

# IBM System x Enterprise Servers in the New Enterprise Data

IBM Virtualization and Consolidation solutions beat the competition and save you money!

118% better performance  
40% lower power consumption

36% better performance  
100% more configuration flexibility

## THE CHALLENGES

ADDRESSING KEY PAIN POINTS OF:

- UNDERUTILIZED SERVERS
- SERVER SPRAWL
- AGING SERVER INFRASTRUCTURE
- INCREASING MANAGEMENT COSTS
- SOARING POWER CONSUMPTION
- RELIABILITY AND AVAILABILITY

## THE SOLUTION

VIRTUALIZE AND CONSOLIDATE TO:

- CONSERVE DATA CENTER FLOOR SPACE, INCREASE FLEXIBILITY, AND INCREASE UTILIZATION FROM 5-12% TO AS MUCH AS 85%.
- REDUCE OPERATING COSTS, ADMINISTRATIVE COSTS, HARDWARE DEPLOYMENT TIMES, AND TOTAL COST OF IT OWNERSHIP.

- 1TB memory in 128 DIMM sockets
- 16 sockets
- 64 processor cores
- 28 adapter slots (including 8 Active PCIe slots)

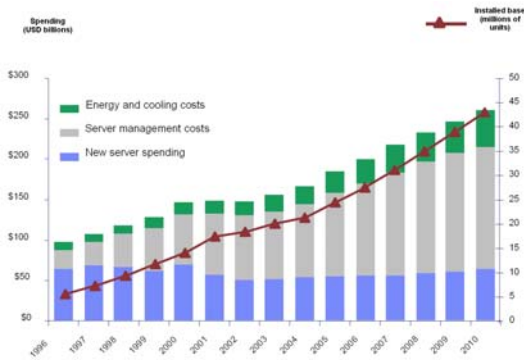
**WHY RUN 20 APPLICATIONS ON 20 SERVERS  
WHEN YOU CAN RUN THEM ALL ON JUST A FEW  
— OR EVEN 1 — WITH BETTER PERFORMANCE?**

Virtualization changes everything!

Once you start to virtualize your servers and storage, you will find that you can enjoy a higher degree of server utilization and simpler, more comprehensive server management. But you must have the right partner and the right tools in order to get the most value from your virtualization projects.

When that happens, you'll quickly start pulling fewer watts, running cooler, using less floor space, and spending less on wiring and utility bills. And, you'll be up and running when you need to be...*while lowering your TCO and getting a bigger bang for your IT buck!*





- Energy and cooling costs are expected to increase 54% over the next 4 years\*
- Management costs are rising 7 times as fast as hardware costs\*

\* Source: IDC, *Worldwide Server Power and Cooling Expense 2006-2010 Forecast*, Doc #203598, September 2006

### EVERY DAY, OPERATIONAL ISSUES CONTINUE TO BESET DATA CENTERS:

- DATA VOLUMES AND BANDWIDTH REQUIREMENTS DOUBLE EVERY 18 MONTHS.
- THE NUMBER OF DEVICES ACCESSING DATA OVER NETWORKS DOUBLES EVERY 2.5 YEARS.
- THE NUMBER OF 10GB ETHERNET PORTS WILL TRIPLE OVER THE NEXT 5 YEARS
- COSTS TO POWER AND COOL SYSTEMS HAVE RISEN ANYWHERE FROM DOUBLE TO EIGHTFOLD.
- MANAGEMENT COSTS HAVE RISEN FOURFOLD IN THE LAST 5 YEARS; THEY ARE PROJECTED TO GROW AT LEAST 10% PER YEAR.

### OVERALL IMPACT:

OPERATIONAL OVERHEAD COSTING UP TO 70% OF IT BUDGETS AND CONTINUING TO GROW...LEAVING FEW RESOURCES FOR NEW INITIATIVES.

