# Revision history

<table>
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<th>Date</th>
<th>Document revision</th>
<th>Description of changes</th>
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<tr>
<td>August 2015</td>
<td>1.0</td>
<td>New release of the product</td>
</tr>
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### Application Programming Interfaces

- MSM API for Multi-System Services
- MSM API for Compliance
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- MSM API for shell commands
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- Vision Core API for Compliance Checker
- Vision Core API for Vision Security

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- SDK for VCE Vision software

### SNMP Integration

- SNMP with VCE Vision software

### Third-party management solutions

- Third-party management solutions overview
Introduction

This document provides a high-level technical overview of the VCE Vision™ Intelligent Operations software.

The target audience for this document includes customers, VCE vArchitects, and VCE partners.

Important: VCE Vision software Version 3.0 supports one or more VCE Systems in a data center environment. However, the multi-system management capabilities must be enabled as part of the White Gloves Program. Please contact your vAccount Manager for more information about this enablement program.

The VCE Glossary provides terms, definitions, and acronyms that are related to the Vblock System.

To suggest documentation changes and provide feedback on this book, send an e-mail to docfeedback@vce.com. Include the name of the topic to which your feedback applies.
## Accessing VCE documentation

Select the documentation resource that applies to your role.

<table>
<thead>
<tr>
<th>Role</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td><a href="http://support.vce.com">support.vce.com</a></td>
</tr>
<tr>
<td></td>
<td>A valid username and password are required. Click <a href="http://vcedownloadcenter.com">VCE Download Center</a> to access the technical documentation.</td>
</tr>
<tr>
<td>Cisco, EMC, VMware employee, or VCE Partner</td>
<td><a href="http://partner.vce.com">partner.vce.com</a></td>
</tr>
<tr>
<td></td>
<td>A valid username and password are required.</td>
</tr>
<tr>
<td>VCE employee</td>
<td><a href="http://sales.vce.com/saleslibrary">sales.vce.com/saleslibrary</a> or <a href="http://vblockproductdocs.ent.vce.com">vblockproductdocs.ent.vce.com</a></td>
</tr>
</tbody>
</table>
VCE Vision™ Intelligent Operations

VCE Vision software overview

VCE Vision software is a health and life-cycle management software embedded in VCE converged infrastructure systems. Its intelligence, automation, and visualization facilitate standardized, repeatable IT operations center and systems administration processes, making it easier to keep a data center or hybrid-cloud environment healthy, optimized, and secure.

VCE Vision software enables VCE customers and third-party consumers 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. VCE Vision software lets customers rapidly verify that VCE Systems are running the currently supported software or firmware for a particular Release Certification Matrix (RCM). Additionally, customers 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 a customer’s VCE System and their 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.

In previous releases of VCE Vision™ Intelligent Operations, a VCE Vision software user could only interact with a single VCE System using the VCE Vision™ Plug-in for vCenter, VCE REST APIs, SNMP, or the VCE Vision™ Adapter for vCenter Operations Manager. VCE Systems separately, either through
the VMware vCenter Server, vCenter Operations Manager, or through a public REST API or SNMP interface, as illustrated in the diagram below:
With VCE Vision™ Intelligent Operations 3.0 release, VCE Vision software now provides the ability to manage and interact with one or more VCE Systems in a data center through a centralized single point of access as illustrated in the diagram below:

**Important:** VCE Vision software Version 3.0 supports one or more VCE Systems in a data center environment. However, the multi-system management capabilities must be enabled as part of the White Gloves Program. Please contact your vAccount Manager for more information about this enablement program.

This single point of access is provided through the following VCE Vision software interfaces:

- VCE Vision dashboard
- VCE Vision shell
- REST APIs
VCE Vision software supports the following features:

