCE Systems. Use VCE Vision software to rapidly verify that VCE Systems are running the currently supported software or firmware for a particular Release Certification Matrix (RCM). Additionally, you can use VCE Vision software to maintain security hardened infrastructure in accordance with VCE Security best practices.

VCE Vision software effectively acts as a mediation layer between your VCE System and its existing management tools. The software allows for intelligent discovery by providing a continuous, near real-time perspective of the compute, network, storage, and virtualization resources as a single object, ensuring that the management tools reflect the most current state of the VCE System.

Related information

Data center architecture (see page 14)

Product architecture

Each VCE System has a VCE Vision Core, MSM, and an MSP VM deployed and configured as part of the installation process.
The following illustration shows the components and services contained in each VM:
**MSM VM**

In a data center environment with one or more VCE Systems, each VCE System contains an MSM VM. The following table shows the components, APIs, and services that are running on each MSM VM:

<table>
<thead>
<tr>
<th>Components, APIs, services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apache HTTP Proxy</td>
<td>Used as a proxy server for all HTTP based communication and to ensure that the VCE Vision dashboard is accessible through the proxy server.</td>
</tr>
<tr>
<td>VCE Vision dashboard</td>
<td>A web-based user interface that provides information about all VCE Systems and components.</td>
</tr>
<tr>
<td>MSM API for Tech Support</td>
<td>Provides a set of REST resources for component log collection. The <code>vision-msm-tech-support</code> service manages the MSM API for Tech Support.</td>
</tr>
</tbody>
</table>
| MSM Compliance service                      | Validates that VCE Systems are compliant when compared to different criteria that VCE provides. The `vision-mvb-compliance` service is used to manage the MSM compliance. A compliance scan can be performed for:  
  - Release Certification Matrix (RCM) compliance  
  - Security Hardening compliance  
  - VCE Security and Technical Alert compliance  

   **NOTE:** The Security Hardening compliance and VCE Security and Technical Alert compliance are supported on a Vblock System and a VxBlock System only. |
| Software Module Manager service             | Enables you to manage modules. Software modules can be enabled or disabled as required. The `vision-subscription-manager` service is used to manage the Software Module Manager.  

   **NOTE:** The Security Hardening module is supported on a Vblock System and a VxBlock System only. |
<p>| MSM API for multisystem services            | Queries and filters data collected from a set of VCE Systems in an MSM environment. The <code>tomcat</code> service is used to execute the MSM API services. |
| Collection Manager service                  | Executes the MSM Collection Manager that runs in the Vert.X instance and performs data collection. |
| MSM API for Security Web                    | Provides a set of REST resources for controlling access to system resources within an MSM environment through role-based access control (RBAC). |
| MSP API for RCM content prepositioning      | Provides a set of REST resources that are used to execute the RCM content prepositioning functions, such as downloading RCM content, deleting content, canceling RCM downloads, and so on. |</p>
<table>
<thead>
<tr>
<th>Components, APIs, services</th>
<th>Description</th>
</tr>
</thead>
</table>
| **VCE Vision shell**        | An extensible management tool that provides a single interface to interact with VCE Systems and their components. VCE Vision shell uses the services from the MSM VM to manage multiple VCE Systems. The VCE Vision shell provides a REST API using CherryPy, which is a lightweight Python web server used to expose Vision shell functionality through REST APIs.  

| **NOTE:** The VCE Vision shell is supported on a Vblock System and a VxBlock System only. |
| **RabbitMQ**                | A messaging broker that provides the MSM services and applications with a common platform to send and receive messages asynchronously, and ensures that messages are delivered. |
| **Elasticsearch**           | A distributed search server that provides a full-text search engine by using a REST API. The documents or records in Elasticsearch are JSON objects that are stored and made searchable by indexing collected data. |
| **Vert.X**                  | A lightweight event-driven application platform for web applications. The Vert.X instance contains the MSM Collection Manager. |
| **Cassandra**               | A distributed database management system that is designed to handle large amounts of data across a clustered server environment. In MSM, Cassandra is used to store collected data, credentials, metadata and element associations for the services provided by MSM. |
**VCE Vision Core VM**

The VCE Vision Core VM provides a set of REST resources that provide the ability to access data in System Library. The following table shows the components, APIs, and services that are running on each VCE Vision Core VM:

<table>
<thead>
<tr>
<th>Components, APIs, services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAgent</td>
<td>The Foundation Management (FM) Agent uses the system configuration to retrieve information from the components in the VCE System. The FM Agent performs discovery on a scheduled basis. The information that is retrieved for an interval is used to update the system information in PostgreSQL.</td>
</tr>
<tr>
<td>RCM Content Pre-positioning</td>
<td>VCE Vision software enables you to retrieve software and firmware for components in a VCE System to maintain compliance with the current Release Certification Matrix (RCM) and to upgrade to new RCM versions. To download RCM content in a multisystem management environment, you must use the VCE Vision dashboard. Any RCM content that is downloaded using the VCE Vision™ Plug-in for vCenter is not reflected in a multisystem management environment. If required, refer to the Plug-in for vCenter online help for information about downloading RCM content using the Plug-in for vCenter.</td>
</tr>
<tr>
<td>Vision Software Repository</td>
<td>A service that provides an API to manage VCE Vision software on the VCE Vision Core VM. It is used by RCM content prepositioning to store RCM content.</td>
</tr>
</tbody>
</table>
| VCE Vision™ API for Compliance Checker   | Used to validate that VCE Systems are compliant when compared to different criteria that VCE provides. A scan can be performed for:  
  - Release Certification Matrix (RCM) compliance  
  - Security Hardening compliance  
  - VCE Security and Technical Alert compliance  

**NOTE:** The Security Hardening compliance and VCE Security and Technical Alert compliance are supported on a Vblock System and a VxBlock System only. |
| VCE Vision™ API for System Library        | The API for System Library provides a set of REST resources for retrieving information about VCE Systems. The API retrieves data associated with each VCE System. |
| VCE Vision™ API for Vision Security      | Provides a set of REST resources for controlling access to system resources through role-based access control (RBAC). |
| RabbitMQ                                 | RabbitMQ is a messaging broker that provides the VCE Vision Core services and applications with a common platform to send and receive messages asynchronously, and ensures messages are delivered. |
Components, APIs, services

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PostgreSQL is a relational database management system. It is used to store collected data, credentials and records for the services provided by the VCE Vision Core VM.</td>
</tr>
</tbody>
</table>

MSP VM

Important: Only one MSP VM must be deployed and configured within a cluster. The MSP VM must be associated with the MSM VMs in its local data center for that cluster. If other MSP VMs have been deployed and configured, you must power down these VMs.

