Zenoss®

WHITE PAPER

Service Level Monitoring with Cisco UCS and Zenoss

This white paper explains how you can achieve service level monitoring using Cisco Unified Computing System (UCS) and Zenoss.

Introduction

The Cisco Unified Computing System (UCS) is a next-generation hardware infrastructure designed from the ground up for today's next-generation datacenter environments. It unifies computing, network, storage access, and virtualization into a cohesive system.

Zenoss Service Dynamics is a purpose-built product that improves the delivery of IT service to applications, business services and supporting infrastructure in the dynamic datacenter. It's one product that unifies the delivery of IT service across physical, virtual and hybrid cloud infrastructures

Working together, Zenoss and Cisco UCS can provide comprehensive service level monitoring.

Understanding Cisco UCS

Cisco UCS is Cisco's entry into the large-scale datacenter server space. From inception, it was designed to give datacenter staff the hardware infrastructure needed for today's dynamic, scalable, and highly virtualized datacenter environments

Cisco UCS unifies the following components into a cohesive system:

- Compute resources
- Network access
- Storage access
- Virtualized components, such as VMWare ESX servers

In this paper, we'll focus on the Cisco UCS B-Series Blade Servers. A Cisco UCS installation consists of UCS blade servers housed in blade chassis, UCS fabric interconnects and fabric extenders, and UCS network adapters, which all work together as a single, cohesive, integrated system.

A Cisco UCS installation can consist of up to 480 blade servers, with two quad-core processors on each blade. Each of these 480 blades can host 10 to 20 virtual machines, and a single Cisco UCS installation can host between 4,800 to 9,600 virtual machines. Regardless of whether a Cisco UCS installation has a single blade server or 480 blade servers, all resources participate in a unified management domain.

Cisco's unified fabric technology reduces costs by eliminating the need for multiple sets of adapters, cables, and switches, and radically reduces the number of devices requiring setup, management, power, cooling, and cabling.

Using a single management interface, Cisco UCS administrators can manage thousands of processor cores, easily move operating system workloads from blade to blade, and integrate control of network and storage paths.

Zenoss Support for Cisco UCS

Zenoss began investigating Cisco UCS integration because Zenoss customers wanted to know how they could manage all of their datacenter components, including new Cisco UCS components, using the Zenoss "single pane of glass" approach.

As Zenoss researched customer needs around Zenoss and Cisco UCS integration, and investigated Cisco UCS capabilities, Zenoss quickly uncovered the following areas of interest and synergy:

- Cisco UCS provides a new, exciting, and complete model of datacenter hardware infrastructure, designed specifically for the next-generation datacenters Zenoss supports.

- The Cisco UCS model-driven hardware infrastructure management approach closely aligns with the Zenoss model-driven datacenter management approach.
- Zenoss can seamlessly integrate with Cisco UCS hardware infrastructure components and Cisco UCS Manager using native Cisco UCS management APIs.

Zenoss realized that Cisco UCS and Zenoss working together can provide best-of-breed "business-to-blade" datacenter management. Cisco UCS unifies computing, network, and storage and provides a logical view of Cisco UCS hardware infrastructure components. Zenoss provides unified server, network, storage, and virtualization management in heterogeneous environments, as well as a logical view of application and IT services. The complementary Zenoss and Cisco UCS management models work together to simplify datacenter operations, reduce costs, and provide all the capabilities needed to monitor today's dynamic, next-generation datacenters.

Datacenter administrators can use the unified view Zenoss provides to view application performance metrics for a business-critical application running on a guest virtual computer in a Cisco UCS system all the way down to the status of an individual fan running in a Cisco UCS chassis – all without having to jump from tool to tool.

Zenoss and Cisco UCS Manager Integration

Cisco UCS Manager is the device-management software used to manage the entire Cisco UCS system. Cisco UCS Manager provides centralized management capabilities for Cisco UCS systems and allows Cisco UCS administrators to manage the entire Cisco UCS system as a single logical entity.

Cisco UCS administrators use Cisco UCS Manager to perform the following tasks:

- **Device discovery, configuration, and management** – Automatically discovers components that are added, moved, or removed from the system, adds them to inventory, tracks which components are assigned to specific applications, and applies service profile configurations as appropriate.
- **Server provisioning** –Selects a server from a pool of available servers, loads appropriate software, and appropriately customizes and configures the server.
- **Fault diagnosis and monitoring** – Monitors for faults by checking logs and displays fault information in the Cisco UCS Manager user interface.
- **Auditing and statistics collection** – Maintains logs of operations performed on UCS components as well as information about faults on UCS components.