<table>
<thead>
<tr>
<th>Features and content</th>
<th>Description</th>
</tr>
</thead>
</table>
| Packaging VCE Vision software into core and value-add     | VCE Vision software now comes packaged with core and value-add modules. The value add modules include:                                                                                           |<|• VCE Vision RCM Compliance Module  
• VCE Vision Security Compliance Module | modules |                                                                                                |
| Discovery                                                 | Allows customers to manage VCE System components based on their most current state by:                                                                                                      |<|• Performing an initial discovery in the factory to identify the VCE System as it was built.  
• Building a comprehensive VCE System model, including the management infrastructure, providing the customer with a view of the inventory of their VCE Systems.  
• Discovering both logical and physical components of the VCE System and updating management tools in near-real time.  
• Performing periodic rediscovery during operation ensuring an up-to-date representation of the VCE System. |                                                                 |
| Data Collection                                            | VCE Vision software uses data collectors to collect information by extracting the required data from the various web services like the Vision REST API, SNMP, VPlex REST API, UCS, and so on.                                                                                       |                                                                 |                                                                 |
| Health monitoring                                         | Expedites the diagnosis of potential problems and speeds remediation through:                                                                                                                                                                                                 |<|• Providing a health score for one or more VCE Systems that is based on VCE best practices.  
• Producing a consolidated health status at the VCE System level, while also providing the ability to drill down into issues at the component level.  
• Identify potential issues in the health of one or more VCE Systems. |                                                                 |
| Identification                                             | Provides a converged, single system view of each VCE System by:                                                                                                                                                                                                                   |<|• Presenting a unique identity for each VCE System.  
• Providing system-specific information, such as the serial number, model, and location. |                                                                 |
<table>
<thead>
<tr>
<th>Features and content</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Collection and event messaging</td>
<td>Enhances a customer’s troubleshooting experience by enabling log collection for VCE Systems and their components using built-in logging capabilities that:</td>
</tr>
<tr>
<td></td>
<td>• Enable rapid troubleshooting.</td>
</tr>
<tr>
<td></td>
<td>• Forward aggregated log data from VCE Vision software to other log hosts.</td>
</tr>
<tr>
<td></td>
<td>• Translate events from vendor formats and protocols to standard formats and protocols.</td>
</tr>
<tr>
<td></td>
<td>• Segregate application logs from authentication and authorization (AA) logs.</td>
</tr>
<tr>
<td></td>
<td>• Expedite data collection for troubleshooting.</td>
</tr>
<tr>
<td></td>
<td>• Use the RabbitMQ event messaging model (messaging system based on the AMQP standard) to publish messages to the RabbitMQ broker.</td>
</tr>
<tr>
<td></td>
<td>• Allow clients to subscribe to the broker using customized routing keys to filter and receive messages.</td>
</tr>
<tr>
<td></td>
<td>Customers can use the VCE Vision dashboard or the API for Tech support to collect these log files.</td>
</tr>
<tr>
<td>Configuration backup and recovery</td>
<td>Configuration backup and recovery ensures that customers do not lose any configuration data for their VCE Vision Core virtual machine.</td>
</tr>
<tr>
<td>User security</td>
<td>• Provides Role-Based Access Control (RBAC) support across multiple VCE Systems enables customers to manage permissions to the specific resources or applications for the users and groups based on the roles of the users and groups.</td>
</tr>
<tr>
<td></td>
<td>• Integrates with Active Directory for authentication and authorization.</td>
</tr>
<tr>
<td>Data federation across one or more VCE Systems</td>
<td>Data collected on one VCE System is automatically propagated to all VCE Systems in a cluster.</td>
</tr>
<tr>
<td>Validation and compliance</td>
<td>Ensures reliability and performance of a customer’s VCE Systems by:</td>
</tr>
<tr>
<td></td>
<td>• Verifying that the VCE Systems are compliant with the VCE Release Certification Matrixes.</td>
</tr>
<tr>
<td></td>
<td>• Enabling customers to validate successful upgrades to component firmware and software.</td>
</tr>
<tr>
<td></td>
<td>• Optionally, run security hardening scans to ensure that VCE Systems are compliant with VCE security best practices.</td>
</tr>
<tr>
<td>Features and content</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Search capability</td>
<td>Provides a freeform search function that allows customers to use the VCE Vision dashboard or REST APIs to search for detailed information about all VCE Systems and their components.</td>
</tr>
<tr>
<td>Key Performance Indicators (KPIs)</td>
<td>Provides information about key indicators that allow a customer to monitor and manage their workloads more efficiently. Indicators are time-based and historical and customers can view KPIs using the VCE Vision dashboard or through a REST API.</td>
</tr>
<tr>
<td>Virtual machine resource monitoring</td>
<td>Virtual machine resource monitoring enables customers to identify and monitor a collection of resources associated with a virtual machine. Customers can use the dashboard or the MSM API for Multi-System services to review point-in-time and historical Key Performance Indicators (KPIs) associated with those resources.</td>
</tr>
<tr>
<td>VCE Vision dashboard</td>
<td>Enables a customer to view all VCE Systems in a data center. For example, view health across all VCE Systems, run compliance scans, do free-form search queries, view KPI information, and so on.</td>
</tr>
<tr>
<td>VCE Vision shell</td>
<td>Provides a single shell interface to interact with one or more VCE Systems and their 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 used for additional functionality.</td>
</tr>
</tbody>
</table>
| Platform / component support | VCE Vision software supports VMware vSphere Distributed Switch (VDS) on the:  
  - VxBlock™ System 340  
  - VxBlock™ System 540  
  - VxBlock™ System 740 |
| Open APIs                   | Enables simplified and speedy integration with third-party management solutions by:  
  - Providing an easy way for third-party developers to integrate with the VCE Vision software application programming interfaces (Open APIs).  
    Supporting a REST model of application development.  
  - Providing a software development kit (SDK) that provides sample code and tools for VCE Vision Core REST APIs. |
<table>
<thead>
<tr>
<th>Features and content</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toolkit for third party developers</td>
<td>Provides the foundation for the VCE Developer Program through:</td>
</tr>
<tr>
<td></td>
<td>• A VCE Developer portal</td>
</tr>
<tr>
<td></td>
<td>• Open APIs</td>
</tr>
<tr>
<td></td>
<td>• API reference documentation</td>
</tr>
</tbody>
</table>

For more information about the VCE Vision™ Intelligent Operations 3.0 architecture, refer to the related topic.

## Architecture

### Product architecture

Each VCE System has a VCE Vision Core and an MSM virtual machine deployed and configured as part of the installation process.
The following diagram shows the components and services contained in each virtual machine:

**MSM virtual machine**

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

<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>
<tr>
<td>Components, APIs, Services</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</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 |
| Software Module Manager service             | Enables a customer and VCE customer services 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.                                                                                   |
| MSM API for Multi-System Services           | Queries and filters data collected from a set of VCE Systems in an MSM environment. The `tomcat` service is used to execute the MSM API services.                                                                                                                                   |
| Collection Manager service                  | Executes the MSM Collection Manager that runs in the Vert.X instance. The MSM Collection Manager is responsible for executing data collectors that perform data collections.                                                                                                 |
| 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).                                                                                                                                   |
| 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 virtual machine to manage multiple VCE Systems.                                                                                       |
  
  **Note:** 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. |
| RabbitMQ                                    | A messaging broker that provides the MSM services and applications with a common platform to send and receive messages asynchronously, and ensures the persistence of messages until delivery to a consumer.                                                                                      |
| 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.                                                                                             |
### Components, APIs, Services

<table>
<thead>
<tr>
<th>Components, APIs, Services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vert.X</td>
<td>A lightweight event-driven application platform for web applications. The Vert.X instance contains the MSM Collection Manager.</td>
</tr>
<tr>
<td>Cassandra</td>
<td>A distributed database management system that is designed to handle large amounts of data across a clustered server environment. This provides high availability with no single point of failure when data is replicated across the cluster. In MSM, Cassandra is used to store collected data, credentials, metadata and element associations for the services provided by MSM.</td>
</tr>
</tbody>
</table>

