
Cisco and Red Hat Simplify the Journey to Cloud Computing

What You Will Learn

This document is intended for IT decision makers. It describes how the combination of Cisco UCS® configurations running Red Hat Enterprise Linux OpenStack Platform can be used to deploy massively scalable cloud infrastructure. Topics discussed include the business and technical value of the solutions and how the solutions can be used to support compute-optimized, storage-intensive, and mixed workload environments.

Cisco in collaboration
with Red Hat



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Highlights

Accelerate Cloud Deployment

- Preconfigured Cisco Unified Computing System™ (Cisco UCS®) Solution Accelerator Paks simplify cloud infrastructure deployment.

Trust Your Cloud Software Installation

- The Cisco UCS OpenStack Installer automates the installation for Red Hat Enterprise Linux OpenStack Platform services.

Scale on Demand

- The Cisco UCS architecture makes it easy to add computing and storage resources as demand rises.

Provision Cloud Infrastructure Faster

- Built-in automation enables configurations to be deployed quickly, easily, and accurately.

Simplify Management

- End-to-end management provides visibility and enables the monitoring and automated remediation of physical servers, storage, and network devices.

Protect Investments with an Open Solution

- Cisco UCS running Red Hat Enterprise Linux OpenStack Platform offers highly scalable cloud infrastructure without the risk of vendor lock-in.

Companies around the world are turning to the Cisco Unified Computing System™ (Cisco UCS™) and Red Hat Enterprise Linux OpenStack Platform to simplify the process of building cloud infrastructure.

The Need for Cloud Computing

Today's hypercompetitive business climate creates challenges for IT departments. Management demand to deliver more business applications and services on a moment's notice creates pressure on IT staff who already struggle with data center infrastructure that fails to keep pace and pushes the boundaries of budget constraints. Cloud computing is rapidly transforming businesses and organizations by providing access to flexible, agile, and cost-effective IT infrastructure. These elastic capabilities help accelerate the delivery of infrastructure, applications, and services with the right quality of service (QoS) to increase revenue.

Cisco UCS and Red Hat Enterprise Linux OpenStack Platform: Your Path to the Cloud

OpenStack is an open source cloud operating system developed by a community of open source developers and participating organizations. The project seeks to address all types of clouds by delivering solutions that are simple to implement, are massively scalable, and have a comprehensive set of features. OpenStack software consists of a series of interrelated projects that control pools of computing, storage, and networking resources throughout a data center. All these resources are managed through a dashboard, which gives administrators control while empowering users to provision resources through a web interface or an API (Figure 1).

Community innovation is creating new opportunities for cloud computing. Many organizations are turning to OpenStack technology to create massively scalable

OpenStack Components

- **Nova** for physical and virtual resource provisioning
- **Swift and Cinder** for block-based storage management and placement
- **Neutron** for network device configuration and supporting secure network containers
- **Keystone** for identity management
- **Glance** for managing virtual machine images

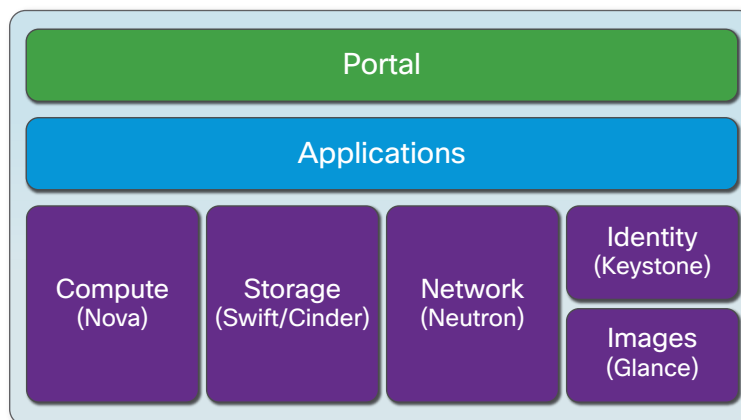


Figure 1. OpenStack Architectural Components

cloud infrastructure. Red Hat Enterprise Linux OpenStack Platform combines the leading commercial Linux distribution, Red Hat Enterprise Linux, with OpenStack technology to deliver cloud software infrastructure. This open, modular cloud platform supports a variety of hypervisors and can scale to thousands of tenants and tens of thousands of servers, virtual machines, and storage. By running this sophisticated software on Cisco UCS, IT departments can transform their complex, heterogeneous environments into scalable, flexible, agile, and secure cloud infrastructure that costs less to acquire, operate, and maintain.

