



Taking Virtualization to the SMB Market

How Lenovo is driving Virtualization solutions for the SMB market by lowering costs and simplifying deployment

White Paper

Lenovo Virtualization
Solutions

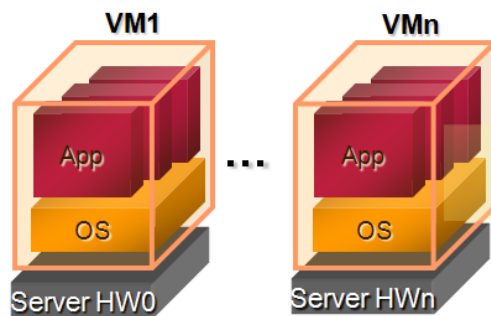
Introduction

Virtualization is becoming increasingly popular as a way for companies to save money on IT costs and streamline their operations. While there has been much talk and hype in the industry regarding this technology, until recently virtualization has remained the purview of mid to large scale organizations. Lenovo is working actively to bring virtualization and its benefits to the small and mid-sized businesses with its ThinkServer™ product line.

What is Virtualization?

Virtualization is a software technology that lets you run several independent operating systems on the same physical machine, as illustrated in Figure 1. These operating systems run in a “virtual” space, yet each still appears to others on the network as an independent, distinct server. With virtualization, the physical server is simply a host that provides resources on which the virtual servers run. Each virtual server runs as a complete system, with its own dedicated share of the host server’s CPU, memory, and hard drives. This is accomplished by software—commonly called the “hypervisor”—that handles allocating resources of the host server to each of the virtual servers. You can fit as many virtual servers on a physical server as you have resources to allocate, so obviously the more memory, processor cores, and disk space you have available on the physical server, the more virtual servers you can run.

Traditional Server Environment “One App One Server”



Virtual Server Environment “Many Apps run on One Server”

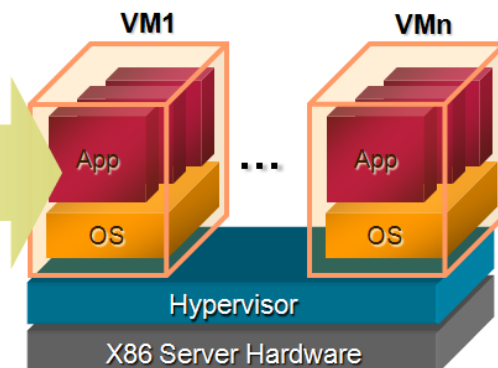


Figure 1: Server virtualization enables multiple independent operating systems to be run on a single physical machine.

Why Virtualize?

Virtualization offers many compelling benefits over a traditional server environment including fewer servers to manage, better system utilization, and reduced maintenance and software licensing costs. These benefits are not limited to large organizations with datacenters full of servers. SMB customers can benefit from virtualization even if they have only a handful of servers. Let's explore some of the ways that a small- or mid-sized business could benefit from virtualizing their IT infrastructure.

Reduce Sprawl

Because you can consolidate several legacy servers onto a single server based on the latest technology, you can reduce the overall server count without sacrificing performance. Technology speeds are advancing at an ever increasing rate. For example, Lenovo's new ThinkServers, based on Intel's® latest Xeon® processor family offers one of the largest performance leaps in their history—11 times the performance of single-core processors from 2004. You could consolidate ten legacy servers onto one new dual-processor ThinkServer without any sacrifice in performance yet still realize the maintenance and hardware replacement savings of running nine fewer servers.

Maximize Utilization to Save Costs

Traditional IT departments follow a “one application one server” model—meaning each server is dedicated to a single application or task. However, oftentimes servers sit idle for much of the day, interrupted by brief periods of high activity. For example, a server may only be busy during normal business hours or only when running nightly batch programs. Even when servers are busy, they typically use only 10-15% of their actual capacity. This idle time represents a significant hidden IT cost. You've essentially paid for performance that you are not using. Virtualization helps solve this problem by consolidating several under-utilized servers onto a single platform, maximizing the return on your IT investment.

Another hidden cost of servers is the power consumption and cooling costs. An idle server still consumes power, adding to the monthly energy bill. For example, a typical customer paying \$.10/KWh for a server running at 10% capacity has an annual power cost of nearly \$800 per year just for the unused capacity.¹ Since this scales linearly with the number of idle servers, it's easy to see how quickly this adds up. Lenovo helps solve this challenge by offering ENERGY STAR® qualified ThinkServers, which consumes 30% less power than an equivalent non-qualified server. Virtualizing with Lenovo ThinkServers not only increases your ROI by maximizing server utilization, but can also save significant money from reduced power consumption.

Rapid Deployment & Easy Maintenance

Many companies support more than one environment. For example you may have separate configurations for development, QA, and production. Virtualization makes standardizing across these environments easy by allowing you to save a configuration and then re-deploy that configuration to each environment. In addition, when you purchase new hardware, you can easily deploy your saved configurations, making migration to new hardware seamless.

