



TAKING CONTROL

CONSOLIDATION
CAN HELP YOU TAKE CONTROL
OF THE SERVER ROOM.

SERVER SPRAWL CREATES A SERIOUS FINANCIAL AND EFFICIENCY LEAK AT MANY ORGANIZATIONS. CONSOLIDATION CAN HELP EASE MANAGEMENT REQUIREMENTS AND REDUCE COSTS.

Server sprawl may be the bane of many IT organizations' existence. But the events that led to it are quite reasonable. A workgroup in the organization needs a new application; so IT buys a new server to run it on and locates it somewhere near the workgroup. »»»

No muss; no fuss. No need to estimate capacity, worry about the problems with shared DLLs (Dynamic Link Libraries) or application conflicts, or determine whether the already-crammed data center can physically accommodate more equipment.

But it's a pay me now or pay me later situation. Up front, the one-server, one-application strategy is the easiest to implement. But it's extremely inefficient when it comes to support, power and cooling. And buying or leasing a server that will be utilized to only a fraction of its capacity ignores your grandmother's wise advice to 'waste not, want not.'

Of course, ten or so servers distributed throughout the building probably won't overburden IT or increase costs unacceptably. In fact, it's a reasonable strategy for small companies that have to implement new applications quickly.

But when the sprawl grows into dozens or even hundreds of machines, each of which has to be serviced, periodically upgraded and backed up, the costs of support can become onerous.

» CONSOLIDATION SOLUTIONS

There are three basic solutions to server sprawl, all of which involve consolidation. The first, and easiest to implement, is application consolidation: simply placing more than one application on some servers.

The second is physical consolidation, which involves herding all the servers into the data center. The third solution is logical consolidation. In this model, multiple applications are moved to a single server with the help of virtualization software.

These tools partition a server into multiple 'virtual machines,' each running separate instances of the operating system.

The methods are not mutually exclusive. In fact, physical consolidation may make logical consolidation easier to implement, just as it will lighten the load of any type of support or upgrade. Still, for each organization, there are specific advantages to each model or subset of each model.

» APPLICATION CONSOLIDATION

Not all consolidation projects have to be major initiatives. There are small processes which are relatively easy and less impactful on the overall IT structure but which may yield at least some benefits.

When appropriate, those are often good first steps. For example, you can determine if the one application per server model is really needed in all cases.

"The first thing to look at is whether you can solve your problems by consolidating workloads without physically moving any servers or adding virtualization," says Anil Desai, an independent consultant. In this approach, similar applications run on a single machine instead of separate machines. "This will lessen the underutilization issue to some extent at least."

Still, Desai and others point out that this strategy is neither for the faint of heart nor for the stretched of IT human resources. IT will have to do some careful planning to make sure the applications it intends to install on the same server do in fact play well together and that the server has sufficient power so that performance is not degraded.

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And troubleshooting can be more complicated. For example, if the server goes down because of a software issue, IT will have more suspects to sort through.

On the upside, it doesn't cost anything to consolidate applications. If you're bringing in a new application, and you find it can share a server with another application, you have an immediate cost savings equal to the price of the new server which you didn't have to buy, along with ongoing savings in power and cooling costs.

» PHYSICAL CONSOLIDATION

After companies increase the number of servers to about 12, many find they can have better control over costs and support by moving them into the data center.

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Wolf adds that a single center that houses all the servers can allow for better control over cooling and power requirements since data centers are often outfitted with more efficient exhaust systems and power-management systems.

There is little downside to a physical consolidation project. If it's a simple matter of moving machines from closets throughout the building to the basement data center, it should be relatively safe and pain free.

The big question though is whether the data center can accommodate all those servers. "Many data centers simply do not have any more rack space for an influx of new servers," says Wolf.

Partly to solve the space problem, many physical consolidation projects include blade servers. Blade servers are basically very compact machines designed for high-density server storage and reduced power and cooling requirements.

There are two parts to a blade system: a chassis and the servers, which slip into the chassis. The chassis provides the power supply, cooling and network interfaces for all the blades.

There are a number of advantages to blades, the most obvious of which is their size — about half that of standard servers. "The initial interest in blade computing resulted from their compactness," says Jay Bretzmann, IBM's manager of product marketing System x offerings. In theory, if you switched all your data center servers to blades, you could double the center's capacity.

But Bretzmann points out that many data centers are not running out of room as quickly as they are running out of power capacity and cooling capability. Blades come to the rescue here as well.

GETTING STARTED WITH VIRTUALIZATION

According to “The Roadmap to Virtual Infrastructure: Practical Implementation Strategies,” published by VMware, the following three steps will help most organizations start a successful virtualization program:

1. ACHIEVE STAKEHOLDER BUY-IN EARLY AND MAINTAIN IT THROUGH ALL PHASES OF THE PROGRAM.

One way to accomplish this is to create a high caliber team of people who are not only technically credible but also socially influential in the organization. Such a “SWAT” team should help to mitigate fear, uncertainty and doubt on the part of business managers.

2. START WITH A PROPER INFRASTRUCTURE ASSESSMENT AND DESIGN

Before beginning a deployment, assess the organizational and technical readiness. This process should map out the inventory of the existing infrastructure (including applications, services, CPUs, drives, NICs, RAM, etc), current utilization rates and the blueprint for moving to a virtual infrastructure.

3. ESTABLISH A PHASED WORKLOAD SELECTION PLAN

Decide if you want to start with small, less-used applications in order to get your feet wet or if you prefer to start with high-visibility applications. In any case, be sure to include user acceptance testing, adequate IT training and validated remediation options in case of problems.