Red Hat Enterprise Linux OpenStack Platform provides a comprehensive set of open APIs that span computing, storage, network, and scalability services along with an open, plug-in architecture for customization and extension. Although cloud-enabled applications developed to documented API standards can run on organization premises, in public clouds, or on a combination of the two (hybrid cloud) for greater flexibility and business agility, it is important to have the right infrastructure underneath.

Cisco UCS: The Right Foundation for Red Hat Enterprise Linux OpenStack Platform Deployments

Virtualized infrastructure is the foundation of most cloud environments. Cisco UCS leads the way in virtual infrastructure innovation, integrating industry-standard, x86-architecture Intel® Xeon® processor based servers with networking and storage access into a unified system (Figure 2). Server, networking, storage, and intelligent management resources work together in a self-aware and self-integrating system. This design delivers greater computing density and network simplicity in a smaller footprint that reduces operating costs.

Transcending the boundaries of traditional blade chassis and racks, Cisco UCS creates a physically distributed, centrally managed system that delivers scalability and performance. A unified fabric supported by a single, distributed virtual switch interconnects all server resources. The system represents a radical simplification compared to traditional architectures, resulting in lower capital and operating costs.

Cisco UCS

Cisco UCS delivers a radical simplification of traditional architecture with the first self-aware, self-integrating, converged system that automates system configuration in a reproducible, scalable manner.

- More than 70 world records on critical benchmarks
- The benefits of centralized computing, through a single point of management, delivered to massive scale-out cloud applications
- Self-aware and self-integrating system
- Automatic server provisioning through association of models with system resources
- Standards-based, high-bandwidth, low-latency, lossless Ethernet network

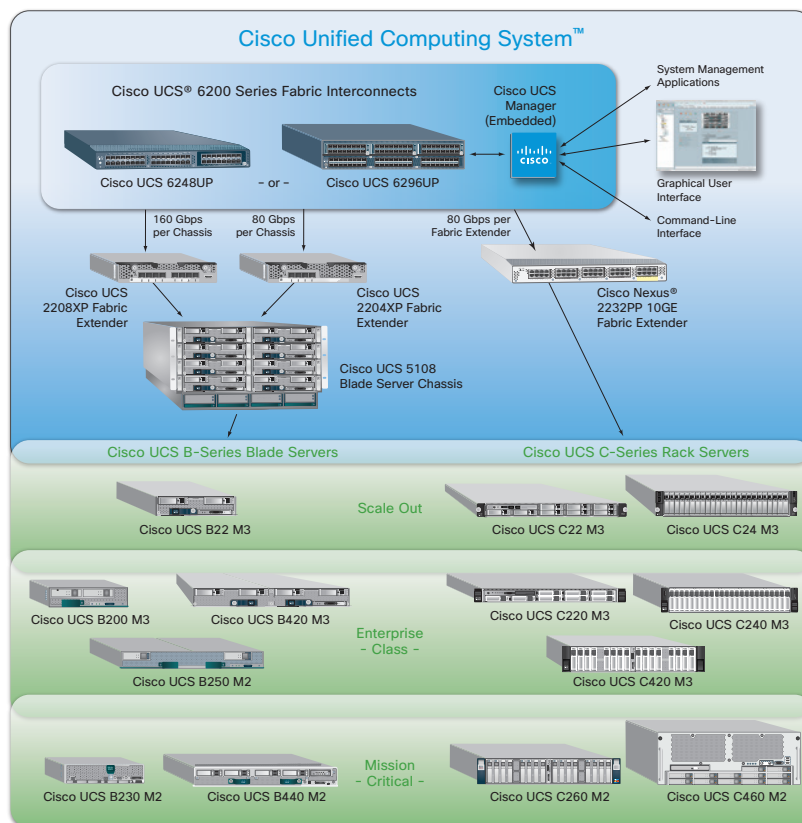


Figure 2. Cisco UCS Is a Single Unified System

Accelerate your Journey to the Cloud with Cisco UCS and Red Hat Enterprise Linux OpenStack Platform

Cisco UCS technology has helped companies around the world change the fundamental nature and management of their virtual infrastructure. Now that same technology, available in preconfigured Cisco UCS Solution Accelerator Paks, can be combined with Red Hat Enterprise Linux OpenStack Platform to simplify the process of implementing and deploying cloud infrastructure that handles a wide range of workloads (Figure 3).

