

# A MODEL OF VIRTUALIZATION

The Dell IT group has virtualized more than 5,000 servers and saved the company over US\$29 million using a scalable, worldwide virtualization model



## SOLUTIONS

- CONSOLIDATION
- MANAGEMENT/UTILITIES
- VIRTUALIZATION



## CUSTOMER PROFILE

**COUNTRY:** United States

**INDUSTRY:** Technology

**FOUNDED:** 1984

**NUMBER OF EMPLOYEES:** 65,200

**WEB ADDRESS:** [www.dell.com](http://www.dell.com)

## CHALLENGE

Business growth and a fast-paced product development cycle require the Dell IT team to accelerate deployment of new servers and applications—without exceeding data center space and within power constraints.

## SOLUTION

Virtualizing on Dell™ PowerEdge™ servers enables the Dell IT team to speed new server deployment, use data centers more efficiently, and dramatically reduce server costs.

## BENEFITS

### Get IT Faster

- The Dell IT team partnered with the Dell Infrastructure Consulting Services (ICS) virtualization practice to jump-start the solution by identifying the best servers to virtualize first
- The IT team is now able to deploy virtual servers and new applications to meet internal demand approximately 90 percent faster than before virtualization

### Run IT Better

- Virtualization improves server processor utilization by approximately 30 percent

### Grow IT Smarter

- Dell PowerEdge servers double data center processing density
- Dell saves an estimated US\$29 million on new hardware purchases, reduced space, and power costs
- The IT team achieves consolidation ratios of up to 20:1 to save data center space
- The Dell IT team expects to virtualize an additional 3,000 to 4,000 servers by 2009, for a total of more than 8,000 servers



Millions of people count on the advances in computer technology to help them improve productivity and save time. Dell engineers constantly strive to deliver those advances in the form of innovative computing and networking products. With important development projects ramping up all the time, the Dell IT team needs to constantly deliver more computing power and new or updated applications for Dell product development groups and other internal business units.

**“OUR ANALYSIS SHOWS THAT EVERY NONPRODUCTION VIRTUAL MACHINE WE DEPLOY SAVES US ABOUT US\$6,500 COMPARED TO DEPLOYING AND RUNNING A PHYSICAL SERVER, AND EVERY PRODUCTION VIRTUAL MACHINE SAVES US ABOUT US\$9,300 OVER A THREE-YEAR PERIOD.”**

**Matt Brooks**, IT strategist, Dell IT Group

Keeping up with internal needs became especially challenging as the company expanded and globalized. “Like IT organizations at many growing companies, we risked not being able to deliver the necessary application platforms quickly enough to meet increased internal demand,” says Matt Brooks, Dell IT strategist. “From ordering the hardware to completing the installation, each new deployment could take as long as 45 days. We needed to reduce that time to keep up with the speed of the business.”

The IT team also began to run up against data center space limitations. “We had gradually added new servers over the years to handle the growth of our business,” explains Brooks. “We were running out of space for new servers and were straining the power and cooling limits of our facilities. We knew that if we exhausted the remaining capacity, we would be forced to build or lease new data center space at a huge cost. We wanted to avoid this expense by getting more computing power out of our existing space while simultaneously reducing our energy consumption.”

#### **INCREASED DEMAND AND UNDERUTILIZED SERVER RESOURCES**

Even as demand for new servers increased, the Dell IT team was not able to fully utilize existing servers’ resources. “We experienced much the same problem with server underutilization as the rest of the industry,” says Brooks. “Out of the 20,000-plus servers that we manage globally, we determined

that nearly three-quarters of them never exceeded 20 percent processor utilization because most servers were running only one or two applications. Instead of just adding more servers to address increased demand, we realized that we had to use our resources more intelligently and efficiently.”

Many of the servers at Dell’s data centers were also older models that were time-consuming and expensive to maintain. “We estimated that nearly 30 percent of our servers were three to four generations old. Older equipment is usually the cause of most IT service and repair problems,” says Brooks. “We realized that we needed to reduce the number of older servers.”

The Dell IT team decided to address these challenges by virtualizing and consolidating its data center servers. However, the IT team needed better data collection and analysis tools to conduct an in-depth analysis of the current environment and future growth. The answer turned out to be practically next door—the IT team partnered with the Dell ICS virtualization practice to take advantage of their sophisticated tools and expertise.

#### **DELL ICS HELPS THE IT TEAM DEVELOP A POWERFUL VIRTUALIZATION MODEL**

Dell IT and the Dell ICS virtualization practice combined forces and conducted a pilot Virtualization Readiness Assessment (VRA) to identify the most promising server virtualization opportunities

## **HOW IT WORKS**

### **HARDWARE**

- Dell™ PowerEdge™ R900 server with Intel® Xeon® processors
- Dell EqualLogic™ PS5000XV Series storage area network

### **SOFTWARE**

- Altiris® Deployment Solution
- VMware® ESX Server
- VMware VirtualCenter
- VMware VMotion™

### **SERVICES**

- Dell Infrastructure Consulting Services (ICS) virtualization practice

# “SINCE IMPLEMENTING VIRTUALIZATION, WE HAVE REDUCED APPLICATION DEPLOYMENT TIME FROM AN AVERAGE OF 45 DAYS TO JUST 4.”

**Matt Brooks**, IT strategist, Dell IT Group



and determine the impact of implementing a virtual infrastructure. The group surveyed a sample of approximately 500 servers, representing a cross-section of the company's servers. The team monitored each of the servers to measure CPU, memory, and disk utilization. "VRA is a fantastic service," says Brooks. "This enabled us to make highly informed decisions about where to start and how to proceed and gave us the information we needed to determine the most appropriate server model for our environment."