### VCE Vision Core virtual machine

The VCE Vision Core virtual machine provides a set of REST resources that give customers the ability to access data in System Library and download RCM content through the VCE Vision™ Plug-in for vCenter. The following table shows the components, APIs, and services that are running on each VCE Vision Core virtual machine:

<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 customers to retrieve software and firmware for components in a VCE System to easily maintain compliance with the current Release Certification Matrix (RCM) and more efficiently upgrade to new RCM versions. The <em>tomcat-asset-mgr</em> service is used to manage RCM Content Pre-positioning. <strong>Note:</strong> RCM Content Pre-positioning is only available through the VCE Vision™ Plug-in for vCenter or a command line interface on the VCE Vision Core virtual machine and must be performed on each individual Vblock System where required. <strong>Note:</strong> RCM Content Pre-positioning is not supported for VxBlock Systems as part of the VCE Vision™ Intelligent Operations Version 3.0 release.</td>
</tr>
</tbody>
</table>
### Components, APIs, Services

<table>
<thead>
<tr>
<th>Components, APIs, Services</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision Software Repository</td>
<td>A service that provides an API to manage VCE Vision software on the VCE Vision Core virtual machine. It is used by RCM Content Pre-positioning 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 |
| 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 provides a complete set of resources that allows customers to retrieve data on the entire model 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 the persistence of messages until delivery to a consumer. |
| PostgreSQL                                  | 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 virtual machine. |

### Related information

- **System requirements** (see page 19)
- **Data Center architecture** (see page 17)

### Data Center architecture

VCE Vision™ Intelligent Operations provides a high-availability clustered data center environment to support one or more VCE™ Systems in one physical data center contained within a network. There are multiple variations of customer environments available, but this topic describes a common topology that best conveys the architectural design of a data center environment.
Important: VCE Vision software Version 3.0 supports one or more VCE Systems in a data center environment. However, the multi-system management capabilities must be enabled as part of the White Gloves Program. Please contact your vAccount Manager for more information about this enablement program.

A data center environment with more than one VCE System can be classified as being highly-available when a minimum of three MSM virtual machines are configured to form a cluster. A high-availability environment remediates the possibility of a single point of failure, for example, if an MSM virtual machine goes offline for maintenance, the data is still available and the cluster functions seamlessly.

Clustering is a technique used to ensure high-availability. It provides an effective and flexible approach to ensure that there is no single point of failure. As depicted in the diagram below, three MSM virtual machines are configured so they can communicate and work together forming a cluster of MSM virtual machines.

The following diagram shows a data center consisting of five VCE Systems. The MSM capabilities and functionality are exposed after the deployment and configuration of the MSM virtual machines. A customer can use the VCE Vision dashboard, the VCE Vision shell, or REST APIs to interact and manage their VCE Systems in a data center:

For more information about the system requirements, refer to the related topic.
Related information

Product architecture (see page 13)
System requirements (see page 19)

System requirements

Review the minimum requirements when deploying the VCE Vision Core virtual machine and the multi-system management (MSM) virtual machine.
<table>
<thead>
<tr>
<th>Virtual Machines</th>
<th>Memory Requirement (GB)</th>
<th>vCPUs</th>
<th>Disk Size (GB)</th>
<th>Supported AMPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCE Vision Core virtual machine</td>
<td>8</td>
<td>2</td>
<td>200</td>
<td>• Logical AMP - see table below for supported VCE Systems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• HA-AMP</td>
</tr>
<tr>
<td>MSM virtual machine</td>
<td>12</td>
<td>4</td>
<td>250</td>
<td>Note: Where RAM size is &gt;=128GB. If RAM is &lt;128GB, the HA-AMP must be upgraded to have a minimum of 128GB of RAM. Contact VCE Sales and Support for assistance when upgrading the HA-AMP. AMP-2 - all flavors of AMP-2 are supported, for example, AMP-2V, AMP-2P, AMP-2RP, AMP-2HA and so on.</td>
</tr>
</tbody>
</table>

Depending on the VCE Systems, the VCE Vision Core and MSM virtual machines reside on either a logical or physical Advanced Management Platform (AMP).

<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>No</td>
</tr>
<tr>
<td>Vblock® System 300 family</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VXBlock™ System 340</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 family</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VXBlock™ System 740</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Related information

Product architecture (see page 13)
Data Center architecture (see page 17)
Features

VCE Vision software comes packaged with a core set of features and value-add software modules. Together, they allow customers to manage a converged infrastructure and life cycle 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 virtual machine 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 diagram is a high-level overview of integration between System Library and various products and protocols:

Related information

Logging and events (see page 28)

Discovery (see page 22)

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 virtual machine 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)

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 28)
Identification (see page 26)
Data collection

VCE Vision software uses data collectors to collect information by extracting the required data from the various web services like the Vision REST API, SNMP, VFlex REST API, UCS, and so on.