High-Density Configuration

Many popular business enterprise applications and high-performance computing applications require horizontally scalable cloud infrastructure. The capability to add servers as demand increases allows the solution to offer massive horizontal scalability without sacrificing networking and storage performance.

Mixed-Workload Configuration

The mixed-workload configuration is designed for cloud infrastructure that must support a wide variety of applications. Providing balanced computing, networking, and storage resources, this preconfigured solution can help solve some of the

biggest performance and provisioning challenges companies face with application infrastructure.

Storage-Intensive Configuration

Many enterprise applications spend much of their time interacting with underlying storage systems. With big data on the rise, these data-centric applications, such as databases and the enterprise applications that use them, require access to high-performance, massively scalable storage infrastructure.

The Cisco and Red Hat Advantage

The combination of Cisco UCS and Red Hat Enterprise Linux OpenStack Platform provides an excellent platform for compute-optimized, mixed, or storage-centric applications that need to run in private, public, or hybrid cloud infrastructure.

Open Architecture

A market-leading, open alternative to expensive, proprietary environments, the simplified architecture of Cisco UCS running Red Hat Enterprise Linux OpenStack Platform delivers greater scalability, manageability, and performance at a significant cost savings compared to traditional systems, both in the data center and the cloud. Using industry-standard x86-architecture servers and open source software, the Cisco® and Red Hat solution enables IT departments to deploy cloud infrastructure today without concern for hardware or software vendor lock-in.

Accelerated Provisioning

Cloud infrastructure must be able to flex on demand, providing infrastructure to applications and services on a moment's notice. Cisco UCS simplifies and accelerates cloud infrastructure deployment through automated configuration. The intelligent infrastructure abstracts server identity, personality, and I/O connectivity from the hardware, enabling these characteristics to be applied on demand. Every aspect of a server's configuration, from firmware revisions and BIOS settings

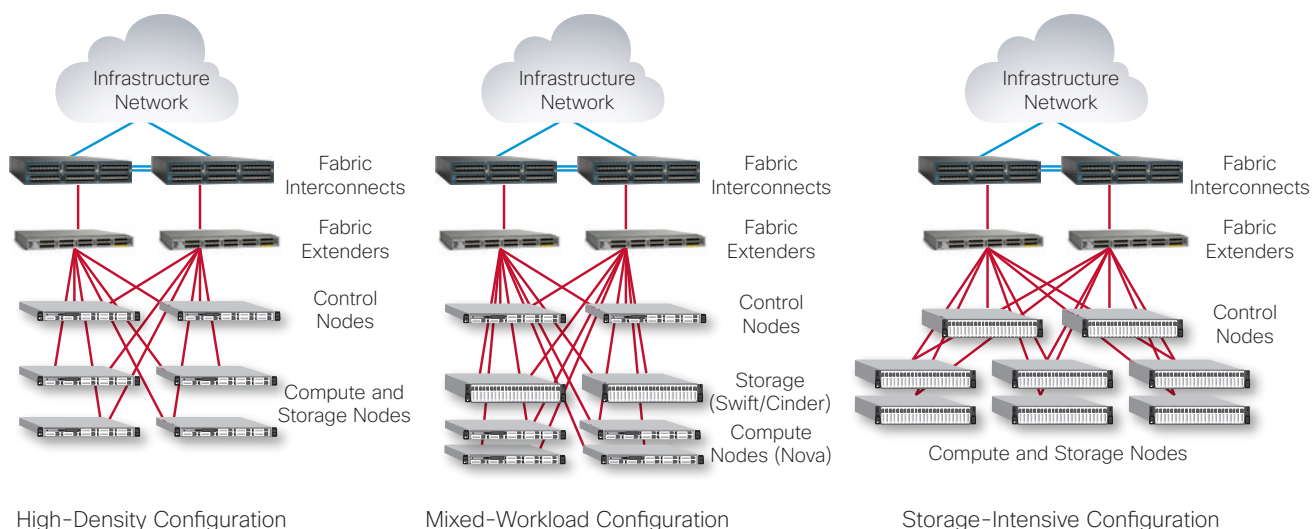


Figure 3. Cisco UCS Configurations for Cloud Infrastructure Deployments

to network profiles, can be assigned through the system's open, documented, standards-based XML API or Cisco UCS Manager GUI. Cisco service profile templates establish policy-based configuration for server, network, and storage resources and can be used to logically preconfigure these resources even before they are deployed in the cloud infrastructure.

