



# CONSOLIDATING DATA CENTERS AS A PATH TO EFFICIENCY AND IMPROVED SERVICES

Data center consolidation can bring enormous benefits to state and local governments in a difficult economy.



**DATA CENTER CONSOLIDATION** is a popular way to save money. This is crucial in the present economy, which forces state and local governments to meet demands for more sophisticated services with fewer resources. As a result, government CIOs and IT directors must cut infrastructure costs so they can fund other business-related efforts.

However, consolidation means assuring performance with fewer resources, including the automation of routine tasks so agencies can keep up with changing demands. Data center consolidation, therefore, introduces increased management challenges that, if addressed properly, can result in improved performance and quality of service.

Virtualization has emerged as one way to meet this challenge in the data center. Virtualization lets organizations get more value from their existing data center hardware by running multiple “virtual machines” on one physical server. A Web server running Linux to support citizens’ property tax inquiries online, for instance, could be one virtual machine sharing the same physical server as a virtual file server running Windows to support internal documentation for the county. Using virtualization and clustering — which lets administrators pool together multiple physical servers so they act

like one extremely powerful and flexible machine — data centers can now dynamically reallocate resources based on up-to-the-minute business demands.

In a traditional data center, each server is devoted to a specific function. For instance, an e-mail server deals only with e-mail and a payroll server handles only payroll. But the old way is inefficient because the e-mail server could only run at 65 percent capacity, for instance, during business hours to accommodate spikes in demand. And that server would use significantly less capacity during nonbusiness hours. The payroll server, on the other hand,

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might run at only 5 percent capacity during business hours as a few changes and queries are processed by personnel, holding the remainder of its capacity in reserve for the larger job of payroll processing after hours.

Using virtualization, the e-mail server and payroll server could theoretically share the same machine, with e-mail processing using the bulk of the capacity during business hours and payroll processing using the bulk during off hours. Using this method, governments purchase and maintain less equipment. They also save on the cost of housing, powering and cooling huge server farms that only use a fraction of their processing power. In some situations, idle servers can consume up to 50 percent of typical server energy usage. However, the likelihood is that these two functions don’t currently live under the same roof. Payroll may be processed and run by data center staff within a government’s administration department, while e-mail servers may be administered separately by each department.

Bringing all of a government’s processing needs together under one roof can bring immense efficiency and cost benefits to the government organization. A single data center also gives organizations more flexibility to align their processes with their goals — especially when services-based approaches, such as SOA, and an increased use of industry standards begin bridging and breaking down information silos.

Migrating to a consolidated data center, however, must be well planned and managed to gain the most benefit. Virtualization, along with consolidation, comes with many management

challenges. Add to that the rapidly evolving ways of doing government business that demand constant changes in an increasingly interconnected computing environment, and the task can quickly overwhelm government staffs. With the right tools and processes, however, state and local governments can deliver on the promise of data center consolidation.

#### **Automation Is Essential**

As the numerous computing elements come together in a single data center, automation is critical. With data center automation tools, administrators can use business rules to trigger shifts in workload. For instance, if a local disaster hits and demand spikes for the Web server that controls the office of emergency management’s Web site, the surge in traffic can trigger an automatic load shift to another machine that’s free and has the capacity to handle the load. This automated server provisioning also can be programmed to support regularly scheduled business events, maintain



service-level agreements, or quell heating and cooling issues within the data center.

Automation allows organizations to minimize labor costs associated with allocating resources to meet business demands, facilitates meeting those demands more quickly, and helps with planning for future needs and minimizing risk associated with disaster recovery.

But virtualization, which makes consolidation possible, requires management considerations that traditional data centers did not, including containing virtual sprawl, mapping virtual machines to their physical host machines and the complications of managing configurations in a mixed platform environment. Without the proper tools, chaos can reign in the virtualized data center, negating its potential benefits.

For example, virtual machines can be created on the fly to meet the latest business requirements, which is one of virtualization's greatest assets. However, because virtual machines do not take up "physical" space in the data center — although they are obviously hosted on physical resources — they can be easily lost, abandoned or forgotten when

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business needs change. The resulting "virtual sprawl" can, over time, contribute to physical sprawl as lost virtual machines usurp physical machine capacity. Left unchecked, equipment requirements will grow, thus undermining one of the primary reasons to consolidate.

The ability to discover and map the physical and virtual element relationships within your infrastructure is essential in the consolidated data center. Tools that continuously check for and update these relationships can help managers keep track of all elements within the data center. In addition to containing sprawl, these tools help IT staff understand how

physical and virtual elements underlie business processes.

Understanding relationships among physical and virtual machines and business process also helps data center administrators recognize the effects of configuration changes on other elements in the data center.

Policies also should be implemented to control configuration changes or “drift,” which can increase downtime and hamper recovery efforts as gaps appear between recovery and working configurations. Automating these policies — so that configuration audits are triggered when changes occur or new resources are provisioned — will help keep things running smoothly and reduce risk to organizational functions and data.

### Order From Chaos

Consolidation brings together numerous existing functions. Trimming away redundancies and inefficiencies means data center managers must create order from the numerous existing hardware and software platforms, security requirements, policies and practices. The adoption of virtualization and dynamic provisioning increases the amount of moving parts data center staff must manage. Automation reduces the amount of staff and time required to manage them and makes processes more efficient. However, to be sure that all of these pieces work in symphony, centralized management processes and tools are essential. Therefore, management solutions must work across platforms and applications.

In addition, data center staff should be on the same page. Before any order can be brought to the technology, it’s essential that data center staff speak



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the same language and use the same processes. This is where standards, such as ITIL® (Information Technology Infrastructure Library), can be of service. ITIL sets out common terms and definitions that get everyone using the same terminology, and it also lays out best practices that help data center managers normalize and map out processes, align them with business goals and plan for what lies ahead.

Data center managers should seek out tools that support these stan-

dards. Often the best practices and standards prescribed by ITIL can be set as policies and automated with software tools.

Using standards, sound management and automation, state and local governments can experience the full benefit of data center consolidation strategies — from saving money to gaining the flexibility needed to provide new and improved services to citizens.



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