

Compact, sustainable, cost-effective solutions for scalable computing

Get the strategic advantage of IBM investments in innovation

Executive summary

- Constantly adding more physical servers to the infrastructure is unsustainable in the long term, yielding significant costs in maintenance, electricity and manpower
- Traditional approaches to scale-out computing also tend to create inflexible, hard-to-manage infrastructures.
- IBM's ongoing investment in its fifth generation of x86-architecture rack and blade servers brings enterprise-class computing and efficiency to the platform.
- Hardware is just one piece in the jigsaw; IBM can also deliver the required strategic advice, architectural design, financing, management software and services.
- IBM's commitment to innovation makes us the right long-term partner for companies looking to take back control of their scale-out and scale-up computing landscape.

The combination of an industry-standard architecture, broad availability of skills and low acquisition costs have made the x86 platform a ubiquitous feature of global data centres. As the platform matures, it is increasingly deployed to run mission-critical workloads—but the 'commodity' perception can be a disadvantage as well as a benefit. Typical x86 servers may be cheap to buy, but low utilisation rates can mean high running costs for limited return in computational power. A 2007 IDC study suggests that for every pound spent on new hardware, an additional 50 pence is spent on power and cooling.¹ The study shows that operational costs are steadily rising as a proportion of total spend; if this trend continues, companies will soon be spending more on powering and cooling their hardware than they do on acquiring it in the first place. The 'sprawl' of x86 servers is putting significant pressure not only on the environmentals in the data centre, but also on IT staff resources. Put simply, this growth path is not sustainable in the long term.

IBM® understands the limitations of traditional approaches to the x86 architecture, and continues to invest heavily in making sure that its own offerings break the mould and deliver genuine enterprise-class computing. IBM System x® solutions are founded on decades of innovation and investment, and draw on IBM's rich heritage of research and development across multiple enterprise platforms. What's more, we continue to invest in cutting-edge technology, pushing back boundaries with innovations such as Watson, our Jeopardy-playing machine intelligence that is capable of understanding questions posed in human language and generating the correct answers. We don't claim that Watson is likely to directly impact your business—but the surrounding research into architecture optimisation and workload scheduling will certainly contribute to our work in developing x86 technologies. Similarly, our ongoing investment in our Mainframe and POWER7® platforms also brings innovation to our x86 platform.



By choosing IBM as your strategic partner for x86 servers, you can build an infrastructure that is open, flexible, efficient and scalable, and that will offer high service levels with low total cost of ownership.

Unlike other major vendors, IBM is a true developer of x86 solutions, not merely an assembler of third-party technologies. We understand that robust and flexible hardware is just one element in an effective solution, and should be backed by trusted advice, a committed future roadmap, enterprise-class services and support, and integrated end-to-end systems management software.

By choosing IBM as your strategic partner for x86 servers, you can build an infrastructure that is open, flexible, efficient and scalable, and that will offer high service levels with low total cost of ownership. And as you continue to evolve towards a cloud architecture, IBM can advise you on the most effective and cost-efficient route.

Keep your options open

One of the most attractive features of the x86 architecture is the choice it gives businesses in terms of the software stack. The choice of operating systems, virtualisation technologies, networking technologies and so on is practically unlimited. However, many businesses are now realising the downside of having this many options, which tends to translate into too much complexity. Choosing the lowest-cost option for every single requirement will certainly produce the lowest total cost of acquisition, but the challenge of managing and maintaining a huge array of different technologies will make it extremely expensive in the long run.

In common with other major vendors, IBM is focusing on making x86 servers robust enough and scalable enough to act more like traditional enterprise platforms. Unlike other major vendors, IBM has deep experience and a long history of investment in enterprise computing on which to build. Our belief is that businesses should first select their chosen standard operating environment, then determine the required hardware resources and the best vendor to deliver them. And,

again unlike other major vendors, while we believe that standardising on the 'building-blocks' of your infrastructure will produce long-term efficiency gains, we don't force you down a particular route. Our x86 solutions are open and we work closely with an enormous number of global technology partners to ensure that businesses are free to choose the right landscape for their needs.

With the ability to provide a true end-to-end solution—from advice and financing through to installation and ongoing maintenance—IBM is committed to supporting its clients for the long term. Designing hardware that is fit for future requirements takes significant investment, time and skill, and in every area IBM is years ahead of the competition. The assumption that scale-out architectures should be composed of numerous extremely low-cost commodity machines may still be valid for some large providers of consumer search services, but for the typical business such an approach would typically be based on out-dated notions about the low reliability of x86 servers. IBM's ongoing investments in both hardware and systems management software have made the System x platform robust enough to host dozens of virtualised systems, enabling businesses to shrink their infrastructure without increasing their risk.

Technological edge

A key differentiator for IBM's x86 platform is our level of investment—both internally and with external partners such as Intel®. Over the past ten years, IBM and Intel have jointly invested approximately £500 million² in bringing the latest eX5 architecture to the market.

Moore's law may eventually hit a roadblock, but for the present all vendors can offer significant performance improvements with each new generation of hardware simply by assembling faster, lower-cost components. IBM believes that higher processor clock speeds and faster memory can only go so far in improving performance—in any case, the typical x86 landscape is so underutilised that the vast majority of the computing power is effectively wasted. To ensure a viable return on their investment, companies need to consider the long-term sustainability of their approach to x86. Racking in larger numbers of more powerful computers may solve an immediate performance problem, but it also creates a future headache in terms of environmental and management overheads.

