Virtualization strategy for mid-sized businesses

IBM, Intel and VMware virtualization benefits for mid-sized businesses

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Reduce cost, improve service and manage risk with virtualization

Virtualization of business applications allows IT operations in companies of all sizes to reduce costs, improve IT services and manage risk. The most dramatic cost savings are the result of reducing hardware, space and energy usage, as well as the productivity gains that also lead to cost savings.

Service improvements include high availability of x86 application workloads and rapid provisioning of new services to meet the dynamic needs of the business. Virtualization can also mitigate risk to business operations. For example, when faults are detected or server load is too high, workloads can be moved out of harm's way.

This paper shows how mid-sized companies can benefit by implementing a virtualization strategy. Unique, industry-leading capabilities from IBM, Intel® and VMware are highlighted.

Virtualization now provides a variety of capabilities and ROI benefits for mid-sized businesses that helps them keep their competitive edge in the marketplace.

Small and medium-sized companies often struggle to cope with server sprawl, cost control, unwieldy management of the IT infrastructure and a lack of responsiveness to dynamic business requirements.

Studies indicate that approximately 20 percent of servers today are "virtualized" and that number is projected to double over the next two years. Another study predicts the number of logical servers generated on virtualized servers will surpass the number of non-virtualized physical servers by 2010.

Virtualization began on mainframes 40 years ago and has grown on x86 servers over the past decade to the point where it's a robust, mature technology with VMware. The adoption of virtualization on x86 platforms provides four benefits to mid-sized businesses:

- Fewer, better utilized servers
- Rapid provisioning of servers
- Affordable business continuity
- Streamlined, efficient management

By implementing virtualization on x86 platforms, each physical server can host multiple application workloads, each with its own operating system in an independent virtual machine (VM). This consolidation capability can greatly increase server utilization and ease deployment of systems.

Virtualization has become a critical IT strategy for small and mid-sized businesses. In addition to cost savings, virtualization with IBM, Intel and VMware addresses business continuity issues and allows IT managers to:

- Eliminate planned downtime, for hardware maintenance, for example
- Reduce unplanned downtime, leading to higher system availability
- Test and implement disaster recovery plans
- Protect data, including non-disruptive backup and restore processes
- Balance real-time workloads

In these challenging times, mid-sized businesses need to simplify IT infrastructure and reduce costs. Yet, with diverse storage, server and network requirements, and often with limited physical space to store and manage systems, their options can be limited by both the amount of available physical space and budget concerns. Where virtualization can offer small and mid-sized businesses significant benefits is not simply in server consolidation, but also with affordable business continuity.

IBM, Intel and VMware are simplifying the transition to virtualization for small and mid-sized businesses with a powerful, end-to-end virtualization solution: IBM BladeCenter® S chassis and BladeCenter HS22 blade and SAN storage in a single chassis—as well as high performance IBM System x3550 M2 and x3650 M2 rack servers. All feature Intel Xeon® 5500 series processors and are available with VMware ESXi embedded hypervisor.

What is virtualization?

Virtualization is technology that allows application workloads to be managed independent of host hardware. Multiple applications can share a single, physical server. Workloads can be moved from one host to another without downtime. IT infrastructure can be managed as a pool of resources, rather than a collection of physical devices.

What is virtualization for mid-sized businesses?

Today, a data center or computer room, regardless of the size of the organization, must be carefully planned and managed. It must provide the essential energy to power servers, cool them and expand capacity over time without running out of room or overwhelming the power and cooling capacity.

Virtualization technology from IBM, Intel® and VMware provides immediate benefits and better ROI to mid-sized businesses when applied to what is often a mix of different x86 servers and management systems. Virtualization is not just for large enterprises. It is a well-established technology that reduces hardware requirements, increases utilization of hardware resources, streamlines management and reduces energy consumption.

Virtualization is most often implemented on x86 servers as either operating system (OS) virtualization or hypervisor-based virtual machines. OS virtualization uses a single instance of an operating system (such as Microsoft® Windows® or Linux®) with the help of virtualization software, to host a large number of individual workloads.

The hypervisor approach is completely different. A hypervisor is code shared among the guest operating systems and the hardware. The guest operating systems can be various versions of Windows and Linux, and can be mixed and matched on the same system. (For example, Windows 2000, Windows Vista, SLES 9 with Xen, and RHEL 5 without Xen can all operate simultaneously, including standard and enterprise varieties of each, as well as both 32-bit and 64-bit implementations.)

The hypervisor ensures that each operating system instance gets its proper share of hardware resources and also that activity in one virtual machine (VM), or partition, does not impact any other partition or the overall system.