However, Cisco UCS Manager provides a Cisco UCS-specific view, and does not perform the following tasks:

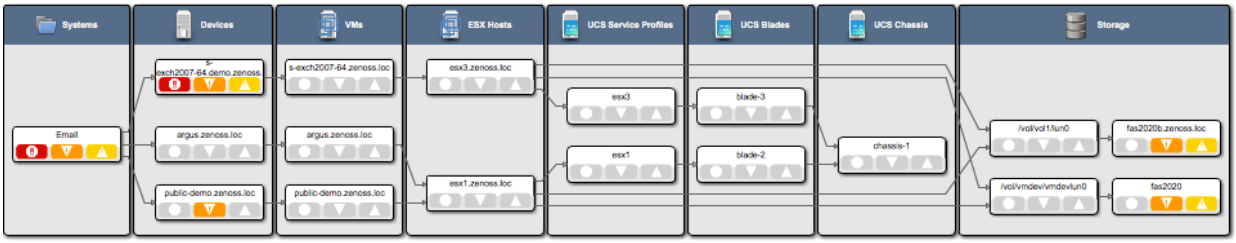
- **Does not manage non-Cisco UCS hardware** – Any hardware not a part of the Cisco UCS cannot be configured or managed using Cisco UCS Manager.
- **Does not manage operating systems running on Cisco UCS** – Cisco UCS Manager is for Cisco UCS hardware and provides no visibility into operating systems, hypervisors, or virtual guests running on Cisco UCS. You also cannot manage or apply any software that is not a part of Cisco UCS using Cisco UCS Manager.
- **Does not troubleshoot specific components** – Cisco UCS Manager does not diagnose errors, attempt to fix problems, or suggest workarounds.

The model-driven Zenoss management approach seamlessly integrates with the Cisco UCS Manager model and enhances and extends Cisco UCS management capabilities.

Datacenter administrators can use Cisco UCS Manager to manage their Cisco UCS computing, network, and virtualization resources. However, Zenoss takes over where Cisco UCS Manager leaves off by allowing cross-system and heterogeneous device management from a single pane of glass.

Zenoss uses native Cisco management APIs to collect information from Cisco UCS Manager and combines it with additional comprehensive information about non-Cisco infrastructure components. Zenoss displays all of this information together in the Zenoss Console. With this unified view, datacenter staff can see IT service, performance and availability information, not only for Cisco UCS components, but also for all other physical and virtual devices running in the datacenter. Datacenter staff can view application performance metrics for a business-critical application running on a guest virtual computer as well as the status of a chassis, blade, or fan running in a Cisco UCS chassis without having to use multiple tools.

To assist operations, Zenoss automatically provides a visual summary of the system level grouping. This grouping provides a top-down view into the entire business service and any events that may be impacting service performance. For example, the following is a virtualized email system deployed using VMware on top of a UCS device:

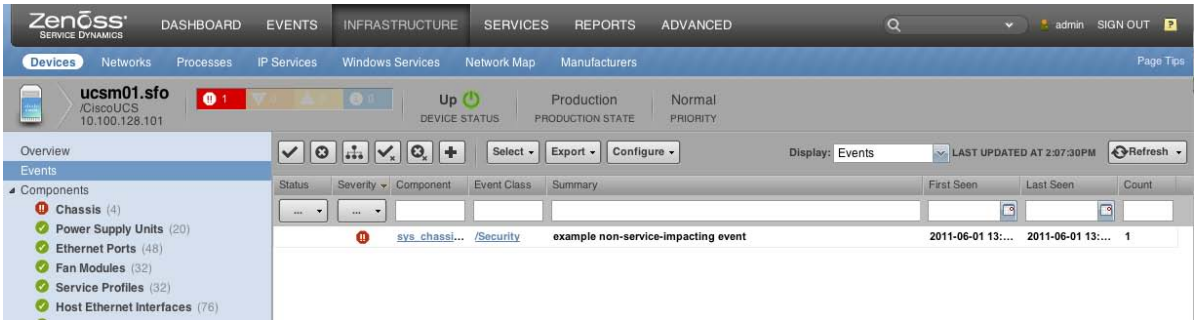


Leveraging Zenoss's dynamic model, the system view automatically updates if there are any changes to the virtual or physical devices.

