



## Virtualization: Looking Beyond Consolidation

Organizations can gain all sorts of benefits from virtualization including improved disaster recovery abilities, reduced power consumption and easier management.

It is not difficult to understand why server virtualization has grown in popularity. The technology allows organizations to combine and consolidate workloads on a smaller number of physical servers. This increases hardware utilization and leads to a number of other benefits.

According to the Information Technology Intelligence Corp. (ITIC) 2009-2010 Global Virtualization Deployment Trends Survey, almost 50 percent of respondents reported that server virtualization helps them lower their total cost of ownership (TCO). And it helps them achieve faster return on investment (ROI).

"Most organizations go into virtualization with the idea of reducing hardware commitments and increasing utilization of existing servers in the data center," says John Humphreys, senior director of product marketing, Datacenter and Cloud Division, Citrix.

Organizations can realize tremendous cost savings. "Capital expenditure reduction is very evident," he confirms. "Doing a 10-to-1 consolidation ratio with an average cost of \$5,000 to \$7,000 per server, you've saved \$60,000 for the organization. But the operating expenditures side is harder to quantify."

According to Rob Smoot, group manager, product marketing, VMware, capital expenditure savings increase via the ability to consolidate multiple machines onto one host. "When you're able to virtualize the entire IT infrastructure, that's where savings can add up quickly," he says.

"We generally see organizations get at least 50 percent capital expenditure savings after server consolidation," he adds. "In many cases, we have organizations above 50 percent."

There's no question that virtualization offers organizations cost reductions. However, by reducing the number of servers in the data center, organizations are gaining a significant number of other benefits as well.

### **Resource Flexibility**

One of the reasons for the popularity of server virtualization is that there are flexibility advantages gained from having a virtualized and simplified infrastructure. There are also short-term wins that come from solely using server virtualization for server consolidation.

"There's a cost savings and, in many cases, a very clear near-term payback," says Gordon Haff, principal IT advisor at the tech analyst firm Illuminata. "That's one of the reasons that server virtualization is taking off. Organizations don't need to buy into a grand vision of virtual infrastructure in order to gain advantages. It has both strategic and tactical IT advantages."

How fast is the shift to server virtualization happening? According to Gartner, 18 percent of server workloads this past year ran on virtualized servers. And that share will continue to grow to 28 percent by the end of 2010, reaching close to 50 percent by 2012.

"There is a level of complexity that goes with implementing server virtualization. And organizations are now better equipped to deal with that complexity," Haff says.

"It's an additional layer of software that needs to be installed, managed and used in order to bring advantages," he adds. "While server consolidation is an advantage for organizations of any size, when you're talking about some of the things that you can use virtualization for, such as backup, disaster recovery, resizing server pools, those are really benefits for larger organizations."

Reducing the number of physical servers is a hard dollars-and-cents cost. Like any ROI, measuring softer costs around management and IT flexibility is more difficult.

"Virtualization clearly brings flexibility, but it may increase certain types of management costs," Haff continues. "When you reduce the numbers of servers or reduce the need to purchase more, those are direct hard costs."

"The most tangible piece is capital expenditures," says Doug Strain, virtualization product manager, infrastructure software and blades, HP. "You can defer some or all of your server purchases and use underutilized capacities in the servers you have, or buy fewer servers."

"The other thing we hear is that organizations run into more physical constraints. They run out of room or run out of capacity for power and cooling in the data center," Strain adds. "It's not very feasible now to get more data center space."

### ***Operating Expenditures and TCO***

When it comes to operating expenditures, it's harder to see a direct correlation between virtualization implementation and cost savings. However, one area where there is a direct relationship is power consumption.

"You see some places where IT ends up having to pay the power bill, which directly impacts IT costs," Strain says. "But the other thing we're seeing is that organizations are asking IT to be ecologically friendly and green, and it's become a mandate. So organizations are saving money and operating expenses by reducing power consumption."

Based on power consumption alone, many organizations can justify the cost of virtualization and consolidation. According to the U.S. Environmental Protection Agency, energy use in U.S. data centers more than doubled from 2000 to 2006. For every dollar spent on new server hardware in 2007, more than 50 cents was spent on power and cooling costs, according to IDC.

The other big operating expense is the cost of managing servers. "You'd expect [power costs to drop] as organizations are slowing the growth or going flat in terms of the number of physical servers they're using," Strain says.

"You would [also] expect management costs to go down," he adds. "Some studies have shown that although it is going down, it's not going down that rapidly."

IDC reports that when organizations are using physical servers, systems administrators can manage 25 servers, on average. As they virtualize, organizations realize some savings around management; it bumps up to 35 virtual machines per system administrator.

"It's an improvement," Strain says. "However, considering that adding servers has almost become too easy, they're not seeing savings in management costs with so many new virtual machines. Organizations still have to keep the same number of people maintaining those physical and virtual servers."

"You still have to manage the virtual environment, so you still have operating costs," says VMware's Smoot. "But in some cases, we're finding that organizations are realizing that the number of workloads an administrator can manage increases to hundreds of machines per administrator."