Benefits of virtualization for mid-sized businesses

Today, multi-core processors from Intel and large memory capacities allow dual-processor servers, running VMware virtualization software, to host application workloads that, just a few years ago, would have required four-socket servers or larger. This intelligent sharing of computing, storage and information resources across different disciplines and departments in an organization unlocks the value of multi-core processors.

In a virtualized environment, system resources are gathered into a virtualized resource pool—and can be allocated dynamically—allowing servers and storage resources to be used more efficiently.

Reduce cost and save energy

IBM System x® and BladeCenter® servers based on the new Intel Xeon® 5500 series processors, combined with IBM System Director Active Energy Manager™, deliver major advances in power instrumentation, automated energy efficiency and management flexibility for IT, contributing to lower energy costs while meeting performance demands.

Get more performance with the new two-socket IBM System x3550 M2 and x3650 M2 rack servers 30 mm two-socket HS22 blade server solution, all based on the Intel Xeon 5500 series processors. Use less power with faster, lower-voltage, multi-core processors, solid-state drives, and the industry's most energy-efficient servers and blade chassis. A 25 percent power savings can be achieved with the highly efficient, Energy Star-compliant power supplies that support Intel's Demand Based Switching (DBS).

With Intel Intelligent Power Technology, these systems can lower energy costs by automatically putting the processor into the lowest possible power state to meet the current workload with minimal impact on performance. Intel's Integrated

Power Gates can reduce power to individual cores to near zero, independent of the other cores. Further, by upgrading three-to-five-year-old single-core servers, such as replacing the IBM BladeCenter HS20 with the latest IBM BladeCenter, energy costs can be reduced by 90 percent. The estimated costs savings from energy and other operating cost efficiencies can pay for the new server in an estimate 7 months**.

VMware vConsolidate benchmark data shows the new generation servers providing nearly double the number of virtual machines per watt versus the previous generation.

Add value

The new generation of IBM servers delivers innovation throughout the systems management stack of hardware, firmware and software. The new Integrated Management Model (IMM) includes features that help manage, monitor, troubleshoot and repair—remotely. Replacement of a 20-year-old BIOS with a new Unified Extensible Firmware Interface (UEFI) offers even more function, a better user interface and easier management.

“UEFI is the next generation BIOS, based on industry standards. It is a foundation for delivering many innovative features to improve manageability, security, and the installation process,” said Doug Fisher, a vice president and general manager at Intel. “Intel applauds IBM’s decision to adopt UEFI in the newest Intel processor-based IBM System x and BladeCenter products.”

IBM Systems Director 6.1, a platform management solution, allows IBM clients to manage their entire data center—physical and virtual—efficiently, from one place and with one user interface. Systems Director can automate virtual machine relocation by using event action plans that integrate hardware monitoring with VMware VCenter.

Intel Hyper-Threading Technology and Intel QuickPath Architecture are additional features found in the latest generation of IBM System x servers. Intel Hyper-Threading Technology increases performance of both multi-threaded and single threaded workloads. Intel QuickPath Architecture includes narrow high-speed links stitching the processors together. High-end processors, including the X5550, X5560, and X5570 experience maximum QuickPath Interconnect frequency of 6.40 gigatransfer per second. In virtualized environments, Intel Hyper-Threading Technology and Intel QuickPath Architecture are key ingredients to achieving superior virtualized performance.

Intel Turbo Boost Technology is built into the new Intel Xeon processor 5500 series. It enables flexible performance for virtualized servers by automatically allowing processors cores to run faster than the base operating frequency, increasing performance.

Improve IT services

With VMware virtualization on Intel and IBM, IT services can be implemented in a much more efficient manner. Application workloads can be moved from host to host for maintenance. That means no downtime for employees, or customers using those applications. Unplanned downtime can be greatly reduced or even eliminated.

"… the cost savings and business-level benefits are so straightforward that it's really a 'no-brainer'."

— Sam Stravato, Chief Technology Officer, AIC Ltd.

Flexibility

System x and BladeCenter servers can be configured with a variety of processors, memory, storage and I/O options. Intel provides a platform approach to virtualization with technology in the processor, chipset and Intel networking devices that boost performance, enhance I/O and enable flexibility.

With Intel VT FlexMigration and VMware Enhanced VMotion, flexibility and investment protection is built in—IT managers have the ability to conduct live VM migration across multiple generations of Intel Xeon servers—providing tremendous flexibility for failover, load-balancing, disaster recovery and real-time server maintenance.

IT managers can also upgrade to future generations of Intel Xeon servers in the VM resource pool.