The MSP VM provides the functions required for the RCM content prepositioning feature. The following table shows the components and services that are running on each MSP VM:

<table>
<thead>
<tr>
<th>Components and services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Share service</td>
<td>The vision-contentshare is used to manage the inventory of RCM content that is local to the running instance of the vision-assetmanager service.</td>
</tr>
<tr>
<td>Download service</td>
<td>The vision-downloader service manages the following tasks:</td>
</tr>
<tr>
<td></td>
<td>• Acknowledges a download request.</td>
</tr>
<tr>
<td></td>
<td>• Downloads each required file from the Content Distribution Network (CDN).</td>
</tr>
<tr>
<td></td>
<td>• Provides status updates during the download process.</td>
</tr>
<tr>
<td>Content Source service</td>
<td>The vision-contentsource manages the entitlements, request notifications from the CDN, and ensures that all downloaded RCM content matches the download requests.</td>
</tr>
<tr>
<td>Asset Manager service</td>
<td>The vision-assetmanager service co-ordinates the Content Share, Content Source, and the Downloader services for working with RCM content that resides on the MSP VM.</td>
</tr>
<tr>
<td>PostgreSQL</td>
<td>PostgreSQL is a relational database management system. It is used to store the downloaded RCM content on the MSP VM.</td>
</tr>
</tbody>
</table>

Related information

System requirements (see page 6)

Data center architecture (see page 14)
Data center architecture

VCE Vision software allows you to set up a multisystem configuration within your data center environment.

VCE Vision software provides support for multiple VCE™ Systems. In a data center environment, an MSM VM can be associated with up to two VCE Vision Core VMs:

Important: Only one MSP VM must be deployed and configured within a cluster. The MSP VM must be associated with the MSM VMs in its local data center for that cluster. If other MSP VMs have been deployed and configured, you must power down these VMs.

VCE Vision software provides support for a clustered environment that includes multiple MSM VMs. These MSM VMs can be configured to run in a single physical data center, or in multiple physical data centers that are geographically separate.

The following illustration shows a single-site environment consisting of three MSM VMs, each of which is associated with a single VCE Vision Core VM. The MSM VMs are configured to form a cluster. The MSM
capabilities and functionality are exposed after the deployment and configuration of the MSM VMs. Use the VCE Vision dashboard, the VCE Vision shell, or REST APIs to interact and manage VCE Systems:

In a single-site configuration with one data center, VCE supports up to three MSM VMs running within the data center. Each MSM VM can be associated with up to two VCE Vision Core VMs.

VCE Vision software also provides support for a multi-site clustering configuration that includes a maximum of three data centers. In a multi-site configuration with three data centers, each data center may have no more than two MSM VMs running, where each MSM VM is associated with up to two VCE Vision Core VMs.

For complete instructions and guidelines for clustering, refer to the Dell EMC VCE Vision™ Intelligent Operations Administration Guide.

Related information

Product architecture (see page 8)
System requirements (see page 6)
VCE Vision software overview (see page 7)
Features

VCE Vision software comes packaged with a core set of features and value-add software modules. Together, they allow you to manage a converged infrastructure and lifecycle management process that is the foundation of data center stability, optimization, and security.

Introduction to System Library

VCE Vision System Library is provided as part of the VCE Vision Core VM and provides the foundation and core functions of the product. System Library enables communication between VCE Vision software, VCE System components, and applications on the network.

System Library performs the following core functions:

- Discovering the VCE System and its components
- Discovering identity information about the VCE System
- Calculating the health or operating status of the VCE System and its components
- Forwarding events and messages from the VCE System

The following illustration is a high-level overview of integration between System Library and various products and protocols:

VCE Vision System Library is provided as part of the VCE Vision Core VM. For details on the data collectors provided with the MSM VM, see the related topic on data collection.
Discovery

To perform discovery, System Library uses different protocols to gather the inventory, location, and health of the VCE System where the VCE Vision Core VM is deployed. System Library then populates the information that it discovers into an object model. That object model resides within a database and is exposed through REST and SNMP interfaces.

What does System Library discover?

System Library discovers the VCE System itself and the following physical components and logical entities:

<table>
<thead>
<tr>
<th>Group</th>
<th>Physical components</th>
<th>Logical entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compute</td>
<td>All</td>
<td>ESXi</td>
</tr>
<tr>
<td>Network</td>
<td>All</td>
<td>VLANs</td>
</tr>
<tr>
<td>Storage</td>
<td>All</td>
<td>• Storage groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RAID groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• LUN relationships to RAID and storage groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Masking records</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mapping records - LUNs mapped to FA ports so that ports can see the LUNs for access</td>
</tr>
<tr>
<td>Management</td>
<td>All</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

How does System Library discover a VCE System?

The initial discovery process takes place when the VCE System is manufactured. Initial discovery relies on an XML file that contains build and configuration information about the VCE System. System Library uses the XML file to populate basic information about the VCE System and establish communication with components.

After initial discovery, System Library uses the following methods to discover the VCE System and its physical components and logical entities:

- XML API
- Simple Network Management Protocol (SNMP)
- Storage Management Initiative – Specification (SMI-S)
- Vendor CLIs, such as EMC Unisphere CLI (UEMCLI)
- Intelligent Platform Management Interface (IPMI)
How often does discovery occur?

System Library performs discovery every 15 minutes by default. However, you can change how often discovery runs to meet your business requirements.

Related information

Logging and events (see page 22)
Identification (see page 20)
Introduction to System Library (see page 16)
Data collection (see page 18)

Data collection

VCE Vision software collects information by using data collectors to extract the required data from the various Web services, including Vision REST API, SNMP, VPLEX REST API, UCS, and so on.

Data collectors facilitate a data collection framework that provides the following benefits:

- Generic - can collect data from any new domains without having to change the data collection framework.
- Extendable - add new discoveries without changing any baseline collector framework.
- Scalable - the data collection framework is flexible, so it can collect data from many different types of components in a data center.
- Load balancing - the collection mechanism ensures that data collections can be monitored when orchestrating collections.
- Metadata driven - new attributes can be added when updating the baseline collector framework.
- On demand collection - initiate a data collection process through a REST API, for example, if a new component update is available.
The following table describes the data collectors:

<table>
<thead>
<tr>
<th>Data collector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision collector</td>
<td>Uses the Vision REST API to collect the VCE System configuration data and key performance indicators (KPI) already discovered in VCE Vision Core. The Vision collector stores this configuration and KPI data from VCE Vision Core into the Cassandra and Elasticsearch databases.</td>
</tr>
<tr>
<td>Storage Management Initiative-Specification (SMI-S) collector</td>
<td>Works with the EMC CIM Object Manager (ECOM) service that runs on SMI components to discover metrics for VNX and VMAX:   • Storage array    • Storage processor    • Storage volume    • Storage pool    • Storage tier    • Disk</td>
</tr>
<tr>
<td>Simple Network Management Protocol (SNMP) collector</td>
<td>Collects information from SNMP enabled devices such as Cisco Nexus and MDS switches, to discover metrics. For example, information can be collected from the following network components:   • Switches    • Network chassis    • Container    • Fan    • Expansion module    • Power supply bay    • PSU    • Network temperature sensor    • SFP    • IPI appliance</td>
</tr>
<tr>
<td>vSphere API collector</td>
<td>Works with the VMware vCenter Server using the vSphere API to discover metrics, for example, datastores, disk partitions, clusters, and so on.</td>
</tr>
<tr>
<td>VNXe REST collector</td>
<td>Collects metrics from EMC VNXe storage devices.</td>
</tr>
<tr>
<td>Unity REST collector</td>
<td>Collects configuration data from an EMC Unity storage array and its components.</td>
</tr>
<tr>
<td>XIO REST collector</td>
<td>Collects metrics for storage array, storage volume, disk and port. All other configuration information is collected by Vision collector.</td>
</tr>
<tr>
<td>XML API collector</td>
<td>Collects information from the Cisco UCS using the XML API to discover metrics.</td>
</tr>
<tr>
<td>VMware NSX collector</td>
<td>Collects information on VMware NSX components, such as Virtual Appliance Management and the NSX controllers. The NSX collector interfaces with the NSX Manager APIs.</td>
</tr>
</tbody>
</table>
### Identification

Each VCE System has properties that uniquely associate it with a System Library, which populates the properties to the object model so you can access them to identify each VCE System and all its components.

