
vmware
Virtualization
Essentials

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Introduction: What is Virtualization?

Like most organizations, you are probably facing new IT challenges as your business evolves and grows. In a dynamic environment, you need to improve agility to keep pace with fast-changing business needs. Your employees, customers, and business partners are demanding more responsive service and more sophisticated applications. As you try to keep pace with new requirements and growing demands, your IT infrastructure is becoming larger and more complex—putting more pressure on your IT organization.

Virtualization helps address your most pressing technology challenge: the infrastructure sprawl that's forcing IT departments to channel 70 percent of their budget into maintenance[1]—and sapping resources for business-building innovation. The difficulty stems from the architecture of today's X86 computers: they're designed to run just one operating system and application at a time. That means that even small data centers have to deploy many servers—each operating at just 12 percent of capacity.[2] That's highly inefficient by any standard. Virtualization software solves the problem by enabling multiple operating systems and applications to run on one physical server or "host."

[1] Mark P. McDonald, "Maximize IT Returns by Amplifying Performance Rather Than Administering a Budget," Gartner Blog Network, January 9, 2012.

[2] "Gartner Says Efficient Data Center Design Can Lead to 300 Percent Capacity Growth in 60 Percent Less Space," http://www.gartner.com/newsroom/id/1472714

How Does Virtualization Work?

At the heart of virtualization is the "virtual machine" (VM), a tightly isolated software container with an operating system and application inside. Because each virtual machine is completely separate and independent, many of them can run simultaneously on a single computer. A thin layer of software called a hypervisor decouples the virtual machines from the host. And it dynamically allocates computing resources to each virtual machine as needed.

This architecture redefines your computing equation and delivers:

- **Many applications on each server** – Since each virtual machine encapsulates an entire machine, you can run many applications and operating systems on one physical server at the same time.
- **Maximum server utilization, minimum server count** – Every physical machine is used to its full capacity, allowing you to significantly reduce costs by deploying fewer servers overall.
- **Faster, easier application and resource provisioning** – VMs are self-contained software files that can be manipulated with copy-and-paste ease. This brings unprecedented simplicity, speed and flexibility to IT provisioning and management. You can even transfer running VMs from one physical server to another—a process known as live migration. You can also virtualize business-critical apps to improve performance, reliability, and scalability while reducing costs.

Virtualization Defined

For those more visually inclined...

Each virtual machine is an isolated software container with an application and operating system. A single computer can simultaneously run multiple VMs.

Delivering Real Business Benefits

Why are so many organizations turning to virtualization? A virtualized environment is simply a smarter, more agile platform to support your most important business priorities. Migrating to a virtualized infrastructure delivers an immediate return on your investment. And it sets the stage for serious business benefits now and in the future.

Reduced Complexity

Adopting a virtualized infrastructure can help you significantly reduce the complexity of your environment, to simplify operations and maintenance. Virtualization enables you to move from operating and managing discrete, siloed infrastructure components toward a pooled infrastructure that can be managed holistically. It creates a foundation for more efficient IT management, improved security, and an improved ability to focus on business priorities.

Simplified IT Management

Managing servers in a physical IT environment is time-consuming. Nine out of ten IT departments spend at least half of their time doing routine administrative tasks, such as adding and managing new server workloads, adding new employees, or developing and launching new applications.[3]

Today's virtualization management tools typically include intelligent automation capabilities. These tools eliminate the need for IT workers to manually perform routine maintenance and troubleshooting on multiple physical machines. In fact, these tools not only make it easy to pinpoint IT issues, but they can also help IT to proactively detect and resolve issues to reduce downtime.

Many companies that have implemented virtualization have reported IT productivity gains, with 73 percent seeing significant reductions in time spent on routine administrative tasks.[4]

And because it helps simplify and automate processes that have traditionally been complex or done manually, virtualization frees your IT employees to concentrate on tasks that are more important to growing your business. The result is improved productivity, return on investment, and strategic focus. In a recent survey, 66 percent of IT managers found operational improvements with virtualization in the form of greater efficiencies in support and management.[5]

[3] "The Benefits of Virtualization for Small and Medium Businesses: Survey Results." VMware. http://www.vmware.com/files/pdf/VMware-SMB-Survey.pdf.

[4] Ibid

[5] "Desktop Virtualization Earns Its Stripes: Intel's IT Manager Survey on Virtualization." September 2011.

More Robust Security

Due to the isolated nature of virtual servers, websites and applications are more protected with virtual security that is adaptive and protects the virtual machines from malware and attacks as they migrate from host to host.

