

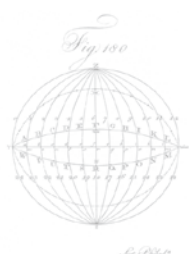
## Getting the MAX from your Virtualized Environment: Comprehensive Solutions from VMware and IBM

Companies have implemented server virtualization to reduce hardware and space costs in the datacenter. Now, those same companies are poised to virtualize their most critical enterprise applications, the next step towards the goal of a fully-virtualized, efficient computing environment that reduces the cost of hardware, licenses, and labor. For this they require high-performance systems, comprehensive management, recovery capabilities, and well-tuned end-to-end solutions. It's a challenge for IT organizations: a flexible, scalable infrastructure with systems optimized for each workload.

Cloud computing holds the promise as a new service consumption and delivery model, characterized by on-demand self-service, ubiquitous network access, location independent resource pooling, and pay-per-use. The end user focus of self-service and self-management is new and requires a transformation of today's IT model. This is another challenge for IT: investments now that fuel the journey to cloud computing.

IBM® and VMware® are uniquely qualified to provide workload-optimized systems, consultative services, and heterogeneous service management for companies moving to a more fully virtualized environment or cloud computing. Now, it's IT energizing the business.

**WORKLOAD OPTIMIZED VIRTUALIZATION**



## THE POWER OF COLLABORATION

When IBM and VMware first began collaborating on solutions, they discovered that the combination of IBM mainframe-inspired x86 servers and VMware x86 server virtualization experience would deliver more innovative solutions than either company working alone. For running mission-critical workloads, the companies delivered rock-solid reliability, dramatic cost-savings, and increased efficiency that surpassed every other solution in the industry. More than ten thousand joint customers later, IBM and VMware continue to focus on designing and developing virtualization solutions that redefine industry standards and fuel your company's journey to cloud computing.

The introduction of the IBM eX5 architecture and portfolio of rack and blade systems designed for virtualization continues the rich history of collaboration between IBM and VMware. It delivers on our shared goals of simplified deployment for the IT environment, lower capital costs, and reduced operational costs.

*"IBM was the first VMware system vendor. And our collaboration and innovation continues today. With vSphere on IBM systems, clients can virtualize more scalable systems giving them more flexibility and lower costs."*

Alex Yost,

IBM System x Vice President and Business Line Executive

## INTRODUCING eX5

eX5 is an innovative architecture and portfolio of rack and blade systems designed for virtualization. The goal of IBM eX5 and VMware® vSphere™ is to get the most out of virtualization investments. The more applications that can fit into the VMware environment, the greater the reduction in costs and downtime.

**Architectural choice.** Workload-optimization is the "secret sauce" for true IT efficiency. The eX5 System x® and BladeCenter® systems are based on the next-generation Intel® Xeon® processor-based server platform, for the expandable server segments. With eX5, IBM provides architectural choice for the VMware environment. Enterprise-class System x3850 X5 and x3690 X5 servers deliver mainframe-inspired reliability, availability, scalability, and serviceability features. Powerful BladeCenter HX5 scalable performance blade servers enable unprecedented compute, memory, and I/O capacity in a blade

## WHY IBM AND VMWARE?

- Scalable, resilient virtualization
- Workload optimization
- Lower total cost of ownership and quick return on investment
- Best-practices deployment
- Higher reliability
- Vast virtualization experience
- One-stop integrated support
- Broad portfolio of solutions designed for virtualization

form factor for compute- and memory-intensive workloads.

**Improved application performance.** With eX5 and VMware vSphere, clients can virtualize mission-critical applications without sacrificing performance by configuring larger systems with more—and more affordable—memory. This means reduced system and license costs while optimizing the performance of transaction- and database-intensive workloads including ERP, CRM, and SCM.

**Maximum memory.** eX5 systems with MAX5 deliver unprecedented memory capacity in rack servers, delivering up to 2X the memory of other servers in its class, allowing the consolidation of more workloads onto fewer servers. Unique MAX5 memory expansion capabilities allow more VMs—and larger VMs—per server without using high-cost memory DIMMs. With more DIMM slots per server you can virtualize more workloads at a lower cost.

**Virtualization density.** eX5 servers support maximum virtualization density, which translates to the lowest cost per virtual machine. With the highest number of VMware VMs on each highly-scalable server, savings accrue on hardware, space, operations, and licensing costs.



Fig. 179

System x3690 X5



### UNIQUE VIRTUALIZATION SOLUTIONS

At the core of the IBM and VMware solutions are innovations resulting from the collaboration of two of the most advanced technology companies in the world.

**Mainframe-inspired reliability.** IBM System x and IBM BladeCenter servers shield your IT from disaster with multiple levels of protection, including redundant I/O, I/O virtualization, IBM Predictive Failure Analysis, light path diagnostics, and automatic node failover. VMware vSphere complements this with availability services that allow IT to provide applications with varying levels of high availability depending on their priority and need: VMotion™ live migration of virtual machines across servers, Storage VMotion live migration of VM disks, High Availability automatic restarting of applications in the event of failures, and VMware Fault Tolerance for continuous availability.

