The intelligent data center

By Paul Steeves and Matt McGinnis

It’s fast. It’s adaptable. And it automates IT infrastructure response to complex service demands so organizations can focus on innovation and growth. Now, 12th-generation Dell™ PowerEdge™ servers raise data center IQ and efficiency to further heights.
However, many organizations find themselves caught in the gap between the strategic vision and the everyday reality. End users are continuing to generate and process massive amounts of data, and powerful business applications are pushing infrastructures to the limits of capacity. Without modernization, the data center is unable to keep up with extraordinarily high expectations of the business and organizational units that IT serves, and productivity may erode as a result. While virtualization and cloud computing approaches offer the scalability to increase capacity on demand, IT organizations also must consider ramifications of increased infrastructure management complexity.

To meet intensifying service-level requirements within the confines of flat IT budgets, decision makers need to leverage advanced data center technologies in the following ways:

• Heighten systems performance to help improve workload and applications output
• Optimize resource utilization and operational efficiency
• Increase flexibility and reliability of supporting infrastructure to enhance throughput capacity, data access, and security

Flexible service delivery is essential to meet the needs of diverse business and organizational units. That flexibility also must be reflected in the supporting infrastructure delivering those services. Otherwise, outdated processes that are not designed to meet evolving needs may lead to inefficiency—and unnecessary expense.

Exploring innovative systems to advance Efficient IT
The latest Dell PowerEdge servers reflect inputs from more than 7,700 customers around the world on what they need to power their business. The result is a portfolio of systems designed to address the biggest challenges IT faces today—and the flexibility to evolve with upcoming technological advancements.

Built to support demanding workloads, 12th-generation PowerEdge servers are engineered with the optimal combination of features and performance scalability for both large and small data center environments. (See the sidebar, “Smart, capable, and well connected.”)

Accelerate performance
PowerEdge servers introduce important innovations designed to improve system performance, increase throughput capacity, and speed data access—enabling data centers to power business applications at peak efficiency and deliver data quickly for valuable insights. Each server is designed with maximum memory as a priority because memory is a crucial component in heightening system performance. Maximized memory helps increase caches, accelerate processing, and expand capacity to support virtual machines.

Accelerated I/O throughput helps reduce bottlenecks to optimize overall performance. Additional expansion slots open up the possibilities for fast data access. To provide the flexibility to choose network speed and preserve infrastructure investments, Dell PowerEdge Select Network Adapters—based on a modular network interface card (NIC) technology—let administrators deploy the desired network fabric without using up a valuable PCI slot. These network adapters allow administrators to select speed, technology, vendor, and other options to meet specific organizational requirements. In addition, Switch Independent Partitioning technology helps maximize bandwidth use across organizations and workloads by dividing a 10 Gigabit Ethernet (10GbE) converged network adapter into eight separate channels to allocate bandwidth where it is needed, when it is needed.

Of course, data is of no value unless it can be converted into insights. To dramatically reduce query times, 12th-generation PowerEdge systems introduce Express Flash, the industry’s first front-accessible, hot-swappable PCI Express (PCIe) solid-state drive (SSD) offering the option of in-box data tiering. Express Flash drives can deliver an increase of up to 10.5 times more Microsoft® SQL Server® transactions per second compared to standard Serial Attached SCSI (SAS) hard drives.

World-class hardware and software RAID provide data redundancy and protection. In addition, the CacheCade data accelerator caches the most frequently accessed data and stores it on SSDs. CacheCade is designed to provide 28 times quicker average query response time while supporting three times more users on Oracle® Database 11g Release 2.
Certain workloads, such as Microsoft Exchange Server messaging and collaboration, perform optimally when using internal storage. The PowerEdge R720xd server can be configured with up to 24 internal hard drives. This enhanced drive density enables administrators to support three times the number of Exchange Server 2010 mailboxes and process twice the number of messages per day compared to the previous-generation PowerEdge R510 server with 12 drives running Exchange Server 2007.

