

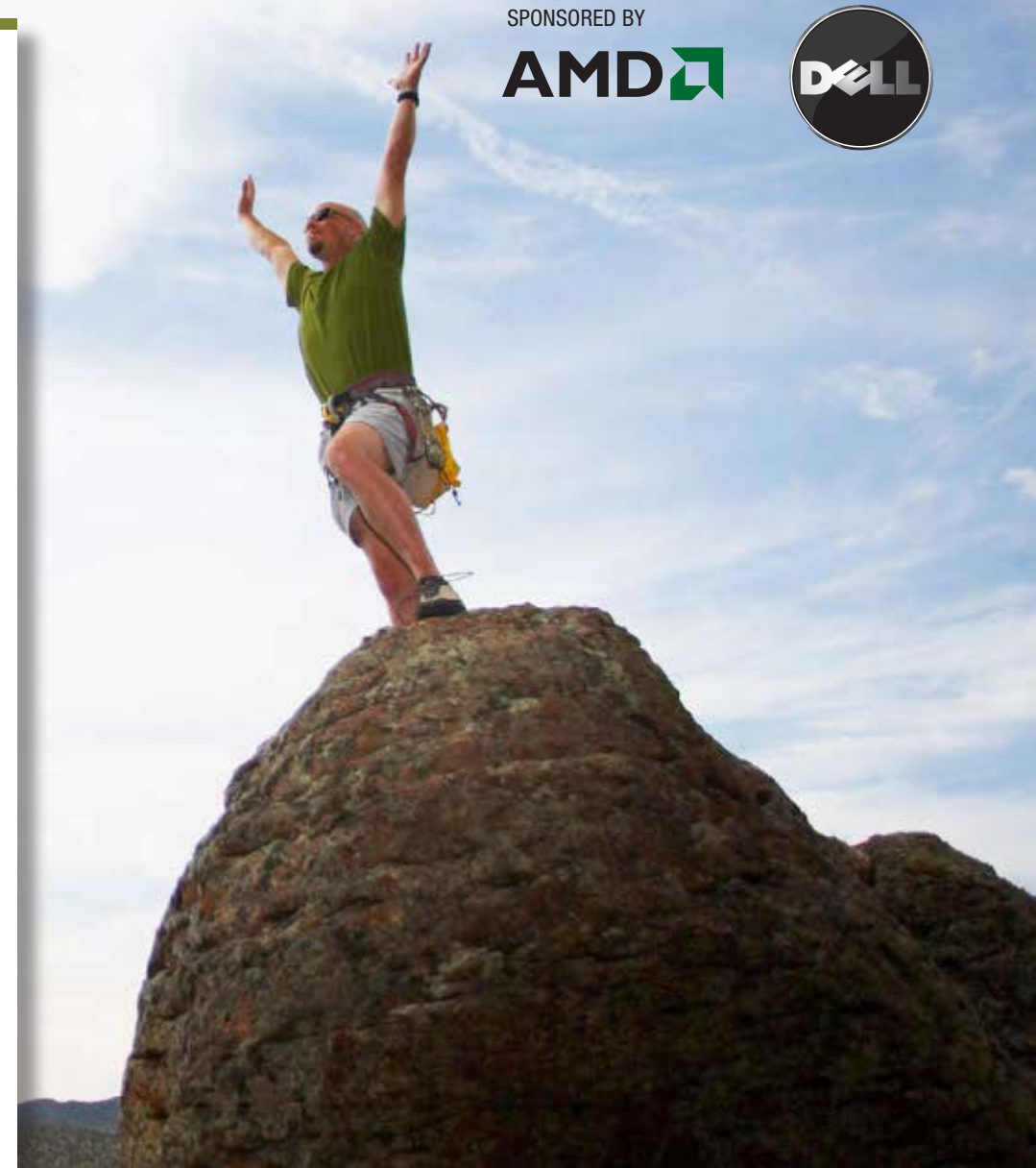
# Virtualization 2.0: Driving To Higher Ground Beyond The Basics

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## Inside

- ▶ **Consolidation.** It took only weeks for a manufacturer to cut its server footprint nearly in half and begin saving more than \$100,000 per year in infrastructure costs.
- ▶ **Virtualization.** AMD and Dell team with Microsoft to showcase the best virtualization can offer with Hyper-V at center stage.
- ▶ **InfoWorld's server reviews:** Dell PowerEdge R805 and R905 servers, based on the AMD Opteron™ processors, are fast, efficient and budget friendly. Reviewers find that Dell servers offer dedicated CPU resources to get virtualization done right.
- ▶ **Deployment optimization.** A solution that is business-ready right out of the box.
- ▶ **A virtualized cloud.** Web hosting firm builds a cloud environment on a foundation of energy-efficient, powerful and reliable hardware.
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- ▶ **Unplugging the mainframes.** Union Pacific downsizes from mainframes to small servers while upsizing agility and competitive edge.





## Case Study: **Metabo** The Right Tools for the Job

German manufacturer cuts server footprint by approximately 47 percent with new data center.

Metabo understands the importance of good hardware. For more than 85 years its tools have been used on construction sites in around 120 countries worldwide, in extreme climates from the arctic to the rain forest. With crucial designs and hardware blueprints moving through its systems, Metabo needs reliable and scalable technology in its datacentres. The company's existing servers and storage were old, unreliable and difficult to administer—with capacity limitations. Frank Sievering, head of IT and processes at Metabo, explains the challenge: "Especially with the older servers, we had to pray that the hardware continued performing well. Maintenance required a lot of effort and external support."

To deliver a more stable and adaptive infrastructure,

Metabo wanted to consolidate its servers and implement VMware® ESX server software in the datacentres. It also wanted to cut maintenance costs by moving to SUSE® Linux Enterprise 10. In addition, Metabo needed an extra layer of security from a new mirrored solution. Sievering says: "If important parts of the datacentre are down for even a few hours our processes shut down too; we're no longer able to manufacture or sell electrical tools and additional products."

Sievering approached different solution providers for help to build an infrastructure and was impressed with Dell's approach. Dell ProConsult, part of Dell Infrastructure Consulting Services, conducted a full system assessment of Metabo's architecture to determine its exact requirements. Dell consultants then provided

### CUSTOMER PROFILE

Company: **Metabo**

Industry: **Manufacturing**

Country: **Germany**

Founded: **1924**

Employees: **2,300**

Web site: **www.metabo.de**

### CHALLENGE

Metabo wanted to build a completely new IT environment at two mirrored datacentres and include virtualization in its infrastructure.

### SOLUTION

Dell worked with Metabo's IT team to build a simplified datacentre based on Dell™ PowerEdge™ blade servers with VMware® and Dell EqualLogic storage.

### BENEFITS

- Data migration completed in weeks
- Server maintenance costs reduced by approximately 66 percent
- Server footprint cut by around 47 percent
- Datacentre management simplified
- Maximum availability guaranteed
- Long-term scalability ensured with Dell servers and storage

## Metabo Case Study (cont.)

Metabo with a testing environment to see how different hardware performed in real-life situations, giving the head of IT and processes valuable data on input/output (I/O) performance. A consultant from Dell recommended Dell™ PowerEdge™ blade servers with a move to an internet small computer system interface (iSCSI) storage solution to simplify operations and cut costs.