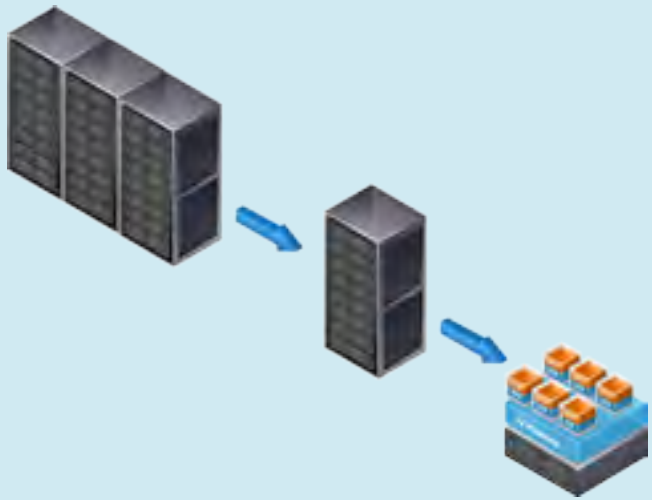
In a virtual environment, security can be delivered as an efficient, software-defined service—decoupled from physical devices, aggregated, and applied precisely where needed, without hardware upgrades. Your IT staff can move and scale virtual workloads free from security constraints and the need for specialized appliances. Integrated firewalling and optimized gateway services protect your network edge.

All virtualization platforms are not the same. An effective platform, such as VMware vSphere® with Operations Management™ will employ "bare-metal" virtualization, in which the hypervisor interfaces directly with computer hardware without the need for a host operating system.

To optimize security and manageability, an effective solution will combine bare-metal virtualization with other advanced capabilities, such as:

- **Small hypervisor footprint** – Simplifies deployment, maintenance and patching, and reduces vulnerability by presenting a much smaller attack surface.
- **Software acceptance levels** – Prevents unauthorized software installation.
- **Robust APIs** – Enable agentless monitoring, eliminating the need to install third-party software.
- **Host firewall** – Protects the host management interface with a configurable, stateless firewall.
- **Improved logging and auditing** – Log all host activity under the logged-in user's account, making it easy to monitor and audit activity on the host.
- **Secure syslog** – Log messages on local and/or remote log servers, with remote logging via either SSL or TCP connections.
- **AD integration** – Configure the platform host to join an Active Directory domain; individuals requesting host access are automatically authenticated against the centralized user directory.

Data Center Consolidation



By reducing the number of physical servers, organizations can make management more efficient—and free employees to focus on more strategic initiatives.

Dramatically Lower Costs

Cost savings is a leading benefit of virtualization, and it can free a business to redirect their resources into value-add opportunities. Organizations can significantly reduce their expenses and make the most of resources through effective pooling, increased automation of operational processes, and the appropriate use of available public cloud services.

Our customers have found that improved server utilization and application management can reduce the personnel time required for IT management. When it's time to refresh physical hardware, we've seen customers amplify the return on investment by expanding virtualization. In fact, more than half of resource-constrained businesses cite server virtualization as a hardware-infrastructure priority because of manageability, lower costs and efficiency.[6]

Virtualization can also help resource- or budget-constrained companies reduce CapEx by consolidating servers and OpEx by minimizing maintenance, power and cooling requirements. Smaller businesses with fewer IT resources and assets might eliminate the need for dozens of servers.

Enable Flexible, Agile IT Service Delivery

Business responsiveness is critical today for companies of all sizes. In a competitive environment, it's more important than ever to anticipate and meet changing business needs. Virtualization creates a dynamic infrastructure that helps businesses react more quickly to changing market demands, evolving business conditions, or new customer requirements.

Once an organization has begun its migration to a virtual environment, it can leverage advanced virtualization capabilities to build an IT infrastructure that is highly responsive to business and customer demands. For example, virtualization capabilities, like distributed resource scheduling dynamically aligns compute resources with business priorities through automatic load balancing across hosts. Virtualization helps ensure that your applications remain available and performing at their best, no matter what demands are placed on them.

Virtualization is also the foundation for the next generation of IT. Companies that embrace it can look forward to easier deployment and management of even more advanced technologies, such as cloud computing, for greater business value in the future.

[6] "Demand Insights: The SMB Hardware Infrastructure Market," Forrester, April 20, 2011.

Dependable Business Continuity

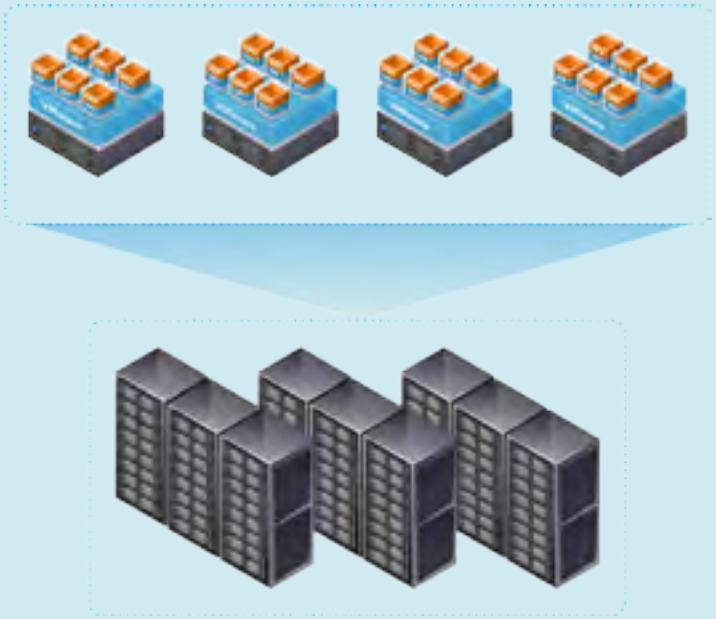
In today's competitive world, keeping your business operations up and running at all times is truly the difference between success and failure. Resource-constrained businesses like yours can't afford to close their doors, even temporarily, because a systems outage has occurred or key data has been lost or stolen. In fact, 49 percent of businesses that suffer a disaster never reopen their doors.[7]

