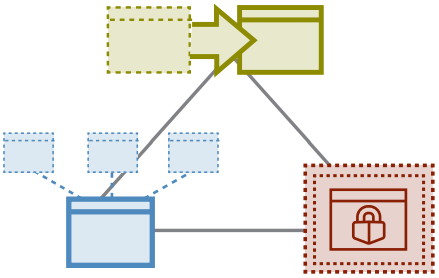

7 Virtualizing Your Mission-Critical Applications: Seven Things You Must Know

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Enterprises that seek a successful move to virtualization have a number of hurdles to overcome. Not all are obvious. Virtualization offers a lot of benefits to the organization that implements it correctly — a reduction in power and cooling costs, fewer physical servers to manage, faster go-to-market with new services, and easier and more effective administration of computing workloads — but those improvements can be realized only when the lifecycle of virtualizing your mission-critical applications is managed properly. This paper identifies seven key things that you must know if your business is to be successful in virtualizing your mission-critical applications.

Introduction

Virtualization in data centers, storage systems, and even personal computers has become a recent and major IT industry trend. Virtualization software separates the physical from the logical in an IT environment. It abstracts computer resources as it enables a single physical resource to function as multiple virtual resources.

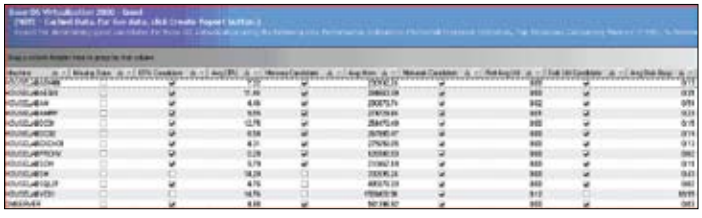
As virtualization solutions become more mature and as new versions become available, the conversations are moving away from if virtualization should be used towards when and how. Yet the process of introducing virtualization into any data center can be a daunting task. Deciding which of a company's applications it makes sense to virtualize and how best to deploy them requires careful planning and execution. Properly managing and monitoring those workloads once virtualized requires specialized tools. Most important, the move to virtualization must be accomplished in ways that enhance—rather than reduce—the operational flexibility of IT.

Considering these cautions, this paper identifies seven key things that you must know if your business is to be successful in virtualizing your mission-critical applications. You may find that there is more to virtualization's impact on data center operations than you previously thought. Leveraging the right tools—those that manage virtual assets alongside those in the physical world—goes far in ensuring success with your virtualization environment.

The First Step in Any Virtualization Project is Inventory

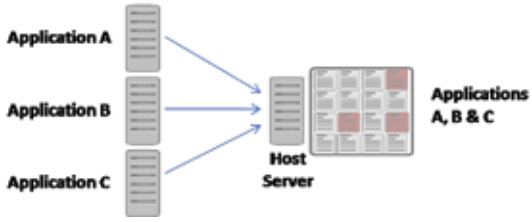
Once an organization has a virtualization strategy in place, the first step prior to any technology rollout is a full inventory of the environment. Although this task seems like an obvious first step, it is an oft-omitted action in many virtualization implementations. An effective inventory must include at minimum the following elements:

- **Physical server hardware composition,** location, networking, and peripherals. Virtualization will consolidate servers onto fewer host systems. Understanding the existing capabilities of assets in production will determine the hardware needs for virtual hosts. Location information is important because virtualization environments are highly centralized; therefore, some services may need relocation to participate in virtualization. Peripheral inventory is critical because many virtualization solutions do not support certain types of peripherals.
- **Server workload and installed software or services.** The business services you plan to host atop your virtual machines, along with their needs for interconnectedness, will determine how they are positioned in the virtual environment. A thorough inventory of the installed software and services, in addition to servers, will assist with identifying areas where virtualization and consolidation makes sense for the environment.
- **OS and application licenses.** Virtualization changes the terms for many types of software licenses. For some types of software, license costs will go down. For others, virtualization can actually increase license costs. Knowing this information first assists with making good decisions about which services it make senses to virtualize.
- **Performance baseline leveraging common server counters.** This step is the most critical of any inventory activity. Only by understanding the current performance behaviors of a physical server can an educated decision be made about its virtualization candidacy. Native tools such as Microsoft Windows PerfMon exist to provide this data but can be difficult to use. Alternative solutions that collect and analyze performance data across the environment can provide more guidance on candidacy options. This step is discussed in more detail in the next section.



