



Right-sizing servers for dedicated hosting and Web 2.0 environments

By Tony Stewart

To cost-effectively meet wide-ranging service-level requirements, Dell™ PowerEdge™ C5000 Series microservers offer a mix of performance and power efficiency options that help hosting service providers increase revenue, reduce costs, and simplify operations.

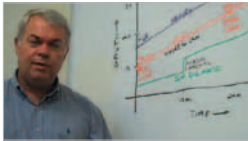
Hosting service providers face a balancing act, finding ways to improve profitability and simplify operations while meeting service-level requirements for their end customers. For example, some customers may want their applications hosted on dedicated physical servers, rather than virtualized servers in a shared cloud environment. Application needs vary, and when it comes to meeting customer needs and reducing costs, a single-size server approach does not fit all organizations.

As business grows, hosting providers may begin to run out of floor space and cooling capacity in their data centers; and they may become power constrained as computing density intensifies. A highly efficient server architecture can avoid costly data center expansions by allowing hosting service providers to deliver increased compute power within the same energy, cooling, and space footprint. These considerations are the genesis of the Dell PowerEdge C5000 Series rack servers for scale-out and hosting service environments.

Paving the way for microserver-based hosting services

The Dell Data Center Solutions (DCS) team worked closely with hosting service providers to create a cost-effective microserver, code-named Fortuna, designed to facilitate hosting in power-constrained environments. This first-generation Dell microserver held 12 single-socket servers in a 2U form factor and was designed to use 20–29 W per server at full load. The compact design enabled the consolidation of seven data center racks into a single rack, and included enterprise features such as 64-bit OS support, virtualization capabilities to easily move workloads across physical servers, and comprehensive baseboard management controller (BMC)–based remote management.





Back to the future

Jimmy Pike, chief architect on the Dell DCS team, explains the rise of lightweight servers for applications that do not require the robust capabilities of advanced servers.

[youtube.com/watch?v=vZyU-gkT_5k](https://www.youtube.com/watch?v=vZyU-gkT_5k)



To meet an expanded range of hosting service provider needs, Dell engineers later built on the knowledge gained in designing Fortuna, heightening processor capability and RAM and workload capacity. The resulting server, code-named Viking, was designed to help hosting and content delivery network (CDN) service providers cost-effectively address space, power, and cooling challenges. Viking provided 8- or 12-server nodes in a 3U chassis; each node was a single-socket server with up to four hard drives, 16 GB RAM, and two Gigabit Ethernet (GbE) ports.

Next, the Dell DCS team moved forward with the development of a microserver designed for a broader range of organizations—beyond those buying thousands of servers at a time. The team's efforts resulted in the introduction of the Dell PowerEdge C5000 Series microservers. Compared to previous generations, PowerEdge C5000 Series servers are designed to handle heavier workloads and offer expanded options that can be important to hosting service providers, including additional storage, a larger memory footprint, virtualization capabilities, and support for error-correcting code (ECC) memory. (For more information, see the sidebar, "Dell and Intel: Joining forces to advance microserver technology.")

Creating the next-generation microserver

The Dell PowerEdge C5220 server can fit up to 12 one-socket servers in a 3U form factor, providing four times the density of conventional 1U server designs. Moreover, this configuration is designed to use four times less floor space and rack hardware than a conventional 1U configuration.

In addition, PowerEdge C5220 servers use shared-infrastructure components to help reduce weight, cost, and number of parts. Server nodes in the chassis share mechanical components, high-efficiency fans, and

redundant power supplies. (For more details about the PowerEdge C5220 server configuration, see the sidebar, "At a glance: The Dell PowerEdge C5220 microserver.")

PowerEdge C5220 microservers are also available in an eight-server configuration that allows room for expansion through a mezzanine card to support Serial Attached SCSI (SAS) drives or 10 Gigabit Ethernet (10GbE) connectivity. The server also provides incremental flexibility, from 4 to 12 server nodes in the chassis. Hosting service providers can add additional nodes as their customer bases grow.

All server nodes in the chassis are cold-aisle accessible. This front-side serviceability provides an advantage for data centers that run at high temperatures to help reduce cooling costs and hot-aisle activity. In addition, hot-swappable power supplies and server nodes help simplify serviceability.

Deploying Dell PowerEdge C5220 servers for hosting services

With its exceptional density, power efficiency, and serviceability, the Dell PowerEdge C5220 server is designed to address the needs of organizations that require the appropriate level of performance, feature set, and reduced cost in step with the following hosting models:

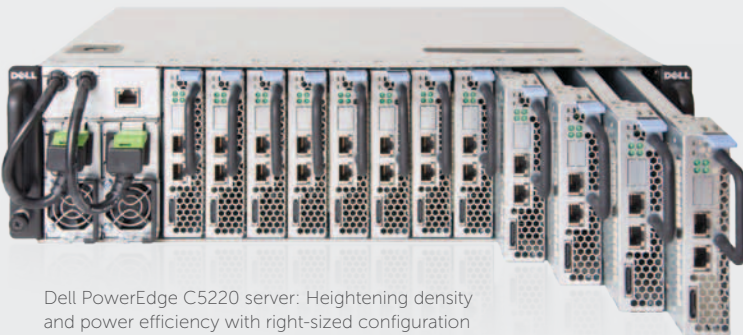
- **Dedicated hosting:** To be competitive with pricing models, hosting service providers need to pack as much compute density as possible into their data centers, while containing power and cooling costs. Dell PowerEdge C5220 microservers also help reduce up-front capital costs by enabling hosting providers to purchase only the necessary initial capacity and then add server nodes as required.
- **Web 2.0 applications:** PowerEdge C5220 microservers are well suited for organizations that deliver static content over the Internet, including



At a glance: The Dell PowerEdge C5220 server

Designed for environments in which maximizing power efficiency and compute density are critical, Dell PowerEdge C5220 servers fit up to 12 server nodes in a 3U form factor. A shared power and cooling infrastructure in the PowerEdge C5000 chassis enhances energy efficiency and helps reduce operating costs. The chassis includes dual hot-plug redundant 1,400 W power supplies and N+1 redundant cooling fans.

