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VIRTUALIZATION FOR MIDSIZE BUSINESSES: KEEP YOUR FOOT ON THE ACCELERATOR

An Executive Brief
Sponsored by IBM

FEBRUARY 2012

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INTRODUCTION

Does this mean that the benefits of virtualization will soon reach a crescendo, and IT managers will be scrambling for the next wave of efficiency and flexibility? Not by a long shot.

Virtualization—the abstraction of the logical from the physical—has been an outstanding tool in IT’s never ending quest to wring increasing levels of cost efficiency and flexibility from existing server hardware and data center infrastructure. Prior to virtualization, a static relationship existed that tied a single instance of the operating system software and its collection of applications to a dedicated server. If the operating system and application workload—that is, the demand on the server’s resources—was constant, utilization of the server could be maximized, resulting in minimal dormant or unused hardware resources. Furthermore, the power consumption by the server and the cooling of that server is efficient; there is little waste in supporting an active server. Yet, application usage is seldom constant. The existence of peaks and valleys during the day, within the workweek, seasonally, and unexpectedly, is the reality for most businesses. Consequently, average server utilization without virtualization is low, and energy and cooling is wasted on servers that are ‘on’ but are not actively serving a business need.

Server virtualization upends this serial relationship. With server virtualization, a hypervisor dynamically creates multiple, isolated software instances, or virtual machines (VMs), on a single server. This abstraction allows multiple workloads to simultaneously share the server’s resources. By interleaving the ebb and flow of multiple workloads, server utilization rates can be dramatically and permanently improved. In addition, server sprawl can, for a period of time, be reversed.

Given the inherent benefits of server virtualization, it is not surprising that server virtualization is rapidly being adopted. Based on a 2011 sampling of U.S. IT decision makers at midsize and large businesses, use of virtualization exceeds 70%.¹ Furthermore, the percentage of servers virtualized is already high and increasing. Thirty-four percent of the survey respondents stated that 50% or more of their servers are currently virtualized; and 62% predict that 50% or more of their servers will be virtualized in five years. It is noteworthy that these trends are not unique to the U.S. In a global survey of midsize businesses commissioned by IBM, 67% list virtualization as an IT project that is already underway or planned to be implemented in 2011.²

Does this mean that the benefits of virtualization will soon reach a crescendo, and IT managers will be scrambling for the next wave of efficiency and flexibility? Not by a long shot. There are other streams of benefits virtualization can deliver, especially for the growing number of midsize businesses with shifting strategic priorities toward customer

¹ Frost & Sullivan survey conducted in the second quarter of 2011.

² Survey of 2,112 business and information technology decision makers in midsize businesses was conducted by KS&R, Inc. in late 2010. Survey findings are summarized in *Inside the Midmarket: A 2011 Perspective*; available at http://www-304.ibm.com/businesscenter/cpe/download0/212133/Inside_the_Midmarket_Global_Report.pdf.

focus, innovation, and revenue growth.³ The challenge is in knowing what this broader virtualization toolset is and how to make it work for your midsize business.

WHY SERVER VIRTUALIZATION?

