Seven Reasons Why Cisco UCS Is Better for Your Business Than White-Box Servers

Solution Brief
April 2015

Highlights

Fewer Failures

- We have an entire department dedicated to helping ensure that our solutions use the highest-quality components.

Benefits of Power Efficiency

- With ENERGY STAR certification. You get more performance from the power you use.

Benefits of World-Class Performance

- Cisco Unified Computing System™ (Cisco UCS®) delivers world-class performance with more than 100 world records across a wide range of workloads.

Need for Security

- We build security into our solutions using the Cisco® Secure Development Lifecycle (SDL).

Robust Management Features

- Cisco Integrated Management Controller (IMC) comes free with every Cisco UCS rack server.

Innovation of Virtual Interface Cards

- Cisco virtual interface cards (VICs) make the system I/O infrastructure completely programmable with a zero-touch model.

Reduced Risk

- Cisco Validated Designs provide the foundation for efficient solution deployments.

Using your allotted resources wisely is admirable. However, have you thought in detail about the real costs associated with using "white-box" servers? The Cisco Unified Computing System™ (Cisco UCS®) delivers advantages, including a lower total cost of ownership (TCO), beyond those that white-box servers can deliver.

You want to be a hero for your IT department by purchasing the least expensive server you can find, commonly a non-brand-name server put together by a systems integrator, referred to as a white-box server. But how much will that cheaper server cost you in operating expenses? How will it affect your data center's reliability? How will it affect your application service? Initial cost is only one of several components of the TCO equation. The architectural, operational, management, reliability, supportability, and performance savings you gain by deploying Cisco UCS can quickly offset or negate the savings in initial purchase price for a white-box server. Cisco UCS servers are among the highest-quality servers you can purchase for the money you spend. And over time, Cisco UCS rack servers also save you much more in operating costs than the amount you save by purchasing a white-box solution.

Seven Points to Consider

Generally, white-box servers appeal to very large technology companies operating hyperscale data centers. These companies employ large staffs of specialized engineers to design and deploy highly customized homogeneous applications across a vast number of servers. These companies turn to white-box vendors for stripped down, low-cost, non-name-brand servers. However, this is not the

typical environment for an enterprise data center or service provider, which more commonly includes numerous applications with significant variability. Before you purchase a white-box solution for your environment, here are seven points you should consider.

The Cost of Failure

We use great care to validate our approved vendors and preferred suppliers. Cisco has an entire department dedicated to component engineering to help ensure that our solutions use the highest-quality components. We perform rigorous testing of the electrical and mechanical design and verify environmental factors. We do not incorporate components from the gray market, reject lots, or "last buys" to lower the cost to us of building Cisco UCS. Such an approach is extremely risky and is used by companies to maintain thin hardware profit margins, when price is the only differentiator. Although the gray market may offer short-term advantages over parts obtained through authorized distribution channels, there are no standards, controls, or records to verify proper storage and handling. Because the quality and reliability of these parts cannot be assured, manufacturers and vendors of other components used in the solution will not authorize the pass-through of warranties for the solution. For example, if "gray market" power supplies are used in the solution, the memory, fan, and other component vendors will not honor their warranties. Unless you are organized to handle increased server failures rates, you don't want these components running in your production environment either.

According to a study in 2013 from the Ponemon Institute, which was sponsored by Emerson Network Power, the average cost per minute for unplanned downtime is now US$7,900. This is a 41 percent increase from the US$5,600 in 2010. For example, in September 2010 Virgin Blue airline's checking and online booking system went down. This failure interrupted the company's business for 11 days and decreased profit by an estimated US$20 million. Virgin Blue's reservation management service provider ended up compensating Virgin Blue for its loss. Our process improves the overall quality of the solution and improves the mean time between failures (MBTF) to increase reliability.