Sievering says: “Dell analysed our existing environment—testing our storage and I/O performance requirements. We didn’t see this level of attention from other firms. In addition, most vendors presented us with traditional storage options, but Dell’s approach, with Dell EqualLogic storage, stood out as innovative and progressive in its simplicity.”

For each datacentre, Metabo chose a Dell™ PowerEdge™ M905 blade server with Quad-Core AMD Opteron™ 8300 Series processors to run the company’s SAP Enterprise Central Component (ECC) 6.0 enterprise resource planning software. High performing Quad-Core processors from AMD are essential because of plans to add SAP functionality in the coming months—in the previous environment, this would have been impossible. Six Dell PowerEdge M805 blade servers, housed in a Dell PowerEdge M1000e

“Most vendors presented us with traditional storage options, but Dell’s approach, with Dell EqualLogic storage, stood out as innovative and progressive in its simplicity.”

Frank Sievering, Head of IT  
and Processes, Metabo

modular blade enclosure, representing the platform, are virtualized with VMware ESX server software to create 80 servers that run Metabo’s other applications.

These servers are connected to four Dell EqualLogic PS5000XV storage area networks (SANs), which are mirrored onto a Dell EqualLogic PS5000E SAN for backup purposes. For Sievering, the introduction of two Dell EqualLogic SANs has been a key advancement. “The advantage of the Dell EqualLogic storage is its simplicity and

scalability. When we need more storage capacity, we just connect a new box—there’s no more to it than that. The whole process takes just a few minutes,” he says.

Dell consultants worked on-site at Metabo to deliver VMware and Dell EqualLogic training in the form of workshops for the organisation’s IT teams.

Dell technicians then worked to migrate the company’s applications—the transition taking just six weeks. All of Metabo’s hardware is covered by Dell ProSupport for IT, Mission Critical option with four-hour on-site service. This gives the IT team direct access to Dell Expert Centres, at any time day or night, and a single point of contact for escalation management.

### Environment built for a third of the cost

Even though Dell designed and deployed an entirely new mirrored environment for Metabo, the cost was a third of what it spent on the previous infrastructure. The move from fibre channel based storage to Dell EqualLogic’s iSCSI solution alone has saved the firm 70,000 Euros a year. Dell EqualLogic storage is based on virtualized modular storage architecture, which prevents underutilisation and over-provision-

## VIRTUALIZATION POLL

Where are you currently in your efforts to consolidate your server environment?

- ☐ Determining requirements
- ☐ Evaluating alternative options/solutions
- ☐ Building a vendor selection set
- ☐ Reviewing vendors
- ☐ Seeking funding
- ☐ Received funding
- ☐ Considering replacement of existing installations



[Click here to vote](#)



## Metabo Case Study (cont.)

ing, but allows for easy scalability. Dell engineered an environment for Metabo that is based on simplicity and manageability, but with optimum performance. Sievering says: "Through standardisation, we've reduced the complexity of our datacentres. When the time came to migrate our applications, there was no impact on end-users."

### Virtualization cuts server footprint by approximately 47 percent

Metabo has reduced the number of SAP servers from 15 to eight—six of which are virtualized with VMware ESX server software. Altogether, the company has virtualized 80 servers, enabling Metabo to save space in the datacentre and simplify system management. Sievering says: "It's now easy to add and migrate virtual machines whenever needed. With virtualization, we have more flexibility in the datacentre and no reliability issues."

A key factor in Metabo's decision to work with Dell was its experience of VMware—particularly in load balancing and calculating system capacity. The initial testing that Dell performed for Metabo proved invaluable. Sievering explains: "Dell showed us that we were overestimating demand and capacity.

## How it works

### Services

- Dell ProConsult
- Dell ProSupport for IT (Mission Critical option)

### Software

- VMware® ESX server software
- SAP Enterprise Central Component (ECC) 6.0 ERP software
- SUSE Linux Enterprise 10

### Hardware

- Dell™ PowerEdge™ M805 and M905 blade servers with Quad-Core AMD Opteron™ 8300 Series processors
- Dell PowerEdge M1000e modular blade enclosure
- Dell EqualLogic PS5000XV and PS5000E storage area network (SAN)

Now, we have greater understanding of our capacity requirements, which reduces costs when deploying new applications."

### Blade servers bring simplicity to the data center

Sievering soon saw the benefits that blade servers would bring to Metabo's datacentres. Blade servers offered the perfect solution to Metabo's space-saving and scalability needs, but Sievering was convinced when he saw the performance of Dell's

PowerEdge M805 blade servers with their low power consumption. The M805 blade servers allow quick virtualization with software and built-in secure digital card for embedded hypervisors. Sievering was also impressed with the servers' Quad-Core AMD Opteron processors' performance under virtualization. For example, the processors' Rapid Virtualisation Indexing uses Nested Page Table technology, which allows virtual machines to directly manage memory. Sievering says: "With Dell Power-

Edge M805 blade servers, we have exceptional performance through virtualization, and the power we need for advanced SAP functionality."

### Collaboration with Dell at every stage

With Dell consultants on hand at every stage of the project—from concept development to completion—Metabo has doubled the capacity in its datacentres at a reduced cost. But for Sievering, the value of Dell's commitment to the project is revealed in a variety of ways. "Everything's a lot easier today. For instance, we never have to buy additional network components. Dell understood our requirements, and made sure that we had the right, most cost-effective system, which is also easy to maintain," says Sievering. •



# Partnering for Virtualization

AMD Opteron™ processor-powered Dell servers showcase the power of virtualization at Microsoft® Technology Centers around the globe. [By Tom Farre](#)

A difficult economy puts a premium on cost savings and efficiency in IT operations, including strategic decision-making. That's the idea behind the Microsoft® Technology Centers (MTCs), 18 facilities around the world that help IT and business executives envision, plan, build, deploy, operate and optimize secure, customized solutions based on Microsoft and partner technologies.

"Our MTCs provide leading-edge technology, a team of experts and proven processes to enable sound and cost-effective IT decisions," says Thomas Mathew, director of the MTC in Dallas. "MTCs improve efficiency by shortening the time required to develop strategic business solutions and reducing the total cost of solution acquisition."

The ideas behind the MTCs seem to resonate well with the public. In 2008 the MTCs hosted 33,821 sep-

arate customers and influenced more than half a billion dollars in Microsoft server and services revenue. Microsoft surveys showed that customer satisfaction with the MTCs averaged 8.21 out of a possible 9.

Key to this success is that the MTCs showcase Microsoft's technology in concert with state-of-the-art products from Microsoft's major partners, such as AMD and Dell Inc. Partner involvement helps create real-world solutions involving hardware, software and services that mirror the environment IT executives face every day in their own organizations.

Case in point: More than half of the customers engaging the MTCs show a keen interest in infrastructure consolidation through virtualization, due to its efficiencies in server utilization, energy use and conservation of space in the data center. Microsoft relies on its longstanding alliance with AMD to demonstrate Microsoft Windows® Hyper-V™ virtualization technology on the latest servers powered by AMD Opteron™ processors.

