

IBM System x Enterprise Servers in the New Enterprise Data Center

IBM



Virtualize and **consolidate** with IBM and save...

118% **better performance** and 36% **lower performance-per-watt** than the competition

SUPERIOR CONFIGURATION FLEXIBILITY:

- 1TB OF MEMORY
- 16 SOCKETS
- 64 CORES



100% MORE THAN THE COMPETITION!

IBM CAN HELP YOU CONSOLIDATE UNDERUTILIZED RESOURCES FROM TODAY'S 5-15% UTILIZATION TO UP TO 85% UTILIZATION.

IBM gives you the freedom and innovation you need to solve real business challenges and remain competitive in a fast-moving marketplace.



Multiple forces are driving a transformation of the data center



A TRANSFORMATION OF THE DATA CENTER

Coping with dynamic change in the data center while stretching your IT dollars further and further and doing more with less are facts of life. New technologies offer you many options for relieving the strain.

But how do you know which solution and which solution provider are right for you?

How can you be sure?

That's where IBM® comes in. Our proven breadth of industry expertise, 4th generation X-Architecture® platform (eX4), and the x3850 M2 and x3950 M2 integrated System x™ enterprise servers deliver leadership performance and **flexible scalability unmatched by any competitor** anywhere in the world.

IBM System x enterprise servers in the new emerging data center target **Virtualization and Consolidation, Database, and Enterprise Applications**, while focusing on performance, reliability, and manageability. This means **better value for your IT dollar** thanks to:

- Mainframe reliability and availability features for more confidence in running your business on x86 servers
- A better design that uses less energy, which, in turn, helps lower the TCO of your business operations
- More than 100 #1 benchmarks in all types of workloads, surpassing the competition by significant percentage points
- Unmatched configuration flexibility of CPU, memory, and I/O

INCREASE HARDWARE UTILIZATION WHILE DECREASING THE NUMBER OF PHYSICAL SERVERS

By **consolidating and virtualizing** on IBM System x enterprise servers, you can increase the utilization of your hardware and decrease the number of your physical assets. This means fewer servers required to run the same workloads.

The result: A business that runs more cost effectively now, while also supporting growth and innovation.

EVERY DAY, YOU'RE FACED WITH CHALLENGES LIKE:

- MANAGING SPACE, POWER, AND SERVER
UTILIZATION RESOURCES
 - KEEPING PERFORMANCE HIGH AND ENERGY
CONSUMPTION LOW
 - STREAMLINING AND IMPROVING OPERATIONAL
EFFICIENCY
 - ADDING NEW FUNCTIONS AND AFFORDABLY
SCALING YOUR INFRASTRUCTURE
- ALL WHILE STAYING WITHIN BUDGET!



**COST-EFFECTIVE
SCALABILITY**

**UP TO 64 CORES AND 1TB
MEMORY WITH A 4-NODE
x3950 M2 SYSTEM**

You need to streamline IT operations and increase the percentage of server utilization, while keeping performance high and energy costs low. IBM's eX4 technology offers:

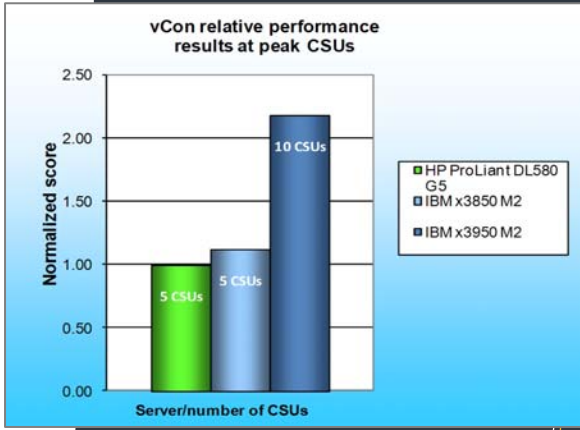
- True 2-to-16-socket scalability up to 64 cores
- Up to 1 terabyte of memory for better workload density
- Memory ProteXion™ with redundant bit steering offers twice the memory resilience of the competition
- 4th generation Snoop filter 4 times larger than the competition's best
- 40% lower memory latency than the nearest competition
- More flexible memory configurations than competitors, at significantly lower costs

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

- Minimize unused capacity
- Achieve lower cost per virtual machine
- Lower energy and management costs, and TCO