The Benefits of Power Efficiency

Cisco UCS is ENERGY STAR certified. In fact, Cisco UCS has the best power-to-performance ratio in the market, and is 25 percent more power efficient than systems from equivalent white-box original design manufacturers (ODMs) such as Supermicro (Figure 1), according to public SPECpower_ssj2008 results. No white-box vendors, including Supermicro, ABMX, Quanta, Servers Direct, RackMountPro, and Silicon Mechanics, are ENERGY STAR certified. Systems with lower performance-per-watt scores require more power and cooling to perform the same amount

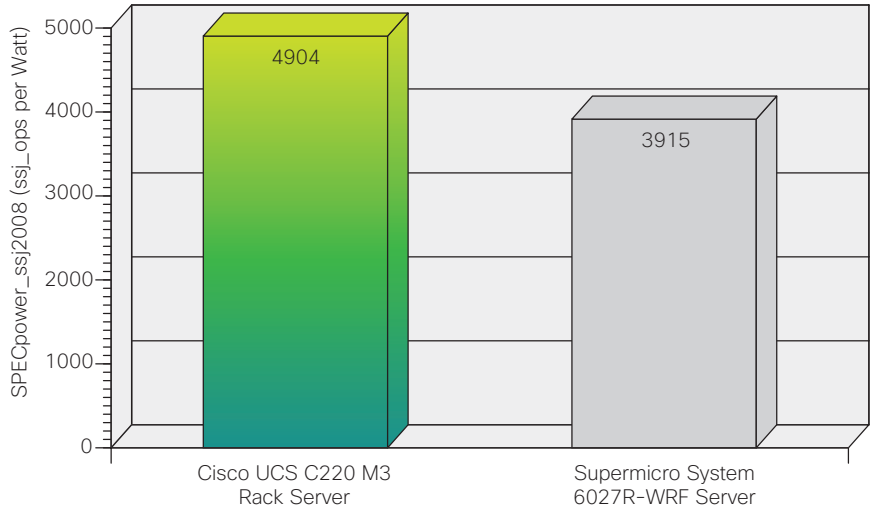

Figure 1. Supermicro Consumes 41 Percent More Power Than Cisco UCS

Note: SPEC Fair Use Rule disclosure condition: At 100 percent target load, the Cisco UCS C220 M3 server achieved 1,443,280 ssj_ops using 261W, and the Supermicro System 6027R-WRF server achieved 1,296,979 ssj_ops using 272W.

of work, leading you to incur higher operating expenses (OpEx) that can quickly offset any capital expenditure (CapEx) advantage.

The Benefits of World-Class Performance

Many people think that all servers based on the Intel reference architecture are the same. This could not be further from the truth. Intel reference architectures are published early and intended only as an initial platform for Intel processors before Intel releases engineering samples of processors to its partners. At this point, the processors are usually not optimized or fully released and typically predate the final production releases of chip sets and CPUs. Servers from white-box vendors, which may be designed to this prerelease reference architecture, are not optimized, not thoroughly tested, and possibly not fault free.

In contrast, Cisco's BIOS and firmware engineering and development team performs certification testing to meet rigorous standards. We work closely with Intel and other tier-1 partners to improve and correct any problems we may find. In addition, we add many features to our server hardware, firmware, and BIOS, such as power savings and fabric resiliency, that improve performance and reliability and are unique to Cisco UCS. This is why Cisco UCS servers are consistently the highest-performing in their class (Table 1), across a broad spectrum of workloads. Cisco UCS has set more than 40 world-record benchmarks on Cisco UCS C-Series Rack Servers and more than 100 total including Cisco UCS B-Series Blade Servers. The white-box vendors rarely perform and publish industry-standard benchmarks because their solutions do not have the performance or efficiency to achieve an acceptable score. On the rare occasions that these vendors do publish benchmark results, they are quickly marked as noncomplaint due to irregularities or noncompliance with the benchmark run rules.