Properties that System Library uses for identification include the following:

- VCE System serial number
- VCE System model
- VCE System location
- Unique ID (UID)

System Library updates the object model during the regular discovery process in case any changes are made to the properties.

VCE Vision software generates a unique ID (UID) that can be used to correlate objects retrieved by the Vision collector with objects retrieved by other MSM collectors. The UID is a human-readable string, which is useful in cases where the UID contains a hierarchical path.

### Health monitoring

VCE System health reflects the overall operational status of the system as well as the operational status of logical components and sub-components.

VCE System health is a bottom-up calculation that monitors health or operational status of the following:

- The physical components of the VCE System such as a chassis, disk array enclosure, fan, storage processor, or data mover.
• The compute, network, storage, and management components that logically group the physical components in a VCE System.

• The VCE System as a whole.

Physical components in the VCE System report an `operationStatus` or `operStatus`. VCE Vision software uses the operational status from the physical components to create a `calculatedStatus` that is based on a set of VCE-defined best practices. In this way, the `calculatedStatus` is an assessment of how the `operationStatus` impacts the overall health of the VCE System.

Use the VCE Vision dashboard and the MSM API for multisystem services to retrieve health status for components and elements. The following table describes the different calculated health statuses:
<table>
<thead>
<tr>
<th>Health status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operable</td>
<td>All components have optimal health. The system is operating as expected.</td>
</tr>
<tr>
<td>Minor</td>
<td>An issue exists with one or more components. This status does not represent a significant impact to the overall health of a VCE System.</td>
</tr>
<tr>
<td>Degraded</td>
<td>One or more components are operating with degraded bandwidth, capacity, or redundancy. The system might be operating with decreased performance.</td>
</tr>
<tr>
<td>Major</td>
<td>One or more components has a significant issue. The system might be operating with decreased performance and at risk of failure.</td>
</tr>
<tr>
<td>Critical</td>
<td>One or more components has a fatal or otherwise serious issue. The system might not be fully operational and is at significant risk of failure.</td>
</tr>
<tr>
<td>Inoperable</td>
<td>The VCE System or one of its components is not operating as expected or a failure has occurred.</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>One or more components does not report health status. This status occurs when components are disabled or excluded from health monitoring. This status does not affect the overall health of the VCE System.</td>
</tr>
</tbody>
</table>

**Logging and events**

Each component in a VCE System generates events or log messages. System Library collects and normalizes these messages and writes them to a local log file or forwards to a remote server. Use these log files to analyze and isolate possible issues with VCE Systems. Use the VCE Vision dashboard or the API for Tech Support to collect component logs.

**NOTE:** Logging is supported on a Vblock System, VxBlock System and VCE Fabric Technology Extension only.

Use the VCE Vision dashboard to download a zip file of the log files for any specified component. The API for Tech Support also provides a set of REST resources for component log collection that allows you to trigger log collection tasks, monitor log collections, and so on. For more information about the logging capabilities, see the *Dell EMC VCE Vision™ Intelligent Operations Administration Guide* and the *Dell EMC VCE Vision™ Intelligent Operations Programmer’s Guide*.

Logging and event messaging enable rapid troubleshooting with the following built-in logging capabilities:

- **VCE System components** are correlated according to time, aggregated, and made available to other IT tools to facilitate troubleshooting and root cause analysis.
- **Events from vendor formats and protocols** are normalized to standard formats and protocols.
- **Application logs from authentication and authorization (AA) logs** are segregated.
- **Data collection** is expedited for troubleshooting.
- **RabbitMQ event messaging model** (messaging system based on the AMQP standard) publishes messages to the RabbitMQ broker.
Clients can subscribe to the broker using customized routing keys to filter and receive messages.

**Syslog messages**
System Library makes the following syslog messages available:

- Component log messages
- Application log messages

**SNMP and Advanced Message Queuing Protocol (AMQP) events**
SNMP and AMQP handle events from the following sources:

- SNMP traps
- Common Information Module (CIM) indications
- Cisco XML API

VCE Vision software does not collect logs for non-VCE products.

**NOTE:** Log collection is not supported for VMAX or on any component that is configured on AMP-2P, AMP-2RP, AMP-2HA, AMP-2LP, or AMP-2S.

**Related information**

[Introduction to System Library](see page 16)

**Configuration backup and recovery**
Configuration backup and recovery ensures that you do not lose any configuration data for the System Library instance on the VCE Vision Core VM.

You are responsible for backing up the MSM VM. VCE recommends performing an agent-less VM backup using backup software that is commonly used in the data center.

**VCE System configuration backup**
A VCE System is deployed with configuration backups for each VCE System component, as follows:

<table>
<thead>
<tr>
<th>VCE System</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vblock System 100</td>
<td>Cisco Catalyst 3750-X Switch</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 3064-T Switch</td>
</tr>
<tr>
<td></td>
<td>Vblock compute servers (CIMC)</td>
</tr>
<tr>
<td></td>
<td>Management servers (CIMC)</td>
</tr>
<tr>
<td>VCE System</td>
<td>Component</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Vblock System 200 series | Cisco Nexus 5000 Switch  
Cisco Nexus 1000V Switch  
Cisco Nexus 3000  
Cisco C-Series server(s)  
EMC VNX  
Vblock Compute Servers (CIMC)  
Management servers (CIMC) |
| Vblock System 300 series | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 1000V  
Cisco Nexus 3000  
Cisco UCS fabric interconnects (UCS Manager)  
EMC VNX  
Management servers (CIMC)  
Technology Extension for Storage  
VCE™ Technology Extension for Cisco UCS compute |
| VxBlock System 340 | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 1000V  
Cisco Nexus 3000  
Cisco UCS fabric interconnects (UCS Manager)  
EMC VNX  
Management servers (CIMC)  
Technology Extension for Storage  
VMware Virtual Distributed Switch (VDS) |
| VxBlock System 350 | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 1000V  
Cisco Nexus 3000  
Cisco UCS fabric interconnects (UCS Manager)  
Management servers (CIMC)  
Technology Extension for Storage  
VCE™ Technology Extension for Cisco UCS compute  
VMware Virtual Distributed Switch (VDS) |
<table>
<thead>
<tr>
<th>VCE System</th>
<th>Component</th>
</tr>
</thead>
</table>
| Vblock System 540          | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 3000  
Cisco Nexus 7000, and/or Cisco Nexus 9000  
Cisco Nexus 1000V  
Cisco UCS fabric interconnects (UCS Manager)  
EMC XtremIO  
Management servers (CIMC)  
Technology Extension for Storage  
VCE™ Technology Extension for Cisco UCS compute |
| VxBlock System 540         | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 3000  
Cisco Nexus 7000, and/or Cisco Nexus 9000  
Cisco Nexus 1000V  
Cisco UCS fabric interconnects (UCS Manager)  
EMC XtremIO  
Management servers (CIMC)  
Technology Extension for Storage  
VMware Virtual Distributed Switch (VDS) |
| Vblock System 700 series   | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 3000  
Cisco Nexus 7000, and/or Cisco Nexus 9000  
Cisco Nexus 1000V  
Cisco UCS fabric interconnects (UCS Manager)  
EMC Symmetrix VMAX  
Management servers (CIMC)  
Technology Extension for Storage  
VCE™ Technology Extension for Cisco UCS compute |
| VxBlock System 740         | Cisco MDS 9000  
Cisco Nexus 5000  
Cisco Nexus 3000  
Cisco Nexus 7000, and/or Cisco Nexus 9000  
Cisco Nexus 1000V  
Cisco UCS fabric interconnects (UCS Manager)  
EMC Symmetrix VMAX  
Management servers (CIMC)  
Technology Extension for Storage  
VMware Virtual Distributed Switch (VDS) |
By default, the Configuration Collector backs up configuration files twice a day at 1:30 AM and 1:30 PM to the following directories:

- /opt/vce/backup/amp2
- /opt/vce/backup/storage
- /opt/vce/backup/network
- /opt/vce/backup/compute

### System Library configuration backup

VCE Vision software automatically backs up System Library configuration files. When the backup task runs, it creates a `.TAR` file that contains:

- System Library configuration files from the following directories:
  - /opt/vce/fm/conf
  - /etc/snmp/snmpd.conf
  - /etc/logrotate.d/syslog
  - /etc/srconf/agt/snmpd.cnf

- JBoss configuration files

- System Library administrative, configuration, and model database schemas and data files

By default, the backup occurs every day at 12:00 AM. A maximum of seven backups are saved on the system.

System Library configuration files are backed up to: /opt/vce/fm/backup/.

### PostgreSQL database backup

In addition to System Library configuration files, VCE Vision software automatically backs up PostgreSQL database schema and data so you can restore VCE Vision software to a working state, if required.

VCE Vision software creates backups of the database in `.tar.gz` file format to the `/opt/vce/fm/backup/postgres/` directory. By default, VCE Vision software stores the PostgreSQL database backups for the current day and the previous two days.
The following example describes how VCE Vision software stores PostgreSQL database backup files:

- At 11:59 PM on Tuesday, VCE Vision software stores backup files for Tuesday, Monday, and Sunday.
- At 12:00 AM on Wednesday, VCE Vision software stores backup files for Wednesday, Tuesday, and Monday. VCE Vision software deletes the backup files for Sunday.

VCE Vision software runs the task to back up the database schema and data every 10 minutes. You can change the schedule and frequency of the backup tasks. You can also run backups on demand outside of the scheduled tasks.

**User security**

Security functions are available that enable you to control access to VCE Vision software across one or more VCE Systems in a data center environment.

User security management capabilities include:

- Credential management
  - Create new users with the appropriate access rights.
  - Update default passwords.
  - Update access credentials for a component.
  - Update Central Authentication Services (CAS) credential information.
  - Import third party SSL certificates that can be used by VCE Vision software.

- Integrate VCE Vision software with Active Directory
  - Using role-based access control (RBAC) to perform security authorization checks for any client applications making an API call.
  - Map roles to Active Directory groups.
  - Set up single sign-on (SSO) for the VCE Vision dashboard.

**Data federation**

Data federation ensures that data collected from one or more VCE Systems is available to all other VCE Systems within the data center. Data is aggregated and organized without having to request synchronization logic or copying the original data from each component or VCE System.

This ensures that any changes in the logical or physical components are reflected in all VCE Systems in the data center. For example, if a VM is migrated to a new host or a VM is deleted on a particular VCE System, these updates are reflected in the MSM layer by using either the VCE Vision dashboard or the REST API queries. Types of data available for one or more VCE Systems include:

- Operating status (health of the VCE Systems and/or their components)
- Log collection for one or more VCE Systems
• Compliance status of one or more VCE Systems:
  — Release Certification Matrices (RCM)
  — Security Hardening best practices
• Key performance indicators (KPI) for one or more VCE Systems including:
  — Historical data for a component
  — Aggregated metrics for a component
  — Power usage
• Physical-to-logical relationships that can be used to facilitate workload management.

 Compliance management

VCE Vision software provides the following compliance options:

RCM compliance
The RCM compliance scan is provided as part of the VCE Vision RCM Compliance Module. RCM content prepositioning is also part of this module. It is used to maintain compliance with the current Release Certification Matrix (RCM) and to upgrade to new RCM versions.

Security Hardening compliance
The Security Hardening compliance scan is provided as part of the VCE Vision Security Compliance Module.

VCE Security Alert (VSA) or VCE Technical Alert (VTA) compliance
If the VCE Security and Technical Alert content pack is downloaded from the VCE Download Center, a VSA/VTA compliance scan is also made available.

The VSA/VTA content pack is external to the installation process and is delivered as a standalone content RPM file on VCE Download Center, which is accessible from support.vce.com.

Related information

VCE Vision RCM Compliance Module (see page 41)
VCE Vision Security Compliance Module (see page 41)

Compliance overview

VCE Vision software compliance lets you verify that VCE Systems are running the currently supported software or firmware for a particular Release Certification Matrix (RCM), as well as maintain security hardened infrastructure on a daily basis in accordance with VCE security best practices.
How compliance works

VCE Vision software scans one or more VCE System settings (for example, the status of services across devices, such as Telnet, SSH key size, passwords, and so on) and compares those values to the expected values in compliance policies and profiles and other common security best practices. Each policy has one or more profiles that specify the rules and values to check for system components. For example, RCM 5.0.2 identifies a profile that corresponds to a specific RCM for firmware on specific VCE Systems. Running a compliance scan using the profile for RCM 5.0.2 checks the system for the firmware versions defined in that release.

Each profile is a grouping of rules used to audit a system based on values defined according to VCE standards. For example, if the RCM 5.0.2 profile includes a rule to check the firmware version on Cisco UCS B-Series blades, it checks the blade’s firmware against the profile’s recommended value. If the values do not match, the check fails.

