



What Sellers Need to Know

IBM[®] X6 Architecture

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What is IBM X6 Architecture?

IBM X6 Architecture is IBM's 6th generation of enterprise X-Architecture (eX6). It is the IBM branded name for IBM value added architecture that combines the best of industry-standard technologies with IBM innovations to provide the greatest possible flexibility in x86 servers. These technologies add scalability, performance and resilience to IBM's x86 offerings. Although X6 servers use similar processors to competitive systems, there are also major differences in server design and implementation.

The IBM X6 Value Proposition

The melding of industry-standard components with IBM innovation produces an offering with a unique set of capabilities that differentiate IBM's x86 offerings from the completion. Customers with the need and ability to leverage these capabilities will realize benefits in performance, energy efficiency, cost and productivity, which will allow them to manage their business more effectively.

Key IBM X6 Technology Highlights

The following are some of the new innovations and technology highlights included in the IBM X6 architecture. This is not a complete list and does not cover any of the X5 or earlier innovations.

Application Performance

IBM X6 servers use the latest processor technology from Intel to provide up to 100% faster compute performance over previous generation systems based upon preliminary SPEC and TPC benchmark results. The Intel Xeon E7-4800/8800 v2 series processors feature 15 cores per processor. Unlike most other x86 systems that require two or four processors, the X6 based systems have the flexibility of offering processors in increments of 1. This allows the customer to grow with one, two, three and four processor options on a four socket server and two to eight processors on an eight socket system.

IBM X6 Book Technology

Books are modular units that can be slid in and out of the front or the back of the server. This technology is both new and unique to the IBM X6 systems and provides the flexibility to grow and upgrade technology without replacing the base unit. Books provide an additional advantage for future upgrades. The accounting rules that govern what you can call a system upgrade are based on how much of the system changes, and if you do an upgrade, you don't have to write off the remaining undepreciated portion of the system as you have to do with a box swap upgrade. The serial number is attached to the enclosure, as long as most of the components don't change, a customer may be able to keep depreciating the system in the normal three-year or five-year accounting schedule yet realizes updated technology in a shorter time frame.

Compute Books – Contain one processor socket and 24 DIMM slots. Unlike most systems that ship with two or four processors, IBM X6 systems have the ability to support one, two, three or four processors potentially lowering upfront costs and adding flexibility to grow when needed. When a new processor generation becomes available, the processor books can be replaced with the new technology and the old books can be used in other systems.

I/O Books – Contain 3 PCIe adapter slots and come in both long and short form factors.

Storage Books – support either eight 2.5-inch HDD bays or 16 1.8 Inch IBM eXFlash SDD bays.

Flash Technology

IBM X6 systems support 3 types of flash storage eXFlash DIMMs, eXFlash SSD storage and High IOPS PCIe SSD adapters. All three can be used in the same X6 based system currently providing a total of up to 33.6TB of high-IOPS flash storage in a 4U server and up to 54.4TB in an 8U server. Additional optimization is provided by the FlashCache Accelerator software which optimizes data placement.

IBM eXFlash Memory Channel Technology – eXFlash DIMMs are flash memory chips packaged on DDR form factor DIMMs in the memory channel along with regular memory DIMMs. This storage can be used directly as block storage or as cache memory to boost the performance of SSD/HDD storage. Connecting flash memory directly to the memory bus eliminates arbitration and data contention on the I/O hub providing near instantaneous data access. Currently, up to 12.8TB of eXFlash DIMM storage can be housed in 32 DIMM slots. A single 400GB eXFlash DIMM can produce 125,000 4KB random read operations and up to 645MBps data transfer rate based upon IBM lab testing. In addition, IBM has developed IBM WriteNow technology that enables the lowest write latency to block I/O storage in the industry, allowing the super-early write commit of data and Direct Data Accelerator to provide for the customization and tuning of eXFlash to maximize application throughput.

IBM eXFlash SSD Storage – Typically 2.5-inch solid-state drives (SSDs) fit in HDD bays that connect using a SAS/SATA interface and a HDD controller designed for mechanical disks. The IBM X6 approach is to use with an SSD-optimized controller and a modular storage book that houses 1.8-inch SSD drives. One 4U system containing 16 1.8-inch SSDs contain up to 6.4TB of Flash storage, an 8U system housing two books provide 12.8TB of Flash storage.

High IOPS SSD PCIe Adapters – For read-intensive transactional workloads requiring extreme IOPS performance, IBM X6 provides flash drives on a PCIe adapter form factor. These adapters range in capacities from 356GB to 2.4TB an offer up to 480K IOPS throughput and 70% lower write latency (15µs) than a SAS HDD (50µs) and a 3GBps random read data transfer rate. Up to six adapters are supported in 4U X6 servers using three I/O books for a total of up to 14.4TB and 28.8TB in an X6 8U server.

IBM FlashCache Storage Accelerator – This optional software provides intelligent caching to cache hot data off a wide variety of SAN, NAS and DAS HDD and SDD based storage systems. This can increase storage access up to 2X by caching data within the server and delivering extremely low latency for virtual and physical server environments.

IBM X6 Memory Technology

The IBM X6 Architecture includes many features to add resiliency to memory handling. IBM Memory ProteXion is a feature not found in other x86 servers that provides multichip error protection. In addition, IBM X6 servers feature the advanced reliability provided by memory scrubbing, page retire, memory page integrity sorting, memory mirroring and memory rank sparing

Processor Availability

Processor High Availability allows the x3850/3950 X6 maintain access to networking, storage and server management during a processor failure.

Predictive Failure Analysis (PFA)

IBM X6 systems offer the broadest array of PFA enabled components in the industry to allow replacement of components before they fail, including processors, memory, storage, adapter slots, power supplies, fans, and voltage regulator modules.