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

- **Generic** - can be used to collect data from any new domains without having to change the data collection framework.
- **Extendable** - new discoveries can be added 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.
- **Meta data 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 (KPIs) 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 metric data for VNX and VMax:</td>
</tr>
<tr>
<td></td>
<td>• Storage Array</td>
</tr>
<tr>
<td></td>
<td>• Storage Processor</td>
</tr>
<tr>
<td></td>
<td>• Storage Volume</td>
</tr>
<tr>
<td></td>
<td>• Storage Pool</td>
</tr>
<tr>
<td></td>
<td>• Storage Tier</td>
</tr>
<tr>
<td></td>
<td>• Disk</td>
</tr>
<tr>
<td></td>
<td>• IPI appliance</td>
</tr>
<tr>
<td>Simple Network Management Protocol (SNMP) collector</td>
<td>Collects information from SNMP enabled devices like Nexus and MDS switches, to discover metric data. For example, information can be collected from the following network components:</td>
</tr>
<tr>
<td></td>
<td>• Switches</td>
</tr>
<tr>
<td></td>
<td>• Network Chassis</td>
</tr>
<tr>
<td></td>
<td>• Container</td>
</tr>
<tr>
<td></td>
<td>• Fan</td>
</tr>
<tr>
<td></td>
<td>• Expansion Module</td>
</tr>
<tr>
<td></td>
<td>• Power Supply Bay</td>
</tr>
<tr>
<td></td>
<td>• PSU</td>
</tr>
<tr>
<td></td>
<td>• Network Temperature Sensor</td>
</tr>
<tr>
<td></td>
<td>• SFP</td>
</tr>
<tr>
<td>vSphere API collector</td>
<td>Works with the VMware vCenter Server using the vSphere API to discover metric data, for example, datastores, disk partitions, clusters, and so on.</td>
</tr>
<tr>
<td>VNXe REST collector</td>
<td>Collects metric information from EMC VNXe storage devices.</td>
</tr>
<tr>
<td>XIO REST collector</td>
<td>Collects only metrics for storage array, storage volume, disk and port. All other configuration information are collected by Vision collector.</td>
</tr>
<tr>
<td>XML API collector</td>
<td>Collects information from the UCS using the XML API to discover metric data.</td>
</tr>
</tbody>
</table>
Identification

A VCE System has properties that uniquely identify them to System Library. System Library populates these properties to the object model so that customers can access them and identify each VCE System and all 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.

For more information about the data collection process, refer to the related topic.

Related information

Discovery (see page 22)
Data collection (see page 24)

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.

Health status for components and elements can be retrieved using the VCE Vision dashboard and the MSM API for Multi-System Services. The following table describes the different calculated health statuses:
<table>
<thead>
<tr>
<th>Health Status</th>
<th>Description</th>
</tr>
</thead>
</table>
| Operable      | All components have optimal health.  
The system is operating as expected. |
| Minor         | An issue exists with one or more components.  
This status does not represent a significant impact to the overall health of a VCE System. |
| Degraded      | One or more components are operating with degraded bandwidth, capacity, or redundancy.  
The system might be operating with decreased performance. |
| Major         | One or more components has a significant issue.  
The system might be operating with decreased performance and at risk of failure. |
| Critical      | 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. |
| Inoperable    | The VCE System or one of its components is not operating as expected or a failure has occurred. |
| Not Applicable| 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. |

**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. Customers can use these log files to analyze and isolate possible issues with their VCE System.

Customers can use the VCE Vision dashboard or the API for Tech Support to collect component logs.

Using the VCE Vision dashboard, customers can 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 customers to trigger log collection tasks, monitor log collections, and so on. For more information about the logging capabilities, see the *VCE Vision Administration Guide* and the *VCE Vision Programmers Guide*.

Logging and event messaging enable rapid troubleshooting with 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.
- Normalizes events from vendor formats and protocols to standard formats and protocols.
- Segregates application logs from authentication and authorization (AA) logs.
- Expedites data collection for troubleshooting.
• Uses the RabbitMQ event messaging model (messaging system based on the AMQP standard) to publish messages to the RabbitMQ broker.

• Allows clients to 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's XML API

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

Related information

Introduction to System Library (see page 21)

Configuration backup and recovery

Configuration backup and recovery ensures that customers do not lose any configuration data for their System Library instance on the VCE Vision Core virtual machine.

Note: Customers are responsible for backing up the multi-system management (MSM) virtual machine. VCE recommends performing an agent-less virtual machine 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>Vblock System 200 family</td>
<td>Cisco Nexus 5000 Switch</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 1000V Switch</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 3000</td>
</tr>
<tr>
<td></td>
<td>Cisco C-Series server(s)</td>
</tr>
<tr>
<td></td>
<td>Vblock Compute Servers (CIMC)</td>
</tr>
<tr>
<td></td>
<td>EMC VNX</td>
</tr>
<tr>
<td></td>
<td>Management servers (CIMC)</td>
</tr>
<tr>
<td>Vblock System 300 family</td>
<td>Cisco MDS 9000</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 5000</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 1000V</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 3000</td>
</tr>
<tr>
<td></td>
<td>Cisco UCS fabric interconnects (UCS Manager)</td>
</tr>
<tr>
<td></td>
<td>EMC VNX</td>
</tr>
<tr>
<td></td>
<td>EMC VNXe (AMP-2HA)</td>
</tr>
<tr>
<td></td>
<td>Management servers (CIMC)</td>
</tr>
<tr>
<td></td>
<td>Technology Extension for Storage</td>
</tr>
<tr>
<td>VxBlock System 340</td>
<td>Cisco MDS 9000</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 5000</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 1000V</td>
</tr>
<tr>
<td></td>
<td>Cisco Nexus 3000</td>
</tr>
<tr>
<td></td>
<td>Cisco UCS fabric interconnects (UCS Manager)</td>
</tr>
<tr>
<td></td>
<td>EMC VNX</td>
</tr>
<tr>
<td></td>
<td>EMC VNXe (AMP-2HA)</td>
</tr>
<tr>
<td></td>
<td>Management servers (CIMC)</td>
</tr>
<tr>
<td></td>
<td>Technology Extension for Storage</td>
</tr>
<tr>
<td></td>
<td>VMware Virtual Distributed Switch (VDS)</td>
</tr>
<tr>
<td>VCE System</td>
<td>Component</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Vblock System 540</td>
<td>Cisco MDS 9000&lt;br&gt;Cisco Nexus 5000&lt;br&gt;Cisco Nexus 3000&lt;br&gt;Cisco Nexus 7000, and/or Cisco Nexus 9000&lt;br&gt;Cisco Nexus 1000V&lt;br&gt;Cisco UCS fabric interconnects (UCS Manager)&lt;br&gt;EMC XtremIO&lt;br&gt;EMC VNXe (AMP-2HA)&lt;br&gt;Management servers (CIMC)&lt;br&gt;Technology Extension for Storage</td>
</tr>
<tr>
<td>VxBlock System 540</td>
<td>Cisco MDS 9000&lt;br&gt;Cisco Nexus 5000&lt;br&gt;Cisco Nexus 3000&lt;br&gt;Cisco Nexus 7000, and/or Cisco Nexus 9000&lt;br&gt;Cisco Nexus 1000V&lt;br&gt;Cisco UCS fabric interconnects (UCS Manager)&lt;br&gt;EMC XtremIO&lt;br&gt;EMC VNXe (AMP-2HA)&lt;br&gt;Management servers (CIMC)&lt;br&gt;Technology Extension for Storage&lt;br&gt;VMware Virtual Distributed Switch (VDS)</td>
</tr>
<tr>
<td>Vblock System 700 family</td>
<td>Cisco MDS 9000&lt;br&gt;Cisco Nexus 5000&lt;br&gt;Cisco Nexus 3000&lt;br&gt;Cisco Nexus 7000, and/or Cisco Nexus 9000&lt;br&gt;Cisco Nexus 1000V&lt;br&gt;Cisco UCS fabric interconnects (UCS Manager)&lt;br&gt;EMC Symmetrix VMAX&lt;br&gt;EMC VNXe (AMP-2HA)&lt;br&gt;Management servers (CIMC)&lt;br&gt;Technology Extension for Storage</td>
</tr>
<tr>
<td>VCE System</td>
<td>Component</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
</tr>
</tbody>
</table>
| 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  
EMC VNMe (AMP-2HA)  
Management servers (CIMC)  
Technology Extension for Storage  
VMware Virtual Distributed Switch (VDS) |
| Vblock Specialized Systems for Extreme Applications | Cisco UCS fabric interconnects (UCS Manager)  
Cisco Nexus 3000  
Cisco Nexus 5000  
Cisco Nexus 1000V  
EMC VNMe  
EMC XtremIO  
Management servers (CIMC) |

