

# Technology Times

April 2008 Volume XXIX, No. 2

## Virtual is a Reality: Increase hardware utilization and reduce energy consumption with virtual servers

by Pam George

Star Trek aficionados undoubtedly remember the episode "The Trouble with Tribbles" On the show, a crafty vendor gives a cuddly creature, known as a "tribble" to a crewmember. But the fuzzy animal proliferates faster than mice, filling every crevice of the ship and threatening to devour all the Enterprise's supplies.

Servers are a lot like tribbles. Adhering to the old adage "one application, one server," companies have been buying servers until rack after rack is filled. All that infrastructure, much of it underutilized, sits idle while still consuming vast amounts of power and cooling.

The situation can become dire. Ken Harbin, President of PHD Technologies, cites a global retailer that had nearly 700 servers. During a routine inspection by the fire marshal, the retailer's system was flagged. "Under thermal imaging, the breaker panel was lit up like a Christmas tree" says Harbin, whose Stroudsburg company specializes in backup, restoration and disaster-recovery solutions for virtualization platforms.

The fire marshal told the retailer to reduce its power consumption or face a shutdown. With PHD Technologies' help, the company reduced the number of servers it needed to just 25. "It was a huge savings just in air conditioning," Harbin says.

Credit the dramatic decrease to "server virtualization," which allows a company to exceed a server's physical limitations and traditional practices. Using software, a company can create "virtual" servers. Virtual servers are real in every respect," they run the same operating system and the same applications; they appear on the network as the same device. For all intents and purposes, they are indistinguishable from their physical counterparts. But in fact, several to dozens of virtual machines can run on one physical server.

"Now I can take one physical server and load Microsoft Windows on there several times, as well as install Linux on there," explains Tom Dugan, CIO of Recovery Networks, which has offices in Philadelphia and Plymouth Meeting.

The result saves companies money: fewer servers, less electricity, less air conditioning and a more efficient backup system. The end result is also more manageable and scalable.

"Our customers have experienced phenomenal results by implementing a server virtualization model in their environments," says John Biglin, CEO of Interphase Systems Inc., a leading management and technology consulting firm with offices in Plymouth Meeting and Bridgewater, N.J. "We find that the majority of our enterprise customers focus on the savings yielded by consolidating hardware, but we find much more substantial and strategic benefits in the way of true fault tolerance, disaster recovery, business continuity and environment management."

No wonder virtualization is a hot topic. Indeed, on June 3 the Philadelphia VMware Users Group and the Eastern Technology Council will hold the second annual Virtualization Technology Conference.

### Breaking the old model

Server virtualization is a sharp departure from the practices of the past, in which each operating system or application was allotted its own server. Administrators would never put, say, Microsoft Exchange on the same server as Microsoft SQL. Accounting software invariably would require its own server or group of servers. Active Directory would require several. Backup software would require at least one more.

Easy to see why servers multiply. Dugan had a client with 35 employees and 38 servers. Another client had just six people and nine servers. "Get a new application? Get new server," he says of the philosophy they followed.

In part, that is because applications on the same operating system often pull from common files and resources. "The operating system is written to think that it owns it all," says Tim Muetting, Virtualization Solutions Manager for

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Sunnyvale, Calif.-based AMD, which makes microprocessors. "There was no mechanism to segregate that until virtualization software."

When applications run on the same server, upgrading one may require downtime for the other in the form of reboots, and there are further risks of unanticipated conflicts. Keeping applications on separate servers makes sure they don't "step on each others' toes," Dugan explains.

But segregation results in underutilized systems, many of which operate at a tiny fraction of their total capacity, sometimes between 5 and 15 percent, Mueting says. Primed for peak periods, they're generating heat 24 hours a day, seven day a week.

"How often does the accounting server get hit hard? Maybe at the end of the quarter or when they're running reports," Dugan notes. "The rest of the time, the horsepower is going to waste."

## Many benefits of virtualization

Virtual solutions, which also include virtual desktops and virtual storage solutions, gained significant momentum around 2006. The impetus for continued growth is a "perfect storm," Mueting says. Power and cooling consumption keeps doubling and data centers are running out of space.

VMware, founded in 1998, pioneered the virtualization movement and boasts that all 100 Fortune 100 companies run VMware. The Palo Alto-based company is the "800-pound gorilla" in the industry, Dugan says. Harbin agrees, "They are the king."

The software, according to VMware's website, lets users turn "hardware into software," creating a virtual machine that can run its operating system and applications just like a physical machine. These virtual machines share the same hardware resources, but do not interfere with each other.

VMware has its competitors, including XenSource, Microsoft Hyper-V and Virtual Iron, which all allow users to run multiple applications and operating systems - different versions of operating systems, for instance, Solaris, Linux and Windows on one server. (You still cannot run a Mac platform on the same server as Windows.)

Virtualization software from anyone of those vendors turns servers into "files," much like those you'd see if you opened your documents folder and viewed the contents. You can easily move the information around, transferring it between physical servers or making copies on a CD or for a laptop. Most importantly, you can now get an identical copy of a production server for your test environment simply by copying a file.