This sample report shows data used to determine strong candidates for virtualization using key performance indicators such as processor and network utilization, average disk utilization and the top processes consuming memory.

- **Current and anticipated storage requirements.** Virtualization's consolidation from segregated direct-attached storage to consolidated storage will require significant investment in technology upgrades. Architecting the right amount of this storage to support expected growth is important for managing cost.
- **Anticipated growth of server/service needs with special consideration for virtual machine sprawl.** Virtualization's ability to quickly create new servers and services from templates allows IT to rapidly meet the needs of the business. But it can also mean a huge expansion in the number of servers under management. Planning for that growth along with the implementation of policies and governance for preventing virtual machine sprawl are necessary components of a successful virtualization strategy.
- **Existing systems management tools and their capabilities.** Because it is likely that not all assets will be virtualized, the management of virtual environments must integrate with the management of physical assets. Integrated tools that provide for common monitoring and management tasks across both halves are key.



Comprehensive systems management solutions enable virtual infrastructure administrators and application owners to report performance metrics pre-and post-migration.

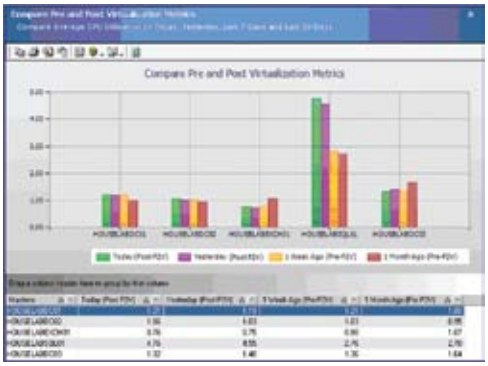
This inventory step is important so that an understanding of the physical environment can be leveraged into the architecture for deploying the virtual. Only with this information in-hand can you make the right decisions that lead to a successful implementation.

Pre-Virtualization Performance Monitoring is Critical

One of the steps outlined in the previous section has primary importance: Performance baseline leveraging common server counters. Understanding the performance behaviors of existing physical assets is critical to recognizing their success once virtualized. Virtual machines, when collocated with others on the same virtual host, must share the available resources on that host. When one virtual machine oversubscribes resources for its processing, it can impact the others on that same host. The end result of this behavior is a reduction in quality for multiple IT services.

Because of this heightened potential for multiple failures, monitoring for performance and looking for machines with extraordinary needs is an important step in ensuring virtualization success. Although hundreds, if not thousands, of performance metrics are available, only a few are truly necessary in gathering the gross resource requirements of a virtual candidate:

- **Processor Time.** The amount of time the processor is performing productive work is defined by this metric. When services require large amounts of processor time, they are difficult to collocate with others on the same virtual host.
- **Processor Queue Length.** In situations where existing processors cannot keep up with the load being placed upon them, instructions queue up for processor attention. That queuing is measured by this metric. A high processor queue length can indicate that existing processor power is not enough to support the needs of the workload.
- **Total and Available Memory.** Memory in virtual systems has the ability to be much more tailored to actual needs. Because assigned memory can be changed as necessary, administrators must watch for memory that is not being used by systems and trim configurations to suit.
- **Memory Page Rate.** This counter is an indicator of how much memory is being swapped out of high-performing RAM to low-performing disk. When available memory is low and the page rate is high, it can mean that the server's memory needs are greater than its available memory.
- **Disk Queue Length.** Virtualization solutions can have heavy requirements for disk performance in order to process changes within the virtual machine. If a candidate workload has a high disk queue length, a bottleneck may exist with its disk subsystem.
- **Threads and Context Switch Rate.** Each process is made up of a number of threads. Those threads are processed by the system's processor and swapped out to work on multiple processes simultaneously. High threads and context switches mean many processes are vying for processor attention.



This sample report shows data used to determine strong candidates for virtualization using key performance indicators such as processor and network utilization, average disk utilization and the top processes consuming memory.

