



Dell PowerEdge C6105 Server Delivers Hyperscale Computing for Cloud Hosting, HPC & Shared Environments

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Introduction

The rapid emergence of Web 2.0, cloud hosting and high performance computing (HPC) environments is spurring demand among mainstream businesses for hyperscale data centers that conserve organizations’ resources while maximizing performance and lowering operational expenses.

In these types of hosted and shared infrastructures, the inherent capability of the server to deliver core count, power efficiency and serviceability are more important than raw compute power. And the new [Dell PowerEdge C6105](#) server, featuring the [AMD Opteron 4100 Series](#) processor does just that.



Organizations across a wide variety of vertical markets including government agencies, universities, legal, healthcare and finance, to name a few, have a pressing need for robust servers that deliver cost effective, high density performance gains while consuming less power, lowering utility costs and conserving physical space in the data center. Businesses also require that new server hardware be non-disruptive, easy to deploy and manage in support of Web 2.0, cloud hosting and HPC applications. And they want a cost effective entry level price point that is affordable for all levels of businesses.

Dell™ PowerEdge™ C6105 and the AMD Opteron™ 4100 Series Processor: Optimized Shared Infrastructure

Emerging Web 2.0, private and public cloud hosting and HPC networked environments differ from traditional, legacy premises-based scale-up networks which rely on raw compute power. In contrast, the nascent Web 2.0, cloud hosting and HPC environments utilize a virtualized, shared architecture.

Dell specifically engineered the PowerEdge C6105 server, with the AMD Opteron 4100 Series processor, for use as a hyperscale server in virtualized Web 2.0 and cloud hosted scenarios. It addresses the evolving needs of data centers for a “lean, mean,” power efficient server. The Dell PowerEdge C6105 also delivers consistent, reliable performance, excellent manageability and serviceability.

The Dell PowerEdge C6105 server is also aggressively priced. Based on the AMD Opteron 4100 Series processor, the world’s lowest power-per-core server processor¹, it is designed to help cost-conscious, mainstream businesses achieve operational cost efficiencies and lower their Total Cost of Ownership (TCO), while having access to the same features and functions as some of the world’s largest cloud computing environments.

Dell drew upon its lengthy experience and extensive knowledge of cloud computing infrastructure architectures to design the PowerEdge C6105 server. Dell’s client roster includes 20 out of the top 25 most heavily trafficked Internet sites and four of the top five global search engines. Over the last three years, Dell’s Data Center Solutions (DCS) group has custom–designed infrastructure solutions for the top global cloud service providers and hyperscale data center operators. They understand the needs, issues and challenges facing organizations. Dell found that the custom implementations they did for very large enterprises have broad applicability for scale-out small to midsized businesses (SMBs) and small to midsized enterprises (SMEs).

According to Steve Croce, Dell’s C6105 product marketing manager, Dell developed a “scale-out” approach to ensure that even a small amount of savings in power, cooling, cabling, fans and racks multiplied across a large number of servers, will yield significant, immediate and ongoing operational cost savings.

The inherent features and functions in the AMD Opteron 4100 Series processor are an ideal complement to the Dell PowerEdge C6105 server says, Margaret Lewis, AMD’s product marketing director.

“The Dell PowerEdge C machines are purpose-built servers, designed for HPC, Web 2.0, data analytics, gaming and cloud building. They are well-suited for rack deployments and large homo-

¹AMD Opteron™ processor Models 4162 EE /4164 EE have the lowest known power per core of any server processor, at 5.83W (35W/6 = 5.83W/core). Intel’s L5609 is 10W/core (40W/4 cores) see http://www.intel.com/p/en_US/products/server/processor/xeon5000/specifications.



geneous cloud/cluster application environments where the software stack provides primary platform availability and resiliency,” Lewis says.

Like the Dell™ PowerEdge™ C6105 server, the AMD Opteron™ 4100 Series processor is designed for efficiency.

“A move to cloud computing, HPC and Web 2.0 is a move to a more utilitarian computing style,” Lewis observes. “This is not about bigger and faster; it’s about taking core capabilities like performance and power consumption and refining them to give businesses solid functionality and the ability to conserve power,” she adds.

The AMD Opteron 4100 Series processor code named “Lisbon” that runs in the Dell PowerEdge C6105 server, improved on the preceding version of the processor platform without adding more cores. This helps make it [more efficient](#) in terms of power management, which is a key design consideration for cloud hosters.

Lewis likens the Dell PowerEdge C6105 server to buying a house where you can live comfortably rather than buying a mansion that has 10 rooms that you only use once a year.

“It’s nice to have a house with lots of rooms but you still have to heat, cool and maintain them on a regular basis. You can buy a processor with lots of cores and memory lanes and it’s great for the occasional peak usage. But if it’s not utilized most of the time, it’s very expensive and not necessarily cost justified,” Lewis says.