A reduced server count also means a reduction in potential hardware failures and fewer physical servers for IT professionals to manage. This means fewer trips to the server room and fewer component replacements—all of which significantly improve IT uptime, which saves time and money.

Key Inhibitors for Virtualization Deployment by SMB

While many small- and mid-sized companies have heard of virtualization and could greatly benefit from virtualizing their server environment, there are several factors that often prevent or slow adoption of this key technology.

Unclear Value for the Cost

Many SMB customers do not fully understand the benefits they can receive from virtualization.

While the upfront costs appear high (particularly the cost of external storage), the benefit often seems nebulous or are described at such a high level as to be of little value. For example, a SMB might be told that virtualization cuts hardware usage cost, but be given no understanding of what the actual savings might be or the length of the payback period, making it difficult to determine an actual return on investment. For SMB customers, providing a clear and simple ROI statement is vital to clearing this hurdle.

Industry Noise

Since virtualization is a relatively new technology, there are many vendors providing multiple products, making it difficult for a SMB to understand the differences between each offering. For example, does it make sense to go with Microsoft's Hyper-V technology, or VMWare's ESX? What about open source Linux solutions? Do I need a 4-way Server or Blade Server to run virtualization? SMB customers are understandably wary about choosing a vendor and being locked into a particular technology. As a result, a "wait-and-see" approach develops whereby companies delay adoption while the industry shakes out and a small number of vendors emerge as a safe, long-term solution.

Designed for Large Enterprise

Virtualization was originally designed for use in data centers. Since these facilities typically have a dedicated staff with a full understanding of virtualization, it must follow that the technology and management tools were designed solely for this audience. Most SMB customers do not have the luxury of hiring dedicated virtualization specialists. SMB customers need virtualization solutions that are easy to understand and work right out of the box with minimal expertise.

Virtualizing with Lenovo ThinkServers

Lenovo ThinkServers make it easy for your company to realize the benefits of server virtualization.

Virtualization Built In

Each Lenovo ThinkServer comes standard with a built in virtualization connector allowing you to boot directly to a virtual environment—no operating system necessary. This makes setting up a virtual environment easy; simply copy the software to a USB key, plug in, and turn on. Just the kind of simple solution a SMB customer is looking for.

In addition, because the software running off the hypervisor connector does not run on hard drives, no disk cycles are consumed, improving overall system performance. In fact, the new Lenovo ThinkServer RD220 scores an impressive 23.89 on the VMark benchmark, 2.8x faster than its predecessor.

Industry Leading Partners

Lenovo ThinkServers combine Intel® Virtualization Technologies with full support for industry leading virtualization solutions from Microsoft®, Novell®, VMware®, Red Hat®, and Citrix®. All of these companies are well known and have excellent reputations. This gives you access to a broad array of low-cost virtualization solutions and ensures that you can run the first class virtualization technology of your choice on your Lenovo ThinkServer with confidence.

Limitless Expansion Possibilities

Lenovo ThinkServers were designed with virtualization in mind, giving you almost limitless ways to scale your server. With 12 internal hard drive bays running high performance SAS drives, 16 memory slots, and up to 2 Quad-core CPUs, ThinkServers are well equipped to virtualize your most powerful applications.

Cost Effective Solution

Part of what made virtualization cost prohibitive to the small business in the past was the need for external networked storage, which is often expensive and difficult to implement. A typical SMB lacks the money or expertise to implement external storage just to deploy a virtualization solution.

For implementing a 4-to-1 or 8-to-1 consolidation, however, external storage is not necessary. Lenovo's ThinkStation RD220 comes with 12 internal hard drives, providing robust internal storage capabilities and eliminating the need for external storage. This enables a small business to clear the storage cost hurdle and greatly accelerates their return on investment.

ROI Analysis of Server Consolidation

Consider the IT environment found in a typical SMB and see for yourself why virtualizing on Lenovo ThinkServers makes sense. We'll assume that there are currently eight 1-socket servers in the network, each approximately four years old. Each server is dedicated to a single purpose and follows the "one server, one application" model. We'll further assume that each legacy server has 2GB of memory and two 160GB SATA drives in a RAID 1 array, running Microsoft® Windows® Server 2003.

We'll replace all eight existing servers with one new Lenovo RD220, consolidating the legacy servers onto the single, new ThinkServer. To enable future expansion, we'll increase the total memory from 16GB to 24GB. We'll also take advantage of the built in hypervisor connector by using a USB key preloaded with VMWare's free ESXi software. The comparison between the legacy servers and the Lenovo RD220 appears in Figure 2.