One-touch provisioning of OpenStack technology is available for cloud environments on Cisco UCS running Red Hat Enterprise Linux OpenStack Platform. The Cisco UCS OpenStack Installer handles the booting of bare-metal systems and installs and configures the cloud software infrastructure (Figure 4):

- **Configures Cisco UCS Manager:** The Cisco UCS Manager software is configured with policies that enable the software to automatically discover chassis and servers and create and assign their service profiles.
- **Applies the configuration:** The installer begins the process by applying the Cisco UCS bare-metal configuration using the Python software development kit (SDK). Cisco UCS is preconfigured with pools of hostnames and IP addresses.
- **Starts the event listener:** The installer starts the event listener, which looks for changes to attached servers so they can be automatically provisioned with appropriate service profiles.
- **Adds servers to Red Hat Enterprise Linux OpenStack Platform:** Servers are added to the application cluster following an event completion notice from Cisco UCS Manager. During this process, preexecution (PXE) boot devices are deployed, and the nodes are registered with the database component of Red Hat Enterprise Linux OpenStack Platform.
- **Passes control to Red Hat Enterprise Linux OpenStack Platform:** After providing an inventory of nodes to the control nodes, the installer passes control of operations to the Red Hat Enterprise Linux OpenStack Platform software for virtual machine provisioning.

Virtual Infrastructure Density

Cisco UCS enables cloud infrastructure to meet ever-increasing guest operating system memory footprint demands on fewer physical servers. The system's high-density, high-performance design increases consolidation ratios for 2-socket servers, saving the capital, operating, physical space, and licensing costs of running virtualization software. Cloud infrastructure can host applications using less-expensive servers without sacrificing performance. As a result, IT departments can put more virtual machines on each server, reducing physical server sprawl and breaking down management silos.

Simplified Networking

Addressing the increasing need for better design and control, Cisco UCS provides greater network density with less cabling and complexity. Cisco's unified fabric integrates Cisco UCS servers with a single high-bandwidth, low-latency network that supports all system I/O. This fabric carries IP, storage, and management traffic over redundant 10 Gigabit Ethernet and Fibre Channel over Ethernet (FCoE) networks. This approach simplifies the architecture and reduces the number of I/O interfaces, cables, and access-layer switch ports that are required for traditional cloud infrastructure deployments. This unification can reduce network complexity by