Viewing Cisco UCS Events and Information in Zenoss

Zenoss unifies the management of Cisco UCS with other datacenter components. Zenoss dynamically collects information about Cisco UCS blade, network, storage, and virtual machine host information, as well as information from non-Cisco UCS applications, operating systems, physical servers, and network and storage devices. Using the Zenoss Event Console, you can see both detailed Cisco UCS event information as well as detailed event information from other hardware components running in your heterogeneous datacenter environment.

For example, the following image shows how you can see Cisco UCS events in the Zenoss Event Console displayed along with events from other components in your datacenter infrastructure, such as VMWare events and application events from Exchange.



Zenoss uses an agentless information gathering approach to discover and model each system, and provides a single, accurate view of all physical hardware components, including all of the Cisco UCS and non-Cisco UCS physical hardware components in your datacenter. Zenoss also allows you to drill down as deeply as you need on individual Cisco UCS and non-Cisco UCS components when triaging and resolving problems with datacenter components.

Managing Cisco UCS with Zenoss

Managing Cisco UCS using Zenoss is easy. You add a Cisco UCS device to Zenoss by simply pointing Zenoss to the Cisco UCS and providing appropriate management credentials. After you add a Cisco UCS device to Zenoss, Zenoss immediately connects to the device, populates the Zenoss management model with components from the Cisco UCS model using native Cisco APIs, and begins monitoring Cisco UCS elements.

For example, you can use Zenoss to perform the following actions immediately after adding a Cisco UCS device:

- Identify which Cisco UCS components are installed
- Review detailed Cisco UCS asset configuration information, such as model and serial numbers
- View current status of Cisco UCS components
- Review current measurements from Cisco UCS components, such as power consumption and fan speed
- Identify specific error conditions generated by Cisco UCS events or created by Zenoss-interpreted thresholds
- Maintain an accurate physical inventory of Cisco UCS components

If you alter your Cisco UCS configuration at a later date, such as by adding memory to a blade, changing the relationship between a service profile and a blade, or even adding a completely populated chassis, Zenoss will automatically discover the new configuration, immediately update its management model, and continue to monitor the updated system.

Cisco UCS Device Status

In Zenoss, each Cisco UCS displays as a single device, and you can manage up to 480 blade servers as a single device. You can view the following information about a Cisco UCS on the Status tab in Zenoss:

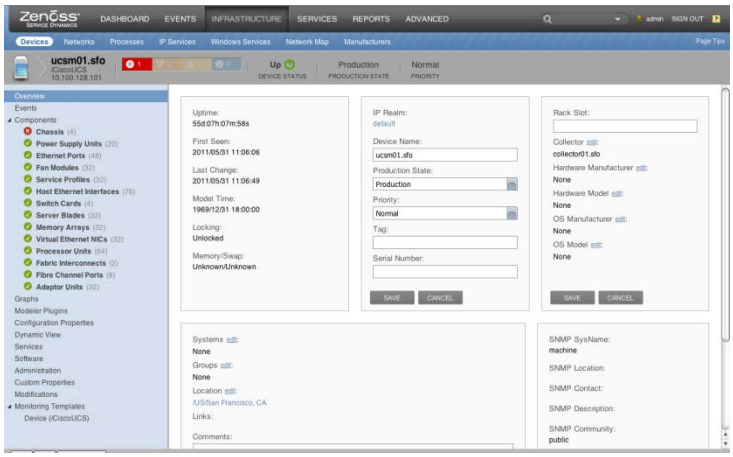
- Current configuration
- Availability and uptime statistics
- Last time the Cisco UCS device status changed
- Last data collection time
- Number of different events related to the selected Cisco UCS device

  For example, critical red events warn about specific issues on the Cisco UCS, such as fan exceeding a temperature threshold. Blue events are normal events.
- Geographic location of the Cisco UCS device

  For example, you can see if the Cisco UCS is located in your North America datacenter or in your Asia Pacific datacenter. Zenoss can also use the location information for the Cisco UCS to display its map location.
- Groups the Cisco UCS device belongs to

  Zenoss allows you to place devices into groups. You can group devices for multiple purposes. For example, you can see if the Cisco UCS is a production system or a lab system. If you are a service provider, you can use the information in the Groups field to see if the Cisco UCS hosts business services for a specific customer or set of customers.

The following image shows the Status tab for a Cisco UCS device in Zenoss.