## AS POWER, COOLING, AND MANAGEMENT COSTS CONSTRAIN GROWTH, TURN TO IBM FOR HELP IN EVOLVING YOUR DATA CENTER

### Is infrastructure complexity tying your hands?

As workloads and demand for compute capacity increase to keep pace with today's rapidly-changing business environment, spending on server management and administration is rising exponentially, and power and cooling costs will more than double in just a few years. Simply maintaining what you have consumes an increasing amount of capital, budget, and staff time—leaving little room for improvements.



A major objective of IBM's New Enterprise Data Center is to help you reverse these trends by offering a holistic approach to implementing energy efficient strategies and technologies across your data center -- something that the competition simply does not address. For instance:

- HP addresses the system level, but not storage.
- Dell focuses on energy efficient x86 processors, but not energy-efficient system design or virtualization.

Only IBM, the undisputed leader in virtualization in the x86 server market, offers a complete solution at each level of the problem:

- Enterprise-class servers with IBM 4<sup>th</sup> generation X-Architecture:
- x3850 M2 was best of show at VMworld 2007.
- x3950 M2 offers true 2-16 socket scalability up to 64 cores
- Multi-architecture support – VMWare , Xen, Virtual Iron, HyperV
- IBM and VMware — a relationship of *firsts!* IBM was the:
  - ✓ First VMware system vendor
  - ✓ First VMware joint development partner
  - ✓ First to leverage VMware SDK
  - ✓ First to offer comprehensive support
  - ✓ First to integrate VMware into virtual client solution

## IBM CUSTOMERS ENJOY REAL DOLLAR SAVINGS THROUGH BETTER ENERGY MANAGEMENT AND UTILIZATION ACROSS THE ENTERPRISE – BOTH NOW AND IN THE FUTURE

Customer	 St. Helens Council (U.S.A.)	 Flintshire County Council (U.K.)
<b>Problem</b>	89 physical servers in data center: <ul style="list-style-type: none"> <li>• Aging infrastructure; servers near end-of-life</li> <li>• No room for growth</li> </ul>	Multiple physical servers running 350 business-critical systems <ul style="list-style-type: none"> <li>• Infrastructure large and complex to manage</li> <li>• Planned migration to a new platform adds more servers and creates unsustainable burden on already overstretched IT staff</li> </ul>
<b>Solution</b>	Consolidation and Virtualization — from 89 servers to 6: <ul style="list-style-type: none"> <li>• 4 IBM System x3850s</li> <li>• 1 IBM System x3650</li> <li>• 1 IBM BladeCenter</li> <li>• VMware to virtualize the environment.</li> </ul>	Consolidation and Virtualization: Remove 80 physical servers: <ul style="list-style-type: none"> <li>• VMware partitions on 6 IBM System x3950 servers with 40 VMware servers</li> <li>• IBM System x and IBM BladeCenter to host virtualized Windows servers</li> <li>• Fully virtualized storage area network based on IBM technologies</li> </ul>
<b>Benefits</b>	Rack-mounted and blade servers = high performance with smaller footprint; more space in data center: <ul style="list-style-type: none"> <li>• Virtualized infrastructure increased flexibility</li> <li>• Met implementation deadlines and budget targets</li> </ul>	Highly available virtualized infrastructure with room for growth = reduced costs in acquisition, operation, maintenance and disposal: <ul style="list-style-type: none"> <li>• Fewer physical machines to manage</li> <li>• Lower total power and cooling requirements and costs</li> </ul>
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IF YOU'RE THINKING ABOUT DOING THINGS DIFERENTLY, THE TIME TO START PLANNING IS NOW

Why should you pick IBM to help? Because you need a partner with the experience required for success.

Simply put, IBM's System x enterprise servers, combined with our virtualization and consolidation "best-of-show" solutions for managing space, power, and server utilization resources, are the right choice.