**The IBM eX5 architecture and scalability.** IBM System x enterprise servers with IBM eX5 architecture provide revolutionary scalability to 64 processor cores and 3TB of memory with the x3850 X5, advanced reliability features, and a high-performance memory subsystem with multiple layers of memory protection. With up to 64 cores and 1TB of memory supported for a VMware environment, the systems provide the processing power and memory capacity for virtualization of larger business-critical workloads without impacting application performance. More applications in a virtualized environment mean greater cost savings and reduced downtime. VMware Dynamic Resource Scheduler dynamically load balances these server resources to deliver the right resource to the right application based on business priority, enabling applications to use more or fewer resources as needed.

**Memory protection technology.** Standard on System x enterprise servers is IBM Memory ProteXion™ technology, which provides multi-chip error correction in addition to IBM Chipkill™

technology, which provides single-chip, multi-bit correction. Memory scrubbing performs memory testing upon boot-up and marks failing memory as bad before it can fail under load. Memory Rank Sparing provides spare on-DIMM ranks, in case of in-use memory failure, as an efficient alternative to memory mirroring.

**Energy savings.** IBM System x and BladeCenter servers are designed to be energy efficient from the ground up using solid-state drives and high-efficiency power supplies and reducing the number of power-hungry components on the server. The systems deliver leadership performance per watt across all applications—magnifying the energy savings inherent with virtualization and server consolidation. IBM Systems Director® Active Energy Manager™ allows companies to predict and manage periods of peak energy usage by monitoring and throttling actual energy consumption. VMware Distributed Power Management allows energy savings at low usage times by consolidating workloads onto fewer servers, and powering down those that aren't needed.

**Predictive failure technology.** Using advanced heuristic techniques and self-diagnostics, IBM Predictive Failure Analysis (PFA) can help detect when components are operating outside of normal thresholds. Because PFA can predict the failure of supported components, you can replace them before they fail. While many vendors offer PFA on hard drives and memory, IBM includes PFA on selected models for more components: hard drives and solid state drives, memory, processors, power supplies, fans, PCIE slots, and voltage regulator modules.

**Management capabilities required for core business applications.** System x servers with VMware vSphere have the robustness and management capabilities required for transaction- and database-intensive systems including ERP, CRM, SCM, and other core business applications. IBM Systems Director provides a single view of all systems—both physical and virtual—along with alerting and ability to trigger the live migration of virtual machines via VMware VMotion.



## COMPLEMENTING THE eX5 PORTFOLIO: ADDITIONAL IBM SYSTEMS SUPPORTING VMWARE VIRTUALIZATION

**IBM BladeCenter. Right. Open. Easy. Green.** BladeCenter is a leadership blade hardware platform that delivers infrastructure simplification and integration. With redundant I/O connections from every blade in every chassis, you can be confident that you have a solution that delivers high availability and disaster recovery which are critical to business success. BladeCenter is ideal for the power-constrained or space-constrained environment. BladeCenter also supports the IBM eX5 architecture and is designed for virtualization with ample memory support, pay-as-you-grow scalability, and extreme energy efficiency.

**Rack and Tower servers for your datacenter and distributed environment.** Many customers virtualize on traditional one- and two-way rack and tower servers. These servers are the core platforms in many IT infrastructures today. Engineered with counterrotating fans, low-wattage power supplies, a barometer, and advanced power management software, they can save as much as \$100/server/year. They can also support multiple virtual machines per platform depending on the workload allowing you to increase server utilization and reduce capital and operational expenditures.

**Introducing the iDataPlex platform—new technology, new architecture, new economics.** Many datacenters are bursting at the seams, unable to add the additional compute capacity needed to advance the business because of space and power limitations. Architected for density and energy efficiency in a scaled-out environment, the shallow rack and half-depth iDataPlex servers bring performance per watt leadership innovation. iDataPlex is designed to put more on the floor with a fully integrated cluster solution deployed a rack or server at a time and can drastically reduce acquisition costs while increasing SLA. Components can be accessed from the front of the rack saving volumes of maintenance time, costs, and effort. Add the optional iDataPlex Rear Door Heat Exchanger, and a radical reduction in cooling costs can be realized in operations.



*BladeCenter HX5*



*System x3850 X5*

## THE “ALWAYS ON” IT ENVIRONMENT

### **Cost-effective availability and business continuity**

Resilient IBM systems combine with VMware vSphere avoidance of planned downtime and reduction of unplanned downtime to keep IT running. Planned downtime is avoided via migration of workloads between hosts when refreshing servers or performing maintenance. VMware High Availability reduces unplanned downtime by automatically restarting applications when an OS or host server fails. For the most critical applications, VMware Fault Tolerance creates virtual machine “pairs” that run in lock step; in the event of an unexpected hardware failure that causes the active VM to fail, the secondary VM immediately becomes active and continues to run. IBM storage management products, including Tivoli Storage Manager FastBack® add another layer of protection with affordable data recovery using VMware Data Protection API's.

### **Rapid recovery from disaster**


IBM server and storage systems with VMware Site Recovery Manager simplify recovery from datacenter outages without the need for expensive redundant hardware, making disaster recovery rapid, reliable, and affordable. DR plans can be fully tested in advance—with no downtime for applications. When virtual machines power back up in the event of a failure, they'll do so automatically according to the specific policies in your recovery plan.