VCONSOLIDATE VIRTUALIZATION BENCHMARK

In 3rd party testing of the 4-processor (4P) IBM System x3850 M2 and 8-processor (8P) IBM System x3950 M2 servers vs. the 4-processor HP® ProLiant™ DL580 G5 server running with an optimum number of vConsolidate stack units (CSUs) and redundant power active at all CSUs:



	x3850 M2	x3950 M2
Performance	IBM's 4P server delivered 11.8% better performance than HP's 4P server.	IBM's 8P server delivered 118.4% better performance than HP's 4P server.
Performance per watt	IBM's 4P server delivered 29.3% better performance-per-watt than HP's 4P server.	IBM's 8P server delivered 35.8% better performance-per-watt than HP's 4P server.
Power	IBM's 4P server consumed 13.6% less power than HP's 4P server.	IBM's 8P server consumed 19.6% less power than 2 HP 4P servers.

**AS INTEL® ADDS MORE
CORES, ONLY IBM
PROVIDES THE
SCALABILITY TO MEET
THE MEMORY DEMANDS
OF CORES BEYOND 4
SOCKETS ON AN
EM64T ARCHITECTURE
SYSTEM**

IBM SYSTEM X3950 M2 SHATTERS RECORDS FOR X86 SERVER PERFORMANCE ON TPC-C BENCHMARK

You need to quickly manipulate data in memory with the confidence that the results are accurate and reliable. IBM enterprise servers offer:

- Greater memory support (up to 1TB of DDR2 memory and faster buffers) for unsurpassed database performance
- **27% more transactions-per-minute** than HP ProLiant DL580 G5
- Error-checking technology and greater reliability and availability for more confidence in leveraging the TCO of x86 architecture
- Scalability in a “pay-as-you-grow” design (IBM is the only Tier 1 vendor with a scale-up solution for SQL)

eX4 technology’s robust memory subsystem allows you to deploy enterprise-class workloads with confidence. You benefit from data reliability and availability.

OPTIMIZE ENTERPRISE APPLICATION CPU, MEMORY, AND I/O UTILIZATION WITH THE BEST CONFIGURATION FLEXIBILITY IN THE INDUSTRY

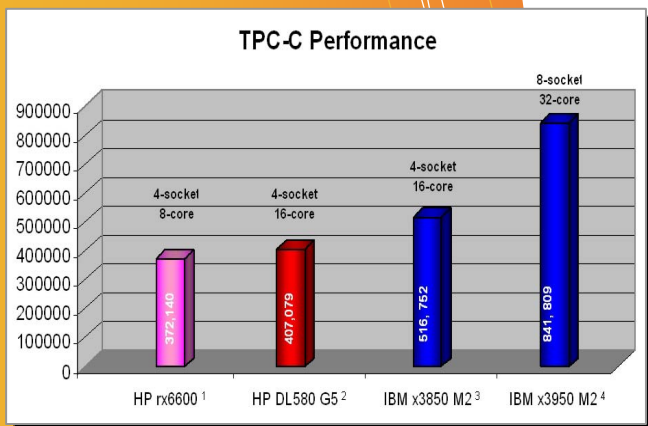
You need to deploy and run enterprise-class workloads and mission-critical, multi-threaded applications with confidence. IBM enterprise servers offer:

- Modular configuration to optimize for memory (up to 1TB), CPU (up to 64 cores), and I/O performance (up to 28 slots, including 8 hot-swap Active PCIe slots)
- Revolutionary “building block” design so you pay only for what you need, when you need it
- Granularity in scaling – 2 to 16 sockets, 4 to 64 cores

You benefit from:

- A system that’s up and running at optimal performance utilization levels
- A better design that uses less energy, which, in turn, helps lower the TCO of your business solution

TPC-C® BENCHMARK



Results referenced are current as of August 22, 2008. All published TPC benchmark results at www.tpc.org

SAP® STANDARD APPLICATION BENCHMARK

IBM System x3950 M2: Leadership 16-processor result achieved on the two-tier SAP SD Standard Application Benchmark running IBM DB2 9.5 and the SAP ERP Release 6.0 application.⁵

IBM leads in reliability/availability features	HP actually took a step backward
Hot-swap PCI	No hot-swap PCI adapters
Active Memory™ subsystem:	No hot-swap memory
Hot-swap memory	DIMM failure can affect up to 16 DIMMs
Memory ProteXion Technology	
Chipkill™ memory	Still require dedicated DIMMs for protection

Results referenced are current as of May 20, 2008. For the latest SAP benchmark results, visit www.sap.com/benchmark.