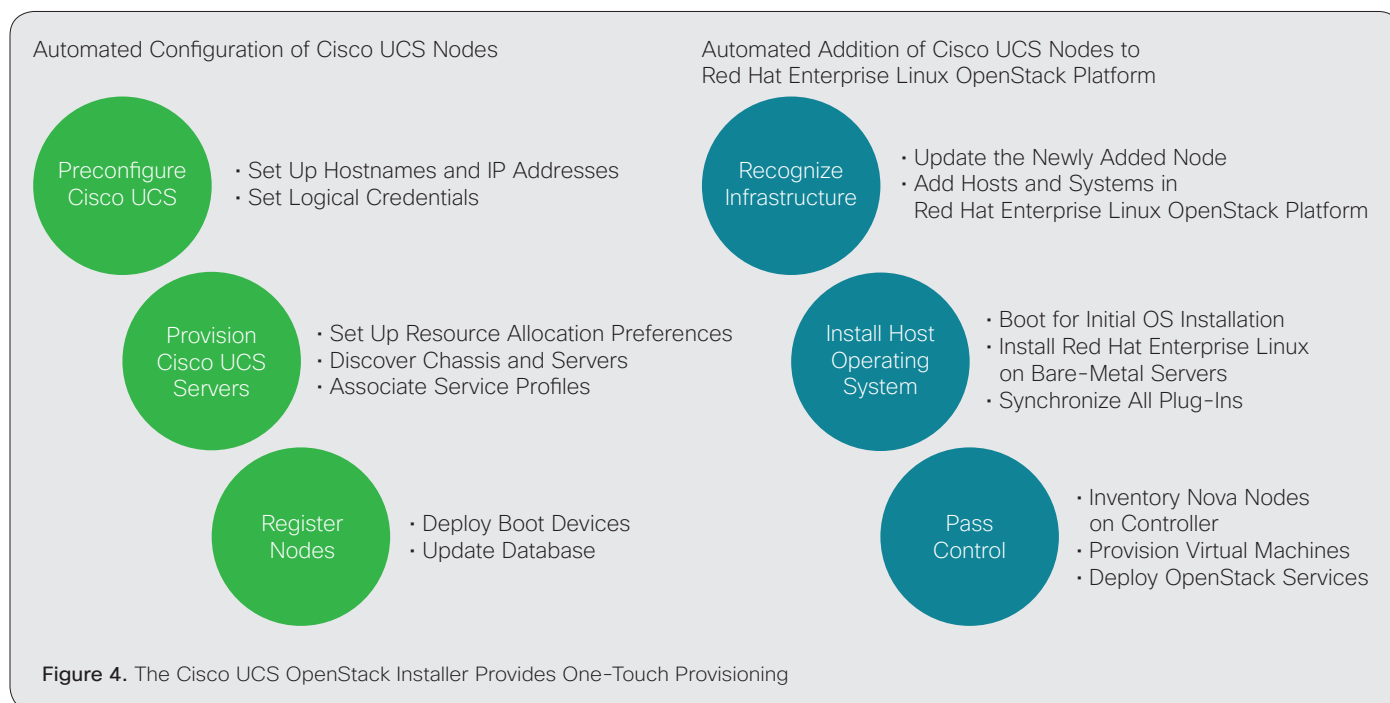
up to a factor of three, and the system's wire-once network infrastructure increases agility and accelerates deployment with zero-touch configuration.

All I/O traffic meets at a single specific and redundant point at which it is efficiently and consistently managed, increasing network security, simplifying management, and reducing errors. This approach eliminates server and hypervisor-resident switching, condensing three network layers into one and reducing capital and operating costs. With the capability to interconnect physical servers and virtual machines as functional equivalents, the architecture delivers outstanding visibility and control that lets virtual networks be managed with the same level of control as physical networks.

Collaboration Leads to Innovation

Deep collaboration enables Red Hat and Cisco to deliver cloud infrastructure solutions that are rooted in technical innovation and market strength. Cisco has shaped the future of computing by developing technology that transforms the way that people connect, communicate, and collaborate. Red Hat, the world's leading provider of open source software, has joined forces with Cisco to offer a comprehensive and versatile cloud computing solution.

These powerful allies share a common vision to deliver a standards-based, cohesive, unified environment that easily scales to meet business needs while



reducing total cost of ownership (TCO). Both companies actively participate in open and industry standards, including the OpenStack community, to help ensure that technology advancements align with customer priorities. With the combination of Cisco UCS and Red Hat Enterprise Linux OpenStack Platform, organizations can benefit from a complete architectural approach that supports data center modernization and delivers cloud infrastructure without the risk of vendor lock-in.

Conclusion

Red Hat Enterprise Linux OpenStack Platform provides a robust foundation for cloud-enabled applications. If your business has already deployed virtual infrastructure with Cisco UCS, adding Red Hat Enterprise Linux OpenStack Platform is the next step toward implementing cloud infrastructure. Similarly, if your IT department has adopted or is considering OpenStack technology, moving to Red Hat Enterprise Linux OpenStack Platform running on Cisco UCS offers the agility needed to stay ahead of the competition.

For More Information

- For complete details about Cisco UCS, visit <http://www.cisco.com/go/ucs>.
- For more information about Cisco UCS Solution Accelerator Paks, please visit <http://www.cisco.com/go/smartplay>.
- For more information about Red Hat Enterprise Linux OpenStack Platform, please visit <https://access.redhat.com/products/Cloud/OpenStack/>.
- For more information about Cisco solutions for cloud computing, please visit <http://www.cisco.com/go/cloud>.
- For more information about getting started with the Cisco UCS OpenStack Installer, please visit http://docwiki.cisco.com/wiki/Openstack:Getting_Started_with_COE_development.



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