System management

The new generation of IBM servers features innovations throughout the systems management stack. Replacement of legacy BIOS with UEFI provides new capabilities important for virtualization.

For example, Systems Director 6.1 allows IBM clients to manage their entire data center—physical and virtual—efficiently, from one place with one interface at the click of a button, and to interoperate with VMware vCenter, including the linkage of event action plans.

Risk management

Virtualization can allow small and mid-sized businesses to implement a cost-effective disaster recovery plan. Not only does virtualization ease the process of planning for continuity and recovery, it also enables effective testing of those plans—with no downtime to the applications.

Economics of virtualization for the midmarket

With organizations of all size watching costs more closely than ever, what are the economics in support of virtualization?

The initial (i.e., entry) hardware cost is not the most expensive part of the investment. The majority of the expense is the *long-term cost of operating and powering* that hardware.

If two servers support the same number of virtual machines, the one with better performance will be doing more aggregate work. To maximize virtualization performance, servers must have three features:

- Processing performance
- *Maximum throughput*
- *Sufficient memory*

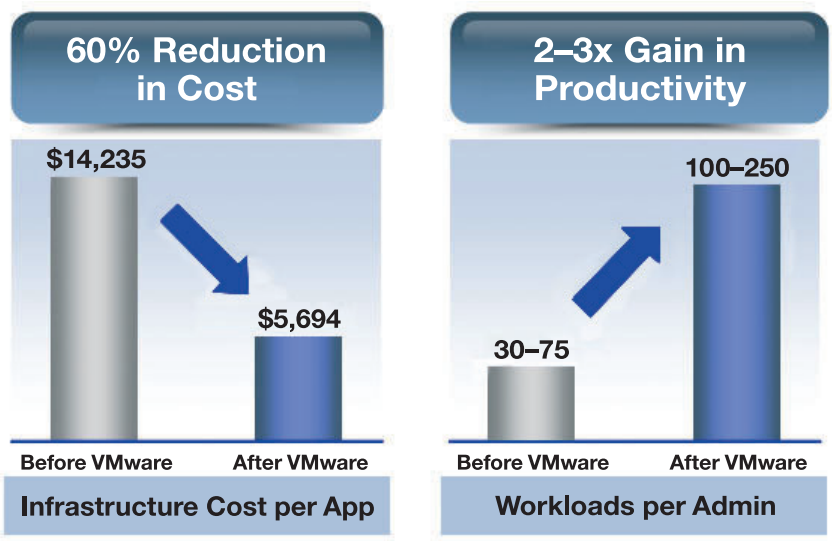

Figure 1. VMware Effect. According to VMware studies, the average cost per application is reduced by 60%. The number workloads each administrator can manage increases by 200 to 300%.

97% of small and mid-sized businesses surveyed felt their VMware project met or beat expectations.

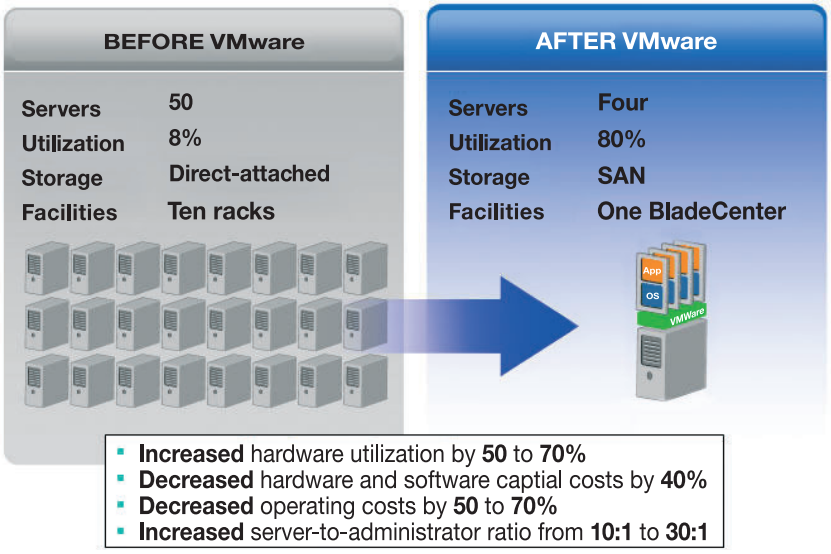

Figure 2. Customer example. A company had 50 servers running a variety of applications, directly attached storage and numerous cables, racks and power cords to support the servers. By implementing a VMware Infrastructure, they dramatically simplified their IT infrastructure.