"AMD is honored to be a global technology partner in the Microsoft Technology Centers," says Jim Boak, former vice president of the Microsoft Alliance at AMD.

"We've been collaborating for many years on AMD64 technology, and the MTCs offer an ideal venue for showcasing virtualization solutions to our mutual customers."

## Technical Role-Playing

The power of the AMD/Microsoft combination for virtualization becomes clear in the MTC's Envisioning demonstration, a role-playing strategy briefing that helps IT and business executives envision real-world solutions based on Microsoft and partner technologies. It follows a "day in the life" of Litware, a fictional company, demonstrating what is possible with Microsoft solutions such as Microsoft® Windows Server®, Microsoft Exchange, Microsoft SharePoint®, Microsoft Dynamics CRM and Microsoft SQL Server®, as well as other industry solutions such as IBM Lotus Notes and SAP applications.

The Envisioning demonstration requires 24 virtual servers to run. Thanks to Microsoft Hyper-V and a Dell R905 server powered by four Quad-Core AMD Opteron processors, all 24 virtual servers run on the single system.

"When we talk to customers, we

## Partnering for Virtualization (cont.)

usually note the evolution of the virtualization platform,” says Ben Wolz, technology architect at the Dallas MTC and a specialist in unified communications. “Three years ago, we had 20 virtual servers running on five physical servers, and when Microsoft introduced Hyper-V, we reduced that to three servers. The Dell R905, powered by the latest Quad-Core AMD Opteron processors, enables us to run all 24 virtual servers on a single server with better performance than before.”

The superior virtualization performance is enabled in part by the long-standing AMD/Microsoft technology collaboration. Hyper-V is optimized for hardware-assisted virtualization technology in the AMD Opteron processors (AMD-V™ technology) and is especially beneficial to heavy virtualized workloads such as those of Microsoft Exchange, Microsoft SQL Server and Microsoft Terminal Services. And AMD's Direct Connect Architecture with an integrated memory controller provides Hyper-V with the fast and secure memory access needed in virtualized environments.

**“We always like to showcase leading-edge technology in the MTCs, so we expect to upgrade the Dell R905 to ‘Istanbul’.”**

**Ben Wolz, Technology Architect, Dallas MTC**

There's also the fact that the Dell R905 server is optimized for virtualization. “The R905 features many slots for adding network adapters, which we can take advantage of if we need to scale up our network,” says Wolz, “and it offers vast amounts of memory, which the processors can handle.” The Envisioning server is loaded with 128GB of RAM, enabling each virtual server to be configured with 2GB to 4GB, and more, of RAM. “So much RAM enables us to

fully leverage the power of the combination of the AMD Opteron processor and Hyper-V,” Wolz says.

As with most enterprise data centers, Microsoft has plans for its MTCs that include more processing power. The Envisioning demonstration, for instance, will soon require 30 or more virtual servers. AMD's processor road map supports this direction with its new processor line, code-named “Istanbul” and introduced in

June, that features six cores per processor. “Istanbul” is socket-compatible with the current Quad-Core AMD Opteron processors and features the same electrical and thermal characteristics.

Upgrading the Dell R905 to “Istanbul” processors is a prospect Wolz anticipates with relish. “We always like to showcase leading-edge technology in the MTCs, so we expect to upgrade the Dell R905 to ‘Istanbul’ when it becomes available,” he says. “We're definitely excited about having more processing power in the same energy profile, which should enable us to add more virtual servers without changing our infrastructure. And due to the socket compatibility, if we can upgrade to ‘Istanbul’ with only a BIOS change, we will consider that as well.”

Such ease of upgrading to the latest technology delivers the kind of efficiency and cost savings MTC customers are looking for. The value inherent in AMD's approach would be impressive at any time, but it is especially welcome in a challenging economy in which every dollar counts. •



InfoWorld Review:

# Dell's Virtualization Servers Surge Ahead

Dell PowerEdge R805 and R905 servers, based on AMD's hexacore Opteron CPUs, are far faster, cheaper, and more efficient than models that shipped only a year ago

Oh, what a difference a year makes! In October of last year, I reviewed a pair of virtualization servers from Dell. Specifically, I examined the PowerEdge R805 and R905 models, which defined the new category of servers purpose-built to support virtualization. At that time, HP did not offer virtualization servers, but with the obvious embrace for the technology by IT departments everywhere, HP has finally entered the fray, trying to beat back Dell and fend off challengers such as Lenovo. I'll look at how those vendors stack up against each other in a head-to-head shoot-out in an upcoming review. In this review, I look at the updates to the Dell servers I examined last year.

Whereas last year's servers were powered with quad-core AMD Opterons, today's systems are driven by the new six-core or "hexacore" Opterons, code-named Istanbul. (Readers who remember their Latin will note that the six-core chips do not follow the tradition of using Latin prefixes for core count that was established with "quad-core." This is presumably because the term "sexacore" was a tad edgy for vendors' marketing and legal departments – hence, hexacore.) Because these processors are pin-compatible with the quad-core Opteron forebears, Dell was able to upgrade the systems without rolling out a new model. As a result, the company stuck with the

| InfoWorld Test Center Scorecard |             |               |             |                |       |                  |
|---------------------------------|-------------|---------------|-------------|----------------|-------|------------------|
|                                 | Performance | Expandability | Power usage | Serviceability | Value | Overall Score    |
|                                 | 40%         | 20%           | 15%         | 15%            | 10%   |                  |
| PowerEdge R805                  | 9           | 7             | 9           | 9              | 9     | 8.6<br>VERY GOOD |
| PowerEdge R905                  | 9           | 8             | 9           | 8              | 7     | 8.5<br>VERY GOOD |



Server Review (cont.)

original model numbers and the original positioning of these two machines.

In our tests, we find that the performance has greatly improved. Further, the price of the R805 has come down significantly. As a result, the price-performance ratio, always a strength of Dell's product lines, is hugely better than it was a year ago. In addition, power consumption is vastly improved for both models. It's hard to recall so much progress made in three different areas in any year-over-year hardware comparisons.

**Many servers in one**

Virtualization servers are systems designed to deliver more of the capacity that virtualization hosts need to run optimally. Virtual machines, or VMs, crave lots of RAM and dedicated CPU resources. Both these servers are highly scalable in terms of RAM, which is often the gating factor on the number of VMs that can be run simultaneously on a server. The entry-level R805 model can accommodate 128GB across 16 slots, while the enterprise-oriented R905 has 32 SIMM slots that hold 256GB, when using 8GB DIMMs. These memory sticks are now fairly easy to find, albeit at elevated prices. The baseline RAM for these systems is 667MHz DDR-2, which is slower than other

Opteron-based servers in this category.

The second criterion for good performance is access to the CPU. On these servers, the processing power is delivered by either quad-core or hexacore AMD Opteron processors. The R805 server I tested came with two 2.6GHz hexacore Opteron 2435 processors, while the R905 came with four 2.6GHz hexacore 8435 chips. The Opteron processors were the first x86 processors to come to market with six cores each. Intel is expected to ship a hexacore processor in 2010.