By default, the Vblock System 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/srcfagt/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 that customers 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. Customers can change the schedule and frequency of the backup tasks. Likewise, customers can run backups on demand outside of the scheduled tasks.

**User security**

Security functions are available that enable customers 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 virtual machine is migrated to a new host, or a virtual machine 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)

• Compliance status of one or more VCE Systems:
  — VCE Release Certification Matrices (RCM)
  — VCE Security Hardening best practices

• Key Performance Indicators (KPIs) for one or more VCE Systems including:
  — Historical data for a component
  — Aggregated metrics for a component
  — Power utilization

• 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 Pre-positioning is also part of this module, and is a feature that is used to maintain compliance with the current Release Certification Matrix (RCM) and more efficiently upgrade to new RCM versions.

**Security Hardening compliance**
This 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.

**Note:** 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 when logged into [support.vce.com](http://support.vce.com).

Related information

- [VCE Vision RCM Compliance Module](#) (see page 50)
- [VCE Vision Security Compliance Module](#) (see page 50)

**Compliance overview**

VCE Vision software compliance lets customers rapidly 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 VCE compliance policies and profiles and other common security best practices. Each policy can have one or more profiles that specify the rules and values to check for the components in the system. For example, RCM 5.0.2 identifies a profile that corresponds to a specific Release Certification Matrix 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, the RCM 5.0.2 profile could include a rule to check the firmware version on Cisco UCS B-Series blades. It will check the blade’s firmware against the profile’s recommended value, for example, 2.2(3b). If the values do not match, this check will fail.

Compliance validation is assessed when customers run a compliance scan on a system. Customers can run compliance scans from the VCE Vision dashboard or from a REST API client using the MSM API for Compliance. After a scan has completed, a score from 0 to 100 is assigned to show the overall system
compliance against that policy. Customers 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. Customers can save the results of the compliance scan to their local system in order to:

- Send report content to the VCE Support organization 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 Release Certification Matrix (RCM) and more efficiently upgrade to new RCM versions. For more information about RCM Content Pre-positioning, refer to the related topic.

Compliance results can be saved as follows:

- PDF document

  **Note:** Customers only have the option to save compliance results to PDF format using the VCE Vision dashboard in a multi-system management (MSM) environment.

- Comma-separated value (CSV) file
- ZIP archive of the Security Content Automation Protocol (SCAP) content (OVAL and XCCDF files)
- ZIP archive of the PDF document, CSV file, and SCAP content

The Compliance service also provides enhanced features such as:

- Profile tailoring that lets customers modify existing compliance policies to fit their environment.

  For more information about profile tailoring, see the *VCE Vision Administration Guide*. 
Available compliance content packs

VCE provides the following content packs for VCE System compliance:

**VCE System Release Certification Matrix (RCM)**
RCMs define software, firmware, and hardware that VCE tests and validates as supported for a VCE System. Customers can run compliance scans against an RCM to easily identify VCE System compliance with that RCM.

**VCE security hardening guidelines (Security Compliance Validation)**
Security Compliance Management simplifies and automates time-consuming steps required to keep converged infrastructure systems’ settings security-hardened according to VCE security best-practices.

**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, enabling a customer to determine the VSA/VTA posture in a very efficient and timely manner. This avoids customers having to rely on manual inspection or support for assessment.

**Note:** 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 which is accessible when logged into [https://support.vce.com/](https://support.vce.com/).

Related information

**RCM Content Pre-positioning** (see page 39)

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

VCE addresses the need for ongoing data center agility by maintaining a release certification matrix (RCM) for VCE converged infrastructure systems throughout their life cycle. Adherence to the RCM helps assure that VCE converged infrastructure systems maintain stability and consistently perform at an optimized level, as expected throughout their life cycle. Unique to VCE, the RCM contains a regularly updated, authoritative listing of interoperable software and firmware versions for compute, storage, network, and virtualization components that have been tested and certified for use within fully integrated VCE converged infrastructure systems.