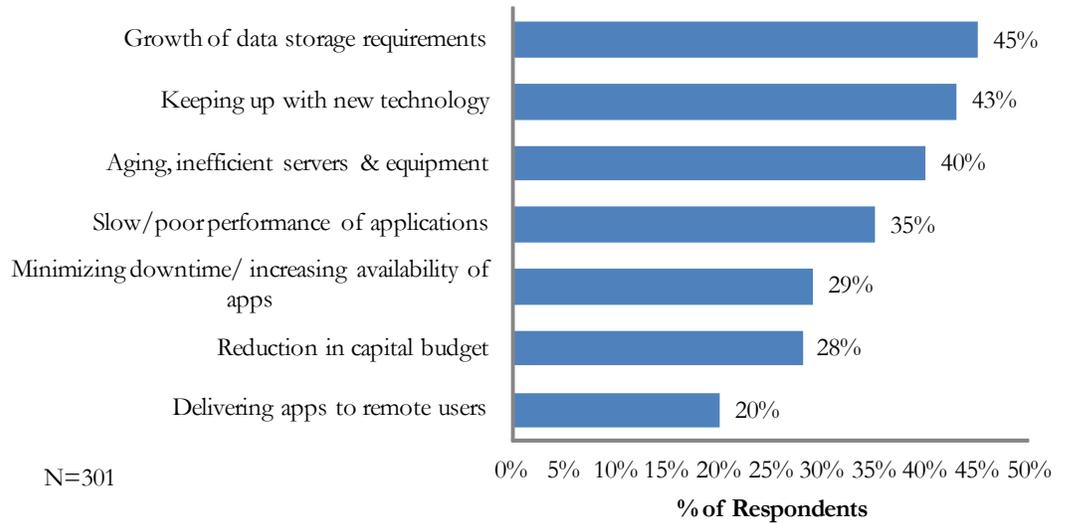
No IT project is considered unless there is a need and the means to address that need. Such is the case in the data center challenges that IT faces. This is particularly relevant to midsize businesses, many of whom do not have sophisticated data centers with designated personnel whose sole responsibility is to care for that data center. Rather, midsize businesses frequently have a standard room that has been put into service to host the company's server and storage infrastructure. Moreover, they do not have the luxury to expand; they must work within their constrained space. And, the same skeleton staff that oversees this room also attends to all of the business's IT needs, such as desktop management, monitoring and managing critical business applications, and providing direction on how technology developments in IT can advance their business's strategic plans. This is an immense and complex role, confirmed through a Frost & Sullivan survey that highlights the many recurring challenges pertaining to data centers.

- **Increase capacity** – Computing and storage requirements are only heading in one direction—upward. Attempting to increase capacity is particularly challenging when the footprint of the 'data center' is fixed and, of increasing relevancy, power availability is limited.
- **Improve effectiveness with greater speed, flexibility, and reliability** – Midsize businesses are caught in a competitive vise—smaller businesses are nibbling at their heels and large enterprises will redirect their resources to protect their turf. If the midsize business is not focusing on how to improve its effectiveness and, by association, its business, the competitive vise will definitely tighten.
- **Gain cost efficiencies in both technological and human resources** – The wrenching adjustments that were required during the recent economic downturn will not be reversing anytime soon. Even as general economic conditions improve, businesses will seek first to reestablish profitability before adding headcount or increasing budgets. Consequently, the midsize business IT organization, which for most has the same internal departments to support as a large enterprise, will be expected to do more with the same. And, where increased spending has been approved, this will only occur if there is a near-term financial benefit.

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³ Each of these strategic priorities intensified from 2009 to 2010, according to the KS&R survey.

Data Center Challenges



Source: Frost & Sullivan

As beneficial as virtualization can be, it is like most ‘IT solutions’—a technology that will not reach its full potential unless it is managed effectively, integrated with complementary technologies, and smartly extended into other areas of business needs.

Although a tall order, server virtualization is a technology that is unique in being able to address multiple challenges simultaneously. By abstracting logical workloads (i.e., software operating system and applications) from the server hardware, and the ability to create and tear down workloads as needs rise and fall, server virtualization enables IT to:

- Increase server utilization rate—that is, more workloads per server
- Respond to computing needs faster in comparison to the lengthier provisioning cycle of dedicated server hardware
- Stretch existing data center resources without increasing footprint and power consumption

MORE OPPORTUNITIES AHEAD

As beneficial as virtualization can be, it is like most ‘IT solutions’, a technology that will not reach its full potential—in cost efficiency, flexibility in meeting undulating business objectives, and contributing to innovation—unless it is managed effectively, integrated with complementary technologies, and smartly extended into other areas of business needs. Following are tangible ways to unlock the fuller benefits of virtualization.

