The State of Virtualization:
Overcoming Management Complexity Challenges and Benefits of Optimized Infrastructures

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Executive Summary

If one technology has changed how companies have done business over the past decade, it’s server virtualization. Virtualization has allowed IT to “run faster and jump higher,” offering IT capabilities that are not available with physical servers.

Server virtualization has evolved beyond simple test and development environments to become an accepted practice, providing substantial operational benefits, faster provisioning, improved disaster recovery, and ease of implementation and management for IT organizations across all industries. From single server virtualization solutions to multi-tier virtualization strategies, virtualization has had a major impact on IT. (For the purposes of this paper, we define a multi-tier strategy as “an environment where different hypervisors may get used for different tiers of an application stack. A multi-tier strategy allows IT to choose the right tool for a specific workload.”)

Let’s look at an example of a multi-tier strategy: When using a three-tier application, you can choose the best performing highly scalable virtualization solution for the Web tier, the best business continuity platform for middleware, and the best solution with high-availability storage capabilities for the data tier. It’s all about choosing the right tool for the right workload at the right time.

ESG asked IT professionals to identify the approximate percentage of x86 servers virtualized to date among those respondents who were current server virtualization users. According to the ESG data, 60% of respondents have virtualized more than half of their workloads, though only 6% have achieved a capacity greater than 90% of their workloads. Several of the primary motivators making the case for virtualization include the following:

- **Removing physical constraints.** Moving easily from physical, on-premises IT resources to public and hybrid cloud consumption models offers simple infrastructure scalability as the organization grows.

- **Eliminating vendor lock-in.** An increasing number of companies are embracing multi-tier solutions for virtualized environments as their IT organizations lean toward investing in tools for specific workloads, and as a way to eliminate the risks of being tied to just one vendor.

- **Decreasing CapEx and OpEx.** By reducing the need for purchasing physical servers and hardware as the needs of the organization grow, as well as reducing the amount of time, resources, and energy necessary to run the business, the financial rewards of server virtualization alone can run into hundreds of millions of dollars—if not billions—and have led to the development and acceptance of cloud computing infrastructure.

While server virtualization is continuing to advance, organizations are still not embracing virtualization whole-heartedly—perhaps not fully convinced that the benefits outweigh the challenges.

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The Challenges of Virtualization

The growth of virtualization has increased IT complexity and the associated issue of virtualization management. The challenges of virtualization can be seen weaving a common thread throughout organizations—whether companies are using a single virtualization solution or a multi-tier strategy.

The most prevalent challenges facing IT organizations include:

- Monitoring systems
- Applying policies
- Tracking chargeback and showback systems
- Controlling virtual sprawl
- Optimizing resources

While enterprises are continuing to embrace multi-hypervisor strategies for their virtualized environments, these strategies present issues that must be addressed before the actual benefits can be realized.

Virtualized structures that are not managed and optimized are a drain on IT resources, making it harder for IT organizations to achieve peak operational efficiency and make effective use of resources. Only when organizations are able to manage across virtual environments with horizontal visibility into the environment, can IT achieve the flexibility and agility needed to transform the business.

Monitoring Systems

Because a hypervisor controls all aspects of virtual server operations, virtualization gives IT an opportunity to gain better visibility into the environment. While great in theory, it is likely that IT still has to deal with disparate tools to monitor the different parts of the infrastructure—server, storage, and networking.

Applying Policies

Since policies traditionally require a great deal of manual intervention (e.g., paperwork, sign-offs, etc.), the process is slow at best. While technology has given IT the means to make resources available quickly and efficiently, IT (or business policy) has not yet fully caught up. IT is still challenged with taking virtualized assets and applying policy in an automated fashion. The process is further complicated when policies span multiple systems.

Tracking Chargeback and Showback Systems

Chargeback and showback processes become more complex with virtualization because the virtual machine exists in a shared-resources environment, presenting a problem when breaking out chargeback to independent cost centers.

To complicate matters further, IT isn’t always able to provide full transparency or even high accuracy across environments to show various business units exactly what resources they are using, or their cost on an annual basis. This process is important so IT can track usage for budgeting and planning purposes on an ongoing basis.

Controlling Virtual Sprawl

Another ongoing headache for IT organizations is virtual sprawl, which tends to happen because virtual machines are created without the benefit of physical controls. Since it’s easy to spin up virtual machines, many machines are created, but then ignored or even forgotten. Not only does this waste capacity, but these “orphaned” virtual machines add to the complexity of tracking and managing a virtualized environment.
Optimizing Resources

Some things never change. The age-old challenge with optimizing resources is being able to achieve a balance between the highest utilization and the greatest efficiency across the infrastructure while ensuring future capacity.

The Benefits of Virtualization

While there are undoubtedly challenges to managing an enterprise virtualization environment, the benefits of virtualization are numerous and seem to outweigh the stated challenges. Benefits include: single tool monitoring for an entire virtual infrastructure, automated policy and quota enforcement, self-service portals, and centralized management operations.

- **A Single Tool to Centrally Monitor the Entire Virtual Infrastructure**
  
  In the past, IT needed to monitor silos using various monitoring tools for different parts of the infrastructure—server, storage, and networking. Today, organizations want the ability to centrally monitor and manage their IT infrastructures from a single pane of glass.