The Need for Security

Cisco's servers are built using the Cisco® Secure Development Lifecycle (SDL). With SDL, Cisco UCS servers must meet two types of product security requirements: internal requirements and market-based requirements. Cisco's internal requirements, or product security baseline (PSB) requirements, focus on important security aspects such as credential and key management; cryptography standards; antispoofing capabilities; integrity and tamper protection; and session, data, and stream management and administration. These features represent the minimum requirements for resilience and robustness, sensitive data disposal, and logging and documentation of services and protocols. Some markets and industries place additional security requirements on our customers. Cisco provides processes, methodologies, and a framework to develop embedded security on Cisco servers, not just a security overlay. Other security-based activities that are part of Cisco UCS server development and testing that occur on an ongoing basis include the following:

- A dedicated Cisco team performs threat modeling and static analysis for the Cisco UCS product portfolio.
- The Cisco Advanced Security Initiative Group (ASIG) seeks to understand how threats enter the system and to fix problems by enhancing hardware and software through the Cisco Defect and Enhancement Tracking System (DETS) and engineering.
- A dedicated Cisco team tests and manages outbound vulnerabilities and communicates as security advisors to customers.

Table 1. Cisco UCS Delivers World-Class Performance with More Than 100 Records Across a Wide Range of Workloads

CPU	Virtualization and Cloud	Database	Enterprise Application	Enterprise Middleware	High-Performance Computing
23	**17**	**7**	**17**	**18**	**18**

- All underlying Linux kernels are checked against PSB requirements, which govern security standards for Cisco products.
- Cisco performs penetration and protocol robustness testing on all Cisco UCS releases.

The Importance of Robust Management Features

White-box vendors do not invest in management or performance tools. Their primary market, the hyperscale customers, are left to create and deploy their own management tools. We let you choose the level of management you need. To manage standalone rack servers, we provide the Cisco Integrated Management Controller (IMC), which is embedded management software that comes free with every Cisco UCS rack server to provide network-based access to every aspect of server management. Cisco IMC control spans the power state; firmware revisions; and remote keyboard, video, and mouse (KVM) devices. Cisco UCS C-Series servers provide up to three management interfaces that can be accessed by in-band or out-of-band tools and techniques (Figure 2). The out-of-band management interfaces supported include:

- Intelligent Platform Management Interface Version 2 (IMPIv2)
- Simple Network Management Protocol Version 3 (SNMPv3)
- Command-line interface (CLI)
- Web user interface
- A powerful open XML API with integration with Microsoft System Center Operations Manager (SCOM) and System Center Configuration Manager (SCCM)
- Microsoft PowerShell with Cisco UCS PowerTool
- HP Operations Manager
- Nagios
- Python
- Perl

The IMC's enhanced capabilities include:

- KVM enhancements (power controls, last-boot capture, digital video recorder capability, and chat capability)
- Local storage management using an XML API
- Advanced RAID storage configuration options
- SNMP Phase 4 (plus storage changes)
- Syslog enhancements
- DIMM blacklisting: Phase 2
- Fault-engine history
- Import and export enhancements

Moving up the management chain, the Cisco IMC Supervisor allows you to manage up to 1000 standalone Cisco UCS C-Series Rack Servers from one management pane. It supports bulk discovery and grouping and tagging of systems for monitoring and inventory purposes. The Cisco IMC Supervisor can be used to perform the following tasks for supported servers:

- Inventory collection for managed servers
- Centralized monitoring capabilities for servers and groups