"After a year or two, organizations are making server virtualization part of their core processes," he adds. "And the operating expenditure savings that result are an ongoing savings that accrue year after year. These savings are a little less than capital expenditures, but are still compelling — in the 30 to 40 percent range."

As for the TCO, it takes a little investment to get to where you realize those savings. Operating expenditures are less clear cut than the capital savings that you see up front.

"Virtualization is a new technology for some organizations," says Smoot. "Typically IT departments are spending the majority of their budgets on the operating side. For every dollar that you're spending on your hardware, you're spending \$7 or \$8 to manage and maintain that hardware. Year after year, organizations can transform how efficiently they manage their IT environment with virtualization."

And with efficiencies, organizations realize the real ROI. "Automation of power management hardware can help manage power consumption," HP's Strain says. "That lets you set a power cap for an entire rack of servers."

### **Management Automation**

One of the benefits of virtualization that results in operating cost savings is the ability to automate management processes. Organizations are gaining higher availability with technologies such as dynamic workload balancing.

"You can dynamically move workloads around so you don't have downtime for planned maintenance, for example," VMware's Smoot says. "The impact is higher availability for the data center."

In addition, there is now a lot of activity in the virtualization industry around automating management capabilities, which could lead to more cost savings. Some of those realized savings can come from something as simple as how an organization deals with potential downtime.

"You want to automate the virtual machines so they can be migrated to another server," Smoot says. "Or you can plan downtime where you're getting a prefailure alert that indicates potential downtime of a server."

Many of these capabilities are integrated into virtualization software, such as HP's Insight Control. With this solution, the process of migrating virtual machines based on degraded hardware can be automated, in many cases, before the server actually goes down.

"With Insight Dynamics, you can do a little more in terms of planning, trending out where virtual machines are going to be needed to optimize the computing and storage and tower resources," says HP's Strain.

"Almost anyone who is virtualizing is thinking about it," he adds. "Part of [the slow adoption of this feature] is concern about implementing new things like this in a down economy."

The only downside to virtualization, according to Citrix's Humphreys, is that it actually increases the appetite for servers within some organizations. "It's very easy to keep adding virtual servers because the cost is essentially zero. You already have the hardware resources in the data center," he says.

"In many organizations, there's difficulty in gaining access to new computing resources," Humphreys adds. "But with virtualization, it's much easier to get new servers up and running."

Too much virtualization can also eat into your operating costs. "Even if you've gone from 500 physical servers to 600 virtual servers, you still have to manage those servers. And the big [drawback] that we're seeing is the time spent managing those virtual servers," Humphreys says.

Every time a vendor releases a new update or a patch, the IT department has to make those changes. "If you have 20 percent more servers, your IT staff has to spend more time servicing and managing those additional servers," he adds. "So the operational savings get lost along the way."

Provisioning services, wherein server workloads are delivered on demand to servers, allows organizations to do more than hardware and server consolidation. This virtualization technique also supports software image consolidation.

If you can reduce the number of images from 100 to a few dozen, then what you need to patch and change decreases. So you can realize some of the operating cost savings by leveraging tools such as provisioning services.

### **Proven Technology**

Even with the potential for virtual sprawl, few if any organizations want to go back to traditional physical servers. "It's a fairly well-established technology at this point," says Illuminata's Haff. "I haven't heard of any instances where an organization has rolled out virtualization in any significant way and then thought it was a bad idea."

But most experts agree that you always want to have the ability to roll back components of an IT infrastructure. "An organization may virtualize a production workload and then decide that they want to manage it physically. But frankly, that kind of issue can be worked out as a part of a systematic IT deployment," Haff says.

"It's all about IT best practices: If you have critical workloads, you want to pilot those before you start to virtualize them."

## Server Virtualization: Disaster Recovery

Many organizations embrace virtualization to save money and to reduce space and power requirements. But virtualization has some strong disaster recovery benefits as well. Understanding how virtualization fits into a disaster recovery plan will prove invaluable to organizations.

According to operations continuity expert Paul Kirvan, it's important to make sure that you don't reduce the number of servers too far. You will need to be able to recover and restore critical applications and operating systems. "You want to make sure that you have enough hardware assets to do a restoration," he says.

When you're developing a recovery environment, it's critical to create your virtual servers so that you have earmarked assets in place that can be used for a disaster. The servers need to be maintained and managed in the same way that your production environment would be.

The good news is that in a virtual environment you can restore things much faster than if you were moving tapes or recovering servers. You can also set up automated processes to help handle the workload.

With solutions such as VMware's vCenter Site Recovery Manager, you can automate the entire workflow of setting up, testing and implementing disaster recovery plans for an entire site in the virtualization layer.

"[This approach] sets up how the failover should happen," says VMware's Rob Smoot. "You decide which applications get the highest level of protection and get recovered first.

"It makes disaster recovery something that most organizations can do without overwhelming cost and complexity," he continues. "Most organizations agree this is important, but few are doing it because it's so labor intensive and expensive."

In addition, VMware vSphere has built-in features that help reduce planned and unplanned downtime. For example, Distributed Resource Scheduler uses VMotion to do live migrations of virtual machines from one host to another to facilitate workload balance across a cluster of servers.

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