Scaling management to match an avalanche of workloads – Similar to lane expansion in high traffic urban corridors where new lanes are quickly consumed by more vehicles, the new supply of capacity made possible through virtualization is quickly absorbed. Consequentially, IT has effectively traded one pain point—managing an

increasing number of physical servers, for another—managing an avalanche of virtual workloads. This management pain can quickly escalate from a dull headache to a throbbing migraine in short order unless prescriptive steps are taken to manage the virtual. In essence, the honed effectiveness of managing physical servers must be practiced faster, with greater precision, and at higher scale with virtual workloads. This entails:

- Real-time visibility into individual workload performance, and alerting before problems become service impacting
- Workload relocation and rapid provisioning to circumvent performance issues, ensure high availability, and elevate system-wide utilization
- Capacity planning based on trends of actual usage

Driving out slack expenses and directing confirmed expenses to workload users

Although virtualization drives cost efficiencies through the shared use of resources, in doing so, it also obscures the connection between user and resource cost. However, effective business decisions demand driving costs accurately to users' organizations. Ensuring this requires the following on-going activities:

- Gathering and compiling resource consumption at the workload level and charging back to the workload users
- Assessing software inventory and license entitlements to identify over-subscriptions and unaccounted use
- Automating routine processes and identifying opportunities to standardize virtual machine images within and across departmental users

Adjusting data and storage management processes – With virtualization contributing to an avalanche of virtual, on-demand workloads, the volume of data will grow exponentially. With that, data and storage management policies and processes designed for a physical environment must be recalibrated for a virtualized environment. A host of questions arise as part of this recalibration:

- Is data adequately protected while in use, in transit among virtual workloads and storage, and at rest?
- Will existing identity and access policies remain in effect, and what modifications to these policies are required?
- Will audits regarding data privacy regulations be supported?
- Are data backup, recovery, retention, and destruction procedures being followed, and how should they be updated for the increasing volume of data?

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Devising and following a server upgrade plan that includes servers explicitly built—from the silicon up—to support virtualization, will not only stretch existing data center space further but will also produce incremental gains in energy efficiency.

Logic dictates that if virtual workloads are increasing in number and in data creation, IT's approach to storage must parallel the on-demand, instant scalability, and high density attributes of server virtualization. Otherwise, storage is at risk of becoming an operational and costly bottleneck.

Migrating from pre-virtualization servers to servers optimized for virtualization – The density of virtual workloads, as previously stated, drives cost efficiencies within existing physical servers, and allows existing data center space to support a higher level of business operations. In time, however, a new capacity threshold will be tested. Just as PCs and consumer electronics continuously evolve to better support advanced applications, the same is true with servers optimized to support virtualization. Devising and following a server upgrade plan that includes servers explicitly built—from the silicon up—to support virtualization, will not only stretch existing data center space further but will also produce incremental gains in energy efficiency (less power consumption per workload and lower heat emissions).

Expanding beyond server virtualization – The underlying concept of virtualization—abstracting the logical from the physical—is not restricted to server virtualization. Virtualization is applicable in other IT domains, each delivering additional benefits.

- **Storage Virtualization** – Logic dictates that if virtual workloads are increasing in number and in data creation, IT's approach to storage must parallel the on-demand, instant scalability, and high density attributes of server virtualization. Otherwise, storage is at risk of becoming an operational and costly bottleneck. Like server virtualization, storage virtualization, if designed and managed effectively, can deliver business benefits in many areas, such as: object centralization; file synchronization and version control; electronic collaboration; automated storage provisioning and data placement; aligning storage costs with performance priorities; and supporting business analytics. Business analytics is among the top IT project implementations for midsize businesses, according to the KS&R survey. Seventy percent of respondents have either started or plan to start a business analytics project. Information management and customer relationship management—projects that rely on large data sets and highly scalable computing capabilities—are also high on project priority lists.
- **Desktop Virtualization** – Desktop virtualization bends virtualization into a complementary direction. In desktop virtualization, multiple end-users' desktops are created, managed, and run on a server, rather than individually on each end-user's device. Essentially, the desktop 'lives' on the server; and the end-user's device—a laptop, a home PC, thin computing device, or tablet—is an interface and display mechanism. Desktop virtualization presents several benefits to IT and end-users. Server-based virtualized desktops provide IT with the uniform control they lack—and end up paying for in helpdesk calls associated with maintaining and repairing traditional PCs. With the end-user device in desktop virtualization not having the same processing requirements as a traditional PC, IT can start swapping out corporate-owned desktops and laptops with thin-computing devices that cost less, require less maintenance, and consume less electricity. For end-users, they retain the same desktop experience they had plus gain the ability to access their personalized desktops from multiple devices. As an end user moves

among devices, he or she has seamless workflow as the last desktop session, including personal files, is stored on the server. With the advances that have occurred in desktop virtualization over the last three years, all businesses should include desktop virtualization as a 'must evaluate' solution to desktop computing and management.