In their six cores, the Opterons offer exactly six threads of execution. Today's Nehalem Xeon processors from Intel come with four cores, each of which can run two threads of execution simultaneously, using Hyper-Threading. Consequently, a quad-core Intel Xeon offers more threads per chip. However, two Intel threads share a single 256KB L2 cache, while the cores on the AMD Opteron are given a full 512KB of L2 cache each. How much of a difference this cache makes depends entirely on the workload. Light workloads that do not require large amounts of data in RAM to complete transactions will work well on Nehalem servers with Hyper-Threading enabled. Database applications and enterprise workloads will prefer the

greater cache of AMD Opterons. (The Nehalem chip's Hyper-Threading can be disabled to reduce – but not eliminate – the cache limitations; however, this step limits the chip to a total of four threads.)

With a total of 12 threads on the R805 and 24 on the R905, Dell's servers provide plenty of processing power. Only a severely overloaded

|                                | PowerEdge R805             | PowerEdge R905             |
|--------------------------------|----------------------------|----------------------------|
| # of CPUs/sockets              | 2/2                        | 4/4                        |
| Type of CPU (as tested)        | AMD Opteron 2435 2.6GHz    | AMD Opteron 8435 2.6GHz    |
| Installed RAM/max RAM          | 16GB/128GB                 | 32GB/256GB                 |
| RAM type/speed                 | DDR2 ECC, 667MHz           | DDR2 ECC, 667MHz           |
| # of RAM sockets used/total    | 8/16 DIMM slots            | 16/32 DIMM slots           |
| # of PCIe slots                | 3 x x8, 1 x x4             | 2 x x8, 5 x x4             |
| USB ports front/back/internal  | 2/2/1                      | 2/2/1                      |
| Disk type                      | SAS                        | SAS                        |
| HDD installed/slots (2.5-inch) | 2 x 73GB / 2               | 2 x 73GB / 4               |
| Network ports                  | 4 x 1GbE w/ TOE            | 4 x 1GbE w/ TOE            |
| Front-panel LCD?               | Yes                        | Yes                        |
| Power supply options           | 2 x 700W                   | 2 x 1100W                  |
| Tool-less case design?         | Yes                        | Yes                        |
| Chassis type                   | 2U rack                    | 4U rack                    |
| Price as tested                | \$7,643                    | \$18,906                   |
| Warranty                       | 3 years, next business day | 3 years, next business day |



## Server Review (cont.)

server is likely to exhaust the processing capabilities of these chips. And it would be more likely that such a server would run into RAM constraints before maxing out these CPUs.

A final requirement of virtualization servers is plenty of bandwidth. These systems are not intended to provide the primary storage for the VMs, nor for their workload. As a result, the servers tend not to support large numbers of high-capacity disks on-system. Rather, they depend on accessing both VMs and data via the network. Because of this design, which is increasingly common in servers of all types, virtualization servers typically have numerous large pipes. The R805 and R905 both have four slots stocked with 1GbE cards that support TCP/IP offloading (TOE). Two of the four slots can hold 10GbE network adapters.

One obvious requirement of all virtualization servers is the ability to boot an operating system that runs a hypervisor. Both Dell systems enable users to boot at least two different operating systems. There is the OS on the hard drives, which in the case of this review was Microsoft Windows Server 2008 running the Hyper V hypervisor. And there is a second optical drive that plugs into the internal USB port. At boot time, it's possible to set the machine to boot from this drive rather than

the hard drives. Consequently, with both systems, you can run different hypervisors without having to configure the software or the hardware. For many sites, this is not an important advantage, as most IT organizations choose one hypervisor as the standard and build their infrastructure around that choice. However, sites with multiple hypervisors in use will be able to move these servers back and forth between hardware pools without having to reconfigure them.

### Test results and report cards

There are three standout results in the benchmarks of these systems when compared with last year's models. All have improved in conspicuous ways, especially with respect to performance and power consumption. The R805 is also significantly more affordable than last year's model.

Comparing performance of virtualization servers is best done using VMmark, which is freely available from VMware. However, this is a complex test suite that is both hard to configure and difficult to run. Because of this, all results, including ours, come from the vendors themselves. The R905 achieved 27.5 tiles (the unit of measure in VMmark). Last year, the same model weighed in at 14.8 tiles. This

is a stunning improvement of 85 percent year over year. The R805 promises similar gains. Dell has not yet published certifiable VMmark results for this machine, but expects a result between 15 and 16 tiles. Similarly configured servers from HP fall within this range, so it's safe to project a midpoint of 15.5 tiles. This number marks a 96 percent improvement over last year's R805 score. This system is faster than last year's R905 model, which had twice the number of processors. It's not often that one year brings a near doubling of performance based primarily on processor upgrades – kudos to AMD.

Power consumption has dropped dramatically. Last year, the R905 sucked up a full 652W to run at 100 percent capacity. This year, it required 405W, a 38 percent drop. The R805 went from 411W to 260W when running at 100 percent. This is an excellent result. Two years ago, an average workstation running at full tilt could easily surpass this level of power consumption.

### Impressive capabilities

Both systems impressed me with their capabilities and, especially, by how much they've progressed in the year since our last review. I rate both systems as excel-

lent for performance and power usage. Expandability is good on both systems, but not out of the ordinary for servers in this category. The nod goes to the R905 for its greater headroom. Serviceability is identical to last year, as these machines are essentially the same except for processor upgrades and minor hardware tweaks. As to value, the R805's enormous price drop propels it ahead of the R905.

The upshot is that, using the weightings favored by InfoWorld, these systems are essentially tied. If your organization values characteristics differently, you should recalculate the scores. Either way, you're likely to find that these servers are closely matched in terms of deliverables. I find myself attracted to the R805 and the prospect of doubling up on it in lieu of buying a single R905. This strategy has a lower overall price point and offers sites finer granularity in their virtualization infrastructure, while not consuming extra rack space. Each additional system at an IT site, however, does have associated costs beyond the hardware and bundled software, so each group needs to evaluate this approach in the context of its own preferences. •

Read this article online at [www.infoworld.com](http://www.infoworld.com)

# Optimize Your Virtualization Deployment with Dell PowerEdge Servers

Enterprises are turning to virtualization to deliver performance, energy efficiency and ease of use. What they may not realize is that these benefits can be hindered by the foundation of their virtualization solution – the servers. To get the most out of your virtualization solution, rely on servers that were built for virtualization, such as the Dell PowerEdge R905 and M905 servers.

## Performance

Architected from the ground up for virtualized environments, the Dell PowerEdge R905 and M905 servers combine the latest generation of Six-Core AMD Opteron™ processors with increased RAM capacity and unmatched I/O to deliver powerful performance. In addition, AMD Virtualization™ technology serves as the foundation for driving near native application performance in virtualized environments.

The PowerEdge M905 delivers 24 DIMM slots, up to 192GB total RAM, and highly available redundant

throughput capacity. Combining an internal SD card for embedded hypervisors with a form factor that minimizes space intrusion, the M905 delivers industry-leading virtualization and robust application and database capabilities all in a four-socket blade server with three highly available I/O fabrics.