VCE Vision software intelligence incorporates RCMs as VCE compliance policies and profiles used to detect drift of firmware and software versions currently installed on VCE converged infrastructure systems from the expected versions, for example, from the current RCM, and to identify which versions require upgrading as listed on the next RCM.
VCE Vision software intelligence incorporates RCMs as VCE compliance policies and profiles used to detect drift of firmware and software versions currently installed on VCE converged infrastructure systems from the expected versions, for example, from the current RCM. The compliance policies and profiles are also used to identify which versions require upgrading as listed on the next RCM. The following diagram shows the RCM compliance management life cycle:

![Diagram of RCM Compliance management life-cycle](image)

**Figure 1: RCM Compliance management life-cycle**

**Note:** For more information about RCM Content Pre-positioning, refer to the related topic.

**Available compliance content packs for RCM Compliance include:**

**VCE System Release Certification Matrix (RCM)**

RCM's define software, firmware, and hardware that VCE tests and validates as supported for a VCE System. Customers can run compliance scans against an RCM to easily identify VCE System compliance with that RCM.

**Related information**

[RCM Content Pre-positioning](#) (see page 39)
RCM Content Pre-positioning

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

**Note:** RCM Content Pre-positioning is only available through the VCE Vision™ Plug-in for vCenter or a command line interface on the VCE Vision Core virtual machine and must be performed on each individual Vblock System where required.

**Note:** In VCE Vision software Version 3.0, RCM Content Pre-positioning is only supported on Vblock Systems.

RCM Content Pre-positioning enables customers to perform the following tasks:

- Viewing RCM content downloaded to a Vblock System.
- Discovering RCM content available for download.
- Downloading RCM content.
- Monitoring the status of RCM content downloads.
- Managing downloaded RCM content.

When customers decide to upgrade an individual Vblock System to a new RCM version, VCE Vision software provides a list of all available RCM versions on the RCM content distribution network. To ensure customers get a list of RCM content that applies to a specific Vblock System, VCE Vision software performs an entitlement check using the Vblock System serial number.
The following diagram illustrates how RCM Content is uploaded to the RCM content distribution network and then downloaded to the Vblock System:

![Diagram](image.png)

**Figure 2: RCM Content Management**

For more information about RCM Content Pre-positioning, see the *VCE Vision Administration Guide*.

Related information

RCM Compliance (see page 37)

Compliance overview (see page 35)

**Security Hardening compliance**

A Security Hardening compliance scan is available that provides security best practices that helps customers identify risks that might exist on one or more VCE Systems in a data center. This enables customers to maintain a security hardened infrastructure.

Available compliance content and extension packs for Security Hardening compliance include:

- VCE security hardening compliance
Security Compliance Management simplifies and automates time-consuming steps required to keep converged infrastructure systems’ settings security-hardened according to VCE security best practices.

**VCE Vision shell remediation extension pack**

The Security Hardening remediation extension pack consists of a set of VCE Vision shell extensions that enable customers to remediate certain VCE System component configurations in order to bring the VCE System in compliance with VCE security hardening best practices.

**VCE Security Alert or VCE Technical Alert compliance**

VCE publishes Technical Alerts to communicate information to customers about a product defect. Technical alerts can be of two types, Technical Notifications and Security Notifications.

**Available compliance content packs for the VCE Security Alert (VSA) and VCE Technical Alert (VTA) compliance include:**

- **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, enabling a customer to determine the VSA/VTA posture in a very efficient and timely manner. This avoids customers having to rely on manual inspection or support for assessment.

  **Note:** 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 which is accessible when logged into [https://support.vce.com/](https://support.vce.com/).

**Compliance Policy Designer**

The Compliance Policy Designer (CPD) is a standalone application that allows customers to create or edit VCE Vision software compliance policies. This application allows for a customized extension of the compliance framework to support additional objects discovered in the VCE Vision software object model. Policies that are generated from the CPD can be added to the VCE Vision dashboard to take full advantage of the VCE Vision software compliance framework.

The Compliance Policy Designer is available on the VCE Download Center which is accessible when logged into [https://support.vce.com/](https://support.vce.com/).

**Search functionality**

VCE Vision software provides extensive search capabilities that can be used to retrieve information about one or more VCE Systems in a data center. A customer can retrieve detailed information about VCE Systems and their components. The VCE Vision dashboard allows customers to save complex search queries, or searches that will be used often. These saved searches can be retrieved when required and re-run accordingly.
Depending on the type of search, a customer can initiate a search using:

- VCE Vision dashboard
- VCE Vision shell
- MSM REST API for Multi System 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. Freeform search queries allow customers 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, customers can also use the MSM REST API for Multi System Services to perform detailed searches. For more information about using the REST API for searching, see the *VCE Vision Intelligent Operations Version 3.0 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>find vcesystems</td>
<td>Finds all available VCE Systems.</td>
</tr>
<tr>
<td>find computesystem</td>
<td>Finds all available compute systems.</td>
</tr>
<tr>
<td>find storagevolume</td>
<td>Finds all available storage volumes.</td>
</tr>
<tr>
<td>find vcesystems where serialNum = &quot;xxxx&quot;</td>
<td>Finds a specific VCE System by specifying the serial number.</td>
</tr>
<tr>
<td>find switch where ipAdress = &quot;10.xx.xx.xx&quot;</td>
<td>Finds a specific switch by specifying the IP address.</td>
</tr>
<tr>
<td>find dae where operStatus = &quot;minor&quot;</td>
<td>Finds all available data array enclosures, where the operation status is set to minor.</td>
</tr>
<tr>
<td>find computesystem where cvmHost like &quot;<em>test22</em>&quot;</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>find switch where operStatus in (unreachable,critical)</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>Freeform search queries</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>find only memoryunit related to computesystem where host = &quot;test34.example.com&quot;</code></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 here tells it to leave out the traversed elements from the results.</td>
</tr>
<tr>
<td><code>find only memoryUnit related to computesystem where host like &quot;slib*vmo.lab&quot; then only calculatedStatus != critical</code></td>
<td>Use 'then only' to further narrow the final results of relational queries.</td>
</tr>
<tr>
<td><code>find computechassis where inputPower between 500 and 900</code></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