Run a compliance scan on a system to assess compliance validation. You can run compliance scans from the VCE Vision dashboard or from a REST API client using the MSM API for Compliance. After a scan completes, a score from 0 to 100 is assigned to show the overall system compliance against that policy. You can see the score for each system in the dashboard. The score is also available in a downloadable compliance report that includes the result of each check performed during the scan. Use the compliance report to address any compliance checks that failed to improve the compliance score on the next scan. The compliance report also lists all components that were scanned for compliance and displays each individual result. Save the results of the compliance scan to your local system in order to:

- Send report content to customer support for help in analyzing and correcting errors
- Compare with other scan reports
- Download software and firmware for components in a VCE System to easily maintain compliance with the current RCM and more efficiently upgrade to new RCM versions.

Save compliance results as a PDF, XLS or CSV file by using the VCE Vision dashboard in a multisystem management (MSM) environment.

The compliance service also provides enhanced features such as profile tailoring, which lets you modify existing compliance policies to fit your environment. For more information about profile tailoring, see the Dell EMC VCE Vision™ Intelligent Operations Administration Guide.
The following compliance content packs are available for VCE System compliance:

**VCE System Release Certification Matrix (RCM)**
RCMs define software, firmware, and hardware tested and validated as supported for a VCE System. Run compliance scans against an RCM to identify VCE System compliance with that RCM.

**Security Hardening guidelines (Security Compliance Validation)**
Security Compliance Management simplifies and automates the steps required to keep VCE Systems settings security-hardened according to VCE security best practices.

**NOTE:** The security hardening guidelines (Security Compliance Validation) is available on a Vblock System and a VxBlock System only.

**VSA/VTA content pack**
The VSA/VTA content pack extends the existing functionality of VCE Vision software compliance by scanning the VCE Systems to determine VCE Security/Technical Alert applicability. This avoids having to rely on manual inspection or support for assessment. The VSA/VTA content pack is delivered as a standalone content RPM or zip file that uses existing APIs and user interfaces in VCE Vision software. It is available on the VCE Download Center, which is accessible through [https://support.vce.com/](https://support.vce.com/).

**NOTE:** The VSA/VTA content pack is supported on a Vblock System and a VxBlock System only.

**Related information**

**RCM content prepositioning** (see page 31)

**RCM Compliance**
The RCM Compliance scan determines if one or more VCE Systems and associated components are compliant with a Release Certification Matrix (RCM).

VCE Vision software intelligence uses RCMs to compare firmware and software versions currently installed on VCE Systems with the expected versions. You can run compliance scans to check that the VCE System complies with that RCM. The compliance policies and profiles also identify which versions...
require upgrading as listed on the next RCM. The following illustration shows the RCM compliance management lifecycle:

![RCM Compliance Management Lifecycle Diagram]

**Related information**

[RCM content prepositioning](see page 31)

**RCM content prepositioning**

VCE Vision software enables you to retrieve software and firmware for components in a VCE System to maintain compliance with the current Release Certification Matrix (RCM) and upgrade to new RCM versions.

**NOTE:** The download of RCM content is supported on Vblock Systems and VxBlock Systems only.

To download RCM content in a multisystem management environment, you must use the VCE Vision dashboard. Any RCM content that is downloaded using the VCE Vision™ Plug-in for vCenter is not reflected in a multisystem management environment. If required, refer to the Plug-in for vCenter online help for information about downloading RCM content using the Plug-in for vCenter.

RCM content prepositioning enables you to perform the following tasks:

- Discover and download RCM content available for download.
- View RCM content downloaded to a VCE System.
- Monitor the status of RCM content downloads.
- Manage downloaded RCM content.

When upgrading one or more VCE Systems to a new RCM version, VCE Vision software provides a list of all available RCM versions on the RCM content distribution network. RCM content becomes available for download after the files are uploaded to the RCM content distribution network. The VCE Download
Center uploads the binary files in the RCM version along with an XML manifest that provides information about the RCM content.

VCE Vision software uses a dedicated multisystem prepositioning (MSP) VM to manage the RCM content prepositioning feature functionality. For example, storing the RCM content and distributing it to a VCE System within the MSM cluster to bring it back into compliance.

Related information

RCM Compliance (see page 30)
Compliance overview (see page 28)

Security Hardening compliance

A Security Hardening compliance scan helps maintain a security hardened infrastructure by providing security best practices that identify risks that might exist on one or more VCE Systems in a data center.

NOTE: Security Hardening compliance is supported on a Vblock System and a VxBlock System only.

The following compliance content and extension packs are available for Security Hardening compliance:

- Security hardening compliance
  Security Compliance Management automates steps required to keep VCE Systems settings security-hardened according to VCE security best practices.

- VCE Vision Shell Security Hardening Remediation Extension Pack
  The Security Hardening remediation extension pack consists of a set of VCE Vision shell extensions that enable you to remediate certain VCE System component configurations to bring a VCE System in compliance with VCE security hardening best practices.

VCE Security Alert or VCE Technical Alert compliance

VCE publishes two types of notifications to communicate information about a product defect: Technical Alerts and Security Alerts.

NOTE: VCE Security Alert or VCE Technical Alert compliance are supported on a Vblock System and a VxBlock System only.

VSA/VTA content pack

The VSA/VTA content pack scans the VCE Vision software to determine VCE Security/Technical Alert applicability. This avoids having to rely on manual inspection or support for assessment. The VSA/VTA content pack is delivered as a standalone content RPM or zip file that uses existing APIs and user interfaces in VCE Vision software and is available on the VCE Download Center through https://support.vce.com/.
Search functionality

VCE Vision software provides search capabilities that can be used to retrieve information about one or more VCE Systems in a data center. You can retrieve information about VCE Systems and components. The VCE Vision dashboard allows you to save search queries, or searches that are used often. You can retrieve these searches and re-run as needed.

Depending on the type of search, initiate a search using:

- VCE Vision dashboard
- VCE Vision shell
- MSM API for multisystem services

VCE Vision software provides the following search mechanisms:

- **Freeform searches**
  
  A freeform search is a query string that supports a flexible, English-like grammar. Use freeform search queries to query information related to VCE Systems, components, and elements for each component by entering freeform text in a search field in the VCE Vision dashboard or running find commands in the VCE Vision shell.

In addition to the VCE Vision dashboard and the VCE Vision shell, you can also use the MSM API for multisystem services to perform detailed searches. For more information about using the REST API for searching, see the *Dell EMC VCE Vision™ Intelligent Operations Programmer’s Guide*.