High-performance, many-core graphics processing units (GPUs) in both mainstream tower and rack servers accelerate a wide range of applications such as high-performance computing and virtual desktop infrastructure (VDI). The inclusion of two internal GPUs is designed to speed sustained gigaflops (1 billion floating point operations per second) performance considerably versus an otherwise comparably configured PowerEdge R720 server operating without the added GPUs.

At the heart of a flexible and efficient data center, 12th-generation PowerEdge servers are powered by the latest processors from Intel—the Intel® Xeon® processor E5 family. Designed to deliver the optimal combination of performance, functionality, and cost-effectiveness, the Intel Xeon processor E5 family can power environments ranging from virtualization and cloud computing to design automation and real-time financial transactions. Even demanding workloads typically get a big performance boost compared to prior generations at consistent power levels. Moreover, peak workload demands can break through the performance ceiling with Intel Turbo Boost Technology 2.0, which is designed to enable up to two times more performance than the previous-generation Intel Turbo Boost Technology. To maximize throughput gains, Intel integrated I/O is designed to dramatically reduce latency by providing more lanes and higher bandwidth than previous-generation Intel processors, with support for PCIe 3.0.

Streamline and automate operational tasks
Under constant fiscal pressure, data centers need to heighen efficiency of IT resources, streamline and automate operational tasks, and leverage existing investments to optimal advantage. Twelfth-generation PowerEdge servers help IT organizations improve operational efficiency and boost productivity.

The latest PowerEdge servers are equipped with the Dell OpenManage™ systems management portfolio, which includes the Integrated Dell Remote Access Controller 7 with Lifecycle Controller (iDRAC7). Dell OpenManage is designed to simplify the life cycle of deploying, updating, monitoring, and maintaining PowerEdge servers. In addition, it enables IT administrators to manage Dell servers in physical, virtual, local, and remote environments.

“As an infrastructure-as-a-service provider, we need lots of configuration flexibility to accommodate the wide-ranging needs of our different customers. The Dell PowerEdge R720 server is the ‘Swiss Army knife’ for cloud environments. With so many memory, I/O, and storage options, it lets us tailor the solution to the customer.”

—Alex Rodriguez
Vice president of systems engineering and product development at Expedient
January 2012
"Our OEM customers who build security appliances previously needed expensive, third-party network-processing cards to achieve the required performance for deep-packet inspection tasks. We can help them eliminate the need for those cards by taking advantage of the tremendous performance improvements offered by 12th-generation Dell PowerEdge servers with the future Intel Xeon processor E5 family. Our customers can reduce component costs, enhance energy efficiency, and speed time to market of their solutions using these new Dell servers."

—Austin Hipes
Vice president of technology at Network Engines, Inc.
January 2012

environments, operating in band or out of band, with or without a systems management software agent.

Dell OpenManage integrates and connects to leading third-party systems management approaches, enabling administrators to introduce additional infrastructure while maintaining their existing systems management investment. It also accelerates the deployment and provisioning of systems cost-effectively and efficiently. Moreover, administrators can automate the reconfiguration of replacement parts and streamline many day-to-day operations through the easy-to-use Dell OpenManage Essentials interface.

Advance virtualization
Virtualization is an important design focus for 12th-generation PowerEdge systems. Utilizing powerful processors, large memory footprints, and big I/O pipes, the latest PowerEdge servers provide an outstanding platform for organizations that are looking to consolidate the inevitable server sprawl that results from explosive growth. These servers also offer an optimized platform for organizations that want to centralize operations with a VDI approach, or increase the number of virtualized applications running on a single server. By deploying PowerEdge servers for these environments, IT organizations can utilize industry-leading hypervisors and take advantage of the Dell Virtual Integrated System (VIS) portfolio. With just a few mouse clicks, these advanced technologies streamline management of both physical and virtual assets in complex virtualization environments.

