



WHITE PAPER

Scaling Server Virtualization to the Enterprise: Accelerate the Time to Value

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Introduction

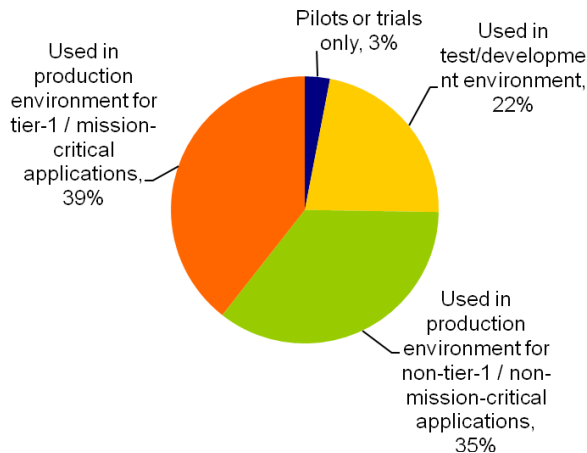
The promise of server virtualization is very attractive to companies of all sizes—leveraging this technology as a foundation to create a dynamic computing platform to deliver higher levels of service to the business is truly compelling. Additionally, it can dramatically reduce data center capital and operational costs as well as enable greater flexibility and higher availability. In order to better understand the motivation behind and perceived benefits of server virtualization, ESG surveyed IT organizations about their virtualization initiatives.¹ The anticipated benefits include reduced costs, improved server backup processes, faster provisioning; simplified management; reduced power and cooling costs, lower floor space requirements, and higher levels of availability and disaster recovery.

Although many organizations have increased their server utilization rates, they have yet to extract the full value server virtualization has to offer for their key operational processes. In the first wave of adoption, server administrators drove implementation. In most cases, consolidation was the primary driver. While these companies have saved considerably on capital and operational costs, there is still much work to be done.

As more production environments standardize on VMs and organizations run more Tier 1 applications in virtualized environments, the stakes get much higher. A recent ESG survey of current server virtualization users indicated that 76% of respondents using virtual machines are using them in production environments and 39% are running Tier 1 applications (see Figure 1). This shift requires organizations to deliver higher service levels and more effectively manage the virtual environments supporting mission critical applications. However, this means that new management tools will need to be brought in and separate processes will need to be developed. These virtual environments will need to be adequately protected and, for mission critical applications, high availability and business continuity solutions need to be put in place.

FIGURE 1. VMWARE DEPLOYMENTS IN PRODUCTION ENVIRONMENTS

Which of the following **best describes** your organization's current VMware implementation?
(Percent of respondents, N=156)



Source: Enterprise Strategy Group Custom Research for EMC, August 2008

Once these applications have been converted to a virtualized platform, primary concern shifts from utilization rates and power and cooling savings to availability and performance. In many cases, the performance issue will extend beyond the server domain and include networking and storage infrastructure. It doesn't truly benefit the company to save on the electric bill if mission-critical, revenue-generating applications are running in a degraded state. In order to take your server virtualization environment to the next level, additional skills, tools, and resources are required.

¹ See: ESG Research Report, *The Impact of Server Virtualization on Storage*, 2007.

This paper explores the obstacles that are preventing organizations from achieving the full benefits of server virtualization technology and recommends specific ways to better manage virtualization initiatives in order to recognize the maximum value of this technology. When it comes to supporting mission critical applications in a virtualized environment, it is important that deployment is done right—the first time.

Obstacles to Optimizing a Virtual Environment

Organizations that rushed to deploy server virtualization realized some immediate benefits, but many have fallen short of the goal of creating a truly dynamic computing platform. Reasons for the inability to complete this transformation include:

- **Virtual Sprawl**

While managing fewer physical machines should be easier, virtualization creates a layer of abstraction and complexity that impacts the management of those virtual machines. Because it is so much easier and faster to create a VM, managing this rapidly growing environment can be a challenge. This ease of deployment means more new workloads can be added and ultimately more VMs are created for each new project. Management is even more critical as VMs move into the production environment and support mission critical applications. Ensuring teams have the appropriate management tools to identify and manage VMs will be essential to effectively managing and optimizing an environment. Many implementations lack such tools and associated processes today.