Chassis and Fabric Interconnect Details

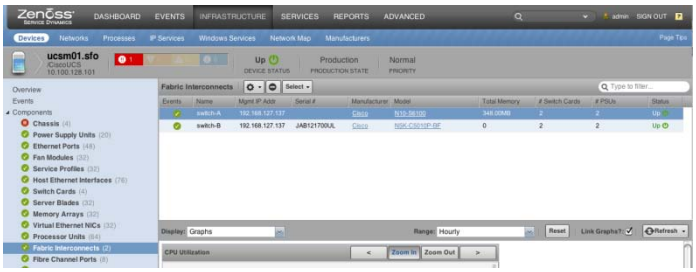
You can see Cisco UCS chassis and fabric interconnect details on the Hardware tab in Zenoss.

The chassis holds Cisco UCS components such as blade servers and fans. In Zenoss, you can see the number of chassis for a Cisco UCS, the number of blade servers and fan modules in each chassis, and the current status of each chassis. You can also see the serial number and model number for each chassis, which helps you manage your Cisco UCS assets.

Fabric interconnects are a core part of Cisco UCS. Cisco UCS provides both 10 Gigabit Ethernet and Fibre Channel over Ethernet fabric interconnects. Fabric interconnects provide both network connectivity and management capabilities to all attached blades and chassis, as well as uniform access to both networks and storage devices.

In Zenoss, you can see the fabric interconnects associated with the Cisco UCS device, the management IP address for each fabric interconnect, the memory for each fabric interconnect, and the current status of each fabric interconnect. You can also see asset management information related to each fabric interconnect, such as the model and serial number of each fabric interconnect.

The following image shows the chassis and fabric interconnect details displayed on the Hardware tab in Zenoss for a Cisco UCS device.



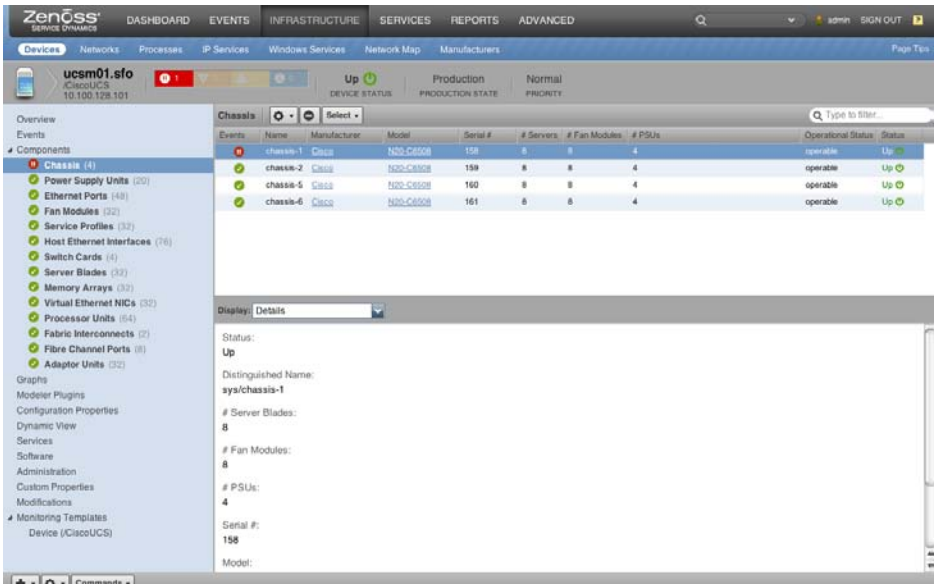
Chassis, Blade Server, Fan Modules, and Power Supply Status and Information

In Zenoss, you can see detailed event and status information for all of the components in a selected chassis on the chassis Status tab. Zenoss displays an event rainbow for each chassis, which allows you to see a summary of critical events, errors, warnings, and informational events for the selected chassis. You can also see the following information for each component in the chassis:

- **Blade servers** – number of blade servers in each chassis, number of CPUs in each blade server, serial number for each blade server, and service profile associated with each blade server