## Simplifying virtualization

From initial design and deployment to ongoing support, Dell is focused on eliminating unnecessary steps in managing your virtual infrastructure. The PowerEdge R905 and M905 servers simplify data centers by embedding industry-leading virtualization software such as VMware ESX, Citrix XenServer, or Microsoft Hyper-V. They are designed to streamline deployment in virtualized environments, providing the capability to begin migrating live virtual machines with a few clicks of a mouse. Plus, the PowerEdge M905 features AMD's Rapid Virtualization Indexing technology, which can

improve the performance of some virtualized applications by utilizing its Nested Page Table technology.

Dell's approach to optimization emphasizes energy efficiency at every level of the infrastructure. For businesses that require the highest levels of performance while maintaining a low energy footprint, the PowerEdge M905 features AMD PowerNow!™ Technology. Utilizing dynamic frequency and voltage support to deliver performance on demand, it can greatly reduce power consumption without compromising performance.

The PowerEdge R905 drives great energy economy for standard 4U four-socket systems. Utilizing 90 percent efficient power supplies, DDR2 SDRAM, and AMD Opteron 8000 Series processors, Dell provides a holistic approach to energy efficiency from server to storage.

## Support

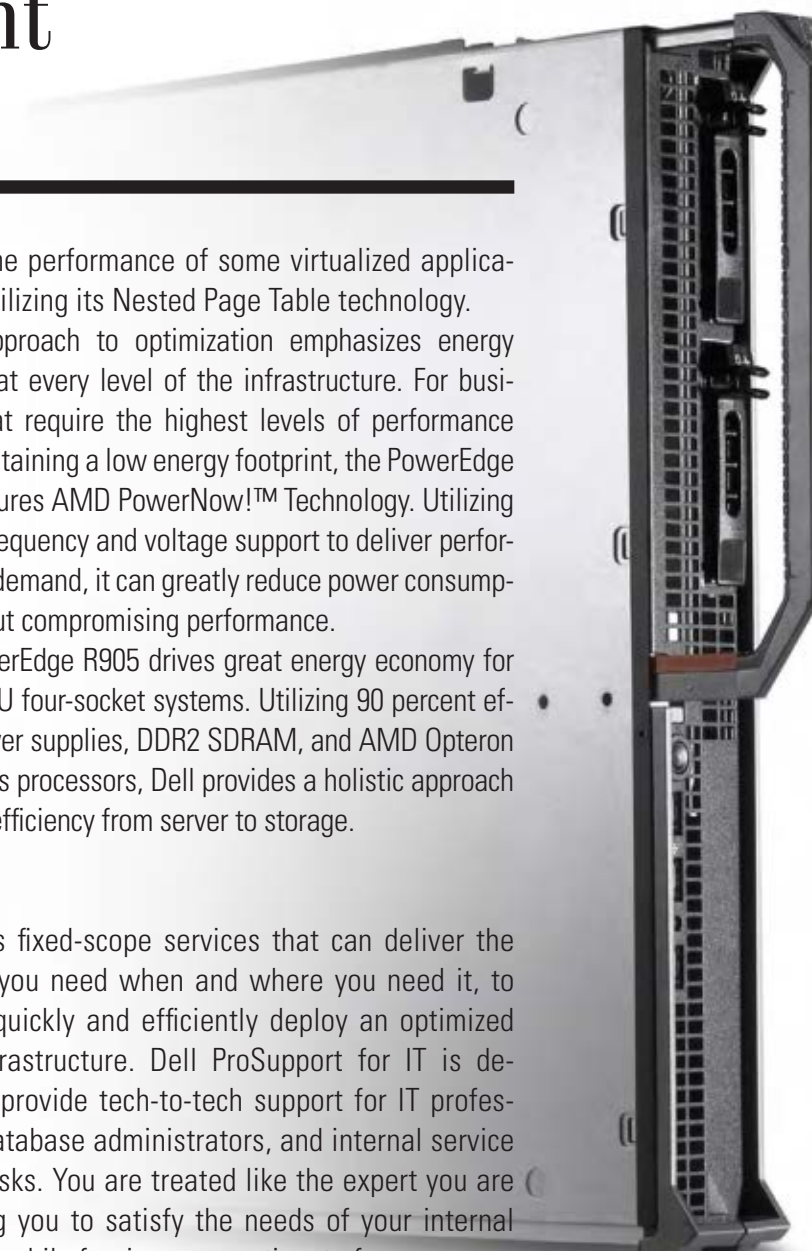
Dell offers fixed-scope services that can deliver the expertise you need when and where you need it, to help you quickly and efficiently deploy an optimized virtual infrastructure. Dell ProSupport for IT is designed to provide tech-to-tech support for IT professionals, database administrators, and internal service or help desks. You are treated like the expert you are – allowing you to satisfy the needs of your internal customers while freeing up your time to focus on strategic IT projects. •



Dell's Armando Acosta describes the use of the AMD Opteron™ processors in Dell PowerEdge servers



Click to Play



## Case Study: **Gandi** Hosting in the Clouds

Internet service provider builds an energy efficient, virtualized cloud environment that uses around 8 watts of power per server.

Gandi is a domain name registrar and web hosting company based in France, founded in 1999. The company only recently launched its web hosting service when new management realised that there was a gap in the market for a more cost-effective and efficient hosting service. With a strong background in web services and IT, Gandi realised that a virtualized hosting product running a cloud infrastructure—where scalable and virtualized resources are provided over the Internet—could cut costs and give the company the edge it needed. Joe White, chief operating officer at Gandi, explains: “Our main concern when building the environment was not space, but power. We also wanted to build a highly

resilient solution and realised that virtualization and cloud computing were the way to go.”

The firm started looking at different solution providers and options for building the infrastructure and tested hardware from a number of different vendors, including Dell. Gandi tested a variety of Dell PowerEdge servers during the assessment process, which allowed the company to validate the architecture. Gandi started running performance benchmarks and found that Dell’s hardware, with AMD Opteron™ processors worked best in the virtualized environment. White explains: “Many of us had worked with Dell in the past and had a strong relationship built on mutual goodwill. But the Dell serv-



### CUSTOMER PROFILE

Company: **Gandi**  
Industry: **Hosting Solutions**  
Country: **France**  
Founded: **1999**  
Employees: **50**  
Web site: **www.gandi.net**

### CHALLENGE

Gandi wanted to build a virtualized infrastructure as the basis for a new web hosting service. With an emphasis on energy efficiency, Gandi needed powerful and reliable hardware to build a cloud environment.

### SOLUTION

Gandi chose virtualized Dell PowerEdge servers with Quad-Core AMD Opteron™ processors for their low power consumption and high performance. When disk storage from another supplier failed, Dell quickly delivered PowerVault disk arrays that offered greater capacity, stability and energy efficiency.

### BENEFITS

- 50 PowerVault disk enclosures delivered in under a week
- Customers have direct access to their servers
- A dependable, rapid response in times of crisis
- Virtualized servers need around 8 watts of power
- Cloud environment offers unlimited possibilities for growth
- Resilient scalable environment



## Gandi Case Study (cont.)

ers also came out top in our tests, so it was ultimately an easy choice to make.”

Gandi’s IT team had a clear idea of the infrastructure they needed and found the Dell consultants knowledgeable and responsive in matching these needs. Gandi wanted to use their own virtualization software and chose 145 Dell™ PowerEdge™ 6950 servers and 100 Dell R905 servers for its new environment. The latest servers use four Quad-Core AMD Opteron™ 8350 Series processors and come with up to 32 gigabytes of random access memory (RAM). White says: “We tested all sorts of different variations of hardware and found that the Third-Generation AMD Opteron processors performed best with our applications.”