The following table shows a sample of freeform search queries:

<table>
<thead>
<tr>
<th>Freeform search queries</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>find vcesystems</code></td>
<td>Finds all available VCE Systems.</td>
</tr>
<tr>
<td><code>find computesystem</code></td>
<td>Finds all available compute systems.</td>
</tr>
<tr>
<td><code>find storagevolume</code></td>
<td>Finds all available storage volumes.</td>
</tr>
<tr>
<td><code>find vcesystems where serialNum = &quot;xxxx&quot;</code></td>
<td>Finds a specific VCE System by specifying the serial number.</td>
</tr>
<tr>
<td><code>find switch where ipAdress = &quot;10.xx.xx.xx&quot;</code></td>
<td>Finds a specific switch by specifying the IP address.</td>
</tr>
<tr>
<td><code>find dae where operStatus = &quot;minor&quot;</code></td>
<td>Finds all available data array enclosures, where the operation status is set to minor.</td>
</tr>
<tr>
<td><code>find computesystem where cvmHost like &quot;*test22*&quot;</code></td>
<td>Finds all available compute systems where the CVM host is like &quot;<em>test22</em>&quot;. This is a freeform wildcard search.</td>
</tr>
<tr>
<td><code>find switch where operStatus in (unreachable,critical)</code></td>
<td>Uses the 'in' keyword to provide a list of values to be searched. All results matching any single value within the list are returned.</td>
</tr>
</tbody>
</table>
Freeform search queries

<table>
<thead>
<tr>
<th>Query</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>find only memoryunit related to computesystem where host = &quot;test34.example.com&quot;</td>
<td>The 'related to' phrase makes the query execute as a relational query. In this example, starting from the matching compute system elements and traversing related elements to find memory unit instances. The 'only' clause omits the traversed elements from the results.</td>
</tr>
<tr>
<td>find only memoryUnit related to computesystem where host like &quot;slib*vmo.lab&quot; then only calculatedStatus != critical</td>
<td>Use 'then only' to further narrow the final results of relational queries.</td>
</tr>
<tr>
<td>find computechassis where inputPower between 500 and 900</td>
<td>Use the 'between' / 'and' keyword combination to limit search results to a range of numerical values.</td>
</tr>
</tbody>
</table>

Pre-defined search queries

VCE Vision software provides several pre-defined searches that can be accessed using a drop down menu in the VCE Vision dashboard. Through a designated menu option, you can launch pre-defined searches related to VCE Systems and components. For example, the following list shows the available pre-defined searches for VCE Systems, compute, and network. Refer to the VCE Vision dashboard for the complete set of pre-defined searches.

<table>
<thead>
<tr>
<th>Use this pre-defined search</th>
<th>To display</th>
</tr>
</thead>
</table>
| VCE Systems                | — All available VCE Systems  
                                      — All Vblock Systems  
                                      — All VxBlock Systems  
                                      — All VxRack Systems  
                                      — All VxRail Appliances  
                                      — VCE Fabric  
                                      — All VCE Fabric Technology Extensions |
| Compute                    | — All available compute systems  
                                      — All unhealthy compute systems  
                                      — All healthy compute systems |
| Network                    | — All available switches  
                                      — All unhealthy switches  
                                      — All healthy switches |
| Storage                    | — All storage arrays  
                                      — All unhealthy storage arrays  
                                      — All healthy storage arrays  
                                      — All storage virtualizers  
                                      — All unhealthy storage virtualizers  
                                      — All healthy storage virtualizers |
Use this pre-defined search | To display
---|---
Virtualization | — All virtual machines
| — All unhealthy virtual machines
| — All healthy virtual machines

**Advanced search options**

The VCE Vision dashboard provides an advanced search option for building more complex search queries.

For more information about running the available search mechanisms in the VCE Vision dashboard and the VCE Vision shell, refer to the *Dell EMC VCE Vision™ Intelligent Operations Administration Guide*.

**Key performance indicators**

A key performance indicator (KPI) is an attribute that VCE Vision software uses to maintain time-based and historical data. VCE Vision software retrieves aggregated and time series KPI such as capacity, performance, and usage for a collection of VCE Systems.

Access KPI information using either the VCE Vision dashboard or the MSM API for multisystem services.

**VCE Vision dashboard**

Displays charts and graphs of KPI information for the selected element type. The following table shows examples of KPI information:

<table>
<thead>
<tr>
<th>Element type</th>
<th>Examples of KPI information</th>
</tr>
</thead>
<tbody>
<tr>
<td>storagearray</td>
<td>Remaining raw capacity</td>
</tr>
<tr>
<td></td>
<td>Total space available for user data</td>
</tr>
<tr>
<td></td>
<td>Remaining managed space</td>
</tr>
<tr>
<td></td>
<td>Total IO per second</td>
</tr>
<tr>
<td>storagepool</td>
<td>User capacity</td>
</tr>
<tr>
<td>storagevolume</td>
<td>Volume user capacity</td>
</tr>
<tr>
<td>disk</td>
<td>Disk raw capacity</td>
</tr>
<tr>
<td></td>
<td>Bandwidth</td>
</tr>
<tr>
<td>switch</td>
<td>Current bandwidth</td>
</tr>
<tr>
<td></td>
<td>Number of error inbound packets</td>
</tr>
<tr>
<td>rack</td>
<td>Monitor total energy</td>
</tr>
<tr>
<td></td>
<td>Monitor average power consumption</td>
</tr>
<tr>
<td>computeserver</td>
<td>Total memory</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
</tr>
<tr>
<td>virtualmachine</td>
<td>Committed storage</td>
</tr>
<tr>
<td>Element type</td>
<td>Examples of KPI information</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>Consumed host memory</td>
</tr>
</tbody>
</table>

**MSM API for multisystem services**

Use the MSM API for multisystem services to retrieve the following KPI data:

- All existing KPI definitions in the VCE System.
- Existing KPI definitions for a particular element type.
- Existing KPI definitions for a particular element type and component category.
- Time series KPI data:
  - A particular time resolution.
  - A start time for time series queries.
  - An end time for time series queries.

Refer to the *Dell EMC VCE Vision™ Intelligent Operations Key Performance Indicators and Certified Elements* document for a detailed list of the VCE Systems KPI.

Refer to the *Dell EMC VCE Vision™ Intelligent Operations Programmer’s Guide* for more information about the MSM API for multisystem services.

**Related information**

[VM resource monitoring](see page 36)

**VM resource monitoring**

VM resource monitoring enables you to identify and monitor a collection of resources associated with a VM. Use the VCE Vision dashboard or the MSM API for multisystem services to review point-in-time and historical key performance indicators (KPI) associated with those resources.

You can see the underlying physical infrastructure that supports each VM, and optimize workload placement and the existing infrastructure. For example, power consumption, storage capacity, server memory, or CPU usage.

Resource monitoring also shows the relationship between VCE System resources, such as virtual compute, physical compute, storage, network, and so on. For example, use the VCE Vision dashboard to view related objects when monitoring resources. This is important when taking a resource offline for maintenance or replacement. It also helps determine what other items will be impacted, particularly ESXi and VMs.
VCE Vision software shows information for each VM and the underlying physical infrastructure. The following illustration shows how the business logical resources, in this case VMs, leverage the infrastructure resources to correlate and generate fingerprint profiles for the VMs:

Use the VCE Vision dashboard or the MSM API for multisystem services to generate the data required for monitoring the workloads associated with VM resources. The following examples show the main VM workload monitoring activities that are available:

- Monitor the performance of VMs across one or more VCE Systems in a data center, for example the logical and physical components.
- Query specific KPI for specific related elements on the data path to investigate performance issues associated with VMs.
- Query related physical elements, such as disk, arrays, and so on for a specific VM.