To make it easier for customers, 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, customers can launch pre-defined searches related to VCE Systems and their 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>Pre-defined search</th>
<th>Available searches</th>
</tr>
</thead>
</table>
| **VCE Systems**    | — Display all available VCE Systems  
|                    | — Display all Vblock Systems  
|                    | — Display all VxBlock Systems  |
| **Compute**        | — Display all available Compute Systems  
|                    | — Display all non-healthy Compute Systems  
|                    | — Display all health Compute Systems  |
| **Network**        | — Display all available Switches.  
|                    | — Display all unhealthy Switches.  
|                    | — Display all healthy Switches.  |

### Advanced search options

An advanced search option is also available on the VCE Vision dashboard that assists customers who may want to build 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 *VCE Vision Administration Guide*. 

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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 key performance indicators such as capacity, performance, and utilization for a collection of VCE Systems.

A customer can access KPI information using either the VCE Vision dashboard or the MSM API for Multi System Services as described below:

VCE Vision dashboard

- View charts and graphs of KPI information for the selected element type. Examples of the types of KPI information available include:

<table>
<thead>
<tr>
<th>Element type</th>
<th>Examples of KPI information available</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>storage volume</td>
<td>Volume read</td>
</tr>
<tr>
<td>disk</td>
<td>Power</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></td>
<td>Consumed host memory</td>
</tr>
</tbody>
</table>

- For more information on how to access charts and graphs, see the VCE Vision dashboard Help.

API for Multi System Services
Customers can use the API for Multi System Services to retrieve the following KPI data:

- Retrieve all existing KPI definitions in the system.
- Retrieve existing KPI definitions for a particular element type.
- Retrieve existing KPI definitions for a particular element type and component category.
- Retrieve time series KPI data:
  - Specifying a particular time resolution.
  - Specifying a start time for time series queries.
  - Specifying an end time for time series queries.

For more information about the KPIs available, see the *VCE Vision Intelligent Operations Version 3.0 Certified Elements*.

For more information about the API for Multi System Services, see the *VCE Vision Intelligent Operations Version 3.0 Programmers Guide*.

Related information

Virtual machine resource monitoring (see page 45)

**Virtual machine resource monitoring**

Virtual machine resource monitoring enables customers to identify and monitor a collection of resources associated with a virtual machine. Customers can use the VCE Vision dashboard or the MSM API for Multi-System services to review point-in-time and historical Key Performance Indicators (KPIs) associated with those resources.

With this feature, customers can see the underlying physical infrastructure that supports each virtual machine, so they can optimize workload placement more efficiently and better utilize the existing infrastructure, for example, power consumption, storage capacity, server memory, or CPU utilization.

Resource monitoring also shows the relationship between VCE System resources, such as virtual compute, physical compute, storage, network, and so on. For example, customers can view related objects when monitoring resources using the VCE Vision dashboard. This is important when customers want to take a resource offline for maintenance or replacement. It will also help determine what other items will be impacted, particularly ESXi and virtual machines.

The following diagram shows how the business logical resources, in this case virtual machines, leverage the infrastructure resources to correlate and generate fingerprint profiles for the virtual machines:
Note: VCE Vision software shows information for each virtual machine and the underlying physical infrastructure.

Using the VCE Vision dashboard or the MSM API for Multi-System Services, customers can generate the data required for monitoring the workloads associated with virtual machine resources. The following examples show the main virtual machine workload monitoring activities that are available:

- Monitor the performance of virtual machines across one or more VCE Systems in a data center, for example the logical and physical components.
- Query specific Key Performance Indicators (KPIs) for specific related elements on the data path to investigate performance issues associated with virtual machines.
- Query related physical elements like disk, arrays, and so on for a specific virtual machine.

For more information about the KPIs available, see the *VCE Vision Intelligent Operations Version 3.0 Certified Elements*.

For more information about generating the data required for the workloads associated with virtual machine resources, see the *VCE Vision Administration Guide* and the *VCE Vision Programmers Guide*.
Related information

Key Performance Indicators (see page 44)

VCE Vision dashboard overview (see page 48)
VCE Vision user interfaces

VCE Vision dashboard overview

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

The dashboard enables a customer to:

- View a high-level dashboard of 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 an easy-to-consume format.
- View charts of key performance indicators (KPIs) for one or more components or elements.
- Configure multi-system 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.

Related information

Virtual machine resource monitoring (see page 45)

VCE Vision shell

The VCE Vision shell is an extensible management tool which provides a single interface to interact with VCE™ Systems and their 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 a customer manage multiple VCE Systems.