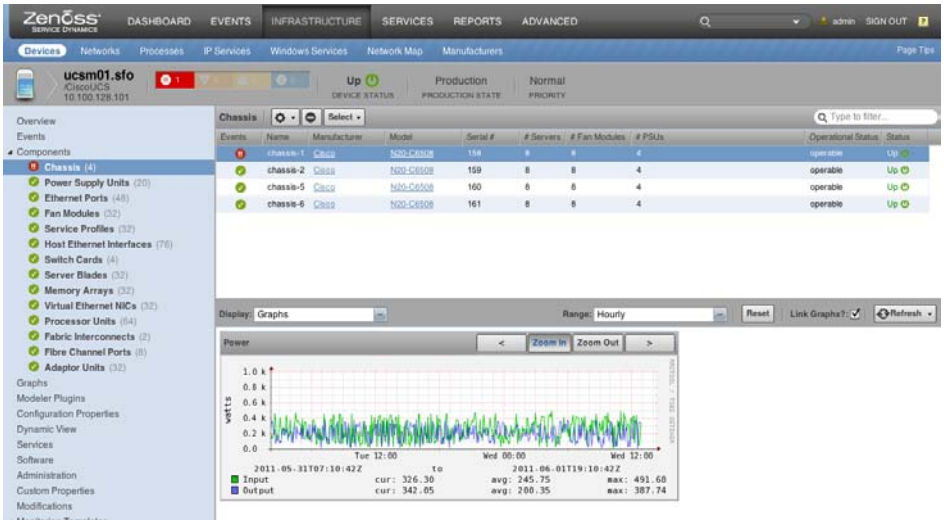
- **Fan modules** – number of fan modules in each chassis, number of fans in each fan module, and the serial number for each fan module
- **Power supply units** – number of power supply units in each chassis, model and serial number for each power supply, and if the power supply is currently on or off

The following image shows the Status tab for a chassis in Zenoss.



Chassis Power Performance Graphs

In Zenoss, you can see detailed information about the power each chassis is using for all components in the chassis. You can use the information displayed in the power input and power consumption performance graphs to help you understand your current datacenter power usage and plan for additional power capacity. The following image shows a chassis power performance graph.



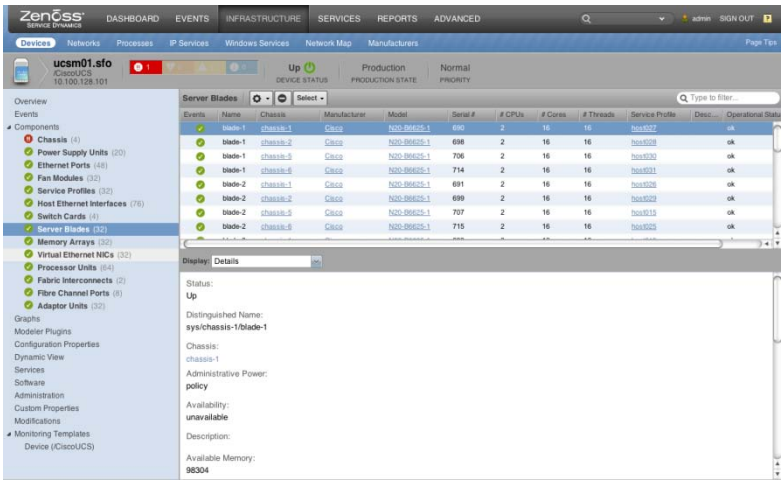
Blade Server Status and Details

In Zenoss, you can see detailed event and status information for a selected blade server on the Status tab. Zenoss displays an event rainbow for each blade server. The event rainbows help you see summarized critical events, errors,

warnings, and informational events for the selected blade server. You can also see the following information for the selected blade server on the Status tab:

- **Server** – model number, serial number, total CPU, total cores, total memory, and the service profile associated with the server
- **Processor units** – process type and speed, socket designation, and current status
- **Memory arrays** – number of devices populated, number of devices remaining, current memory capacity, maximum and remaining memory capacity, and current status
- **Adapter unit** – model number, serial number, port number, name, MAC address, and model number for the adapter between the blade server and the fabric

The following image shows the Status tab for a selected Cisco UCS blade server in Zenoss.



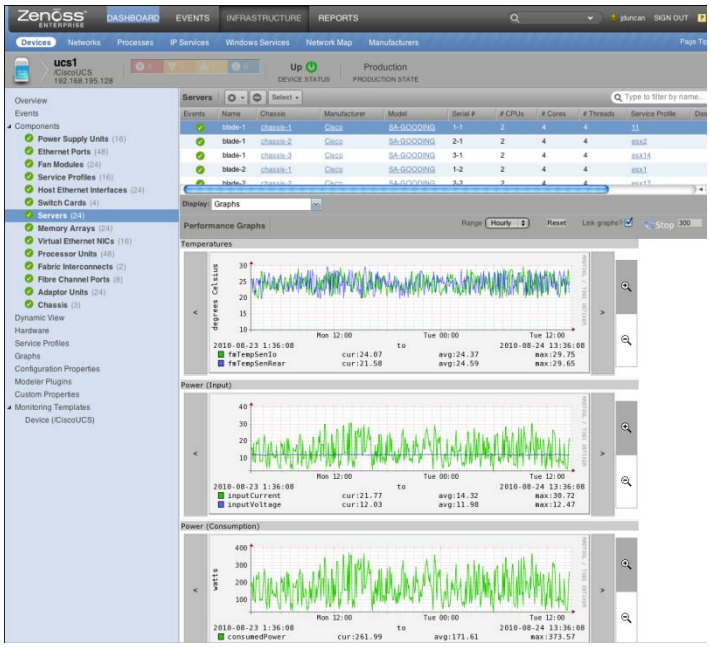
Blade Server Temperature and Power Performance Graphs

You can use Zenoss to help you with your Cisco UCS capacity planning by viewing performance graphs that show temperatures and power input and consumption for a selected blade server.