### **Secure, cost-effective desktops**

Breakthrough virtualization results extend to the desktop. Company data is secure in the datacenter, desktop provisioning takes minutes, and desktop management is simplified. IBM's Virtual Client Solution based on VMware virtualization and IBM server and storage systems helps lower desktop TCO by reducing the cost of operations and end-user support.

## A SOLUTION FOR EVERY WORKLOAD

**Innovative, affordable, resilient IBM x86 servers.** IBM System x and BladeCenter servers tackle the most demanding workloads while helping you manage complexity and risk



in your virtualization environment, from the highly-scalable x3850 X5 and x3690 X5, and BladeCenter HX5 enterprise servers to the superior performance of the x3550 M3 and x3650 M3 System x iDataPlex and rack servers. IBM starts with standard parts and adds innovation to provide outstanding performance, high availability, scalability, power efficiency, and proactive manageability.

In blade environments, the IBM BladeCenter platform delivers an open platform that's easy to manage, energy-efficient, and easy to scale, with a wide range of blade servers including the HS22 and the HS22V, along with AMD Opteron processor-based LS22 and LS42 blade servers, for a unique pay-as-you-grow design. Designed for virtualization, BladeCenter includes redundant power and I/O connections from every blade in every chassis, delivering the level of resiliency required in virtualized environments. For small- and medium-sized companies or sites, the BladeCenter S chassis with HS22 servers supports 200+ VMware virtual machines and up to 3.6 TB of SAN in the chassis.

#### **Storage systems for a scalable VMware environment.**

The IBM System Storage™ portfolio provides a range of cost-effective storage solutions for the VMware environment. The DS3000 series offers affordable, easy-to-use shared storage with SAS, iSCSI, or Fibre Channel server connectivity for SMB and Remote Office/Branch Office sites. The DS5000 series offers scalable, expandable, high-performance shared storage with iSCSI or Fibre Channel server connectivity. Both offer tiered storage capability with the ability to mix Fibre Channel or SAS and SATA drives. DS5100/DS5300 supports solid-state drives (SSDs) as well.

In a VMware environment, the DS5000 series demonstrates sustained balanced performance for mixed workloads, provides superior response times, and is one of several IBM platforms that supports VMware Site Recovery Manager. The VMware vCenter™ Management Plug-in for the DS3000, DS4000, DS5000 offers integrated storage management, monitoring and ease of use that simplifies day-to-day tasks for VMware administrators. These storage systems are complemented by the IBM Storage

Virtualization Controller, providing integration and single point of control, greater flexibility, and improved asset utilization.

**Expert services from IBM Global Services (IGS).** IBM and VMware offer optional integrated support through IBM Global Services in addition to the strong service and support offered through IBM's channel partners. Comprehensive virtualization service offerings from IGS include assessment, planning, strategy development, implementation, and support for IBM, VMware, and third-party technologies. Industry-leading consultative services for shaping the VMware virtualized infrastructure of an efficient IT operation include transformation of business processes leveraging analytics, client experience, and technical expertise; fine-tuning enterprise applications for optimized performance; comprehensive solutions for new service delivery models including cloud computing for on-demand, self-service computing; and managed desktop virtualization service.

**Systems management that improves efficiency.** IBM Systems Director and Virtualization Manager provide simplified systems management of the physical and virtual infrastructure, working with VMware vCenter to optimize IT resources and provide rapid deployment of IT services. Systems Director also integrates with IBM service management offerings from IBM Tivoli group. Together, IBM Tivoli and VMware provide integrated service management to transform datacenters with enterprise-grade cloud technology, enabling the move to fully-virtualized IT.

#### **GET STARTED TODAY**

IBM and VMware have a history of innovative offerings based on unique technology. With the introduction of the System x eX5 architecture and portfolio of rack and blade systems designed for virtualization, IBM systems and VMware allow workload-optimized virtualization for your company's near-term cost-saving needs and the journey to cloud computing. To learn more about the VMware and IBM virtualization solutions, please visit [www.vmware.com/go/ibm](http://www.vmware.com/go/ibm) and [www.ibm.com/virtualization/vmware](http://www.ibm.com/virtualization/vmware).



VMware, Inc. 3401 Hillview Ave Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 [www.vmware.com](http://www.vmware.com)

Copyright © 2010 VMware, Inc. All rights reserved. This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at <http://www.vmware.com/go/patents>.

VMware is a registered trademark or trademark of VMware, Inc. in the United States and/or other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies.

IBM, the IBM logo, ibm.com, BladeCenter, Memory ProteXion, Systems Director, Systems Director Active Energy Manager, System x, System Storage and Chipkill are trademarks of the International Business Machines Corporation in the United States and/or other countries. For a complete list of IBM trademarks, please see [ibm.com/legal/copytrade.shtml](http://ibm.com/legal/copytrade.shtml).

Intel is a trademark or registered trademark of Intel Corporation or its subsidiaries in the United States and other countries.

XSB03014-USEN-01