- **Network Virtualization** - Reliance on communication networks' adaptability intensifies with virtualization. As virtualization takes root, communication flows become more Web-like as the physical location of workloads is a real-time selection, has the potential to be transferred from one physical server to another within a session, and be disseminated among multiple computing and storage devices; all in the name of resource efficiency and performance. Whether in a server room or a high-end data center, server-to-server and server-to-storage communication will increase with virtualization. Server-based desktop virtualization further adds to network traffic on Local Area Networks and Wide Area Networks, as the end user is accessing his or her desktop through a network. While workload performance (e.g., responsiveness and resiliency) is a critical attribute to monitor and manage in this dynamic web of communication flows, it is not the only manageable attribute. Cost efficiency in the use of networks is also possible if networks are constructed with the same adaptability principles as other forms of virtualization.

MOVING VIRTUALIZATION FORWARD

Knowledge is power, but holding a power advantage in the rapidly evolving IT discipline is unattainable for most midsize businesses. This is especially the case when taken in the context of doing more with less; and, as articulated in this paper, when basic server virtualization only scratches the surface of potential benefits. Partnering with a knowledgeable provider is the preferred approach. Surveys confirm this. In the KS&R survey of midsize businesses from around the world, 70% of respondents indicated that they are "seeking a consultative versus a purely transactional relationship with their primary IT provider." This position is also supported by what they cited as execution barriers—difficulty in acquiring and implementing solutions, inability to implement technology with existing resources and infrastructure, and lack of skills and resources. Of even higher magnitude, 88% of U.S.-based midsize businesses in Frost & Sullivan's 2011 survey will seek outside assistance in developing and implementing a cloud strategy, which includes virtualization in private data centers.

Having concluded that partnering is not only advantageous but essential, choosing the right partner is imperative. While there are numerous partnering choices, we recommend narrowing the choices to providers that embody these characteristics:

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Regardless of where businesses enter this four-point journey—consolidate resources, manage workloads, automate process, and optimize delivery—IBM is poised to serve.

- Views virtualization as an evolutionary process aimed at contributing to business outcomes
- Understands that this process starts at a different point for each business and varies in timeline and milestones
- Supports a heterogeneous environment consisting of physical and virtual infrastructure, private and public cloud installations, and standards-based, vendor-agnostic computing, storage, and network components
- Places management, the engine of efficiency and “no surprise” operations, at the center of all virtualization projects
- Has built and continuously enhances a synergistic and broad suite of hardware and software products designed to maximize the benefits of virtualization
- Offers “pay as you grow” financing options to assist businesses in breaking through budgetary barriers and in aligning costs with projected benefits
- Is experienced and has a reputation of applying that experience in all of its projects

IBM, A TRUE PARTNER IN THE VIRTUALIZATION JOURNEY

IBM epitomizes the evolution process of virtualization through its virtualization journey. Regardless of where businesses enter this four-point journey—consolidate resources, manage workloads, automate process, and optimize delivery—IBM is poised to serve. Furthermore, IBM’s community of value-added resellers and local IT management firms fosters tight strategic relationships with businesses, regardless of size and industry.

Consolidate resources – Consolidation of computing power into fewer servers—a natural starting point for most businesses—supports the business objective of lowering its cost structure in both capital expenditures and ongoing operational costs. The cost savings are straightforward: fewer devices to purchase, configure, and manage; and avoidance of data center expansion. For businesses that have just started or already pivoting to server virtualization, IBM can further assist them in reaching a higher tier of utilization and cost efficiency through the migration to IBM systems engineered for virtualization. Well suited for midsize businesses, IBM Power Systems servers with IBM PowerVM technology, and IBM x86-based Enterprise X-Architecture servers, separately and combined, make this objective a reality. Behind the scene, IBM Global Technology Services has developed analytical tools that model workloads and outcomes to determine the optimal approach to virtualize infrastructures. Using these tools and methodologies, IBM has helped clients achieve 60 to 70 percent server virtualization; halve their transformation time windows to virtualized servers; trim up to 50 percent of floor space requirements and facility costs; and produce a 6 to 18 month return on investment. Add