PowerEdge C6105 Server Reduces Cost, Improves Management and Performance

The Dell PowerEdge C6105 server based on the AMD Opteron 4100 Series processor is designed to deliver:

- Ultra low power environment
- Decreased utility costs
- High level power management features
- Efficient I/O and larger fans in the server
- Higher density, more space efficient rack design that cuts down on physical data center space
- Highly manageable and easy to service device
- Convenient, user-friendly form factor

The Dell PowerEdge C6105 with the AMD Opteron 4100 Series processor is designed to be one of the core foundation building blocks for high-performance cluster computing (HPCC), Web 2.0 environments, and public and private cloud infrastructures.

“The PowerEdge C6105 lets users right-size their servers for their applications,” Croce says.

A key tenet of AMD Opteron 4100 and 6100 Series processors is the consistency of architecture and features across the entire product line for 1 processor, 2 processor and 4 processor servers.



Organizations that deploy the Dell™ PowerEdge™ C6105 can take advantage of this consistency, standard features and performance across Dell AMD technology-based servers. This enables IT managers to update their servers simultaneously; saving precious manpower resources and time. And it also helps cut down on the errors associated with continually having to continually apply updates. One of the most notable features of the Dell PowerEdge 6105 chassis is its ease of use and serviceability. Hot plug hard drives are in the front, making it a simple matter for IT managers to swap out drives without requiring them to take the server offline.

All of the aforementioned features and technology help drive better value by making server management tasks easier, notes Dell's Croce.

"The PowerEdge C6105 server powered by AMD processors is focused on power efficiency, space efficiency, performance per dollar and manageability. It enables users to worry less about the budget and more about their businesses because they can achieve superior performance per watt, per dollar," Croce says.

Corporations are increasingly focused on improving server performance, realizing greater management efficiencies as they expand their virtualized environments and transition to cloud infrastructures.

At the same time, organizations and their IT departments are searching for ways to cut ongoing operational expenses, lower Total Cost of Ownership (TCO) and accelerate Return on Investment (ROI).

The Dell PowerEdge C6105 server with the AMD Opteron™ 4100 Series processor achieves those goals by providing organizations with a well balanced system that features computational power, low power consumption, superior access to memory and excellent I/O capability at an aggressive price point.

The PowerEdge C6105 server is a 2U, 4-node server where each node is a 2-socket AMD processor-based server that delivers a low TCO and high power efficiency for scaled out applications in a maximum-density chassis. It features hot-swap server nodes and hard disk drives along with redundant power supplies, making it ideal for energy and budget constrained scale-out environments. This enables organizations to get the high performance compute power they need to support emerging cloud hosting and Web 2.0 environments, while at the same time reducing space requirements, energy consumption and utility costs.

The Dell PowerEdge C6105 is based on a shared infrastructure design. The PowerEdge C6105 enables multiple systems in the same chassis to share power supplies, metal and cooling. This helps drive scale and cost efficiencies, enabling businesses to see real performance gains, while consuming less power and conserving precious real estate.

In addition, the PowerEdge C6105 chassis is more robust and it incorporates larger, more efficient fans than a comparable 1U server. The fact that it shares power supplies, also serves up economies of scale. The PowerEdge C6105 server draws less power, meaning that organizations have lower cooling requirements, and helps organizations reduce their utility bills and lower their carbon footprints. It also fits in nicely with the increasing emphasis on green data center initiatives, Croce says.



Dell™ PowerEdge™ C6105 Server Improves Performance, Power Efficiencies

Dell's PowerEdge C6105 will be among the first servers to use the AMD Opteron™ 4100 Series processor. The new AMD Opteron 4100 Series processors set the foundation for data intensive virtualized server and cloud workloads. AMD says it has leapfrogged its own leading-edge power efficient server processor design by being the first chip vendor to break the 6 watt/core barrier. This enables organizations to double the number of servers, within the same power budget compared to prior generations of AMD Opteron processors. According to internal AMD benchmark tests, the AMD Opteron 4100 Series EE processor draws as much as 26 percent less power than the prior version.² And, it features up to 15 percent greater performance over the prior six-core AMD Opteron processor which was released in the second half of 2009.

The AMD Opteron 4100 Series processor incorporates a full slate of power efficiency features including sleep states on idle, power capping, thermal awareness and low voltage memory support. All of these features help conserve power and improve performance.

The Dell PowerEdge C6105 servers help organizations and IT departments to achieve improved economies of scale and make the most of their resources without the disruption that typically accompanies new technologies.

AMD Opteron 4100 Series Processor — Optimized Performance for Cloud Hosting and Web 2.0

The AMD Opteron 4100 Series processor incorporates AMD-P 2.0, which helps to make it the lowest power per core processor (32 watt/6 core) currently available in the market. The AMD Opteron 4100 Series processor is built from the ground up to be the most power efficient and power-per-core efficient CPU available. The CPU specifically targets the very broad base of customers who are contemplating a move to a cloud infrastructure for their diverse computing needs and require a CPU that is powerful enough to handle data intensive workloads without being power-hungry.