Since cooling and power elements are in the chassis, not in the individual blade servers, manufacturers can use more efficient devices. “When two fans in a blade chassis can do as good a job as six fans in six individual servers, you get a substantial power savings,” says Bretzmann.

Blade chassis can also have redundant power supplies. And they also include network connections that can be software assigned to the individual blade servers as needed.

Another hardware consolidation option is to use dual- or quad-core servers, which combine two or four processors on a single chip. A dual-core processor uses less power, takes up less space and is less expensive than two comparable single processors.

But it’s important to note that when moving from single to double core, or double core to quad core, you don’t double your servers capacity since the processors will have to share resources such as the system bus and memory bandwidth.

Dan Bowers, product manager for industry-standard servers at HP says, “The range of performance boost is about 50 to 90 percent depending on the application.”

For example, HP measured a 75 percent performance boost going from single- to dual-core processor on a sales and

distribution database application benchmark. But, says Bowers, “With applications that use a lot of memory or I/O, you’ll see lower scalability.” For instance, HP measured only a 57 percent performance boost going from dual-core to quad-core processors running Microsoft Windows Terminal Services.

» LOGICAL CONSOLIDATION

Centralizing the physical servers gives IT more control over its resources. But it has no effect on the underutilization problem. For that, IT turns to virtualization.

As noted earlier, virtualization partitions each server into many virtual machines. Each of these segments acts like a separate server running its own operating system (OS).

One primary advantage of virtualization is that you can perform application consolidation without the worries attached to having applications sharing operating systems. Anyone who owns a personal computer knows that running different files and applications on a single OS can create havoc. In addition, many applications do not allow you to run multiple versions of it on a single OS.

With virtualization, each partition acts exactly like a separate machine. So conflicts are impossible.

Since virtualization allows you to safely place multiple applications on each physical server, you can increase server utilization from the typical 10 to 20 percent utilization to 70 or 80 percent, reducing the number of servers you need to run your operation four fold.

Virtualization can also lighten the process of bringing in new applications. Many organizations have complex purchasing requirements, which may require a month or more before a new physical machine is brought in-house. But with a virtual machine, you can run the new application on any machine that has excess capacity.

By eliminating the reliance of the application to the physical server, maintenance and application uptime can be improved. A virtual machine is actually a software file, which can be moved from one machine to another.

This makes capacity planning less critical since if one physical server is getting crowded, you just move any of the virtual machines on it to another server. In fact, if you have shared storage, which John Gilmartin, senior manager for product marketing at VMware says is the dominate configuration of virtual machines, you can migrate complete virtual machines from one physical server to another with literally no downtime.

“As long as a physical server can see the virtual machine file running on another server, the VM can be moved to the second server instantly,” says Gilmartin. If you’re moving the virtual machine in order to maintain the physical server, once the maintenance is complete, you can instantly migrate it back.

“You won’t have to do all your maintenance at 9:00 p.m.,” adds Gilmartin. You can do it in the middle of the day without users being affected.

One early objection to virtualization was that if you place too many applications on one server, if that server goes down, the enterprise will lose a lot of its critical functions. But the ability to

easily move virtual machines from one physical server to another eliminates this issue.

Despite its advantages, virtual machines are not optimal for all applications. Some applications require all or most of the resources of the physical machine.

“For that reason, we recommend as a first step to carry out a capacity planning assessment,” says Gilmartin. Many VM software vendors and integrators have tools which measure the physical resources on each server and match that to the memory, processor and I/O requirements of the applications you plan to run on them.

» RETURN ON INVESTMENT

ROI measurement with virtual machines is relatively straightforward since the main goal is to end up with fewer physical servers than before. So the savings is the total cost of ownership of the reduction in servers.

VMware has a free online TCO/ROI calculator at <http://www.VMware.com/products/vi/calculator.html?id=v1user>. Gilmartin says that most companies achieve ROI within six to nine months.

Figuring ROI for physical consolidation is trickier and depends on whether you merely move the servers into the data center or switch to more efficient servers such as blades or multicore processes.

In the first case, the ROI is the reduction in support costs. In the latter case, ROI is based on, besides lower maintenance costs, reductions in power, and, in some cases, reduced hardware costs.

INTEL AND AMD PROVIDE VIRTUAL SUPPORT

Both Intel and AMD have jumped on the virtualization bandwagon. The microprocessor giants now offer solutions that put virtualization to work in new and improved ways.

Intel Virtualization Technology (Intel VT) is a set of hardware enhancements for Intel servers and client systems that improve software-based virtualization solutions. It streamlines the use of multiple operating systems and applications running in independent partitions, thus improving performance and improving reliability over software-only solutions.

Meanwhile, AMD is making ripples in the virtualization market. Second-generation AMD Opteron processors are now designed to boost server capacity and performance through AMD-V technology. An integrated memory controller enhances virtualization and provides efficient virtual machine memory isolation for improved security and support.

THE HP BLADESYSTEM C3000

Nicknamed “Shorty,” Hewlett-Packard’s BladeSystem c3000 hybrid chassis has remade its now-famous tower enclosure and the server’s guts into a flexible blade-enclosure format. The second enclosure in the form’s c-Class portfolio, the chassis is said to be perfect for remote sites and medium-sized businesses.



The “Shorty” blade chassis can house up to 8 multicore, dual-processor blade servers. To reach that capacity, all half-height servers have to be used. Businesses considering this won’t have to lose their investment in full-height servers since the enclosure will support any combination of half- and full-height c-Class servers.

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