According to a VMware survey, business continuity is a leading driver for companies moving to a virtualized IT environment. After moving to virtualization, 66 percent of respondents reported improved business continuity in the form of high availability, reduced downtime, and other benefits.[8]

Virtualization creates a highly available environment that helps ensure that all your applications are accessible all the time. Should one of your nodes or servers ever fail, all its VMs can be automatically restarted on another machine, with no downtime or data loss.

Along with reduced downtimes and increased security, virtualization provides the foundation for disaster recovery planning and preparedness in case of an unexpected event such as a flood, fire, or other disaster. In a virtual environment, the entire system—including the operating system, the applications, and data—are encapsulated as a set of VM files. By replicating those files to the failover site, the entire system can be recovered in a fast, single-step process. Instead of losing 40 hours or more of downtime, a typical recovery can take an hour or less.

Scaling and Pooling



Virtual environments can easily scale to take on new applications and tasks as business needs change.

[7] "The Benefits of Virtualization for Small and Medium Businesses: Survey Results." VMware. http://www.vmware.com/files/pdf/VMware-SMB-Survey.pdf.

[8] Ibid

Unlocking the Potential of Virtualization

It's clear that virtualization is a compelling way to make your business more efficient, agile, secure, and dependable. Today's organizations are embracing virtualization for server consolidation of IT-owned applications. But to make your move to virtualization a successful one, you need to invest in a platform that supports a rich set of key features.

Support for Business Critical Applications

Business-critical applications are the lifeblood of any business. An effective solution will enable businesses of all sizes to run these core applications on the most advanced virtualization platform. Traditionally, organizations have been hesitant to virtualize these applications because of the perceived risk in many areas, such as performance, security, or even the fear of change itself. As a result, these applications have continued to rely on traditional physical solutions for ensuring application service levels and availability, leading to increased complexity and costs.

The right platform will deliver high application performance and availability with low complexity and cost with peace of mind. And it will be based on a trusted, secure hypervisor architecture for dependable performance and maximum availability.

Capacity Management

Many organizations lack visibility into their infrastructure capacity. Or they may be using unwieldy, manual home-grown solutions to manage capacity within their virtual environments. This can lead to inefficient use of hardware resources and IT administrator time. And as IT environments grow, the capacity problem will only get worse.

The right solution will enable organizations to employ sophisticated operations intelligence to optimize their infrastructure capacity, so they can achieve the highest possible ROI from their hardware investment.

Performance Monitoring

All too often, IT lacks the tools to aggregate and analyze performance data quickly enough to take proactive action and reduce downtime on their infrastructures. Legacy monitoring tools used by IT are based on low-level metrics and static thresholds. This leads to a lack of understanding on root cause, alert storms, and false positives.

With the right platform, organizations can improve performance and avoid disruption of virtual infrastructures, by applying predictive analytics that drive proactive action. This helps organizations enable more proactive identification and remediation of emerging performance and capacity issues. So they can get out in front of potential problems before they impact key business operations.

A Rich Platform Built for Today's Needs

vSphere with Operations Management is a robust platform that enables organizations to meet these challenges, and set the stage for new benefits as their business grows and evolves. It offers the most trusted virtualization platform with critical operational enhancements in performance monitoring and capacity management. The solution is designed for businesses of all sizes to run applications at high service levels, and maximize hardware savings through higher capacity utilization and consolidation ratios.

With vSphere with Operations Management, IT can gain visibility into virtual environments, proactively identify and remediate emerging performance issues, and optimize resource utilization through a unified console.

Conclusion

Virtualization is becoming an attractive alternative for businesses of all sizes seeking to boost their business agility as they simplify IT operations, improve business continuity, and minimize risks. According to an InformationWeek Global CIO Survey, 92 percent of IT executives plan to increase their virtualization initiatives. These survey participants also ranked virtualization as No. 1 of 14 possible initiatives to be funded in 2012 and beyond.

Moving forward with virtualization is easier than you might think. By partnering with the right vendor that can offer a comprehensive solution with rich capabilities, you can build a powerful and flexible virtualized infrastructure.

To learn more about how VMware can help you move forward with your next-generation data center, visit www.vmware.com/virtualization.

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