The Dell PowerEdge R905 servers are designed to streamline virtualization de-

**“There’s really no limit to how far we can go with this environment. It’s easy for us to add more Dell PowerEdge servers whenever we need, and we have the utmost confidence in the solution Dell delivered.”**

Joe White, Chief Operating Officer, Gandi

ployment, by removing barriers to running memory and I/O-bound applications. These servers are virtualized as part of the cloud infrastructure and Gandi currently runs 5,500 virtualized servers in the environment.

Originally, Gandi chose another supplier for its storage requirements. But found that the disks it received were not of the quality it needed and couldn’t handle the throughput

from the virtualized environment, leading to mass failure. When this happened, Gandi spoke to Dell, which quickly dispatched 50 PowerVault™ MD1120 disk expansion enclosures to replace the faulty disks and immediately saw an improvement. White says: “Dell responded very quickly when we needed new storage and delivered crucial hardware in just a few days.” Once in-

stalled, Gandi found that the Dell MD1120s had more benefits than just greater dependability. The disks use energy-efficient, 2.5-inch Serial Attached SCSI (SAS) drives and are well suited for Gandi’s environment, which demands high I/O or throughput rates. White says: “The Dell MD1120 disks are smaller with 2.5 inch drives. This means we can fit more of them into our environment. Plus, compared to other models, they have better performance at lower speeds, which means they consume less power.” Gandi found that the Dell MD1120s had more benefits than just greater dependability. The disks use energy-efficient, 2.5-inch Serial Attached SCSI (SAS) drives and are well suited for Gandi’s environment, which demands high I/O or throughput rates. White says: “The Dell MD1120 disks are smaller



Produced: June 01, 2009 Run time: 2:47

## Video: Stevens and Lewis on the Six-Core AMD Opteron™ processor launch

Dell’s Sally Stevens speaks with AMD’s Margaret Lewis about the Six-Core AMD Opteron™ processors (previously code-named ‘Istanbul’) and the line of Dell PowerEdge servers that will leverage these powerful new processors.



Click to Play

## Gandi Case Study (cont.)

with 2.5 inch drives. This means we can fit more of them into our environment. Plus, compared to other models, they have better performance at lower speeds, which means they consume less power.”

Gandi plans to purchase another 30 to 50 servers every three to six months as demand increases and has developed its own applications, which run on the virtualized servers. Gandi’s new environment is protected by Dell ProSupport for IT with next business day response—a valuable service for White and his team. “The infrastructure is designed to be highly redundant, but it’s good to know that with Dell ProSupport for IT, any problems will be fixed quickly and with the minimum of disruption to our environment,” says White.

### **Energy-efficient servers need around 8 watts of power**

Gandi’s environment was designed to be as power efficient as possible. The virtualized cloud allows for much greater utilisation, which is in turn a more environmentally friendly way of working. With 5,500 virtual servers running on 250 physical machines, power consumption is reduced and Gandi saves money—savings that it can pass on to

its customers. The Dell PowerEdge servers in Gandi’s infrastructure consume 60 watts of power per CPU socket, but White has calculated that it takes just eight watts to run each virtual server.

White says: “The Dell PowerEdge 6950 and R905 servers with AMD Opteron processors in our environment are already very efficient, but we’ve found it takes just eight watts to run each of our virtual servers. This level of efficiency cuts our expenses and lets us provide a more cost-effective service to our customers.”

### **Virtualized cloud infrastructure offers customers near limitless scalability and unparalleled resilience**

The data and applications running on Gandi’s virtualized cloud infrastructure are not linked to specific hardware, which means that White’s team can swap individual servers in or out with no effect on operations. With the right technology in place and continued development effort, the cloud environment can be scaled almost indefinitely. Multiple locations can be connected with minimum expense or stress, even across national borders. White says: “There’s really no limit to how far we can go with this

## How it works

### Services

- Dell ProConsult
- Dell ProSupport for IT (Next Business Day Response)

### Hardware

- Dell™ PowerEdge™ 6950 / R905 servers with Third-Generation AMD Opteron™ processors
- Dell PowerVault™ MD1120 disk expansion enclosures

environment. It’s easy for us to add more Dell PowerEdge servers whenever we need and we have the utmost confidence in the solution Dell delivered.”

### **Customers take control with remote access to virtualized servers**

A key feature of the environment that Gandi has created is the level of control it offers customers. It’s possible to set up and

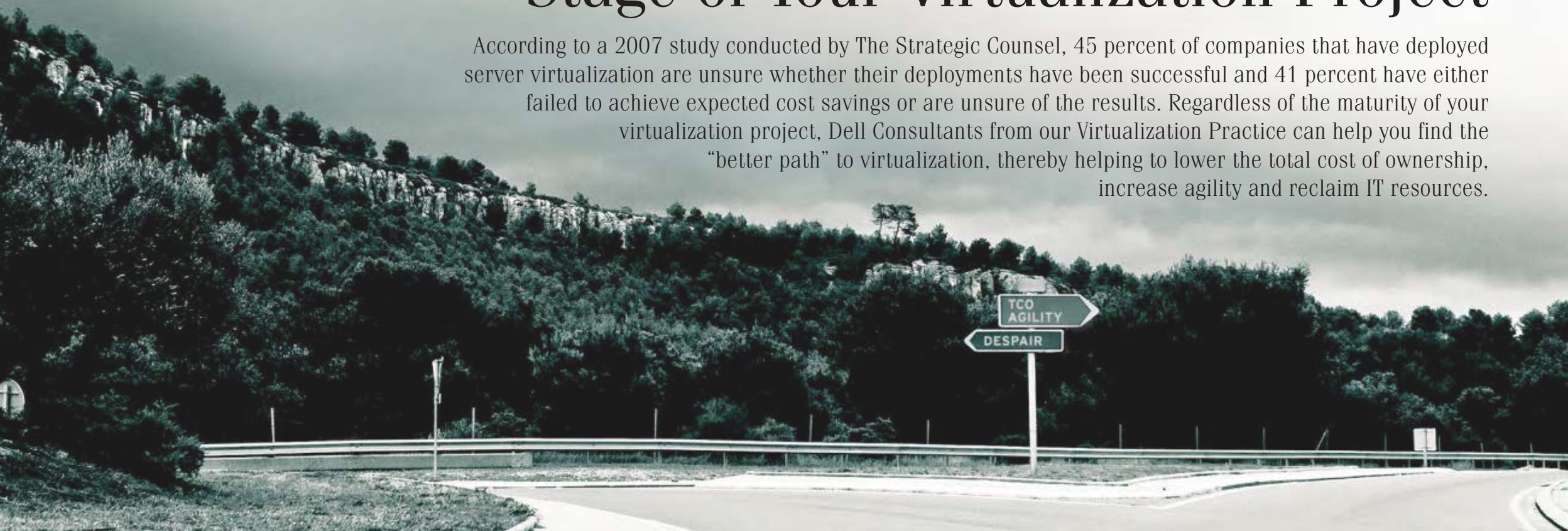
configure the virtualized servers remotely because Gandi gives its customers root access to servers, if desired. Moreover, this access allows customers to vary the power of their server instantly and even book extra capacity for planned peaks in consumption. Gandi plans to release a reactive service to its customers, so that unscheduled surges in capacity will be automatically accounted for. White says: “We’ve built our own cloud infrastructure using Dell technology, and can offer our customers unrivalled access and control over their servers.”