For more information about the KPI available, see _Dell EMC VCE Vision™ Intelligent Operations Key Performance Indicators and Certified Elements_.

For more information about generating the data required for the workloads associated with VM resources, see the _Dell EMC VCE Vision™ Intelligent Operations Administration Guide_ and the _Dell EMC VCE Vision™ Intelligent Operations Programmer’s Guide_.

Related information

- [Key performance indicators](#) (see page 35)
- [VCE Vision dashboard overview](#) (see page 39)
Working with EMC Secure Remote Services (ESRS)

VCE Vision software can connect to EMC Secure Remote Services (ESRS) and automatically send system inventory and RCM fitness information through the ESRS connection to the Dell EMC Data Lake. Services and Support can use the collected data for analysis and remote troubleshooting.

Use the VCE Vision shell ESRS Extension Pack to perform the following functions:

- Configure VCE Vision software to use ESRS
- Deregister VCE Vision software with ESRS
- Update an ESRS gateway configuration or VCE Vision software ID (SWID)
- Upload information to ESRS about your VCE System:
  - Release Certification Matrix (RCM) compliance scan results (ZIP file containing CSV, XLS, PDF, and XML files) (if you have installed RCM content and selected a default profile)
  - VCE System inventory files (JSON)
- Modify the schedule VCE Vision software uses to regularly send RCM and inventory information to ESRS
VCE Vision user interfaces

VCE Vision dashboard overview

The dashboard is an application used to manage and monitor VCE Systems in a data center.

Use the dashboard to:

- View the health/compliance of multiple VCE Systems.
- Run a compliance scan on one or more VCE Systems.
- Issue a freeform or assisted search (wizard), and display the returned list of items in a consumable format.
- View charts of key performance indicators (KPI) for one or more components or elements.
- Configure multisystem Active Directory integration and map AD Groups to Vision roles (for authorized Vision administrators).
- Enable and disable optional packages, such as the VCE Vision Security Compliance Module.
- Download software and firmware components to maintain compliance with the current RCM.

Related information

VM resource monitoring (see page 36)

VCE Vision shell

The VCE Vision shell is an extensible management tool that provides a single interface to manage and configure VCE Systems and components.

The VCE Vision shell removes the complexity of working with individual component interfaces for management and configuration tasks and provides a plug-in structure that can be extended to include additional functionality. VCE Vision shell creates an abstraction layer that removes the burden of having to use different login credentials, IP addresses, and syntax to make configuration changes across multiple components. VCE Vision shell can help manage multiple VCE Systems.

For example, supposed you must update the NTP server IP addresses configured for all switches on a VCE System. By issuing a single command, this change is made without having to log in to each component and perform the task one switch at a time:

```
Vision> ntp switch set ['10.1.139.235', '10.1.219.13']
[Switch 'NSB' at 10.1.139.23:, result: ['10.1.139.235', '10.1.219.13']]
Switch 'NSA' at 10.1.139.22:, result: ['10.1.139.235', '10.1.219.13']
Switch 'MGMT-N3B' at 10.1.139.2:, result: ['10.1.139.235', '10.1.219.13']
Switch 'MGMT-N3A' at 10.1.139.1:, result: ['10.1.139.235', '10.1.219.13']
Switch 'N1A' at 10.1.140.235:, result: ['10.1.139.235', '10.1.219.13']
```

The shell is a framework layer built on top of Python and Vision API bindings. In addition to the commands provided, any valid Python command can be run in the shell.

Developers writing extensions for the VCE Vision shell can provide a single interface for all components and enable users to:

- Perform operations on each VCE System as a single logical entity rather than a collection of components.
- Configure and manage settings at the individual VCE System component level.

Plug-in for vCenter

The Plug-in for vCenter continues to be provided as part of the product, but the VCE Vision dashboard and the VCE Vision shell are the primary interfaces for VCE Vision software.

NOTE: The Plug-in for vCenter is supported on a Vblock System only.

To download RCM content in a multisystem management environment, you must use the VCE Vision dashboard. Any RCM content that is downloaded using the VCE Vision Plug-in for vCenter is not reflected in a multisystem management environment. If required, refer to the Plug-in for vCenter online help for information about downloading RCM content using the Plug-in for vCenter.
Software modules

VCE Vision RCM Compliance Module

The VCE Vision RCM Compliance Module provides the mechanism for managing the RCM compliance lifecycle.

The VCE Vision RCM Compliance Module consists of the following features:

- RCM compliance – ensures that VCE Systems are compliant with the Release Certificate Matrix (RCM).
- RCM content prepositioning - enables you to retrieve software and firmware for components in your VCE System.

For more information about the VCE Vision RCM Compliance Module, see the Dell EMC VCE Vision™ Intelligent Operations Administration Guide.

Related information

Compliance management (see page 28)

VCE Vision Security Compliance Module

The VCE Vision Security Compliance Module, which is optional, consists of the Security Hardening compliance content pack and the Security Hardening remediation extension pack. If purchased, the module is enabled as part of the installation process.

**NOTE:** The VCE Vision Security Compliance Module is supported on a Vblock System and a VxBlock System only.

- The Security Hardening compliance content pack uses VCE security hardening guidelines and enables you to run a compliance scan to identify risks that might exist on the VCE System.
- The Security Hardening remediation extension pack consists of a set of VCE Vision shell extensions that enable you to remediate certain VCE System component configurations in order to bring the VCE System in compliance with VCE security hardening guidelines.

For more information about the VCE Vision Security Compliance Module, see the Dell EMC VCE Vision™ Intelligent Operations Administration Guide.

Related information

Compliance management (see page 28)
**Application programming interfaces**

VCE Vision software provides open REST APIs that can be used to simplify and speed integration with third-party management solutions by:

- Allowing third-party developers to integrate with the VCE Vision software application programming interfaces (open APIs).
- Supporting a REST model of application development.
- Providing Java bindings for the VCE Vision Core REST APIs that allow developers to access the APIs from Java without having to make REST calls.
- Providing a software development kit (SDK) that provides sample code and tools for the REST APIs.

REST is an application architecture for distributed systems that relies on HTTP. Each REST call specifies a URL for a resource along with an HTTP verb (GET, PUT, POST, or DELETE). The URLs can be tested with most standard browsers. The response for each URL is typically formatted in XML or JSON.

VCE recommends that you use the new MSM APIs introduced in the current release, rather than the VCE Vision Core APIs.

**Related information**

[Third-party management solutions](#) (see page 49)

**MSM API for multisystem services**

A client using the MSM API for multisystem services can query and filter data collected from a set of VCE Systems.

A client using the MSM API for multisystem services can retrieve the following kinds of additional information about the MSM environment:

- VCE System information
- KPI definitions
- KPI time series data
- KPI time series batch data
- Supported element types
- Element type information
- Supported attributes for an element type

The API reference documentation for the MSM API for multisystem services is provided on the VCE Developer Portal: [https://www.vce.com/developer](https://www.vce.com/developer)
**MSM API for Compliance**

MSM VMs maintain discovery data for multiple VCE Systems. An MSM compliance service runs within the MSM nodes. The results of each compliance scan is stored in the MSM nodes.