IBM'S SUPERIOR GREEN ENERGY EFFICIENCIES SAVE YOU MONEY – AND VALUABLE TIME!

What if you could increase the percentage of server utilization while keeping performance high and energy costs low — *and* save money on management and energy costs?

IBM's green energy efficiencies enable you to consolidate workloads and virtualize to save money and valuable time!

IBM uses high-efficiency power supplies and CPU/memory regulators, while HP uses memory that is less energy efficient and requires 67% more power, which drives up electricity and cooling costs:

IBM x3850 M2	—	1440W rating, 220V, robust configuration
HP DL580 G5	—	2400W rating, 220V, robust configuration
Dell PowerEdge 9000	—	1570W rating, 220V, robust configuration

IBM internal testing⁶ shows that:

- ✓ HP has a higher power rating and could potentially consume up to 67% more power than IBM.
- ✓ Dell has a higher power rating and could potentially consume up to 9% more power than IBM.

With all servers running at 24x7x365 server hours per year, energy costs are as follows:

IBM = \$1,186 per server per year
HP = \$1,976 per server per year
Dell = \$1,293 per server per year

With IBM, you could save up to \$790 per server, per year, a savings of 40%.

SIMPLY PUT, IBM IS THE RIGHT CHOICE IN A SOLUTION PROVIDER WHO CAN GO THE DISTANCE!

IBM System x enterprise servers help you manage complexity and give you the flexibility to grow with your needs. Proven mainframe-inspired technologies, combined with consolidation and advanced virtualization solutions that expand on demand, result in superior performance, high scalability, unmatched flexibility, and superior efficiency.

IBM System x Portfolio Covers the x86 Spectrum of Business Needs



IBM's System x portfolio gives you *the right choice* for your business needs:

- System x Enterprise Racks and Towers for business infrastructure and applications
- Scale up Enterprise eX4 Rack Servers for consolidation, virtualization, and database serving
- Scale out BladeCenter for infrastructure simplification and application serving
- Scale out iDataPlex for internet scale computing

AGILITY IS KEY!

SCALABILITY AND EFFICIENCY ARE CRUCIAL!

A SOLUTION PROVIDER WHO CAN GO THE DISTANCE IS A MUST!



IN 3RD-PARTY BENCHMARK

TESTING, IBM'S 4-SOCKET

AND 8-SOCKET QUAD-CORE

INTEL® XEON® SERVERS ARE

UP TO 118% MORE

POWERFUL THAN HP'S

FASTEST QUAD-CORE INTEL

XEON SERVERS

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
- Lower total cost of ownership

TPC-C Benchmark Details:

¹ HP Integrity rx6600: 4 dual-core Intel Itanium 2 processor 9050 at 1.6GHz (4 processors/8 cores/16 threads), 372,140 tpmC, \$1.81 USD / tpmC, availability of June 11, 2007.

² HP ProLiant DL580 G5: 4 quad-core Intel Xeon processor X7350 at 2.93GHz (4 processors/16 cores/16 threads), 407,079 tpmC, \$1.71 USD / tpmC, availability of September 5, 2007.

³ IBM System x3850 M2: 4 quad-core Intel Xeon processor X7350 at 2.93GHz (4 processors/16 cores/16 threads), 516,752 tpmC, \$2.59 USD / tpmC, availability of March 14, 2008.

⁴ IBM System x3950 M2: 8 quad-core Intel Xeon processor X7350 at 2.93GHz (8 processors/32 cores/32 threads), 841,809 tpmC, \$3.46 USD / tpmC, availability of April 1, 2008

SAP Benchmark Details:

⁵ Configuration of the IBM System x3950 M2 on the two-tier SAP SD Standard Application Benchmark: 16 processors/64 cores/64 threads, quad-core Intel Xeon processor X7350 at 2.93GHz with 4MB L2 cache per two cores, 256GB of memory, 64-bit DB2 9.5, Microsoft® Windows® Server® 2003 Enterprise x64 Edition, and SAP ERP 6.0, certification number 2008030. Results current as of May 20, 2008.

<http://www.sap.com/solutions/benchmark/index.epx>

Energy Data:

⁶ The United States Department of Energy reports that the nationwide average cost of electricity is \$.094 per kilowatt hour.



TO LEARN MORE ABOUT IBM SYSTEM X ENTERPRISE SERVERS, VISIT:

[WWW.IBM.COM/PRODUCTS/SERVERS](http://www.ibm.com/products/servers)

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