	Existing Infrastructure	Lenovo RD220
Total Count	8	1
Type	1 CPU (dual-core Xeon)	RD2200 (2 quad-core Xeon 5500 CPUs)
Age	4 years	New
Memory	2GB each (16GB total)	24GB
Cost	\$1,500 each (\$12,000 total)	\$5,999
Drive	2x160GB SATA	2x300GB SAS
Operating System	Windows Server 2003	VMWare ESXi

Figure 2: Comparison of legacy server to Lenovo RD220.

Using widely accepted performance benchmarks and industry-standard assumptions of power usage and software costs, we can calculate the 4-year total return on your IT investment. This ROI is shown in Figures 3 and 4.

Initial Investment in Lenovo RD220	\$5,999
Total 4 Year Savings	\$6,846
Net Present Value	\$3,024 (15% discount rate)
Return on Investment	106.2%
Internal Rate of Return	30.6%

Figure 3: Return on investment resulting from virtualization.

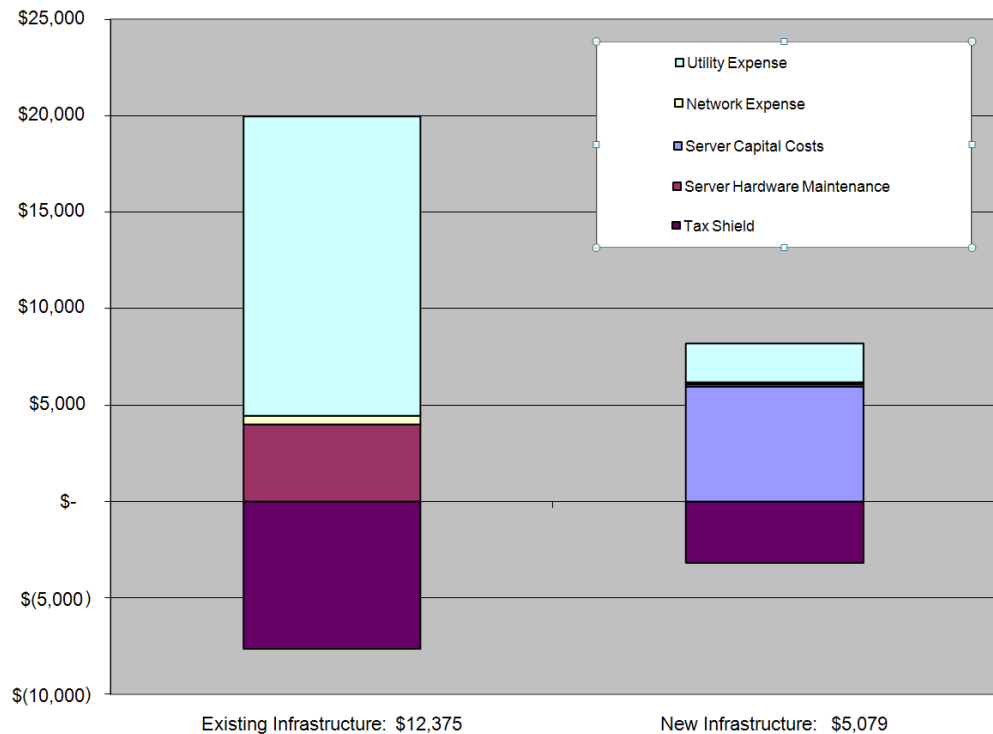


Figure 4: Four-year total cost of ownership summary.

Moving to a virtual environment produces significant savings that your business could immediately realize. These savings come in both quantifiable cost savings, as well as qualitative savings that, while we know are there, are difficult to put a dollar figure on. Let's focus in on a few areas that provide significant, identifiable cost savings.

Power Savings

With seven fewer servers, power usage will decrease. Assuming a rate of \$.10 per kilowatt hour and 24/7 operation (8,760 operating hours a year), the 4-year power bill would be reduced from \$6,451 to \$1,495, a four year total savings of \$4,956.

Hardware Maintenance Costs

By consolidating eight servers into one, the total hardware maintenance cost decreases significantly. Assuming an average maintenance cost of \$125 per server per year, reducing the total server count represents 4-year savings of \$3,500.

Soft Savings

There are additional soft savings, which while not part of an ROI calculation, should still be considered. Chief among these is the fact that since virtualization results in fewer servers, if problems do occur, recovery is much easier since data need only be restored on a single machine.

Summary

As you can see, moving to a virtual environment provides a significant return on investment. We've consolidated our eight legacy servers into just one, built in support for future expansion through additional memory and CPU performance, and significantly reduced our power costs. By doing this, we are able to realize a total four-year return on investment of 106.2%! With the high scalability of ThinkServers, low cost of hypervisors, and computing performance from Intel, small and mid-sized businesses can see an immediate return on their server investment, and take advantage of the many benefits that virtualization offers.

Learn more

To find out more about Lenovo ThinkServers, visit:
<http://www.lenovo.com/thinkserver>

1 Assumes 8,736 hours in a year, or 7,862 hours of idle time at 10-cents per hour

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