For streamlining IT operations and increasing the percentage of server utilization, while keeping performance high and energy costs low. IBM's eX4 technology offers:






- True 2-to-16-socket scalability up to 64 cores
- Revolutionary Intel Xeon dual-core and quad-core MP 7300 Series processors
- Up to 1TB of registered DIMM memory for better workload density and up to 20-30% less power consumption than competitors' fully buffered DIMM technology\*
- IBM Memory ProteXion™ with redundant bit-steering offers twice the memory resilience of the competition
- 4<sup>th</sup> generation snoop filter 4 times larger than the competition's best
- IBM Predictive Failure Analysis®, not just on hard drives and memory but, unlike competitors, also on processors, power supplies, fans, and voltage regulator modules
- 40% lower memory latency than the nearest competition
- More flexible memory configurations than competitors, at significantly lower costs
- IBM Virtualization Manager, awarded "best virtualization tool" by ServerWatch in their 2007 Product Excellence Awards
- VMware ESXi embedded hypervisor, reducing configuration time from hours to minutes
- More than 100 #1 performance benchmarks
- Innovative IBM Rear Door Heat eXchanger
- IBM Project Big Green financing and asset recovery

\* Power consumption varies by DIMM ranking, capacity, and usage.

Data center efficiency begins with consolidation and virtualization.

IBM System x and BladeCenter offer the industry's broadest virtualization portfolio.

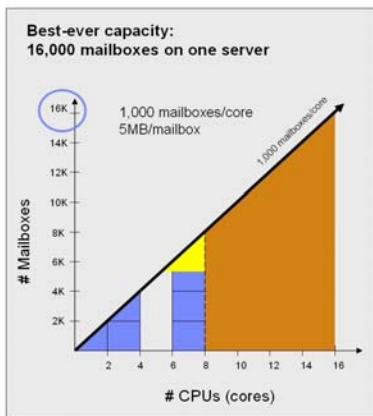
	Infrastructure simplification Integration	Application serving Utilization	Server consolidation Reduction
Platform	IBM BladeCenter	IBM System x Two-socket rack & tower	IBM System x Four-socket with modular SMP scalability in rack
Description	Integrating server, networking and storage resources	Combining a few applications on a single server for greater utilization	Consolidating large numbers of underutilized servers for greatest TCO
Key attributes	<ul style="list-style-type: none"> <li>• Hardware usability</li> <li>• Packaging density</li> <li>• Unified management</li> <li>• Power/cooling savings</li> <li>• Server mobility</li> <li>• High availability/disaster recovery</li> </ul> 	<ul style="list-style-type: none"> <li>• Industry-standard design</li> <li>• Price/performance</li> <li>• Compatibility</li> <li>• Multiple apps per server</li> <li>• High utilization</li> </ul> 	<ul style="list-style-type: none"> <li>• Performance</li> <li>• Scalability</li> <li>• Strong reliability features</li> <li>• Rapid deployment</li> <li>• Reduction of physical systems</li> <li>• Application isolation</li> </ul> 

As a result of fewer servers to deploy, you can:

- Consolidate underutilized capacity from 5-15% to achieve as much as 85% utilization
- Achieve lower cost per virtual machine
- Lower energy and management costs, while lowering TCO – electricity charges for an IBM x3850 M2 server could cost \$790 per year **less than** a similarly configured HP DL580 G5 server

16,000 heavy Exchange users – 1 server  
More than twice what any competitor in the industry has done.

- Virtually eliminates historical software limitations
- Exceeds capacity of native deployments
- Extracts more work from hardware resources
- Unprecedented achievement highlighting the value of scale-up servers



## BIGGER IS BETTER FOR VIRTUALIZED ENVIRONMENTS

IBM recently showcased how the power of combining IBM and VMware technologies enabled IBM to run over 16,000 heavy Microsoft Exchange users virtualized on a single four-processor IBM system.