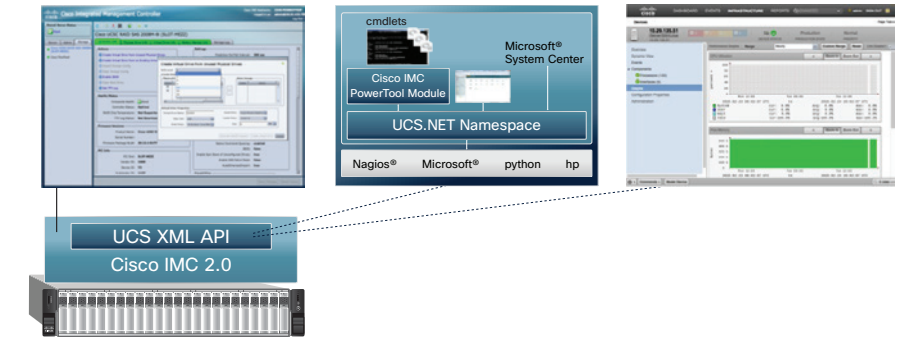

Figure 2. Cisco UCS CIMC Management Can Be Accessed Directly or by Higher-Level Management Tools Through the XML API.

- Firmware management, including firmware download, upgrade, and activation
- Management of server actions, including power control, LED control, KVM launch, and IMC web user interface launch
- Generation and transmission of email alerts for critical faults
- Logical grouping and tagging of servers and presentation of summary views by group
- Role-based access control (RBAC) support to restrict access based on role

In addition, these management capabilities are fundamental to Cisco UCS:

- **Integrated rack and server management:** Cisco UCS Manager is the only server management system that allows you to manage both blade and rack servers from a single interface. It is the first solution to achieve true administrative parity between blade and rack servers, delivering architectural flexibility. In effect, it integrates blade and rack servers into a single unified system. Cisco UCS Manager uses a model-based approach to describe and implement a configuration by associating a model with a server. The model, embodied as a Cisco service profile, is a self-contained description of the entire hardware stack. With Cisco UCS Manager, you can configure server firmware and BIOS settings as well as the type and number of I/O devices. After you have created a model, you can easily apply that model to one or hundreds of servers all at the same time. Like the IMC, Cisco UCS Manager exposes an open XML API for integration with customer and partner management solutions.
- **Global management:** As you scale your Cisco UCS infrastructure, consistent management across possibly globally distributed data centers with global policies becomes increasingly important. Cisco UCS Central Software allows you to manage multiple server instances or domains regardless of where they are located. Cisco UCS Central Software integrates with Cisco UCS Manager and uses it to provide global configuration capabilities for pools, policies, and firmware. It aggregates inventory and fault information to facilitate service assurance across your entire Cisco UCS infrastructure. Cisco UCS Central Software also provides global definition capabilities for policies and resource pools that can be flexibly allocated across distributed data centers. These capabilities allow administrators to use a "define once, deploy many times" workflow for their computing infrastructure.
- **Automation and orchestration:** If you are implementing a cloud environment or infrastructure as a service (IaaS), you can use Cisco UCS Director to bring automation and orchestration to the entire hardware stack. It replaces manual data center provisioning with automated workflows to increase IT consistency and speed. This approach helps your organization respond quickly to new business opportunities. Cisco UCS Director is integrated with both Cisco UCS Manager and Cisco UCS Central Software to help eliminate the need for error-prone manual configuration of your entire infrastructure, including hardware, virtualization software, and operating system software.

The Innovation of Virtual Interface Cards

Cisco virtual interface cards (VICs) are converged network cards (CNAs) that extend the network fabric directly to both servers and virtual machines so that a single connectivity mechanism can be used to connect both physical and virtual servers with the same level of visibility and control. Cisco VICs provide complete programmability of the Cisco UCS I/O infrastructure, with the number and type of I/O interfaces configurable on demand with a zero-touch model.

Cisco VICs support Cisco SingleConnect technology, which provides an easy, intelligent, and efficient way to connect and manage computing in your data center. Cisco SingleConnect unifies LAN, SAN, and systems management into one simplified link for rack servers, blade servers, and virtual machines. This technology reduces the number of network adapters, cables, and switches needed and radically simplifies the network, reducing complexity. Cisco VICs can support up to 256 PCI Express (PCIe) virtual devices, either virtual

network interface cards (vNICs) or virtual host bus adapters (vHBAs), with a high rate of I/O operations per second (IOPS), support for lossless Ethernet, and 20-Gbps connection to servers. The PCIe Generation 2 x16 interface helps ensure optimal bandwidth to the host for network-intensive applications with a redundant path to the fabric interconnect. Cisco VICs support NIC teaming with fabric failover for increased reliability and availability.