For example, you can use the information displayed for the blade server in the temperature performance graph to help you determine if a fan module associated with a blade server is failing. If you see the temperature rising on a blade server due to a fan module failure, you can use Cisco UCS service profiles to quickly move affected applications off of the blade server with the failing fan module and on to another blade server. Once the issue with the failing fan module is addressed, you can use service profiles again to quickly move applications back to their original blade server host.

You can use the information displayed in the power input and power consumption performance graphs to help you understand your current datacenter power usage and plan for additional power capacity. You can even see in Zenoss how power usage on a blade server spikes when application usage spikes. No other tool in the datacenter can provide power consumption information to this level of detail.

The following image shows temperature, power input, and power consumption performance graphs for a Cisco UCS blade server displayed in Zenoss.

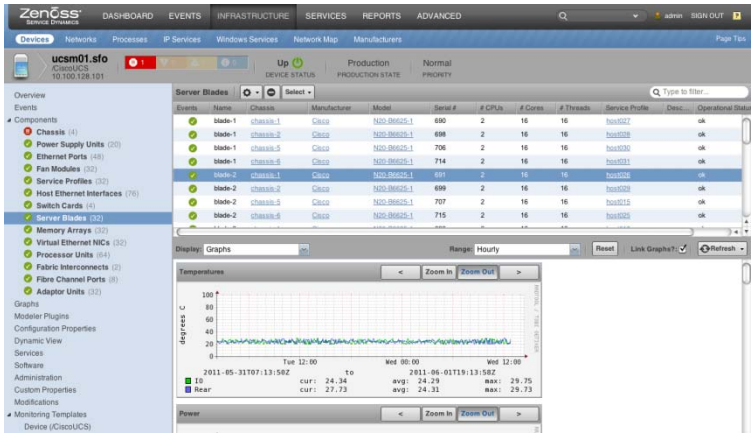


Adapter Details and Packet Performance Graphs

You can use Zenoss to view details and packet performance graphs for adapters associated with blade servers in Cisco UCS. For example, you can see the chassis that contains the Ethernet adapter, the blade server the Ethernet adapter is associated with, and the service profile associated with the adapter. You can also see information about the Ethernet adapter MAC address and model.

You can use performance graphs to see how much capacity one Ethernet adapter port uses on a blade, as well packet error rates.

The following image shows adapter details and a packet performance graph for an adapter associated with a blade server on a Cisco UCS device in Zenoss.

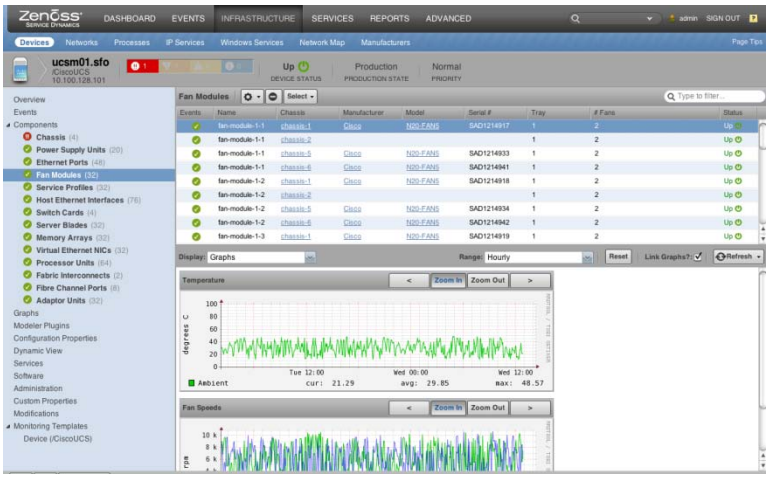


Fan Module Performance Graphs

You can use Zenoss to view details and fan temperature and speed performance graphs for fan modules in a Cisco UCS chassis. For example, you can see events associated with the fan module, as well as graphs that show fan

module temperature and speeds. You can use Zenoss to set temperature thresholds for each fan module, and then receive alerts if any fan modules exceed specified temperature thresholds. This helps you identify fan problems ahead of time, before a fan fails and impacts service delivery.