The benchmark was run by VMware and showed some amazing results:

***The IBM System x3850 M2 with Intel Xeon processors supported more than DOUBLE the number of recommended users running without virtualization.***

### Hardware:

- System x3850 M2
- Four 2.93GHz Intel Quad-Core Xeon 7350 processors
- 128GBs memory

### Software:

- LoadGen simulation tool
- Microsoft Exchange Server 2007 SP1
- Microsoft Windows Server 2003 SP2
- VMware Infrastructure 3

### Configuration:

- Eight 2 vcpu VMs
- 14GBs per VM
- 2,000 mailboxes per VM

View the complete test report at: [http://www.vmware.com/company/news/releases/ibm\\_exchange\\_vmworld.htm](http://www.vmware.com/company/news/releases/ibm_exchange_vmworld.htm)

## IN A THIRD-PARTY VIRTUALIZATION BENCHMARK, IBM'S 4-SOCKET AND 8-SOCKET INTEL XEON QUAD-CORE SERVERS DELIVERED UP TO 118% BETTER PERFORMANCE THAN HP'S 4-SOCKET INTEL XEON QUAD-CORE SERVERS

In 3<sup>rd</sup> party testing of the 4-processor (4P) IBM x3850 M2 and 8-processor (8P) IBM 3950 M2 servers vs. the 4-processor HP ProLiant DL580 G5 server running with an optimum number of vConsolidate work units (CSUs) and redundant power active at all CSUs:

	x3850 M2	x3950 M2
<b>Performance</b>	IBM's 4P server delivered <b>12% better performance</b> than HP's 4P server	IBM's 8P server delivered <b>118% better performance</b> than HP's 4P server.
<b>Performance per watt</b>	IBM's 4P server delivered <b>29% better performance-per-watt</b> than HP's 4P server.	IBM's 8P server delivered <b>36% better performance-per-watt</b> than HP's 4P server.
<b>Power</b>	IBM's 4P server consumed <b>14% less power</b> than HP's 4P server	IBM's 8P server consumed <b>20% less power</b> than HP's 4P server.

***This translates into an affordable opportunity to stay competitive in a fast-moving market.***

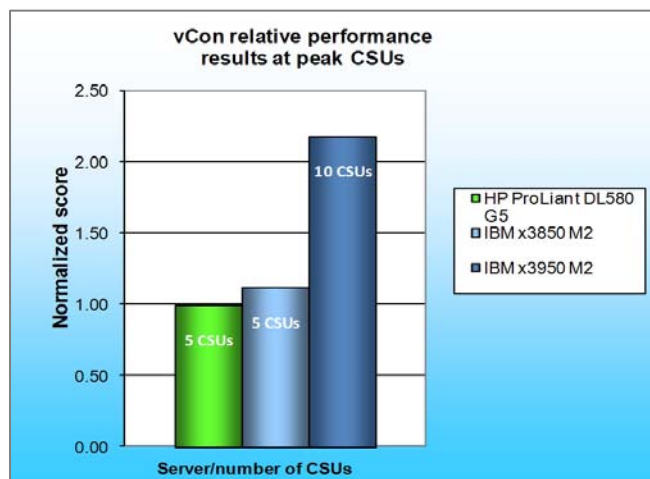
You get all the advantages of quad-core processing:

- IBM's unique 4th generation chipset
- Latest Intel processors
- Balanced system design
- More memory I/O for higher utilization

Plus...

- Lower power consumption
- Lower heat output
- Lower energy bills

For complete details about the performance of each server at five CSUs, see the complete test report at: <http://www.principledtechnologies.com/clients/reports/IBM/IBMVCon0208.pdf>





## THE VALUE OF VIRTUALIZATION DOESN'T STOP AT THE SERVER — DATA IS A CRITICAL ELEMENT OF YOUR NEW ENTERPRISE DATA CENTER






**As with servers, storage devices are often underutilized, typically averaging only about 20% - 25% utilization.**

Realizing that managing multiple storage subsystems, often from multiple vendors, can lead to inefficiencies, application downtime, and management complexity, IBM offers innovated technologies to virtualize storage along with servers.

With IBM's integrated server and storage virtualization solutions, now you can accommodate rapidly expanding data, easily integrate it with your applications and upgrade your storage devices without affecting your applications and users.

And you can realize reduced costs and increased flexibility across a wider range of your infrastructure while addressing your current operational challenges and future needs.