- **Myopic Architectural Views**

In most organizations, virtual server implementations are owned and operated by the server team, which, at first blush, seems logical. However, when you consider the dependence that virtual servers have on other parts of the data center infrastructure—like the network and storage—it becomes clear that a broader approach is needed. Server virtualization is one of those paradigm shifting technologies that mandates greater collaboration among technology domains. Unlike the static, legacy infrastructure it is replacing, server virtualization technology's highly dynamic nature requires much tighter coordination among application owners, IT operations, infrastructure, and security teams. Only with open communication and collaboration can organizations maximize the return on their virtualization investment. Given the years of empire building and competitive positioning common in many organizations, this is a difficult internal bridge to cross.

One of the most obvious, and overlooked, architectural dimensions to consider is the need to carefully plan for and implement a scalable storage network. The ability to add new network and storage capacity will be vital as additional VMs requiring access to shared storage resources are brought online. This is also critical for enabling virtual machine mobility and availability. Without the proper architecture, virtual environments could be prone to network congestion and contention issues.

A different architecture also makes data protection a challenge. In fact, ESG research found that 43% of survey respondents indicated that ensuring proper business continuity and disaster recovery processes was a major challenge. While most organizations have BC/DR experience with physical infrastructure, virtual machines have different requirements—new skills are needed to implement a robust solution. Users need to understand these differences and take advantage of the savings opportunities they present. For example, the cost of a DR solution can be dramatically reduced by leveraging Physical to Virtual (P2V) or Virtual to Virtual (V2V) environments.

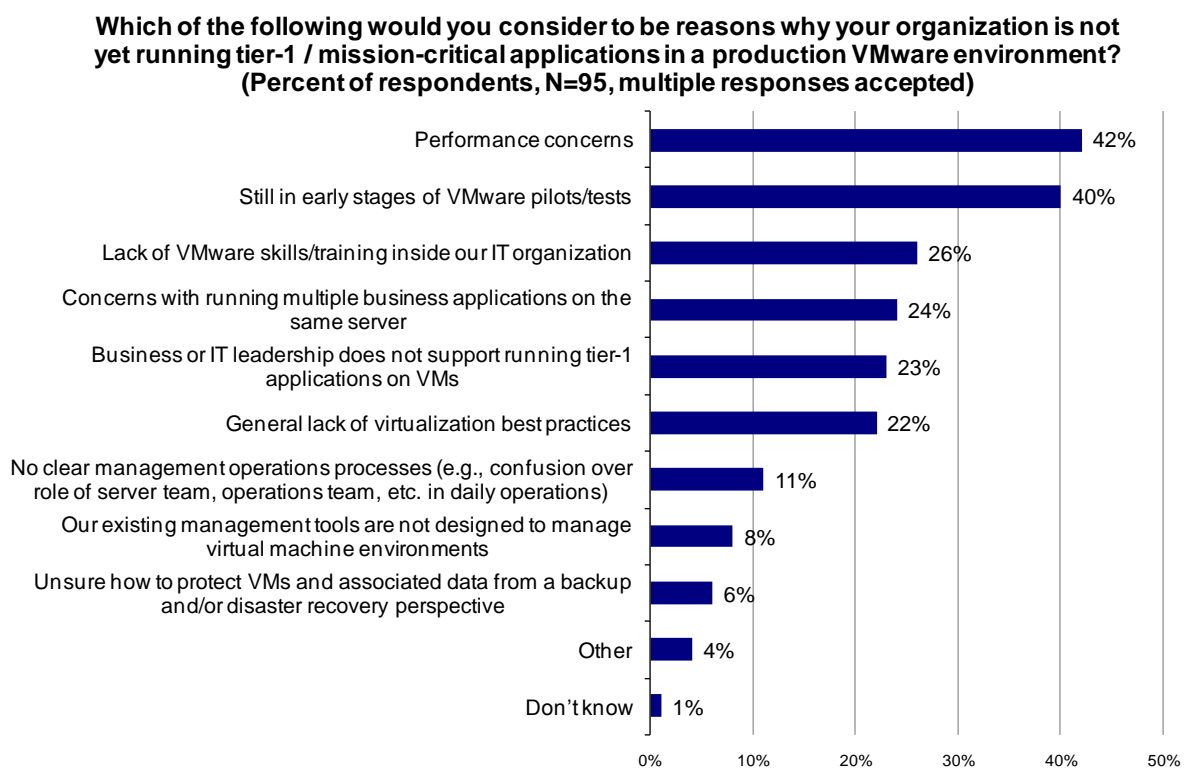
Security and networking warrant consideration in a virtual environment as well. Given the criticality of the applications being supported, it is essential that virtual machines within a resource pool maintain the same level of performance and security as the legacy, physical infrastructure. During the process of consolidating applications on physical servers to virtual machines, many organizations are challenged to ensure that networking and security functions, like quality of service, access lists, and VLANs will stay associated to a VM. In a static environment, this isn't a concern, but in a highly dynamic virtual

environment, the ability to link these services to a VM as it migrates across a resource pool is essential to mitigating risk and ensuring SLAs. This becomes even more important when there is a mixed application workload contending for available physical resources. Priority needs to be given to mission critical applications—users need to know that the priority QoS will be maintained even if the VM migrates to another physical server.