### **Proven fast response to mission-critical hardware failure**

Often the strength of a business partnership is only revealed in a time of crisis. When Gandi’s original disk systems proved inadequate, Dell priority-shipped 50 new PowerVault MD1120 disk arrays to Gandi in under a week. The company now relies on Dell for all its server and storage needs and has a standing order with Dell for new hardware. White says: “When we need it, Dell reacts quickly. Our customers rely on us to provide a stable and flexible service. It’s good to know that we can rely on the same thing from Dell.” •

# Dell Virtualization Services – Fit for Any Stage of Your Virtualization Project

According to a 2007 study conducted by The Strategic Counsel, 45 percent of companies that have deployed server virtualization are unsure whether their deployments have been successful and 41 percent have either failed to achieve expected cost savings or are unsure of the results. Regardless of the maturity of your virtualization project, Dell Consultants from our Virtualization Practice can help you find the “better path” to virtualization, thereby helping to lower the total cost of ownership, increase agility and reclaim IT resources.



## Video: Dell EqualLogic PS Series Storage Virtualization

See and learn how you can get complete flexibility and scalability from this proven, business-class solution.



Click to Play



## Dell Virtualization Services (cont.)

### Server virtualization

Dell's workshop process can help you understand the potential of virtualization technology. Dell can assess your current environment with a view to either initial virtualization, or extending an existing virtual server infrastructure. Dell's assessments are designed to help you make informed decisions to maximize the benefits of virtualization in your environment. Dell Consultants can also design and implement virtualization, working closely with your team to share best practice and help ensure knowledge transfer.

### Server consolidation

Dell's comprehensive approach to server consolidation can help organizations accelerate productivity by delivering customized systems, software, and services that ease management and can result in lower total cost of ownership. Dell experts can show you how server consolidation can meet your current and future requirements. An assessment determines the scope of consolidation with virtualization, if required, and can provide a roadmap for planning and design, that includes comprehensive and detailed server consolidation architecture and implementation plan, based on our field experience. At the conclusion of the design engagement Dell experts can implement your complete server consolidation solution – hardware and software -- so that you can quickly capture the value of the solution.

### Virtualization operational readiness

While server virtualization can reduce the cost of owning and maintaining physical hardware, some of the savings may be offset by the resulting increase in systems management complexity. Dell Consultants can help simplify your operational processes and ensure that you achieve "Operational Readiness" -- the ability to routinely provision, consume and manage virtualization effectively in production environments. The "Operational

Readiness Framework" includes an initial assessment of your current IT service management processes. Dell Consultants analyze the data collected to develop models, evaluate the maturity of the current operations, recommend a roadmap and help to determine the way forward.

### Virtual Server Management

Many organizations lack the required expertise to efficiently manage their virtual server environments. Dell's Virtual Server Management - Remote Monitoring & Reporting service can help optimize your virtual server environment with a cloud-based managed service to provide 24/7 virtual environment monitoring, alerting and reporting. Dell also provides expert analysis and advice with weekly status and monthly in-depth operations reviews.

Dell Virtual Server Management Remote Monitoring & Reporting is designed to provide an up-to-date window into your virtual server environment, helping you -- with expert analysis and advice from Dell consultants -- improve the performance of your virtual server environment without simply resorting to just buying more servers.

Dell offers end-to-end solutions with a single point of contact for hardware, software, services and on-going support. Dell Consultants work with you to gain an understanding of your business objectives and IT strategy, then design plans that are flexible enough to adapt to your current environment and structured to scale to your future requirements. •





# How Union Pacific Stays on the Fast Track

AMD processors help the largest railroad in North America power its critical systems and innovate. [By Tam Harbert](#)

Nothing tells the story of American history and progress quite like the railroad. As the nation was being torn asunder by the Civil War, President Abraham Lincoln signed the Pacific Railway Act of 1862, founding Union Pacific. Seven years later, the Golden Spike was driven at Promontory, Utah, to link the Union Pacific and Central Pacific tracks, creating the Transcontinental Railroad. It was a tremendous feat, literally binding the states into one nation and ushering in the Industrial Age.

Today railroads have gone high tech, with locomotives becoming mobile computing and communications vehicles. And Union Pacific, which helped make history

more than 140 years ago, is using the latest technology to make more-innovative connections.

Specifically, the company is building a new distributed network that will control all 8,400 of its locomotives, traveling across 32,000 miles of track in 23 states. The system, with an x86-based distributed processing platform running Linux as its foundation, will be the locomotive of Union Pacific's operations. And helping power the system: AMD Opteron™ processors.

In six years, Union Pacific plans to tie that platform into an industry-wide, standard, automated system that will increase the safety and operating efficiency of the railroad.

## VIRTUALIZATION POLL

Where are you currently in your efforts to consolidate your server environment?

[Click here to vote](#)

- ☐ Determining requirements
- ☐ Evaluating alternative options/solutions
- ☐ Building a vendor selection set
- ☐ Reviewing vendors
- ☐ Seeking funding
- ☐ Received funding
- ☐ Considering replacement of existing installations

## Union Pacific (cont.)

### From Iron Horse to Itty-Bitty Servers

When Union Pacific first implemented its IBM mainframe, in the 1960s, it was cutting-edge technology. "We were the first railroad system in the world to schedule and route each individual shipment at the car level and automate its tracking," says Lynden Tennison, SVP/CIO of Union Pacific. "It set the bar in the industry for sophistication and automation."

But 40 years and 11 million lines of macro assembler code later, it was time to rethink the system from the ground up. Not only did the company need an integrated system based on modern technology—over the years, various client/server applications had grown up around the mainframe—but the clock was also ticking on the know-how to keep the big iron running.

"Most of the few people who know anything about that code are counting their days to retirement," says Marty Malley, assistant vice president of information systems at Union Pacific. "We realized that if we didn't get this thing replaced, we were going to come to work one day and it would be broken and we'd have nobody who could fix it."

The mainframe was still doing the heavy lifting—that is, running many of the key

**"We want to enable the best possible decision-making throughout our operations, so we can consistently deliver the best possible service at the lowest possible cost to our customers."**

**Marty Malley, Asst. VP of Information Systems, Union Pacific**

processes within the company, including rail car scheduling and train management. So the company made a strategic decision and mapped out a multiyear plan to spend \$150 million to \$200 million to design and build an information technology platform based on a service-oriented and event-driven architecture that leverages open source technology. The heart of the platform would be a new transportation control system called NetControl. Over the next several years, that system would replace Union Pacific's mainframe-based Train Control System (TCS) to take orders, schedule and track shipments, manage the schedules for the trains and the resources needed to run them and optimize response to service interruptions.

