



Designing for hyperscale computing

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Created for hyperscale environments such as private and public clouds, Web 2.0 and online gaming infrastructures, and high-performance computing, Dell™ PowerEdge™ C-Series servers provide outstanding performance in a dense, streamlined, eco-efficient design.

For many organizations building hyperscale IT infrastructures, their data centers are their factories in Web 2.0, online gaming, search engine, and high-performance computing (HPC) environments. Running hundreds or thousands of servers, these organizations need to maximize data center efficiency at every turn. With each infrastructure decision, these organizations are keenly aware of the implications for their bottom line.

To help maximize efficiency and reduce the cost of these hyperscale environments, organizations often require something different than traditional general-purpose servers. They need streamlined systems without the extensive management tools, enterprise storage options, or same-day support contracts typically included with standard servers. At the same time, they need high-performance hardware with a dense, energy-efficient design that can help them save on power, cooling, and space. Dell PowerEdge C-Series servers can address these requirements—helping to decrease total cost of ownership with a dense, streamlined design that was purpose-built for scale-out environments.

Understanding hyperscale computing requirements

Hyperscale environments have hardware requirements that are distinct from traditional data centers. Because these environments have focused uses, organizations do not want to pay for capabilities they do not need. For example, because high availability in hyperscale environments is typically achieved primarily through software, organizations do not need many of the redundant hardware components or availability tools included with other servers. In addition, these organizations do not typically use same-day parts replacement services; instead, they typically have on-site parts kiosks they can use to service multiple systems during regularly scheduled maintenance windows.

At the same time, organizations with hyperscale environments want to accelerate access to the latest technology. They do not want to wait for software components to be updated or hardware components to be validated to gain access to the latest processing architecture. Because the environment has a single focused use, they do not need broad support for a range of operating systems or support for legacy software.



Fast access to high performance

In designing the Dell PowerEdge C-Series, Dell has built on the knowledge gained by producing custom servers for large organizations running hyperscale environments. For example, the PowerEdge C6100 shares several attributes with a customized server that the Dell Data Center Solutions (DCS) team created for R Systems, a high-performance computing (HPC) resource provider.

When a new customer requested a particular large-scale HPC cluster for a rapidly approaching product launch, R Systems needed to find a way to accommodate both the new customer and the company already using that cluster. The R Systems team decided to upgrade a second cluster and migrate the existing customer to that upgraded cluster. R Systems needed dense, energy-efficient servers equipped with the latest Intel® architecture, but without the redundant hardware components and software features supplied with existing PowerEdge models.

Dell PowerEdge C6100: 2U design housing four two-socket server nodes with shared infrastructure



“The Dell DCS group was able to produce the servers more quickly without having to integrate some of the typical software components. By eliminating redundant power supplies and other components that are unnecessary in our particular deployment model, Dell DCS created a server with an extremely compact form factor.”

—Brian Kucic

Vice president of business development at R Systems
October 2009

R Systems worked with the Dell DCS team to design and produce a streamlined server that would deliver the required performance, energy efficiency, and density. The servers feature four nodes in a 2U rack space—a shared infrastructure design that was subsequently adopted for the PowerEdge C6100 server. Each node includes two processors from the Intel Xeon® processor 5500 series.

Because R Systems did not need many of the software components included with general-purpose servers, Dell was able to produce compact servers quickly, without requiring R Systems to wait for software validation on the Intel processors. R Systems was able to accommodate both customers by the launch deadline. The upgraded cluster provided the existing customer with a 200 percent aggregate performance increase using half as many nodes as the other cluster, and the dense, energy-efficient servers helped R Systems control operational costs while conserving data center space for continued expansion.



Up close with the PowerEdge C-Series

In this video walk-through, Dell solutions architect Rafael Zamora gives an up-close look at the first three systems in the PowerEdge C-Series line.

youtube.com/watch?v=EcIXX7vj-8s

| | PowerEdge C1100 | PowerEdge C2100 | PowerEdge C6100 |
|---------------------------------|--|--|--|
| Form factor | 1U | 2U | 2U |
| Sockets | Two | Two | Two per node |
| Memory | Up to 18 Double Data Rate 3 (DDR3) modules | Up to 18 DDR3 modules | Up to 12 DDR3 modules per node |
| Hard drives | Up to four 3.5-inch or ten 2.5-inch disks | Up to twelve 3.5-inch disks plus two internal SSDs (with support for up to twenty-four 2.5-inch disks expected in the near future) | Up to twelve 3.5-inch or twenty-four 2.5-inch disks |
| PCIe 2.0 expansion slots | Three (one x16 slot and two custom daughtercard slots providing SAS and 10 Gigabit Ethernet support) | Four (two x8 slots and two daughtercard slots providing SAS and 10 Gigabit Ethernet support) | Two per node (one x16 slot and one x8 mezzanine slot providing internal SAS, internal RAID, 10 Gigabit Ethernet, and InfiniBand support) |

Figure 1. Key features of Dell PowerEdge C-Series servers

These organizations also want to maximize hardware density: IT professionals who are building hyperscale environments are thinking large, but they do not have endless supplies of power, cooling, or space. They need to maximize the number of nodes within the limitations of the physical infrastructure. (For examples, see the "Fast access to high performance" and "Greener cloud computing" sidebars in this article.)