- **Performance Concerns**

When the IT environment has dedicated equipment and network bandwidth for each application, performance can be fairly predictable—although problems still occur. Leveraging a virtualized and shared environment gives most IT departments reason for concern. This concern grows considerably when organizations transition to running mission-critical applications. In fact, in a recent ESG research survey, organizations were asked why they were not running Tier 1 applications in a VMware production environment. The number one response was performance concerns (see Figure 3).

FIGURE 2. REASONS FOR NOT RUNNING MISSION-CRITICAL APPLICATIONS



Source: Enterprise Strategy Group Custom Research for EMC, August 2008

These performance concerns are not unwarranted; in many cases, as organizations rush to deploy server virtualization, mapping the environment to the underlying network and storage infrastructure is poorly planned. The result can be congestion in the network and contention in the storage arrays. This can be increasingly problematic as the infrastructure rapidly scales. To the supporting infrastructure teams, simply identifying the affected VMs can be difficult, especially if they do not have adequate management tools to properly map VMs through the network and into the storage.

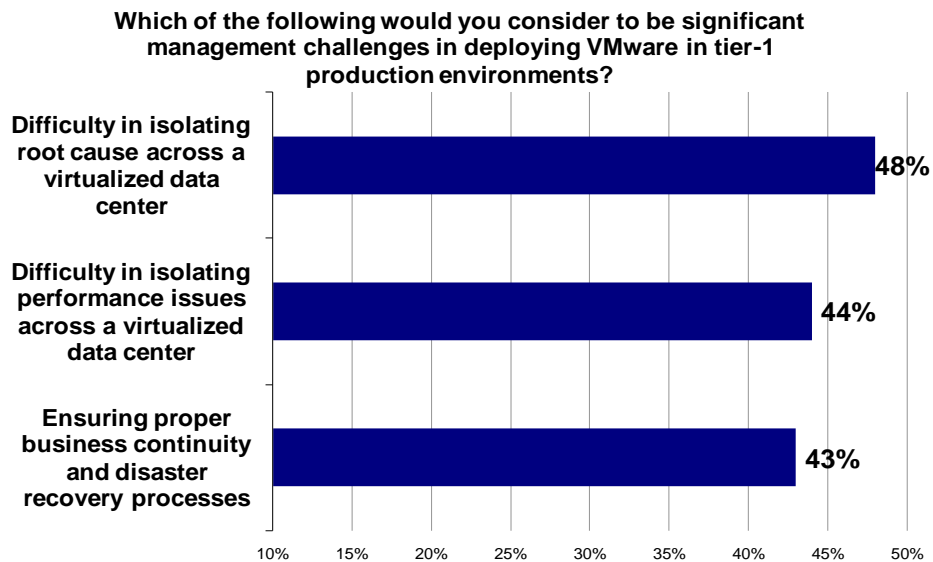
- **Lack of Operational Experience & Support**

Other areas that contribute to an inability to realize the full potential of virtualized environments include a lack of skills and training, which coincides with the fact that many implementations are still in the early stages of deployment. However, on the job training comes at a price: typically, time and possibly costly learning experiences. This fact was highlighted in ESG research when we asked those organizations currently running mission critical applications in a virtualized server environment what their biggest management challenges were. The top three are seen in Figure 3. In this case, there are different

priorities listed—most likely, and unfortunately, learned from experience. Without highly qualified resources, well-defined best practices, and intuitive management tools, extracting complete value from a virtualized server environment can take much longer than expected.

It is this delay in anticipated returns that can also cause executive support to waver and result in projects losing momentum before they can achieve maximum results. Being associated with a successful project can help advance careers; however, being attached to initiatives that bog down and don't deliver the promised results can have a negative impact. Executives will quickly distance themselves and withdraw support from projects that are failing, so it is important to ensure the project has the appropriate skilled resources and tools to guarantee success.

FIGURE 3. TOP THREE CHALLENGES IN MANAGING MISSION CRITICAL APPLICATIONS IN A VIRTUALIZED ENVIRONMENT



Source: Enterprise Strategy Group Custom Research for EMC, August 2008

Ultimately, server virtualization, like almost any new and disruptive technology, requires new skills, processes, and management tools in order to realize its full potential. While vendor presentations are quick to highlight the potential end results, getting there is not always as smooth as it is made out to be. Fortunately, there are resources available and important steps organizations can take to dramatically reduce the time and pain typically inherent in a transition from costly, legacy infrastructure to a more efficient virtual environment.