AMD-P technology is a suite of power management features that are designed to drive low power consumption, support many users, a large number of transactions and resource-intensive applications without compromising performance or causing utility costs to skyrocket. The AMD-P technology is an ideal complement to Dell's energy smart architecture.

The AMD Opteron 4100 Series processor also features AMD Virtualization™ 2.0 (AMD-V™) technology. AMD-V 2.0 is a set of hardware extensions to the x86 system architecture that helps

² As Compared to previous generation Six-Core AMD Opteron™ EE processor-based system. Source: AMD internal performance and power measurements running a java-based workload.

CONFIGURATION INFORMATION:

Six-Core AMD Opteron processor Model 2419 EE based platform: Processor – 2x AMD Opteron processor Model 2419 EE; Motherboard – Tyan 8208 (R05), BIOS v.12; Memory – 6x 4GB RDDR2 667 DIMMs; Power Supply – 3Y Power Technology YM-2415C

AMD Opteron processor Model 4162 EE based platform: Processor – 2x AMD Opteron processor Model 4162 EE (pre-production EVT); Motherboard – Tyan 8228 (R01), BIOS v0.05 0212b; Memory – 6x 4GB PC3-8500 CL7 1.35v LV RDDR3 1066 DIMMs; Power Supply – 3Y Power Technology YM-2415C

Workload: Server-side java, 100% load-point, Microsoft® Windows Server® 2008 R2 Enterprise Edition (64-bit), Balanced Profile Enabled

Power Measurement: Yokogawa Electric International Pte. Ltd. Model WT210, Power data captured every 1 second over duration of workload

Thermal Environment: Digi International Inc. Model Watchport/H temperature sensor, Power data captured at an ambient temperature of 22.6C



organizations better utilize resources to make servers, clients, and data centers more effective. AMD-V™ 2.0 technology features Rapid Virtualization Indexing (RVI) which accelerates the performance of many virtualized applications by enabling hardware-based virtual machine memory management. Another crucial capability is AMD-V 2.0 Extended Migration which assists virtualization software in enabling the live migration of virtual machines among all available AMD Opteron™ processor generations. This live migration feature provides a tangible advantage for businesses because it obviates the need for IT to take servers offline to perform migrations, thus conserving time, money and resources. Also included is I/O virtualization that allows direct device access by virtual machines (VMs) bypassing the hypervisor for improved application performance and better isolation of virtual machines for enhanced integrity and security.

Making the TCO and ROI Case for Dell/AMD Power Efficiency

The hallmarks of the AMD Opteron processor-based Dell™ PowerEdge™ C6105 are high performance and energy efficiency, packed into a dense, but space efficient form factor.

This is something that customers like Justin Giardina, CTO at Iland Cloud Infrastructure www.iland.com, appreciates. Giardina notes that the PowerEdge C6105 is a good fit with the Iland's private cloud offerings. When customers order up a private cloud, Iland deploys a dedicated VMware virtualized infrastructure. "These types of servers help here because they can provide a four-node VMware ESX cluster in 2Us of space, and they only use 3 amps," he says. "Our traditional model might use 8Us and 8 to 12 amps. It's an excellent ratio."

Overall performance improvements, combined with low power consumption and a small, denser form factor, such as the Iland example above, results in maximized reliability and uptime. This in turn, translates into low TCO and accelerated ROI.

Quantifying the Cost of Downtime³

Nearly three-quarters or 74 percent of all businesses say they require a minimum of 99.9 percent network uptime and availability of crucial resources or better. Three "nines" or 99.9 percent uptime is the equivalent of 8.76 hours of per server, per annum downtime. And of that figure, some 40 percent of organizations say their business needs demand very high availability, as much as four or five nines of uptime (99.99 percent, 99.999 percent). Four nines of downtime (99.99 percent) equates to 4.38 hours of per server, per annum unavailability, while five nines (99.999 percent) offers near continuous availability with just .00876 minutes of annual per server downtime.

While many organizations lack the ability to quantify the cost of downtime until after they've suffered an outage, it is possible to use specific examples of hourly downtime to determine the cost of downtime. So for example, if one hour of per server downtime costs a company \$5,000 (US), then a single server that delivers 99.9 percent uptime or 8.76 hours of downtime each year would cost the company \$43,800. By contrast, a company that estimates the cost of one hour of per server downtime to be \$25,000 would see a monetary loss of \$219,000 (US) associated with that one server; multiply that by five (5) servers and the losses would skyrocket to \$1,095 million (US).

³According to a June 2010 independent survey of 400+ organizations worldwide conducted by Information Technology Intelligence Consulting, in Boston, MA.



Conclusions

The Dell™ PowerEdge™ C6105 system equipped with the new AMD Opteron™ 4100 Series processor is ideal for server virtualization, cloud hosting and Web 2.0 environments. It is designed to deliver:

- Ultra low power environment
- High-level power management features
- Greater ease of use and management
- The ability to help organizations reduce their carbon footprints and achieve a “greener,” more environmentally friendly environment
- Higher densities resulting in less space in the corporate data center.

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