Introducing Dell PowerEdge C-Series servers

Dell PowerEdge C-Series servers were created as the result of experience gained by the Dell Data Center Solutions (DCS) team. DCS works with large organizations that need customized servers and support for their hyperscale environments. Through these engagements, DCS has learned firsthand what types of features and characteristics enterprises find essential—and which are unnecessary—in a hyperscale infrastructure. PowerEdge C-Series servers help organizations address the requirements of hyperscale environments without customized designs.

PowerEdge C-Series servers offer a streamlined approach for targeted hyperscale environments. For these servers, Dell has removed the redundant hardware, broad OS support, and same-day parts replacement that these organizations do not need, helping provide the requisite performance levels in dense, energy-efficient configurations.

These servers also allow organizations to gain fast access to emerging technology, instead of waiting for customized solutions or traditional general-purpose servers (with their additional features and extensive OS support). IT groups can deploy focused hardware, capitalize on robust Dell services and support, and even select targeted solutions that help further simplify deployment.

The PowerEdge C-Series comprises three models: the PowerEdge C1100, the PowerEdge C2100, and the PowerEdge C6100. Each can be equipped with processors from the Intel Xeon processor 5500 series or Intel Xeon processor 5600 series; a variety of hard drive types, speeds, and capacities, including Serial Attached SCSI (SAS) drives, Serial ATA (SATA)



Greener cloud computing

By working with software-as-a-service (SaaS) providers worldwide, Dell has had firsthand experience providing these businesses with compact, energy-efficient servers that facilitate simplified management. When Swedish SaaS provider NAB Solutions needed to refresh its cloud environment, its administrators decided to implement a virtualized infrastructure. For this midsize business, it was imperative to use a hardware platform that could conserve data center space for future growth, minimize administrative complexity, and reduce the costs and environmental impact of IT.

NAB Solutions switched to a Dell hardware platform and adopted Dell PowerEdge blade servers for the cloud environment. Each blade includes four multi-core AMD Opteron™ processors and supports the large memory capacity needed for running multiple virtualized servers on each physical host.

“Our new Dell environment has cut power consumption by half. Increasingly, companies will only work with suppliers who can prove they are truly committed to sustainability. Besides the cost savings, green IT is important in helping drive new business.”

—Jörg Wiesemann

Project manager and infrastructure specialist
at NAB Solutions
June 2009

By creating a virtualized environment with a dense hardware platform, NAB Solutions was able to reduce the size of its cloud infrastructure by nearly 87 percent, leaving data center space for future growth. The virtualized environment has also helped simplify key administrative tasks, such as provisioning new servers or moving applications from one physical server to another during maintenance. By using a reduced number of highly energy-efficient servers, NAB Solutions has lowered its power consumption and created an environmentally friendly IT environment.

drives, and solid-state drives (SSDs); and flexible PCI Express (PCIe) 2.0 I/O options (see Figure 1). A standard baseboard management controller with Intelligent Platform Management Interface (IPMI) 2.0 support helps simplify and streamline ongoing systems management.

Each model is suited for different types of environments. The PowerEdge C1100 is designed to deliver outstanding performance and a large memory footprint in a 1U form factor, and can be especially useful for applications that cache massive quantities of data in memory, including search engine, Web analytics, and Web 2.0 applications. The PowerEdge C2100 builds on the PowerEdge

C1100 with a 2U design that supports increased storage capacity, and is geared toward search engine, Web analytics, distributed database, and private or public cloud computing environments.

For maximum density, the PowerEdge C6100 offers a shared infrastructure design with four independent server nodes in a 2U form factor. Optimized for focused environments with hyperscale application workloads, the PowerEdge C6100 provides exceptional compute performance, a large memory capacity, and an eco-friendly shared chassis that helps to reduce the overall weight, power, and cooling requirements for the four nodes. This model is designed to provide twice the density



Explore cloud computing with Dell IT Consulting services

The Dell IT Consulting team can work with organizations that are considering a move to cloud computing, helping them to understand the potential advantages of building a cloud infrastructure and establishing a road map for change.

- **Cloud Workshop:** In a one-to-one format, IT Consulting introduces organizations to private clouds, public clouds, hybrid models, and related concepts such as software as a service (SaaS), explaining the advantages of adopting a cloud approach.
- **Cloud Assessment:** IT Consulting examines current applications and workloads, reviews the current state of the infrastructure, and provides an assessment for cloud computing approaches. The consultants then produce a road map with customized recommendations and strategies that include integrated cloud hardware and software.
- **Cloud Design and Implementation:** IT Consulting streamlines the path to cloud computing and helps reduce costs by recommending, procuring, and deploying a suitable combination of technologies for a tailored cloud implementation.