Optimize energy management
Energy efficiency is a key consideration for data centers, and 12th-generation PowerEdge servers offer exceptional efficiency in terms of power and energy. These servers include components optimized for efficient operation and they are engineered for minimum power consumption. Moreover, 12th-generation PowerEdge servers continue to grow the recently introduced Fresh Air program. Fresh Air servers are designed to operate at ambient temperatures that are higher than typical—enabling organizations to save substantially on data center cooling costs.

Dell OpenManage Power Center is another tool enabling 12th-generation PowerEdge servers to heighten data center efficiency. Power Center enables IT organizations to control power at the server, rack, row, or room level. It also allows administrators to collect and aggregate power usage and implement policies for power reduction in response. In addition, Intel Node Manager technology offers fast, proactive power capping—at the millisecond level—to help prevent outages. Because power efficiency and standards-based innovation are becoming increasingly important to enterprises, Intel and Dell are working together to develop and deliver standards-based power management. Dell is the first enterprise server vendor to offer broad support for Intel Node Manager technology across its server portfolio.

Safeguard business continuity
Offering reliability, availability, and serviceability (RAS) features that include hot-swappable fans, disks, and power supply units (PSUs)—and even redundant fail-safe hypervisors for the virtualization environment—PowerEdge servers are designed to keep data centers running with rock-solid reliability.

Security in the virtual age is a complex, multifaceted challenge. PowerEdge servers help protect data from accidental loss or malicious intrusions by incorporating innovative security technology. Dell also offers services from trusted advisors in the security realm, along with a wide spectrum of security and disaster recovery services including assessment, consulting, design, and delivery.

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Visionary engineering in 12th-generation Dell PowerEdge servers creates the foundation for an intelligent, highly adaptive IT infrastructure. Combined with comprehensive management and workload solutions that streamline and automate operational tasks, the latest PowerEdge servers empower organizations to change the economics of their success—driving unprecedented efficiency gains and business results, whatever their business may be.

To heighten throughput capacity, the servers optimize performance scalability, data access, and network flexibility. The latest PowerEdge servers, powered by the Intel Xeon processor E5 family, are designed to reinforce reliability, availability, and serviceability with features such as hot-pluggable fans, disks, and power supply units. A maximum memory footprint supports massive caches and expanded capacity for virtual machines. Many-core graphics processing units (GPUs) help boost application performance ranging from high-performance computing (HPC) to virtual desktop infrastructure (VDI).

The servers also enable big gains in big-data processing by helping to minimize query times with Express Flash PCI Express (PCIe) solid-state drives (SSDs), which also allow in-box data tiering. The CacheCade data accelerator caches the most frequently accessed data and stores it on the SSDs. Dense internal storage options can be configured with up to 24 internal hard drives; exceptional hardware and software RAID features provide data redundancy and protection.

Accelerated I/O throughput and innovative Dell PowerEdge Select Network Adapters allow IT organizations to deploy the preferred networking fabric—including speed, technology, and vendor. Switch Independent Partitioning technology maximizes bandwidth for applications and workloads by dividing a 10 Gigabit Ethernet (10GbE) converged network adapter into eight separate channels.

Moreover, 12th-generation PowerEdge servers integrate the Dell OpenManage systems management portfolio, which also offers a comprehensive approach for addressing energy-efficiency concerns as computing densities intensify. Dell OpenManage Power Center complements energy-efficient component and system-level design by enabling administrators to control power at the server, rack, row, or room level.

### Key features and capabilities

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<th>PowerEdge C6220</th>
<th>PowerEdge M620</th>
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<td><strong>Four independent server nodes</strong> in a 2U chassis with shared infrastructure offer an optimal mix of performance, efficiency, and flexibility for scale-out environments such as HPC, big data, clouds, hosting, and Web 2.0. Eight-core Intel Xeon E5-2600 processors with Turbo Boost 2.0 and dual QuickPath Interconnect links—plus support for 1,600 MHz Double Data Rate 3 memory with four memory channels—accelerate business results.</td>
<td><strong>Designed specifically for data centers where space is at a premium and extreme performance is a must, this half-height, two-socket blade server combines highly scalable, enterprise-class performance with configuration flexibility, efficient network management, and integrated virtualization. The Intel Xeon processor E5 family enables unprecedented compute and memory density, with up to 768 GB RAM per blade.</strong></td>
<td><strong>Providing exceptional compute density in a general-purpose platform, this 1U, two-socket rack server shines in virtualization, HPC, and workgroup collaboration applications. Powered by the Intel Xeon processor E5 family, the server features up to 768 GB RAM balanced with highly scalable I/O. Flexible internal storage and networking options help maximize the number of virtual machines per server.</strong></td>
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PowerEdge R720