Keys to Maximizing Your Virtualization Investment and Lowering Operational Expenses

Some important focus areas that ensure an organization is maximizing an existing or future investment while reducing operational expenses include:

- **Executive Sponsorship**

Embarking on a server virtualization project is not a short term, limited scope project. Technology that fundamentally changes the computing platform requires patience and commitment. This is especially true for those organizations really interested in maximizing their investment. In reality, server virtualization shouldn't be considered a technology purchase, but rather an ongoing commitment to a more dynamic flexible style of computing.

Executives that initiate these projects have a responsibility to stay engaged throughout the entire process and ensure that the company is getting the most from its investment. Without such support, projects face problems including delayed identification issues, organization-wide resistance to change, and pocket vetoes. In addition to mitigating these potential setbacks, executives should also ensure that critical resources are allocated and available for the duration of the project.

- **Investing in Skill Development**

When a new technology is introduced, a knowledge gap is created. Server virtualization is no different. Most IT groups struggle to balance the need for training on new technology with maintaining daily operations. Finding people with experience is difficult and, without standardized education and certification programs, it is difficult to accurately gauge competence. In order to enable an internal IT group to understand the finer points of server virtualization and how to tune an environment, an investment in training and education is required. This process includes attending industry or vendor conferences to learn best practices from peers in real time and establish a network. One of the keys is ensuring that education is not limited to only the server team—the network and storage teams should be included.

- **Standardizing on Virtualized Infrastructure to Drive Efficiency**

Once the decision has been made to introduce server virtualization technology, organizations should strongly consider transitioning to a fully virtualized model. This will eliminate duplicate physical and virtual infrastructures with different processes, tools, and potentially even operational teams. By streamlining the tools and processes, IT can lower operating costs, reduce complexity, and deliver higher levels of service

- **Taking an Expanded Architectural View**

One of the keys to a successful server virtualization deployment is the realization that it will impact more than just the server domain. In order to achieve mobility and availability goals, the virtual server environment needs to be integrated with a storage network and shared storage. This means that a cross domain approach is required to ensure all the pieces can scale appropriately—without impacting performance.

Once the technology is in place, the IT organization will be able to effectively manage the entire environment—not each domain independently—as one system. The ability to help specify and deploy management software that can provide contextual management of a virtualized data center is critically important to achieve optimal efficiencies. In particular, separation of hardware and software by leveraging virtualization allows each to be managed according to a separate lifecycle.

Users should strongly consider standardizing on a virtualized platform. Going to a fully virtualized environment will also help to lower operating costs by avoiding duplicate physical and virtual infrastructures with different processes.

- **Continuously Improving Process and Operations**

The server virtualization market is developing rapidly and, as new features are developed, it could dramatically impact the value derived from server virtualization software. Third party vendors and server virtualization technology partners are constantly innovating. Organizations must constantly and proactively evaluate new strategies to better leverage existing environments and optimize new deployments. At the very least, there should be a concerted effort to identify and correct any inefficiency that exists. The ability to take a proactive approach rather than reacting to issues will be required to maintain acceptable service levels, especially as the environment scales. For example, provisioning a new server used to take months (obtaining hardware, burn in time, migrating from test and development to production, etc.) and now, with server virtualization technology, provisioning a new VM can be done in just hours or even minutes. What's more, physical servers that utilized tape backup for data recovery and had an RTO of days can now affordably leverage VMs with high availability and fault tolerant features that deliver RTOs of minutes or seconds.

- **Application Profiling**

Ideally, understanding how an organization's applications are going to behave in a virtualized environment would make the transition much smoother. Organizing this information into application profiles and matching those requirements to specific reference architectures and configurations of the extended application environment (networking, storage, and management implications) will make for an easier transition. This will help to either avoid or completely understand mixed application load environments (multiple different applications with varying processor, memory and I/O requirements and importance that can occupy a physical server) and ensure the appropriate resources are allocated at an application level. Leveraging a vendor that can build best practices based on lab-tested configurations will help to ensure that there will be predictable results.