The MSM API for Compliance allows you to:

- Get a list of compliance categories and profiles on each VCE System.
- Start a compliance scan for a specific category for one or more VCE Systems.
- Retrieve the results from a specific compliance scan, or the latest compliance scan, in PDF, XLS, or CSV format.
- Set the target profile for a scan category.

**MSM API for Security Web**

The API for Security Web allows you to:

- Create users
- Create roles
- Assign roles to permissions
- Assign users to roles
- Manage sessions

Roles defined in the MSM environment with the API for Security Web are independent from roles defined in the VCE Vision Core environment with the API for Vision Security. The supported REST API calls within the two environments are different. Therefore, the roles defined in the MSM environment do not apply to the VCE Vision Core environment, and vice versa.

The API reference documentation for the API for Security Web is provided on the VCE Developer Portal: [https://www.vce.com/developer](https://www.vce.com/developer)

**MSM API for shell commands**

The MSM API for shell commands provides a set of REST resources for retrieving and changing settings for VCE Systems and components. Use this API to issue one or more VCE Vision shell commands in the body of the request with the response in JSON format.

Only shell commands can be issued using this REST API. Linux and Python commands work only in a shell command line session, but not through the REST API. This API is only supported in the local mode of deployment for VCE Vision shell. The remote shell does not support the MSM API for shell commands.

See the *Dell EMC VCE Vision™ Intelligent Operations Administration Guide* for an overview of the shell and a complete list of commands for that environment.

⚠️ **NOTE:** The MSM API for shell commands are supported on a Vblock System and a VxBlock System only.
MSM API for Tech Support

Use the API for Tech Support to trigger log collection, monitor log collection tasks, download a log bundle, or find VCE System components that support log collection.

**NOTE:** The MSM API for Tech Support is supported on a Vblock System and a VxBlock System only.

Vision Core API for System Library

All URLs for the API for System Library that retrieve data about the VCE System use the GET verb and return an XML response. A few URLs retrieve system configuration information. These URLs return .ZIP files.

**NOTE:** The Vision Core API for System Library is supported on a Vblock System, VxBlock System and VCE Fabric Technology Extension only.

The API reference documentation for the API for System Library is provided on the VCE Developer Portal: [https://www.vce.com/developer](https://www.vce.com/developer)

Vision Core API for Compliance Checker

The API for Compliance Checker provides a set of REST resources for retrieving benchmarks and profiles, as well as for starting compliance check procedures and looking at the results.

The Vision Core API for Compliance Checker is supported on a Vblock System, VxBlock System and VCE Fabric Technology Extension only.

The API reference documentation for the API for Compliance Checker is provided on the VCE Developer Portal: [https://www.vce.com/developer](https://www.vce.com/developer)

Vision Core API for Vision Security

The API for Vision Security provides a set of REST resources for controlling access to system resources through role-based access control (RBAC). RBAC restricts access to system resources to only authorized users.

The Vision Core API for Vision Security is supported on a Vblock System and a VxBlock System only.

The API for Vision Security relies on a set of predefined permissions. Use it to perform the following tasks to manage users:

- Create users
- Create roles
- Assign roles to permissions
- Assign users to roles

All URLs for the API for Vision Security that retrieve data use the GET verb and return an XML response. Several URLs use the POST, PUT, and DELETE verb to create, modify, and delete RBAC objects. These operations also use XML as the content type.
The API reference documentation for the API for Vision Security is provided on the VCE Developer Portal: https://www.vce.com/developer
SDK for VCE Vision software

The SDK provides a set of examples and components that third-party developers can use to build custom applications that run with VCE Vision software. The examples provide an introduction to application development with VCE Vision Core REST APIs.

**NOTE:** The SDK for System Library is supported on a Vblock System and a VxBlock System only.

### SDK components

SDK components include sample code, a Java binding library, schema files, and SNMP MIBs for the VCE System.

The sample code illustrates how to use the VCE Vision Core REST APIs.

- Use Java and REST to access VCE System resource information through the API for System Library.
- Access information about VCE System events using AMQP.
- Work with the API for Compliance Checker.
- Use the API for Vision Security.

The Java binding library accesses the VCE Vision Core APIs without having to make REST calls.

The following schema files exist:

- API for System Library
- System Library FM Event
- API for Compliance Checker
- API for Vision Security

### VCE Vision simulation

The SDK works with a simulator for the VCE Vision Core software. The VCE Vision Core simulator lets third-party developers interact with data through REST and SNMP to develop applications without having to access VCE Vision software on an actual VCE System.

For more information about VCE Vision software simulation, see the *Dell EMC VCE Vision™ Intelligent Operations Simulator Guide*, which is included with the Simulator download package.

### Access the SDK

Download the SDK for VCE Vision software from the VCE Developer Portal. The Developer Portal provides registered developers with access to all of the resources necessary to develop functionality using VCE Vision software APIs.
Related information

Third-party management solutions (see page 49)
SNMP Integration

Communicating with the Network Management System

SNMP enables communication between VCE Vision software and the network management system (NMS). VCE Vision software can also send SNMP traps and events to the NMS to facilitate discovery polling and report health status changes or issues with physical and logical components.

**NOTE:** VCE Vision software supports SNMP on Vblock Systems and VxBlock Systems only.

VCE Vision software also provides a set of Management Information Base (MIB) modules, and supports various RFC MIB modules, that define the structure of the Vblock System and VxBlock System. System Library populates these MIB modules so an NMS can access the various objects in the Vblock System and VxBlock System. The MIB modules are located on the VCE Vision Core VM in the following file: `/opt/vce/fm/doc/mibs/mibs.zip`.

Refer to the *Dell EMC VCE Vision™ Intelligent Operations Integration Guide for SNMP* for further information.
Third-party management solutions

A variety of third-party management solutions take advantage of VCE Vision software functionality and provide specific business value use cases in the area of monitoring, compliance, security and CMDB. Third-party developers can use VCE Vision software open APIs and the SDK to build integration into their products and solutions.

The third-party solutions take advantage of the VCE Vision software Open APIs and built-in converged operations for their specific applications and user interfaces.

The VCE Solution Exchange is an online portal where you can find solutions that have been built to complement VCE Systems and VCE Vision software. The solutions in this exchange include software applications as well as connectors to existing data center management tools.

A comprehensive list of VCE and third-party solutions with VCE Vision software integration can be accessed through www.vce.com/solutionexchange.

Related information

Application programming interfaces (see page 42)

SDK for VCE Vision software (see page 46)
The information in this publication is provided "as is." Dell Inc. makes no representations or warranties of any kind with respect to the information in this publication, and specifically disclaims implied warranties of merchantability or fitness for a particular purpose.

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

Copyright © 2016 Dell Inc. or its subsidiaries. All Rights Reserved. Dell, EMC, and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be the property of their respective owners. Published in the USA in November 2016.

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