IBM eX5 certainly offers class-leading performance, combining the latest Intel processors with high-speed memory and components. Other vendors may appear to offer similar hardware, but the similarities are only superficial. As the name suggests, eX5 is the fifth generation of IBM X-Architecture®, designed specifically to address real-life business challenges around speed, scalability, security, availability and manageability. A key point of difference is that IBM eX5 decouples memory and I/O from the processor—enabling you to achieve the best balance for your business needs.

Environments that include large databases or multiple virtual machines are typically constrained by memory and throughput, rather than by processor speed. In traditional x86 architectures, bottlenecks in the system mean that the powerful processors are not used to their full potential. The only way to boost performance is to add more physical servers—each of which will be similarly under-utilised. With the IBM eX5 architecture, the number of processors in the system no longer constrains the number of memory modules available—so you can add memory capacity without needing to add processors. In addition to allowing you to make better use of your investment in processors, the IBM eX5 architecture keeps the size and complexity of your physical infrastructure to a minimum, reducing running costs and simplifying management.

Meeting varied business needs

The advantages of eX5 are available in both rack-mount and blade servers, enabling you to choose the appropriate form-factor for your specific requirements.

The IBM 2-socket System x3690 X5 is a highly affordable 2-socket rack-mount server that provides performance, memory-capacity and reliability features previously only found in 4-socket offerings. Featuring the latest processors from the Intel Xeon® Processor E7 family, the x3690 X5 offers up to 20 cores of efficient processing power in a single 2-socket server. The new E7 processors use 32 nm process technology, enabling increased clock frequencies at lower power consumption, and deliver an estimated 20 to 30 percent performance improvement over the Xeon 7500 series.

For large enterprises and demanding workloads, the IBM System x3850 X5 and x3950 X5 rack-mount servers offer extreme scalability, availability and performance. With the optional MAX5 memory expansion, each 4-socket server can support up

to 96 DIMMS, enabling them to handle large databases and virtualised server landscapes with ease. At the time of writing, the x3850 X5 is already available with the recently launched E7 processors, with the x3950 X5 set to follow shortly. In a dual-node configuration with two MAX5 expansion units, the x3850 X5 can provide up to 80 cores of processing power and 192 DIMMS, or, put another way, an incredible 6 TB of memory. However, maximum memory values are only headline figures; what may be more valuable in the real world is that the eX5 systems have numerous memory slots, enabling businesses to utilise a larger number of smaller, lower-cost modules to gain better memory bandwidth and thus much improved price-performance.

The IBM BladeCenter® HX5 is the industry's first scalable blade server with independent memory expansion capabilities, making it ideal for compute and memory-intensive workloads. The HX5 allows the IBM BladeCenter to act as a standardised platform for both 2-socket and 4-socket requirements—and the FlexNode partitioning feature enables 4-processor systems to be reconfigured as two 2-processor systems without any manual intervention. Available with the full range of Intel E7 2000 and 4000 series processors, the HX5's memory capacity is an impressive 640 GB in a 2-socket configuration with MAX5.

Better by design

As you increase your efficiency through consolidation and virtualisation, you will also need to address systems management issues in order to get the maximum benefit. IBM provides an easy path from free integrated systems management software on each System x server right up to sophisticated infrastructure provisioning and orchestration solutions. These IBM tools can span every aspect of IT service delivery, from application performance to energy efficiency, enabling you to create a manageable and sustainable infrastructure that can adapt to meet emerging business requirements.

Ultimately, IBM can help you move towards a cloud architecture, in which the underlying technologies are effectively invisible and entirely generic from the point of view of the users. IBM System x is already designed with this in mind, combining extreme flexibility and reliability with an advanced portfolio of management and provisioning tools. IBM also has considerable experience in building and running cloud environments both internally and for clients, and can act as your trusted advisor as you plan for the future.

The right choice for the future

By selecting IBM eX5 as your strategic x86 architecture, you can create an infrastructure that is open, flexible, efficient and scalable. Critically, eX5 helps you achieve more with less: less complexity, less hardware, less energy consumption, less heat output and less cost. The ability to scale memory and I/O independently of processors enables eX5 to provide optimal support and extreme flexibility for large databases or virtual machine environments. This also helps keep software and maintenance costs to a minimum.

As businesses look to shrink their x86 landscape and make it more responsive to changing requirements, reliability is becoming an increasingly important factor. The IBM eX5 architecture offers class-leading reliability and availability, combined with the ability to host extremely large numbers of virtual machines on a single server, making it the ideal solution for running large heterogeneous software landscapes.

For more information on how IBM eX5 can help you achieve a compact, flexible, powerful and efficient infrastructure for both scale-out and scale-up computing, please contact your IBM or Business Partner representative, or visit ibm.com/systems/x/hardware/enterprise

References:

1: Source: <http://tinyurl.com/3ekdpc3>

2: Source: <http://www.informationweek.com/news/hardware/processors/showArticle.jhtml?articleID=223101109>



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