This 2U, two-socket rack server excels in application and virtualization environments including data warehouses, e-commerce, VDI, databases, and HPC as a data node. Powered by the Intel Xeon processor E5 family, the server offers up to 768 GB RAM, impressive I/O scaling, and flexible network options. Up to four Express Flash PCIe SSDs enable in-box storage tiering; dual RAID controllers enhance throughput and data security.

PowerEdge R720xd

Built to quickly access vast amounts of data and process data-intensive operations and workloads such as medical imaging and e-mail servers, this 2U, two-socket rack server offers extraordinary internal storage capacity. Powered by the Intel Xeon processor E5 family, it offers up to 768 GB RAM, six integrated PCIe 3.0 expansion slots, impressive storage I/O performance, and flexible network management.

PowerEdge T620

Medium-size organizations get high performance and high availability with room to grow in this two-socket tower. The Intel Xeon processor E5 family, 768 GB RAM, stellar I/O bandwidth, extensive internal storage, and GPUs equip this server for virtualization and workloads such as business analytics, information management, customer relationship management, security management, VDI, seismic rendering, and medical imaging.
At the hardware level, the latest Dell PowerEdge servers are designed to protect data with self-encrypting disks (SEDs), an essential piece of strong infrastructure security. Protection from intrusion is also critical to security, and 12th-generation PowerEdge servers provide signed firmware updates to help prevent accidental introduction of a virus during systems maintenance operations, for example. These servers also provide a way to clear any infrastructure changes or inventory information from the Lifecycle Controller to reset them to the factory configuration.

Intel Xeon processors provide security functions as well, with Advanced Encryption Standard New Instructions (AES-NI) encryption technology for fast encryption and with Intel Trusted Execution Technology (TXT), which helps protect against the introduction of malware.

In addition, data is protected against accidental loss with best-in-class RAID options and leading-edge backup solutions. What’s more, administrators can authenticate the integrity of updates using digitally signed firmware, safeguard access to passwords and certificates with the iDRAC Credential Vault device, and protect access to data at rest with automatic encryption and SEDs.

Building the foundation for intelligent infrastructure

Transitioning to 12th-generation Dell PowerEdge servers as the foundation of an intelligent, adaptive IT infrastructure heightens business agility, application performance, and operational efficiency—enabling organizations to achieve a significant return on their technology investment. Built to easily handle demanding workloads, these next-generation servers are engineered with rich features and performance scalability that elevate productivity through enhanced compute capacity for applications and business services. In addition, 12th-generation PowerEdge servers help simplify management by streamlining and automating operational tasks. Plus, an innovative feature set is designed to deliver security, availability, and reliability that help preserve business continuity and keep business-critical applications and workloads available to a highly mobile workforce around the clock.

“As an IT hosting provider, we are always searching for ways to deliver the performance and reliability our customers demand while also improving the efficiency of our infrastructure. In our testing, we were able to run a large number of virtualized workloads on a single Dell PowerEdge R720xd server equipped with the future Intel Xeon processor E5 family. By standardizing on this new Dell server, we can give customers what they need, accommodate continued business growth, and control our operating costs.”

—John Hamner
Server line product manager at Peer1 Hosting
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Authors

Paul Steeves is a senior marketing manager for the Dell server platform group.

Matt McGinnis is a marketing director for the Dell server platform group.

Learn more

Dell PowerEdge servers: dell.com/poweredge