This performance analysis helps deployment teams identify which physical servers may not be good candidates for virtualization. But it is also important to note that these counters are designed for entire-server performance only. A best-in-class approach will measure the performance of applications and business services in addition to server metrics. Ensuring that the physical machines (and the applications that use those machines) that do not make good candidates are excluded from the virtualization activity reduces the chance for failure while ensuring high-quality service for all services in the environment.

Consolidation Is Only One Potential Goal

Although most projects may not consider high-resource-use servers as virtualization candidates, others recognize the value of virtualizing beyond the collocation of more servers to fewer virtual hosts. The added benefits to backup and restore, disaster recovery, snap-shotting, and other automation processes gained through the move to virtualization can sometimes be more valuable than the desire to consolidate.

As stated earlier, some virtual candidates may not fulfill your goals for consolidation due to high resource use. Yet, in environments where consolidation is less important than virtualization itself, high-use servers may be virtualized. In this case, a consolidation ratio approaching 1:1 can be an acceptable goal for deployment—in effect locating a single virtual server atop a virtual host.

When strategizing your goals for your virtualization project, consider that consolidation need not always be the primary goal. When you take a hard look at the business benefits associated with virtualization, other unexpected goals may surface as well. To assist with goal setting in the consolidation ratio determination process, consider the use of monitoring tools that analyze data across multiple servers and provide guidance as to their ultimate destination and configuration.

Right-Size Virtual Resources to Workload Needs

If you asked ten Microsoft Windows administrators the question, "How much RAM do you include in your Active Directory Domain Controllers?" you're likely to get an answer somewhere between two and four gigabytes from each. Yet this type of workload rarely needs that level of memory to perform its job. IT administrators today often over-engineer their physical servers because it is inexpensive to do so and ensures machines have similar physical characteristics.

When the virtual environment has consolidation as a goal, this practice no longer makes practical sense. Consolidating virtual workloads onto physical hosts requires fine-tuning assigned physical resources to the needs of the virtual workload. Doing this process effectively with native tools ranges from difficult to operationally unfeasible with many virtualization solutions today. For technical reasons, measuring resource needs from within the virtual machine does not accurately portray those needs from a physical standpoint. And, the tools at the virtual host layer often can't dig far enough into virtual machine configurations to provide actionable information.

Tools that look at individual processes and behaviors within hosted virtual machines and compare that information with data seen at the virtual host layer are essential in this case. The right tools analyze current and historical data to illuminate where resources might be incorrectly assigned. Failure to leverage these solutions can result in a costly mismatch of assigned resources to virtual machine needs.

Decouple Hypervisors from Their Management Tools

Virtualization's first wave brought about solutions that integrate hypervisors with vendor-supplied management tools. Those tools enable IT to interact with and administer the virtualization environment. Yet platform-specific virtualization management tools all suffer from the same problem: siloing.

Managing a virtualization solution using only the tools provided by its vendor usually means that separate toolsets are required depending on the action that needs to be accomplished. For example, administering configurations within a virtual machine may require a different toolset than that used to impact the virtual machine's configuration on the host. This duplication of management tools is an inefficiency that reduces the overall effectiveness of the virtual environment.

By decoupling an environment's hypervisor from the tools used to manage it, it is possible to more uniformly administer the entire IT environment. Physical machines can be managed alongside their virtual counterparts. Monitoring across all facets of the IT environment—including elements lower in the stack such as networking and those higher such as databases and applications—can be accomplished through a unified interface.

Effective Virtualization Monitors the End-User Perspective

Monitoring is a critical component when leveraging holistic management tools. But simple monitoring that looks only at on-system counters is not enough to truly capture the end users' perspective. Consider the example where an end user is working with an IT system and experiencing below-normal behavior. The slowdown of the service is often not captured by on-system counters like those discussed in the previous section—yet the problem is still very real in the eyes of the user.

Only by incorporating top-down monitoring that captures metrics associated with the end-user experience can issues like these be brought to the attention of IT. These tools that monitor end-user experience look at transactions among IT systems and between those systems and their end users to identify areas of low-quality performance. They also measure aggregate traffic across the network as a whole to identify where external forces may be impacting the problem identified by the user.