The IT team used data from the assessment to help develop a standard virtualization model for use in Dell data centers worldwide. The centerpiece of this model is the four-socket Dell PowerEdge R900 server with Intel Xeon processors running VMware® ESX Server virtualization software. "The PowerEdge R900 is one of the top servers on the market today for virtualization," says Brooks. "With 16 cores per server and up to 256 GB of RAM, the PowerEdge R900 gives us the processing power and memory capacity to maximize the number of virtual machines on each physical server."

## **DELL MODEL SIMPLIFIES DEPLOYMENT OF OVER 5,000 VIRTUAL SERVERS**

The standard Dell virtualization model calls for deploying groups of 10 to 20 physical servers at a time as VMware ESX hosts, with an additional server running VMware VirtualCenter for management. To date, IT team members have used the standard virtualization model to deploy 518 PowerEdge R900 servers and 5,100 virtual servers at Dell data centers around the globe.

"The infrastructure, software, configuration, and processes are the same worldwide, so we can easily scale up the number of hosts based on the requirements at any particular location," says Brooks. "We have a single global image for hosts and another for virtual servers. Using Altiris® Deployment Solution, technicians at our Global Service Center in Malaysia can also rapidly provision a new server anywhere in the world."

## **APPLICATION DEPLOYMENT TIME IS REDUCED BY APPROXIMATELY 90 PERCENT**

Keeping up with internal demand for new servers and applications is no longer a problem. The team uses a gating process to guard against sprawl in the virtual environment, but once a request

is approved, it takes only minutes to configure a virtual server to run an application. "Since implementing virtualization, we have reduced application deployment time from an average of 45 days to just 4—a 90 percent improvement," says Brooks. "In turn, this helps the company's business units work better and accelerates the Dell product development cycle."

## **DELL IT TEAM ACHIEVES CONSOLIDATION RATIOS OF 20:1 AND 10:1**

Virtualization has also enabled the IT team to rein in server proliferation, make better use of data center space, and retire older equipment. "We've achieved an average consolidation ratio of approximately 20:1 in development environments and other nonproduction areas, and approximately 10:1 in production environments," says Brooks. "This has opened up room to grow in our existing data centers and allowed us to avoid the expense of leasing more space."

## **SERVER UTILIZATION IMPROVED BY APPROXIMATELY 30 PERCENT**

Server consolidation has not only reduced the number of physical servers, it has also improved server utilization. The IT team uses VMware ESX technology

to dynamically reallocate virtual machines to the least-utilized physical servers in a farm. "We aim for 50 percent utilization across the server farm, which is an improvement of approximately 30 percent for most of our servers," says Brooks. "If any single physical server spikes above 50 percent, the load is automatically readjusted. When we're about to exceed 50 percent for an entire farm, we add another group of 10 to 20 servers at the same location."

### **DELL POWEREDGE R900 DOUBLES DATA CENTER PROCESSING DENSITY**

With four quad-core processors in each Dell PowerEdge R900 server, the team has twice the processing density of its previous dual-core servers. At the same time, the energy efficiency of PowerEdge R900 servers is helping to control power usage and heat generation in the company's data centers. Along with Intel processors designed to provide more performance per watt, the PowerEdge R900 incorporates a high-efficiency power supply and low-flow fan technology that controls fan speed based on the thermal requirements of the system. "These features help maintain cooler internal temperatures," says Brooks. "We're staying within our data center power and cooling constraints while doing even more work."

### **VIRTUALIZING ON DELL SERVERS SAVES AN ESTIMATED US\$29 MILLION**

The Dell IT team estimates that it has saved the company approximately US\$29,350,000 in cumulative savings to date through its virtualization program and the use of a structured, measured approach. "Our analysis shows that every nonproduction virtual machine we deploy saves us about US\$6,500 compared to deploying and running a physical server, and every production virtual machine saves us about US\$9,300 over a three-year period," says Brooks. "Across the company, it really adds up."

Startup savings from virtualization include reduced costs of procuring, installing, and provisioning new servers, as well as related data center and network infrastructure costs. Year-to-year savings include lower costs for space, power, cooling, and maintenance. "With virtualization, we don't have nearly as many hard drives in the data center because we have fewer physical platforms," notes Brooks. "That means fewer moving parts to maintain, which saves money for the company and reduces the burden on the IT staff."

### **IT TEAM PROJECTS SAVINGS OF US\$52 MILLION FROM VIRTUALIZATION BY 2009**

Based on the success of the virtualization effort to date, the Dell IT team is continuing to virtualize the IT infrastructure and update the standard Dell model. For example, the team plans to change the storage portion of the model to include Dell EqualLogic™ PS5000XV Series storage area networks based on cost-effective IP technology. Team members expect to reach a total of 800 VMware ESX Server hosts and 8,000 to 9,000 virtual servers by early 2009, for a cumulative savings of US\$52,450,000.

"Virtualization is no longer an experiment for us, it's a mainstream technology," says Brooks. "In addition to big savings, virtualization gives us the ability to rapidly deploy more processing power anywhere in the world to support the growing business needs of the company. Ultimately, that helps Dell continue to bring the most innovative and productive products to market for our customers."

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