For example, a customer must update the NTP server IP addresses configured for all switches on a VCE System. By issuing a single command, this change can be made without having to login 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 'N5B' at 10.1.139.23:,  result: ['10.1.139.235', '10.1.219.13'],
Switch 'N5A' at 10.1.139.22:,  result: ['10.1.139.235', '10.1.219.13']]
```
The shell is framework layer built on top of Python and Vision API bindings. In addition to the commands VCE provides, 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**

Beginning with the 3.0 release, the VCE Vision dashboard and the VCE Vision shell are the primary interfaces for the VCE Vision software. However, the Plug-in for vCenter continues to be provided with the product for use in specific situations. In this release, the primary function of the Plug-in for vCenter is to provide access to the firmware pre-positioning feature which allows a customer to view the inventory of RCM content downloaded to a VCE System and discover, download, and manage the firmware and software required to upgrade the components of a VCE System.
Software modules

VCE Vision RCM Compliance Module

The VCE Vision RCM Compliance Module provides the mechanism for managing the RCM compliance life-cycle.

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 Pre-positioning - enables customers to retrieve software and firmware for components in their VCE System.

For more information about the VCE Vision RCM Compliance Module, see the VCE Vision Administration Guide.

Related information

Compliance management (see page 34)

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.

- The Security Hardening compliance content pack uses VCE security hardening guidelines and enables a customer 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 VCE Vision Administration Guide.

Related information

Compliance management (see page 34)
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:

- Providing an easy way for 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.

Representational State Transfer (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.

**Note:** 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 overview](see page 58)

**MSM API for Multi-System Services**

A client using the API for Multi-System Services can query and filter data collected from a set of VCE Systems.

A client using the API for Multi-System 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 API for Multi-System Services is provided on the VCE Developer Portal: [https://www.vce.com/developer](https://www.vce.com/developer)

**MSM API for Compliance**

The MSM API for Compliance provides a set of REST resources for checking or validating compliance of VCE™ Systems when compared to different criteria that VCE provides. For example, customers can check if VCE Systems are compliant with a particular RCM version or compliant with the VCE best practices related to security. This API can check and report compliance for one or more VCE Systems.

Multi-system management virtual machines 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 just get the latest compliance scan, in PDF format.
- Set the target profile for a scan category.

**MSM API for Security Web**

The API for Security Web provides a set of REST resources for controlling access to system resources within the MSM environment through role-based access control (RBAC). Through RBAC, customers can restrict access to system resources to only those users who have been authorized to use them.

The API for Security Web allows customers to:

- Create users
- Create roles
- Assigns roles to permissions
- Assigns users to roles
- Manage sessions
Note: 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 for Security Web relies on a set of predefined permissions.

The API reference documentation for the API for Security Web is provided on the VCE Developer Portal: 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. See the *Administration Guide* for an overview of the shell and a complete list of commands for that environment.

Note: 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.

Note: 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.

**MSM API for Tech Support**

The API for Tech Support provides a set of REST resources for component log collection.

The API for Tech Support allows customers to:

- Find Vblock System components that support log collection
- Trigger log collection
- Monitor log collection tasks
- Download the log bundle

Customers can find complete reference documentation for the API for Tech Support on the VCE Developer Portal:

https://www.vce.com/developer
Vision Core API for System Library

The API for System Library provides a set of REST resources for retrieving information about a VCE System. The API provides a complete set of resources that allows you to retrieve data on the entire model associated with each VCE System.

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

The API reference documentation for the API for System Library is provided on the VCE Developer Portal: 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 API reference documentation for the API for Compliance Checker is provided on the VCE Developer Portal: 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). Customers use RBAC to restrict access to system resources to only those users who have been authorized to use them.

The API for Vision Security allows customers to perform the following tasks to manage users:

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

The API for Vision Security relies on a set of predefined permissions.

All URLs for the API for Vision Security that retrieve data use the GET verb and return an XML response. Several of the 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
Software Development Kit

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.

SDK components

- Sample code that illustrates how to use the VCE Vision Core REST APIs.
  
The sample code shows how to:
  
  - 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.

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

- Schema files for the following:
  
  - API for System Library
  
  - System Library FM Event
  
  - API for Compliance Checker
  
  - API for Vision Security

- SNMP MIBs for the VCE System

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.

VCE Vision software also provides support for multi-system management (MSM) simulation. With the MSM Operations Center, a customer can deploy a collection of MSM virtual machines and VCE Vision Core virtual machines in simulation or lab mode.
For more information about VCE Vision software simulation, see the *VCE Vision Simulator Guide*, which is included with the Simulator download package.

**Access the SDK**

Customers can download the SDK for VCE Vision software from the VCE Developer Portal. The Developer Portal provides registered developers with quick and easy access to all of the resources necessary to develop functionality using VCE Vision software APIs.

**Related information**

[Third-party management solutions overview](#) (see page 58)

[VCE Developer Portal](#)
SNMP Integration

SNMP with VCE Vision software

Customers can enable communication between VCE Vision software and their network management system (NMS) using SNMP to monitor and maintain Vblock Systems.

VCE Vision software can also send SNMP traps and events to a customer's NMS to facilitate discovery polling and report health status changes or issues with physical and logical components.

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. System Library populates these MIB modules so that customers NMS can access the various objects in the Vblock System.

Refer to the VCE Vision Intelligent Operations Version 3.0 SNMP Integration Guide for further information.

Note: VCE support for SNMP includes all Vblock Systems and the components added up to and including VCE Vision™ Intelligent Operations Version 2.6.5.
Third-party management solutions overview

There are a variety of VCE and third-party management solutions that 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 utilize 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 Open APIs and built-in converged operations for their specific applications and user interfaces. This allows the customer to utilize their existing software investments, while taking advantage of the value VCE Vision software brings to converged operations.

The VCE Solution Exchange is VCE’s online portal where you can find solutions that have been built to complement VCE’s VCE Systems and VCE Vision™ Intelligent Operations software. The solutions in this exchange include ground up converged operations software applications as well as connectors to existing data center management tools.

For a comprehensive list of VCE and third-party solutions with VCE Vision integration, visit the VCE Solution Exchange at www.vce.com/solutionexchange.

Related information

Application Programming Interfaces (see page 51)

SDK for VCE Vision software (see page 55)
About VCE

VCE, an EMC Federation Company, is the world market leader in converged infrastructure and converged solutions. VCE accelerates the adoption of converged infrastructure and cloud-based computing models that reduce IT costs while improving time to market. VCE delivers the industry's only fully integrated and virtualized cloud infrastructure systems, allowing customers to focus on business innovation instead of integrating, validating, and managing IT infrastructure. VCE solutions are available through an extensive partner network, and cover horizontal applications, vertical industry offerings, and application development environments, allowing customers to focus on business innovation instead of integrating, validating, and managing IT infrastructure.

For more information, go to http://www.vce.com.