As has already been discussed, virtualization's collocation of many virtual machines on few hosts increases the complexity of ensuring appropriate performance across all services. Your virtualization management solution should include components of end-user-experience monitoring to give you the necessary vision into how services hosted atop both physical and virtual machines are being experienced by your users.

Applications can appear to run slowly to the end user and when virtual administrators rely solely on the hypervisor management console generally is unaware of a performance issue until a trouble ticket is logged. To properly diagnose the performance issue, it is helpful to have data from the application, the virtual machine and the host server.

Align Virtualization Projects with Business Goals

When businesses make the conscious decision to virtualize their IT assets, it is critical to align virtualization projects with business goals. Virtualization's benefit to the organization must be more than technical.

Organizations that make the decision to move to virtualization do so for a number of reasons. Some of these are considered the classic case studies and ROI benefits attributed to the move:

- Consolidation of multiple systems or servers to virtual machines means less physical hardware to maintain
- Less hardware to maintain means reduced costs for power, cooling, management, and provisioning labor
- Greater flexibility with assignment of physical resources to workloads
- Higher levels of uptime with fewer single points of failure in the environment

Yet the classic case studies for virtualization are not always the right ones. Virtualization's impact on business goals must be a primary priority. Virtualization can be a catalyst for levels of automation not otherwise seen in the IT environment.

With the right tools and techniques, remediate and proscriptive actions can be taken across entire swaths of virtual workloads. Virtualization's ability to template potential workloads translates into a substantially lower marginal cost associated with the creation of new services. Above all, virtualization's layer of abstraction, which separates the logical from the physical, improves IT agility in rapidly fulfilling the growing needs of business. Businesses that declare success in their virtualization projects do so when the inclusion of virtualization augments the processing of business.

NetIQ Integrates Virtual Management with IT Management

This paper has explored seven factors that are crucial when considering the virtualization of your critical applications. At the same time, it has shown where external best-in-class solutions can augment existing virtualization platforms with needed planning, monitoring, and management capabilities. NetIQ® AppManager® and NetIQ® Aegis™ fulfill those needs. Together, these products bring to the hybrid physical-virtual environment a powerful combination of proven-quality system performance and availability management and IT process automation. The management and monitoring capabilities of the products help align virtual management with IT management as a whole.

NetIQ AppManager identifies the pain points in an environment both pre- and post-migration to the virtual infrastructure. It does so by leveraging industry best practices in combination with rich monitoring data to determine and position virtualization candidates. The metrics NetIQ AppManager collects as a result of everyday management of systems and applications in the physical data center become valuable business intelligence that enables IT to understand how a virtualized system will perform long before purchasing decisions are made. Once in place, NetIQ AppManager helps ensure continued quality service through its end-user-experience monitoring, feeding data to consumable reports and actionable visualizations. NetIQ Aegis automates the workflow process steps often conducted by operations, security, and virtualization administrators to ensure that such knowledge is clearly captured, processes are followed and environments remain secure.

NetIQ AppManager and NetIQ Aegis bring a sense of confidence to the process of virtualizing a data center. They leverage information throughout the environment to provide critical business intelligence that proactively enables the management of your mission-critical applications while accelerating the adoption of virtual technology.

About NetIQ

NetIQ, an Attachmate business, is a leading provider of comprehensive systems and security management solutions that help enterprises maximize IT service delivery and efficiency. With more than 12,000 customers worldwide, NetIQ provides solutions that yield measurable business value and results that dynamic organizations demand. NetIQ's best-of-breed solutions help IT organizations deliver critical business services, mitigate operational risk, and document policy compliance. The company's portfolio of award-winning management solutions includes IT Process Automation, Systems Management, Security Management, Configuration Control, and Enterprise Administration.

About Attachmate

Attachmate enables IT organizations to extend mission critical services and assure they are managed, secure, and compliant. Our goal is to empower IT organizations to deliver trusted applications, manage services levels, and ensure compliance by leveraging knowledge, automation, and secured connectivity. To fulfill that goal, we offer solutions that include host connectivity, systems and security management, and PC lifecycle management.

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