NetControl was not the only system to run

on a distributed, x86-based platform using Linux. "This entire environment is based on small servers, in a loosely coupled network," says Tennison. "There is no big iron, and we're going with the smallest footprint rather than with multi-CPU, large-scale servers."

By tightly integrating train operations with the company's other key business processes onto one distributed platform, Union Pacific expects to increase productivity, gain efficiencies and enhance responsiveness to customers.

"We want to enable the best-possible decision-making throughout our operations, so we can consistently deliver the best-possible service at the lowest-possible cost to our customers," says Malley. "We think NetControl should put us well ahead of anybody else in the industry."

### AMD Opteron™ processors provide the power

Moving critical business processes such as core financial systems off the mainframe and onto a distributed platform means increasing the horsepower at the company's two data centers in Omaha. An early adopter of virtualization, Union Pacific started using VMware on eight-socket machines that cost more than \$100,000 each in 2004, according to Alan Fisher, Union Pacific's director of distributed systems engineering. But it began to notice performance problems. Specifically, a chorus of complaints arose from the company's contracted developers, who connected to virtualized workstations at the data centers.

"They told us it was taking a minute and a half to load Lotus Notes," says Fisher. "That was unacceptable."

So Fisher's group started looking at alternatives. In testing of virtualized workstations on a \$25,000 server based on a Dual-Core AMD Opteron processor, the performance problems decreased dramatically and the complaints stopped, says Fisher. The combination of price, performance and quality AMD technology offered "changed our world overnight," he says. "Since then we haven't purchased a single server for



## Union Pacific (cont.)

the purpose of virtualization that wasn't based on an AMD processor." Union Pacific is currently deploying quad-core systems to its data center, with plans to include AMD new product offerings such as the Six-Core AMD Opteron™ processor.

Until 2008 Union Pacific virtualized only development test machines running Microsoft® Windows®. But last year it began expanding to production servers, says Fisher, and moved from VMware to operating-system-based virtualization platforms. It has adopted Red Hat's virtualization technology for the Linux environment and Microsoft software – initially Virtual Server® 2003 but then Windows Server® 2008 Hyper-V – for Windows.

Today about 30 percent of the 2,300 data center servers are based on AMD processors, says Fisher, and as the company retires older servers, it plans to replace them with AMD processor-based servers. Most important, NetControl and other critical business functions will run on AMD processor-based servers when they are transferred from the mainframe to the distributed network, says Fisher. At the start of this year, for example, the company switched to a new SAP ERP system that is running on the distributed platform.

"We're taking our most important func-

tions, such as NetControl and our ERP system, and running them on AMD technology," Fisher says.

### Gaining Steam over the Competition

NetControl is about 35 percent complete, and Union Pacific is already benefiting from its increased efficiency. For example, one of the first transactional applications moved from the mainframe to NetControl was bill-of-lading processing, says Malley. A bill of lading is like a purchase order, where the customer tenders a shipment and gives instructions on where to pick up and drop off the commodity. The data from bills is critical, because it determines the movement and configurations of trains and drives the billing process. Union Pacific receives hundreds of thousands of inbound bills a month, according to Malley. In the past, slight errors such as misspellings would cause the mainframe to dump bills into an error queue, requiring several billing clerks to sort through them and resolve the problems. Because NetControl has a rules-based engine, Union Pacific can configure the system to recognize and correct many common problems found in the bills, allowing for greater automation of shipment handling.

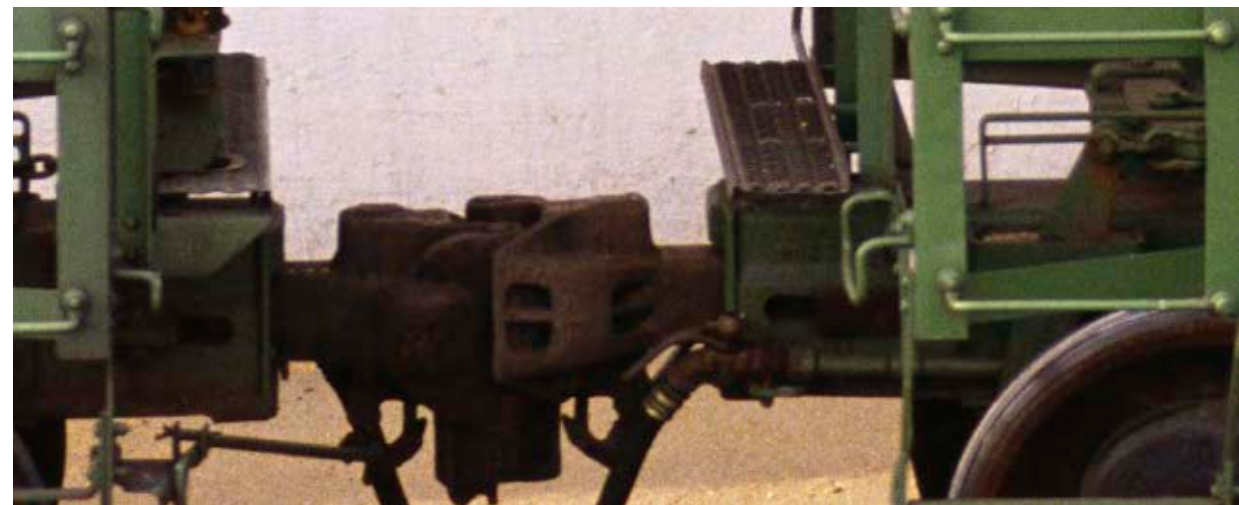
In addition, the system is enabling Union

Pacific to respond more quickly to change. Last year extensive flooding in Iowa required the railroads to embargo or reroute traffic around the affected areas. Most of Union Pacific's competitors had to manually change the information in their systems and then monitor them to make sure the changes were successfully implemented. "We made a couple of minor changes in the flexible rules engine in our new NetControl system, and we were up and running within eight hours," says Tennison.

Ultimately, NetControl will tie in with a technology called Positive Train Control, an industry-wide collision avoidance system

whose implementation the U.S. government has mandated by 2015. Already Union Pacific locomotives contain onboard computers, GPS devices and other types of radio transmitters that monitor operations. Positive Train Control will establish communications between trains and the signals, with sophisticated technology and braking algorithms that will automatically bring both passenger and heavy freight trains to a safe stop. This will help prevent train-to-train collisions, over-speed derailments and casualties or injuries to the public and railway workers.

It's one more way Union Pacific is leading the way in innovation. •



# Virtualization Resources

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- ▶ PowerEdge R905 Server Details
- ▶ PowerEdge M905 Blade Server Details
- ▶ Learn more about Dell servers for virtualization that are based on AMD Opteron processors
- ▶ Learn more about the AMD Opteron™ processor
- ▶ Learn more about Dell's virtualization capabilities
- ▶ Learn more about Dell's storage capabilities for virtualization
- ▶ Learn more about Dell's services capabilities for virtualization
- ▶ Dell Virtualization Advisor

This tool is designed as a guide for customers with a comfortable knowledge of virtualization and their server/storage environment. For those customers who prefer a more customized solution, Dell offers a full range of Infrastructure Consulting Services to analyze your specific needs and operational considerations to provide recommendations including future growth.

- ▶ Would you be interested in receiving more information from a Dell Virtualization specialist?