The Protection of Validated Designs
Cisco spends millions of dollars, and Cisco engineers spend thousands of hours in the lab, to create Cisco Validated Designs. These documents provide the foundation for efficient solution deployments. They incorporate a broad set of technologies, features, and applications to address your needs. Every design has been comprehensively tested and documented by Cisco engineers to provide you with a deployment guide and best practices to help ensure faster, more reliable, and more predictable deployments.

Understanding Value

Nevertheless, there are good uses for white-box servers: for example, for self-written, monolithic applications designed to distribute workloads over thousands of servers in hyperscale data centers. In other words, white-box servers can be appropriate if you can create and support the complete environment internally.

However, if you are running enterprise applications and you value performance, availability, flexibility, serviceability, scalability, and manageability, you should consider Cisco UCS. Cisco and our partner ecosystem have hundreds of tools to assist you (http://www.cisco.com/c/en/us/support/web/tools-catalog.html), whereas white-box vendors have none—not even a power calculator tool to assist you with power estimates to efficiently allocate costly data center power and cooling resources.

Likewise, for organizations that don't want to create their own big data deployments, we offer Cisco UCS Integrated Infrastructure for Big Data and Cisco UCS Director Express for Big Data. Cisco was the first to publish big data TPCx-HS benchmark results. Being the first to publish demonstrates the performance and scalability and enterprise readiness of Cisco UCS Integrated Infrastructure for Big Data. We make it easy for you to deploy business solutions, including big data, with flexibility and scalability. Unless you are prepared to deploy a team of specialized engineers to make your white-box environment work for your business, you will be burdened with inefficient deployments that greatly increase your OpEx and slow your time to value.

For More Information

See the following for more information:

- Cisco UCS management communities: https://communities.cisco.com/ucsm
- Cisco UCS C-Series Rack Servers product information: http://www.cisco.com/en/US/products/ps10493/index.html
- Comparison of Cisco UCS C-Series Rack Server models: http://www.cisco.com/en/US/products/ps10493/prod_models_comparison.html
- Cisco UCS VIC performance white papers:
  - Cisco UCS VIC 1240 performance with Red Hat Enterprise Linux (RHEL) Version 6.2: http://www.cisco.com/c/dam/en/us/products/collateral/switches/nexus-7000-series-switches/le_34901_pbvic1240wrhel.pdf
  - Storage performance on RHEL Version 6.2: http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/unified-computing/whitepaper_C11-721280.pdf
  - Networking performance on RHEL with Cisco UCS VIC 1240 and 1280: http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/unified-computing/whitepaper_C11-720526.pdf
- Cisco Validated Designs http://www.cisco.com/c/en/us/solutions/enterprise/design-zone-data-centers/index.html
- Data sheets, ordering guides, white papers, and other resources: http://www.cisco.com/en/US/products/ps10493/prod_literature.html
- Installation and upgrade guides: http://www.cisco.com/en/US/

products/ps10493/tsd_products_support_install_and_upgrade.html

- Hardware and software interoperability matrix: http://www.cisco.com/en/US/prod/ps10265/interoperability.html

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- Cisco UCS C220 M3 Result of October 15, 2012: http://www.spec.org/power_ssj2008/results/res2012q4/power_ssj2008-20121002-00552.html
- Supermicro System 6027R-WRF Result of November 14, 2012: http://www.spec.org/power_ssj2008/results/res2012q4/power_ssj2008-20121029-00566.html

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LE-45201-00 04/15