Comprehensive storage virtualization offerings for IBM's x86 portfolio

<b>Server virtualization</b> <ul style="list-style-type: none"><li>IBM Power Systems PowerVM, System z LPARs, VMware ESX</li><li>Virtually consolidate workloads on servers</li></ul>	
<b>File virtualization</b> <ul style="list-style-type: none"><li>IBM General Parallel File System and Scale-out File Services</li><li>Virtually consolidate files in one namespace across servers</li></ul>	
<b>File system virtualization</b> <ul style="list-style-type: none"><li>IBM System Storage N series Virtual File Manager</li><li>Virtually consolidate file systems into one namespace</li></ul>	
<b>Disk and tape storage virtualization</b> <ul style="list-style-type: none"><li>IBM System Storage SAN Volume Controller, TS7500, TS7700</li><li>Virtually consolidate storage into pools</li></ul>	
<b>Infrastructure management</b> <ul style="list-style-type: none"><li>IBM TotalStorage Productivity Center</li><li>IBM Systems Director Family</li></ul>	

## ADDRESS YOUR #1 MOST-UNDERUTILIZED RESOURCE — THE DESKTOP — WITH IBM VIRTUAL CLIENT SOLUTION

**Think of all the wasted resources every night as each user logs off to go home!**

Imagine if you could consolidate all of those resources back in the data center on a high performance server?

IBM Virtual Client Solution offers all the benefits of the traditional hosted client, and more...

- Potentially higher security
- Better end-user experience
- Dynamic movement of the VM between servers for better utilization of resources for users (using VMotion)

## CONFIGURE AND DEPLOY VIRTUAL MACHINES IN MINUTES WITH AN EMBEDDED HYPERVISOR

VMware ESXi embedded hypervisor, built on a next generation thin architecture, is embedded in a number of IBM x86 servers. This gives you the ability to configure and deploy virtual machines in a matter of minutes!

Features include:

- Innovative, thin hypervisor architecture:
  - Independent of operating system, designed for virtualization performance
  - Unmatched security with small 32MB virtualization-centric architecture
- Intuitive interfaces and intelligent defaults:
  - Menu driven start-up and intelligent defaults dramatically reduce deployment time
  - Plug-and-play server hardware provides instant addition to resource pools for capacity on demand
- Integrated into IBM server hardware:
  - Ensures compatible, pre-tested, and optimized hardware configurations
  - Utilizes remote management tools and industry standard protocols such as CIM

vmware ESXi Embedded Hypervisor



Physical Server

BEST OF VMWORLD 2007  
BEST OF SHOW



## BRING IT ALL TOGETHER WITH IBM SYSTEMS DIRECTOR — VIRTUALIZE MORE, MANAGE LESS

IBM Systems Director helps bring it all together in the data center, with:

- Simplified management of physical and virtual infrastructures
- Rapid deployment and optimization of IT resources
- Reduction in time-consuming management tasks.

Features include:

- Common toolset
- Modular, industry standards-based approach
- Leveraging investments in IBM platform management
- Integration with IBM Tivoli® service management offerings
- Support for IBM and third-party extensions

***So you can focus more on how IT can support your business, rather than on how you can support your IT Infrastructure!***



START NOW TO CREATE A FLEXIBLE AND RESPONSIVE DATA CENTER THAT CAN HELP CARRY YOU INTO THE FUTURE WHILE ADDRESSING THE ISSUES YOU FACE EVERY TODAY

IBM can help you:

- Realize innovation today so you can pass on the benefits to your customers.
- Implement a better way to manage growth, complexity and risk.
- Go green to increase energy efficiency and save.

IBM Systems Director

Simplifying management of both IBM and non-IBM servers and storage  
Something no other vendor can do



“...IBM Systems Director could become the primary point of control -- not just for IBM Systems, but entire data centers.”<sup>1</sup>

— Tony Iams, *Ideas International*

<sup>1</sup> *Ideas International*, Tony Iams, 'IBM Puts Friendly Face on Heterogeneous Virtualization' blog posting, November 2, 2006; [http://ideasint.blogs.com/ideasinsights/2006/11/ibm\\_puts\\_friend.html](http://ideasint.blogs.com/ideasinsights/2006/11/ibm_puts_friend.html)

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