  With a comprehensive reporting, planning, and optimization tool, enterprises:
  
  o Gain full visibility into their virtualized environments—improving security, resource management, and planning.
  
  o Enjoy quicker troubleshooting and problem resolution—decreasing the time and resources needed to resolve issues.
  
  o Reduce operating costs and streamline overall operations—allowing organizations to focus on the business, and embrace new opportunities.

- **Automated Policy and Quota Enforcement to Ensure Continuous Compliance**
  
  Automating policy and quota enforcement ensures that virtual infrastructures are in continuous compliance with government, corporate, and IT regulations. Quota enforcement enables companies to set resource limits to prevent over-provisioning problems, and contain costs.

- **Self-service Portals to Expedite Provisioning and Deployment**
  
  Self-service portals expedite provisioning and deployment, allowing users to broker their own services, providing quicker time to value, and improving their impression of IT resources.

- **Streamlined Virtual Infrastructure Operations via Centralized Management Operations**
  
  By streamlining operations via task automation, organizations free up IT staff to work on value-added activities and, at the same time, reduce risk caused by human error. In addition, having granular control of workload resources, configurations, capacity, and usage levels allows users to fine-tune their own environments, ensuring they are operating at optimum levels.

As previously mentioned, increasing numbers of organizations appear to be taking on the challenges of virtualization in order to reap the benefits. But whether you’re a small or mid-sized company, or an enterprise organization, once you have buy-in on virtualizing, one question comes to mind: Where to start?

What to Look for in a Virtualization Solution

Consider a Multi-tier Approach

Multi-tier strategies are becoming more common for virtualized infrastructure. Why? This is happening because IT organizations are becoming more responsive to the diverse needs of their users, and are leaning toward investing in tools for specific workloads. Organizations also view multi-tier strategies as a way to eliminate the risks of being tied to just one vendor.
Today’s advanced IT solutions are built on open standards. Open standards promote innovation—allowing organizations to adopt innovative tools much more quickly and more cost effectively than if using a closed, proprietary solution. Just as Linux has been part of data center architectures, the open source operating system, hypervisor, management platform and, ultimately, cloud-based platforms are valuable technologies that align well with IT’s goal to consolidate and simplify IT operations.

According to ESG research, there is a growing trend toward multi-tier hypervisor strategies. As Figure 1 indicates, more than half of respondents (55%) currently use or plan to support multiple hypervisors.

![Figure 1. Organizations' Server Virtualization Strategy](image)

**Explore Price/Performance Economics**

As companies build private and hybrid cloud environments, they tend to look closely at price and performance, and justifiably so. Which workloads should go where in order to create maximum cost efficiency and optimum performance? This is not just about being able to drive down capital infrastructure costs—it’s also about being able to reduce costs from an ongoing operational perspective.

With virtualization, it is important that you strike the optimal price/performance equation. While there are economic advantages from simply consolidating workloads across fewer servers, these economic benefits can be further enhanced using virtualization solutions with lower acquisition costs that deliver comparable, and even improved performance for certain workloads.

**The ultimate goal:** Put organizational alignment and competency into place so IT can manage these environments as they scale and, as companies in general, become more efficient in using them.

**Prepare for the Cloud with Open Standards**

Virtual environments are being extended to the cloud using existing management tools and processes, making cloud implementation more efficient, and allowing IT organizations to behave more like value-added business units.

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Equally important, unifying virtual and cloud environments helps deliver efficiency and on-demand usage, which is required to fully embrace a public cloud consumption model.

ESG recognizes that open standards will be critical to the move from virtualization to public cloud, so IT should assess its tooling and management capabilities to be ready to plug into open APIs and open management reporting. Proprietary solutions run the risk of platform lock-in, and potentially void some of the promises of virtualization and cloud computing. Open standards enable IT operations to build and execute seamlessly outside the limits set in place by IT vendors, which have created hurdles and proprietary measurements that can be difficult and/or economically unfavorable to adopt.

**Optimize Virtual Infrastructures**

A common thread woven throughout most businesses preparing for the cloud is the need for comprehensive management across the entire organization. This means that companies must evolve their virtual infrastructures into platforms ready for cloud consumption in different environments—specifically, companies need consistent, unified management capabilities across all of their platforms. End-users should be able to consume resources onsite—and offsite—because their organizations support heterogeneous private, public, and hybrid clouds.

At this point, IT becomes a broker of cloud services, such as self-service portals, giving end-users access to the resources they need. This approach allows IT to optimize staffing while controlling infrastructure costs, and responding to business needs more rapidly.

With an enterprise-grade virtualization platform, IT can deliver infrastructure-as-a-service (IaaS), and support service deployment across hybrid clouds using policies and service level agreements. An enterprise-grade virtualization platform can also help IT tighten the integration with existing enterprise management systems and processes.

**The Bigger Truth**

Virtualization may seem like an under-the-covers technology, but it has played a formidable role in the development of the cloud revolution, and will continue its mission-critical role in the evolution of private, public, and hybrid clouds. IT organizations appreciate a multi-tier strategy that enables the choice of hypervisors across an application stack, while providing a simplified means of management and orchestration across the entire environment.

The next step in this virtualization journey is the extension to the private or hybrid cloud consumption model, where hybrid clouds are rapidly becoming a reality. Enterprises must overcome organizational hurdles and accelerate deployment to the hybrid cloud for IT to successfully move from company administration to a true strategic business enabler.