Balanced System Design

IBM takes a holistic approach to balanced system design, optimizing its x86 servers to deliver outstanding performance and utility around the processors, memory, I/O, storage and network fabrics. This produces a balanced system with speed, flexibility and resilience.

IBM FlexNode Partitioning

This software allows a physical x3950 X6 to be configured remotely by software into logical 4-socket servers as needed. This provides a flexible assignment of processor power for varying workloads.

Features on Demand (FoD)

This allows the purchase of a software key to activate built-in features such as adding NIC ports and RAID software at the time of purchase or any time after providing additional flexibility for the customer.

IBM X6 Solutions

IBM provides solution briefs and reference architectures for select technologies, including the following:

- IBM System x Solution for SAP HANA on X6 [Solution Brief Reference Architecture](#)
- IBM System x Solution for VMware vCloud Suite on X6 [Solution Brief Reference Architecture](#)
- IBM System x Solution for DB2 with BLU Acceleration on X6 [Solution Brief](#)
- IBM System Solution for SAP Business Suite on X6 [Solution Brief Reference Architecture](#)
- IBM System x Solution for Microsoft Hyper-V on X6 [Solution Brief Reference Architecture](#)
- IBM System x Solution for Microsoft SQL Data Warehouse on X6 [Solution Brief Reference Architecture](#)

Competitive Technologies

IBM's X6 architecture makes both a technology and marketing statement.

IBM combines industry-standard technologies with IBM innovations to add scalability, performance and resilience. IBM's design and implementation differences are also part of the X6 architecture. This technology combination is marketed as "IBM X6 architecture" to give it brand identity.

Most of IBM's x86 competitors don't add significant additional technology to their servers and have no additional branding associated with their servers. Some competitors will use this lack of innovation and branding to claim their product is "industry standard" and suggest that is a benefit to the customer. They will also claim IBM X6 architecture is "proprietary" and would lead to vendor lock-in. All x86 vendors run industry standard operating environments such as Windows, VMware and Linux, which would typically be the source of most true "lock-in" discussions.

CISCO uses the term "unified computing system" for their x86 servers but does not specify any additional special value beyond their naming.

Dell also does not do any special enhancements or branding for their servers.

Hewlett Packard does add technology and branding to their x86 server line. The HP ProLiant line uses "Generation 8" or G8 after their product number to signify their current generation of branded enhancements. HP claims "[over 150 design innovations](#)" in their Gen 8 servers including: [HP Integrated Lifecycle Automation](#), [HP Dynamic workload acceleration](#), [HP Automated energy optimization](#), [HP Advanced Error Recovery](#), [HP Memory Quarantine](#) , [HP Advanced fault Resiliency](#).

White Papers

[PUND-IT: IBM X6 Solutions: Six Generations of EXA Innovation Counting](#)

This analyst paper highlights X6 business benefits that include dramatically reduced database cost with X6 deployment, application transparency, and superior price/performance. February 2014

[Frost and Sullivan: Driving Innovation in Banking](#)

Download this analyst brief by Frost and Sullivan to find out how IBM can enhance your IT infrastructure to drive innovation, minimize cost and deliver better customer service in the banking industry. February 2014

[Clabby: The Upsides of an X6 Upgrade](#)

This analyst report describes the advantages of IBM X6 servers over others in terms of: speed, agility, resiliency, space use and cost. February 2014

[IDC: Enterprise Workloads on the X6 portfolio: Driving Business Advantage](#)

This paper shows how the new IBM systems with X6 technology were designed to take clients to a new frontier of x86 computing. These new X6 systems are ideal platforms for meeting business-critical demands with data base, business analytics, and virtualization. February 2014

[IBM: Introducing X6 technology – discover how X6 servers deliver superior solutions](#)

This paper describes how the melding of industry-standard components with IBM innovation produces enterprise servers that offer a unique and superior set of capabilities with which to effectively manage your business. February 2014

[IBM: Why IBM x – 2014: Learn about the unique and superior capabilities System x servers offer](#)

This paper describes how IBM System x servers with the new X6 architecture are the best choice for the data center. February 2014

IBM® Redbooks®

[Workload Optimization with X6 Servers](#)

This IBM Redbook describes the IBM X6 technology innovations that help address challenges clients are facing in the enterprise environments. February 2014

[The Benefits of IBM FlashCache Storage Accelerator in Enterprise Solutions](#)

This paper discusses server performance imbalance that can be found in typical application environments and how to address the issue with the FlashCache Storage Accelerator software to provide required levels of performance and availability for the storage-intensive applications. February 2014

[IBM X6 Servers: Technical Overview](#)

This IBM Redbook provides a technical overview of the sixth generation of IBM Enterprise X-Architecture technology and the IBM X6 servers. February 2014

[IBM eXFlash DDR3 Storage DIMMs](#)

This IBM Redbook addresses IBM® eXFlash memory-channel storage, the innovative flash storage technology that IBM introduces with new X6 family servers. February 2014

[IBM System x Model x3850-X6](#)

This IBM Redbook addresses the IBM® System x3850 X6 server, a four-socket 4U rack-mounted server that represents the sixth generation of the IBM Enterprise X-Architecture®. February 2014

[IBM System x Model x3950-X6](#)

This IBM Redbook addresses the IBM® System x3950 X6 server, an eight-socket 8U rack-mounted server that represents the sixth generation of the IBM Enterprise X-Architecture®. February 2014

[IBM System x3850 X6 and x3950 X6 Planning and Implementation Guide](#)

This IBM Redbook is aimed at clients, IBM Business Partners, and IBM employees who want to understand the features and capabilities of the IBM X6 portfolio of servers and learn how to install and configure the servers for use in production. February 2014