Compelling clouds

Performance and reliability are essential for the successful delivery of cloud computing services. In this case study, read how Swedish company City Network Hosting deployed virtualized Dell PowerEdge blade servers and Dell EqualLogic storage to create an efficient, reliable, scalable platform for its new cloud offering.

dell.com/downloads/global/casestudies/2010-city-network-10008302.pdf

of traditional 1U servers and is well suited for many hyperscale environments, including HPC clusters. In addition, the PowerEdge C6100 helps simplify service: unlike some comparable shared infrastructure servers from other vendors, all nodes in the PowerEdge C6100 are hot-serviceable, enabling administrators to power down any one node without affecting the availability of the other nodes in the system.

Tailoring support with Dell Services

Organizations can capitalize on services developed specifically for PowerEdge C-Series servers as well as many of the same support options available for standard PowerEdge servers. For example, the Dell Configuration and Deployment Rack Integration Services

program was designed for organizations using PowerEdge C-Series servers, and helps accelerate deployment of hyperscale infrastructures by racking, stacking, and cabling servers before shipping them. Organizations receive fully assembled racks that are ready to be powered up. This service also provides rack configuration documents with configuration details that help significantly reduce implementation time.

Organizations can also select from a wide range of Dell Support Services options to help standardize the maintenance of their Dell infrastructures. The Basic Support option provides entry-level hardware support and includes call-in assistance during business hours only. Dell ProSupport for IT is available for 24/7 professional-level hardware and software support

that includes the ability to fast-track dispatch parts and labor, bypassing basic troubleshooting.

Enterprise-Wide Contract is an enterprise-level support service that provides a designated services delivery manager who facilitates proactive planning and reporting to help organizations maximize the uptime and performance of their Dell infrastructures. Organizations can also select self-maintenance options geared toward large-scale enterprises, including on-site parts kiosks for immediate access to replacement parts, periodic on-site maintenance service, and the Dell Online Self Dispatch program. As part of the Online Self Dispatch program, IT administrators can earn a certification to order warranty replacement parts directly from Dell. Dell IT Consulting also offers a comprehensive set of services

to help organizations understand and implement cloud computing in their own environments (see the "Explore cloud computing with Dell IT Consulting services" sidebar in this article).

Accelerating deployment with Dell Cloud Computing Solutions

The upcoming Dell Cloud Solution for Web Applications is expected to be the first turnkey cloud offering that combines software with an optimized architecture powered by Dell PowerEdge servers and a broad range of support services. This solution is designed for organizations deploying Web applications on a private, on-premise cloud as well as telecommunications and hosting organizations looking to build infrastructures for a public cloud. When available, it is expected to deliver the following:

- **Enhanced volatile Web traffic management:**

Load balancing and processor-bursting capabilities allow applications to scale as user demand fluctuates, helping maintain rapid response times.

- **Purpose-built support for Web applications:**

Built-in support for applications written in Java, PHP, Python, Ruby on Rails, and other programming languages helps rapidly deliver virtualized instances that are ready to run Web applications such as Apache HTTP Server or Apache Tomcat.

- **Support for lab to hyperscale deployments:**

Organizations can deploy simple lab clouds for developer workgroups as well as hyperscale production clouds that can scale to hundreds or thousands of virtualized compute instances.

- **Self-service portal:** End users can use a self-service portal to help simplify the process of acquiring compute resources to begin new projects or launch new applications. The portal provides access to compute resources and helps IT departments respond to the needs of the organization as a whole.

- **Physical infrastructure:** Supported hardware platforms include PowerEdge C2100 servers or PowerEdge R710 servers plus Dell PowerConnect™ switches and Dell PowerVault™ storage.

- **Services:** Dell IT Consulting, Configuration and Deployment, and Support Services options have been developed to help organizations plan, implement, and maintain the Dell Cloud Solution for Web Applications.

By combining Joyent cloud software with Dell hardware and services plus an optimal blueprint for creating a private cloud, this solution helps organizations get started rapidly and operate the infrastructure efficiently with highly responsive, on-demand scaling.

Reducing total cost of ownership

Used as a building block for hyperscale server environments, Dell PowerEdge C-Series servers help organizations reduce their total cost of ownership. These servers avoid hardware, software, and support components that are unnecessary in hyperscale deployments, providing a dense, energy-efficient design that packs a tremendous amount of processing performance and memory capacity while helping to reduce power, cooling, and space requirements along with their associated costs. The cloud infrastructure itself is designed to keep costs down by maximizing the utilization of hardware resources. A wide range of service options help organizations simplify deployment and ongoing maintenance so that they can begin to realize the benefits of cloud computing quickly and easily. 



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Learn more



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