To be sure, virtualization makes backup and recovery a snap, which is why experts like Harbin and Dugan appreciate it. "In the case of a disaster, it's just a matter of returning the file," Harbin says. "You can restore an entire environment no matter how large, in hours."

It is just as easy to ramp up as it is to backup. In the past, a new application required a new server, and that required a purchase order number, bids and delivery. With server virtualization, new servers can be provisioned from master templates and customized in minutes. "Now you want it, now you have it - boom! - in five minutes," Dugan says.

Virtualization also makes maintenance a breeze. You can migrate a running virtual machine from one physical server to another, allowing easier hardware maintenance, even during business hours. End users continue to have access to services and data never knowing that the information has migrated.

## Overcoming the objections

Despite the clear advantages, there are those who still drag their feet when it comes to server virtualization.

Some insist that virtualization software can't handle the power that their servers require, or that their applications won't perform as well as they do on separate physical servers.

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"Generally speaking, that's an ostrich approach," Dugan says. Virtualized servers not only perform well, but also accommodate a large amount of activity, such as frequent reading and writing to the disk.

"With each new release of VMware, virtual machines can have more memory, up to 64 gigabytes at present," says Jonathan Butz, Professional Services Manager for Arraya Solutions, a Premier VMware Partner in Plymouth Meeting, "Future releases will undoubtedly support even more."

In addition, hardware manufacturers are stepping up with products that facilitate virtualization. Consider AMD's Opteron processor. "The architecture enables better virtual performance," says Michael Rosenstein, Senior Manager of Enterprise Business Development for AMD's Eastern region. The integrated memory-controller enhances the memory performance in a virtualized environment, he explains. "It streamlines the data movement among virtual machines."

Some people worry that users will inadvertently migrate information from one virtual server to another. But thanks to the software, the virtual servers are seen as separate entities. "You can't break out of one virtual machine and into another," Harbin says. Virtualization, however, does not solve hacking, viruses and worm issues.

Servers that require some types of specific hardware - such as hardware for VoIP (voice-over Internet protocol) phone systems - cannot be virtualized. But more often than not, the decision to keep a dedicated physical server is based on operational procedures rather than whether the technology can handle it, Dugan says. The decision may also rest on whether or not a certain server sits outside a firewall.

At some companies there is strong opinion that it is best to keep mission-critical applications on a dedicated physical server. "If you'd asked me a year and half ago, I would have thought that, too," Mueting says. "As the hardware and the software improves, I don't think you'll see any applications that will be off base."

Large databases will likely be the last to jump on the virtual bus, he says. Given the size and sensitivity of some databases, that is understandable. Nevertheless, virtual storage solutions could ease that transition.

AMD's recently released quad-core processors, which have an enhancement called rapid virtualization indexing, is improving performance for mission-critical resources that make more demands on memory.

## **No company is too small**

While such processors are desirable and make the system more efficient, they are not necessary if you want to virtualize your servers. If your servers are old, however, you should consider replacing them. You will definitely need software such as VMWare. You will also need sufficient storage space.

"It sounds cliché, but the keys to success in implementing virtualization involve an evaluation of the existing environment along with thorough planning and architecting of the virtualization solution," says Biglin of Interphase Systems.

Your company is never too small for server virtualization. "We have some clients with one server and three users," Dugan says. "It's a waste of money for them to buy another physical server."

Rosenstein says interest in virtualization is soaring. (You can even use a version on your home PC) "The momentum will continue to grow," he says. "Every customer I talk to is looking at formulating a virtualization strategy - maybe not for every server or application, but certainly for the low hanging fruit."

"This isn't the technology of the future," says Butz, "It's the technology of the present. Almost all of our customers are embracing virtualization and all that it offers."

## **Storage virtualization magnifies cost savings**

While virtualization today often refers to server virtualization, it is not limited to it. Storage is another area that's open to virtualization, and it complements server virtualization.

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"It accentuates and magnifies the cost savings and efficiencies in a virtualized environment; says James E. Price III, Vice President of Product and Channel Marketing for DataCore Software Corporation in Fort Lauderdale, Fla. 'We do for storage is what VMware does for servers,'"

To put it simply, both products let users exceed what was considered a limitation. Traditionally, storage involves multiple network storage devices, including a storage-area network and hard drives directly attached to or located inside a server. Managing them all can be tedious. Virtualization pools all that storage so that it appears as a single storage device managed from a central location.

But storage virtualization also refers to the process of abstracting logical storage from physical storage. With virtual storage, the system seemingly has an infinite amount of configurable storage. "We can make the existing physical 1 or 2 terabytes of storage look like it is 200 terabytes," Price says.

DataCore's "thin-provisioning" technology adds more potential, letting users "oversubscribe" the amount of space. The result is maximum storage flexibility.

The outcome can be remarkable. "With a traditional storage array 15 virtual servers on VMware's ESX Server, with Windows Server 2003 R2 installed, will consume 300 gigabytes of storage; Price says. "Leveraging DataCore's products, the same 15 VMs only consumes 45 gigabytes."