Leverage Experienced Service Providers to Accelerate Time to Value

Organizations are demanding more from IT; specifically, to reduce capital and operating expenses while at the same time increasing service levels. In addition, the acceptable time to achieve a return on an investment has decreased substantially. As more companies make investments in server virtualization to achieve an initial objective, reaching the second level—creating a fully optimized virtual environment supporting mission critical applications—will require help. Service organizations with virtualization expertise will have greater depth and breadth of experience than internal resources—that expertise will translate into quicker installations with less risk and keep essential IT staff focused on running the business. Additionally, external teams will be more focused on driving tighter alignment with the business and can transcend technology silos easily.

In order to dramatically condense the time required to achieve a return on a virtualization investment, organizations are engaging experienced service providers to accelerate time to value. This is accomplished by:

- **Taking a Holistic Approach**

With internal resources battling the daily grind to meet service levels and keep legacy infrastructure operating, most have little or no time to take a step back and adopt a big picture approach: One that is focused first on the business requirements, case development, and service level requirements. Third party service companies understand and start with a business first approach. This ensures the business, its applications, and the infrastructure it supports are all closely aligned—critical for success. Also, because they are not associated with any internal

technology domains or business units, it is easier to move in and amongst them without being seen as a threat. Service companies should understand that they need to approach server virtualization not as technology solution, but rather as an architecture that can transform business operations.

- **Getting to the Next Level, Faster**

Service providers with virtualization practices have the benefit of being solely focused on helping organizations assess, design, implement, and manage virtualization environments. This deep level of experience is required not only to establish best practices, but also to help shape many of the management tools required for efficient operations. Those organizations fostering strong relationships with virtual server providers will not only have the highest levels of certification, they will also be informed of the latest technology advancements

It's not just the depth of experience; breadth is important as well. The skill sets required to transition go far beyond the server domain and include networking—both LAN and SAN—and block- and file-based storage. Companies need to be able to provide resources fluent in those technologies to enable a complete solution. The ability to help transition the environment to internal resources with education and training will enable them to not only manage the environment, but prepare them to constantly improve and optimize it. The best companies will have a solid track record of success and the ability to share references. A well thought out plan will include training, education, and transition services to enable the IT team to effectively manage the environment. It may also include recommendations for management tools and follow on health checks, residency services, or even remote managed services.

- **Gaining a Deep Understanding of Virtualization Implications Across the Infrastructure**

In choosing a services company as a strategic partner for a critical initiative like server virtualization, it is important to find one that understands all its aspects while having access to the appropriate resources to enable a proper solution. In particular, organizations should look for a services company's ability to leverage:

- **A well established solution lab.** The ability to create or recreate an environment and test a solution is the best way to verify that the given solution will work. In order to do that, significant investments need to be made in building out a test lab that can accommodate as many different configurations as possible. Services organizations that can leverage solutions labs are able to guarantee far more predictable results and eliminate costly and time consuming trial and error.
- **Broad architectural expertise.** Because server virtualization technology also impacts the network, storage, and security domains, it is important to work with a services company that understands how to architect a solution that is inclusive of all these domains. Creating an architecture that incorporates the server, storage, network, and security domains will ensure a more stable platform and eliminate redesigns.
- **Software tools.** As with any new environment, it will be critical to have the proper tools for discovery, planning, analysis, and ongoing management. As companies transition from physical to virtual environments, the ability to effectively manage both environments with a single management tool will help operational efficiency.
- **Training and certification programs.** Guaranteeing consistent quality resources for any given project and facilitating the knowledge transfer to internal resources ultimately provides a faster transition.

- **Adopting a Strong Operational Focus**

At some point, all this new technology will be operated and maintained by your internal IT staff. While the ability to accelerate the time to implement is important, it is also very necessary to select a company that places a lot of emphasis on operations. The ability to leverage ITIL-based best practices and transfer those skills to the internal teams responsible for ongoing management is critical to ensure continued success.

Conclusion

Server virtualization is a paradigm shifting technology that can be the cornerstone of a next generation data center. It uniquely delivers a more flexible and responsive data center while, at the same time, reducing costs. What's remarkable is that this is still a relatively new technology—while it has matured and now plays a bigger role in production and mission critical applications, new functionality and technologies continue to develop. In fact, a significant ecosystem of companies is dedicated to reworking their tools and platforms to optimize them for this usage. So, while many companies have opted to deploy and even standardize on it, few have been able to truly extract all the value it has to offer and take it to an enterprise scale—even fewer can do it in a short timeframe.

Organizations should seriously consider leveraging third party service providers to help them quickly drive server virtualization adoption to the enterprise level and scale it as they grow. The selection process should be based on a provider's ability to meet the criteria outlined in this paper. Choosing the right service partner for your server virtualization initiative will be critical to guaranteeing a positive experience and maximizing the deployment's value in a shorter period of time.



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