Small and mid-sized businesses that have implemented a virtualization strategy can realize a return on their investment (ROI), in some cases in less than one year.** ROI based on energy savings alone can be as short as seven months when replacing single-core Intel Xeon processor-bases servers with the latest Intel Xeon 5500 series processors. Due to drastic virtualization improvements—since 2004, the amount of work that once required eleven single-core servers, now requires only one server with a quad-core Intel Xeon 5500 series processor.

Additional benefits include a new warranty, lower total cost of ownership, and a server that takes up less space, uses less energy and makes less noise.

Why VMware for Intel based IBM virtualized servers in mid-sized businesses

The IBM/Intel/VMware offering is designed to dramatically improve virtualization performance. The IBM X-Architecture® design blueprint enables industry-proven systems that are engineered for small to very large workloads. It allows IT to consolidate an exceptionally large number of x86 server workloads onto a single Intel Xeon processor 5500 based machine.

With more workloads on each physical server, companies need the most reliable and resilient systems for their virtualized infrastructure. IBM System x and BladeCenter servers feature:

- Holistic monitoring with IBM Predictive Failure Analysis alerts, to warn of component failures—even before they happen
- IBM Memory ProteXion that automatically re-routes data around failed DIMMs
- Operating system-independent memory mirroring
- Hot-swappable components

VMware Infrastructure, when deployed on IBM System x and BladeCenter platforms, provides mid-sized businesses with the industry's leading virtualization software, proven in more than ten thousand joint IBM-VMware customer solutions. VMware's industry-leading virtualization and management suite provides a flexible and cost-effective development platform and an application environment with high availability.

VMware VMotion provides the ability to move running virtual machines between physical hosts. This capability is the foundation for benefits such as business continuity, disaster recovery, workload balancing and even energy-savings by enabling live applications to be moved between physical servers with no service disruption. When deployed on highly resilient server platforms from IBM and Intel, clients get the most reliable infrastructure possible.

Virtualization can help you maximize the value of your IT dollars:

- Business agility in changing markets
- Computing resources to meet both current and future needs within the existing power envelope
- An IT infrastructure that is flexible and can scale with business growth
- Performance that can handle the most demanding applications
- An industry-standard platform architecture
- Intelligent management tools
- Servers with enterprise attributes—regardless of their size or form factor

Virtualization can help you improve IT services:

- Rapidly provision new application workloads—cut setup time from days or weeks to minutes.
- Improve IT responsiveness to business needs.
- Eliminate planned downtime by moving workloads before hardware is serviced.
- Greatly reduce—even eliminate—unplanned downtime.

In the past, clients had to choose blades based on optimizing processor performance, **or** storage capabilities, **or** memory capacity. Now, with IBM BladeCenter HS22, clients have a balanced choice—the processing power, storage **and** memory required for virtualization—without compromise.

IBM System x3650 M2 and x3550 M2 are also optimized for virtualization. Both blade and rack options provide IBM resiliency and VMware ESXi embedded hypervisor for rapid setup of a virtual environment.

Conclusion: Small and mid-sized businesses can implement a virtualization strategy—now.

Virtualization is a key element of the IT strategy for businesses of all sizes, with a variety of benefits for small and mid-sized businesses. It helps them build an IT infrastructure with enterprise-class capabilities. And it does so with a form factor—and an ROI—that fits any business.

For more information

To learn more about IBM next-generation servers, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web sites:

- **ibm.com**/systems/x/newgeneration
- http://www-03.ibm.com/financing/us/lifecycle/acquire/jumpstart/index.html
- **ibm.com**/virtualization/vmware
- www.vmware.com/go/ibm
- http://www.intel.com/business/xeon/virtualization.htm

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** Source: IBM actual, public results on HS22 & Intel internal analysis. 1U rack server configuration: 2S 1C Xeon (3.8 GHz 2 MB cache) with 8x 1 GB memory and 1 HDD – total power: 382 W under load, SPECjbb2005 = 50,970 bops. Replace 1U rack server with HS22 blade server configuration: 2S 4C Xeon X5570 (2.93 GHz 8 MB cache) with 6x 2 GB memory and 1 HDD – total power with chassis burden = 317 W under load, SPECjbb2005 = 604,417 bops. Power cost estimate used is US$0.10 kW-Hr. New hardware cost estimate based on projected US list pricing for the HS22 and chassis infrastructure, including 14 blades, BladeCenter E chassis with redundant power and redundant advanced management module. Software license cost for operating system & application estimate used is $1,000 per server. Datacenter floor space cost estimate used is $500 per square foot, average 8 square feet per standard enterprise 42U rack. ROI calculation solved for power cost savings + license cost savings + floor space cost savings = new hardware acquisition cost.

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