The following image shows performance graphs for a fan module in a Cisco UCS chassis in Zenoss.

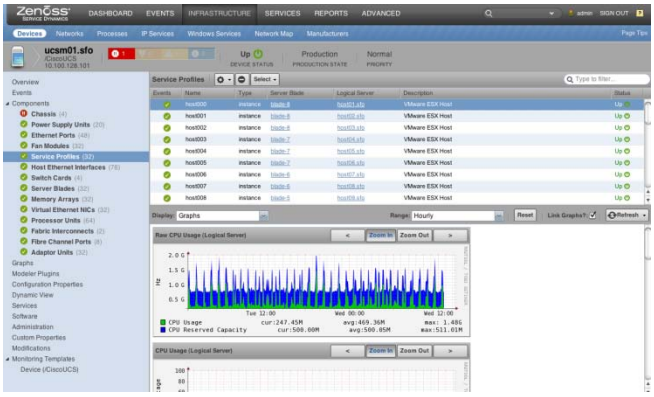


Service Profiles

Service profiles are a unique Cisco UCS feature, designed specifically to save datacenter administrators time. With service profiles, administrators have flexibility to easily assign operating system workloads to blades, move workloads between blades, and disconnect workloads from blades. Every blade server provisioned in Cisco UCS is specified by a service profile. A service profile is a software definition of the blade server and its LAN and SAN network connectivity.

When a datacenter administrator deploys a service profile to a Cisco UCS blade server, Cisco UCS Manager automatically configures the blade server, adapters, fabric extenders, and fabric interconnects to match the configuration specified in the service profile. This automation of device configuration reduces the number of manual steps required to configure Cisco UCS blade servers, network interface cards (NICs), host bus adapters (HBAs), and LAN and SAN switches.

You can use Zenoss to view information about Cisco UCS service profiles. The following image shows how you can view Cisco UCS service profile information in Zenoss, including the name of the profile, the description, and whether the service profile is currently assigned to a blade server.

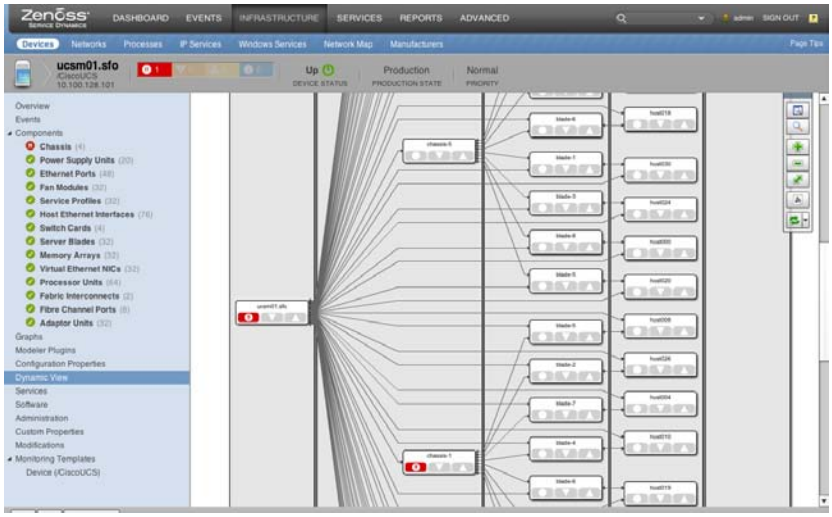


You can also use Zenoss to drill down on a Cisco UCS service profile in order to obtain more detailed information about a specific profile. For example, in Cisco UCS you can have a Production_Exchange_ESX service profile. You

can use this service profile to specify the services and configuration for a virtualized instance of a production version of Microsoft Exchange Server.

If you then want to upgrade the memory on the Cisco UCS blade server that hosts the Production_Exchange_ESX service profile, you can do this in a matter of minutes through the use of service profiles. You simply move the production Exchange ESX service profile to a different blade server, shut down the original host blade server, install more memory, restart the original host blade server, move the Production_Exchange_ESX service profile back to the original blade server, and then restart the virtualized instance of the production Microsoft Exchange Server to incorporate the additional memory.