in IBM Storwize V7000 and the virtualization journey moves from servers into storage. Further, IBM storage virtualization services assist clients in reaching higher tiers of storage infrastructure responsiveness and utilization, and reduce cost and complexity across the client's existing and heterogeneous mix of storage platforms. Sophisticated analytics is also employed to automate data movement, which improves operational efficiencies and reduces risk. The benefits of storage virtualization done right can be as substantial as server virtualization: up to 25 percent reduction in storage capacity requirements, and up to 300 percent increase in utilization rates of storage infrastructure. IBM Global Financing can be folded into this virtualization journey to aid IBM customers in attaining the technology they need, when they need it, and sequence payments to match the flow of benefits.

Manage workloads – As described earlier, not only does virtualization contribute to physical device consolidation—a boost to cost containment and efficiency—it also indirectly contributes to what can be a massive uptick in workloads and data. The net result can be a significant management challenge. If not addressed effectively, a portion of the cost efficiency gains through consolidation of physical resources will be erased by inadequate and clumsy workload management. IBM offers three products—IBM Systems Director, IBM Maximo Asset Management Essentials, and IBM Tivoli—designed to unify and simplify management of virtual and physical environments. IBM Systems Director provides that single pane of glass that is so essential in coordinating administrative tasks across servers and storage in virtualized and physical environments. IBM Maximo Asset Management Essentials brings enterprise-class asset optimization to midsize businesses. Last, IBM Tivoli Monitoring consolidates correlated workload management objectives into a single solution—capacity management and planning, and performance problem identification and isolation—across virtualized and physical environments. With few businesses claiming or even aspiring to be 100% virtualized, the importance of unified workload management across physical and virtual server and storage environments should not go unnoticed.

Automate process – In this portion of the virtualization journey, the goal is to automate the delivery of applications and services to the business, independent of platform or operating systems. In addition to feeding cost savings by reaching resource optimization decisions faster than manually possible, human configuration errors can be taken out of the equation; and the recording that is standard with automation directly supports regulatory requirements. For this goal to be realized, the linkages between business rules and priorities with IT operations must entail a high level of process automation. IBM Tivoli software—IBM Tivoli Monitoring, Tivoli Endpoint Manager, and Tivoli Provisioning Manager—are just a few of the IBM products that automate service delivery. Other supporting products include IBM Tivoli Live Monitoring Services and TSM FastBack for Storwize V7000. As in this step, and the preceding steps in the virtualization journey, they can include several IBM products. IBM or the company's certified partners

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Midsized businesses should not wait for proof to materialize of virtualization's broader and more holistic benefits in other areas touched by IT—notably storage, desktops, and networks. They must move forward with purpose.

consult with each customer in selecting an optimal mix of IBM products to best meet that customer's business aspirations.

Optimize delivery – In optimized delivery, the user community is equipped to serve themselves—a self-service model. In the substantiation of this model, IT attention can be redirected from mundane tasks to strategic business endeavors. To make optimized delivery a reality, IT will need to assemble and automate technology to deliver services and resources in the most cost effective and reliable manner. In turn, business users define their needs, and the services and resources they need are automatically and transparently provisioned. IBM's growing portfolio of cloud services will form the footstones for optimized delivery.

Stratecast The Last Word

Virtualization has rapidly gone from experimentation to production in the server environment for most midsized businesses. Even so, midsized businesses should not wait for proof to materialize of virtualization's broader and more holistic benefits in other areas touched by IT—notably storage, desktops, and networks. They must move forward with purpose.

Doing so is not risk free. For one, there is no universal map that is suitable for each business as to how virtualization should be melded into its IT operations in a manner that maximizes business benefits. The virtualization journey is as unique as the individual business. Also, virtualization must be priced and packaged for midsized businesses. Compared to their large enterprise competitors, midsized businesses' objectives are similar but their in-house resources and funding avenues are not as abundant.

Our recommendation is to select a business partner with proven experience in virtualization implementations across a range of industries; one that offers virtualization products that are not watered-down versions of large enterprise products, but explicitly designed for midsized business implementations and budgets; and has a community of certified partners poised to provide lifecycle assistance. IBM qualifies in all of these areas.

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