Each individual, hot-swappable, and serviceable server node includes one Intel® Xeon® E3-1200 processor, four Double Data Rate 3 (DDR3) unbuffered dual-inline memory modules (UDIMMs), two 3.5-inch or four 2.5-inch hard disk drives, and two Gigabit Ethernet (GbE) ports. For more information, visit dell.com/poweredgec.



Dell PowerEdge C5220 server: Heightening density and power efficiency with right-sized configuration for dedicated applications



Intel and Dell: Why microservers?

Recognizing the power efficiency, density, and cost-effectiveness needs of hosting-provider workloads, here's how Intel and Dell combined efforts to develop advanced technologies and industry standards for microservers.

[youtube.com/watch?v=f7p7rWQJ88s](https://www.youtube.com/watch?v=f7p7rWQJ88s)

Web pages and video streams. Organizations providing these applications typically do not require top compute performance but need high compute density, power efficiency, and hardware cost-efficiency.

- **CDN:** When strategically placed near end users, PowerEdge C5220 microservers help speed access to content and decrease the load on interconnects, backbones, and public and private peer networks. They also help free capacity and reduce delivery costs. Instead of loading all traffic on a backbone or peer link, hosting providers can redirect traffic to these edge servers.

Mapping microserver innovation to hosting models

Business models in the hosting service provider industry are rapidly changing, and cloud-like services are accelerating the pace of innovation. Major industry challenges revolve around increasing revenue, reducing costs, improving profitability, and simplifying operations.

Purpose-built microservers developed by the Dell DCS team offer outstanding compute density and energy efficiency—helping hosting service providers maximize revenue per square foot of data center space while avoiding a corresponding increase in operating costs.

Standardization also helps improve cost-efficiency by enabling microserver manufacturers to enhance flexibility and interoperability. The industry-standard microserver specification released by the SSI Forum offers requirements for server-board form factor and processor, chipset, memory, networking, and system interfaces.

Hosting service and other providers have a wide range of needs. Some require additional processor cores and increased performance. Others need a lightweight server with maximum power efficiency. The standard form factor specified by SSI allows original equipment manufacturers (OEMs) to produce different microserver circuit boards to handle a range of workloads. As a result, system designers can efficiently produce a broad product line within the standard form factor, addressing the various needs of different hosting providers.

Dell and Intel: Joining forces to advance microserver technology

Dell created the Viking microserver platform and the Dell PowerEdge C5220 microserver in close collaboration with Intel, which has played a cutting-edge role in the development of microserver technology. As early as the second half of 2009, Intel saw an emerging need from IT hosting providers and Web 2.0 organizations to find increasingly efficient ways to run their applications. Realizing that these applications could benefit from a low-power, lightweight server that scaled out in a very large manner, Intel started to work on the processor architecture to support these system design form factors.

Intel introduced ultra-low-voltage Intel Xeon processors at 45 W for quad-core and 30 W for dual-core processors to help address the needs of organizations looking to balance performance with a significant low-power footprint. This next-generation processor architecture is incorporated in the Dell PowerEdge C5220 microserver.

Intel and Dell also played a key role in the development of an industry-standard specification for microservers. The initial release of the Micro Module Server Specification was adopted by the Server System Infrastructure (SSI) Forum in 2010.

This standard enables the industry to develop microservers that offer very high levels of flexibility and interoperability.

Working with Dell, Intel created the SSI specification to produce a standard form factor that allows for a wide range of microserver components, which is particularly critical for a relatively nascent sub-segment of the broader server industry.

"To produce a range of different configurations, it's nice to have a standard form factor," says Jason Waxman, general manager for high-density computing at Intel. "That allows many OEMs to produce different boards across a range of different workloads. A system designer such as Dell who wants to reach a breadth of different customer configurations can adapt the best of breed within this form factor."

The SSI specification also gives manufacturers ample room for innovation. This flexibility encourages competition, which in turn offers hosting service providers hardware alternatives. For example, some SSI-compliant microservers might include direct attach storage (DAS), while others may not.

For hosting providers and others who deploy microservers, standards-based hardware can provide a clear path to future generations of technology. Organizations that invest in a standardized microserver platform can expect several generations of infrastructure from that platform.

Right-sizing servers for operational efficiency

The rapid progression of technology enables the processing power of today's server platforms to surpass the needs of many applications. Such is the case for dedicated hosting and other applications that do not require a lot of computing horsepower or advanced feature sets common in some of today's servers. Serving a Web page, for example, is not a complex task.

The Dell DCS team addresses the particular hardware and operational requirements of hosting service providers. Dell PowerEdge C5000 Series microservers are designed from the ground up to heighten data center efficiency and increase revenue per square foot of floor space. By using servers that are right-sized for their applications, hosting providers can make the best use of their computing deployments. **PS**

Author

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Learn more

Dell PowerEdge C Series servers:
dell.com/poweredgec