Zenoss provides a visual view into the UCS system so you can easily see which service profiles are deployed on each blade and what is not currently being utilized:



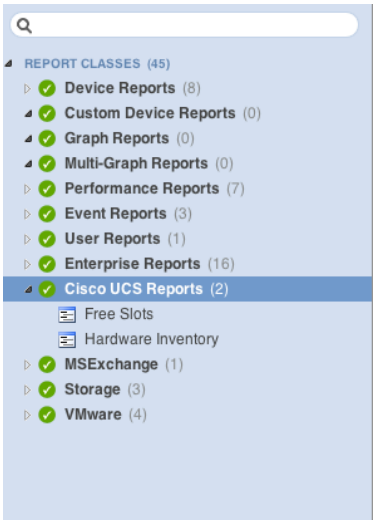
You can also view Cisco UCS policies in Zenoss. Cisco UCS policies are a part of service profiles and determine how Cisco UCS components will act in specific circumstances. You can create and use two types of policies in Cisco UCS:

- Configuration policies, which configure the servers and other components
- Operational policies, which control certain management, monitoring, and access control functions

For example, you might want to specify different boot policies, so that some blade servers can firmware boot (PXE boot), some blade servers can SAN boot, and other blade servers can boot from local storage.

Free Slots and Hardware Inventory Reports

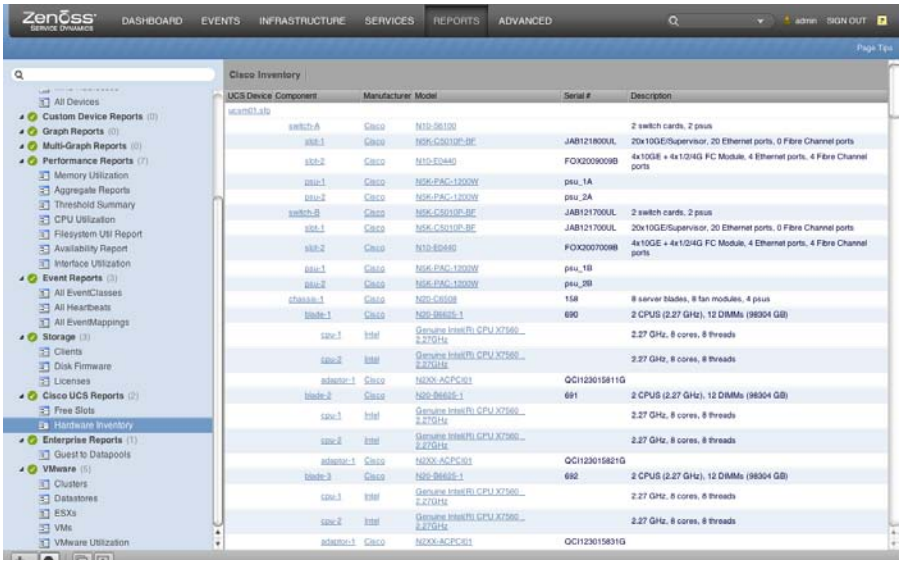
Zenoss provides free slots and hardware inventory reports for Cisco UCS. The following image shows how these two report types display in Zenoss.



The Cisco UCS Free Slots report, which is available only in Zenoss, shows which blade servers have free memory slots, and where you have opportunities to increase capacity by adding more memory to a blade server. You can use this information to help you with Cisco UCS capacity planning.

The Cisco UCS Hardware Inventory report in Zenoss shows all of the Cisco UCS components installed for a selected Cisco UCS device. You can see each component's name, model, serial number, and description in the report. As with any Zenoss report, you can export the report from Zenoss, and add the information into an asset management system. You can also drill down into the Cisco UCS Hardware Inventory report to see additional information about each component. For example, if a new fan module comes out that can reduce Cisco UCS power consumption by 5%, you can use the Cisco UCS hardware inventory report in Zenoss to identify how many existing fan modules you have, where they are located, and how much power they use. You can then use this information to determine how much power you can save by upgrading fan modules and how many fan modules you want to upgrade.

The following image shows the Cisco UCS Hardware Inventory report available in Zenoss.



Summary

The Cisco Unified Computing System (UCS) approach significantly advances the state of datacenter server, network, and storage management. Combining Zenoss model-driven management with Cisco UCS gives datacenter operations staff complete management of their environment. Cisco UCS unifies Cisco UCS computing, network, storage, access, and virtualization, and provides a logical view of Cisco UCS hardware service. Zenoss provides unified server, network, storage, and virtualization management in heterogeneous environments, as well as a logical view of application and IT services. Their complementary management models work seamlessly together to simplify datacenter operations, reduce costs, and provide all the capabilities needed to monitor today's dynamic, next-generation datacenter environments.