

# IBM Enterprise X-Architecture Technology



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## Highlights

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- ***Innovative technology provides revolutionary scalability to help stretch your IT dollars***
- ***New tools generate OnForever™ availability designed to keep your enterprise up and running 24x7***
- ***Application flexibility enables smooth platform transition and capacity to scale both up and out***

## Pioneering a new era in industry-standard computing

Based on the IBM @server commitment to provide you with innovative technology, application flexibility and new tools, IBM announces the next great wave of innovation for the Intel®-based server platform. Called Enterprise X-Architecture™ technology, it borrows from IBM mainframe and supercomputer labs to produce revolutionary advances in the I/O, memory and performance of IBM @server xSeries servers. This new server paragon creates a flexible “pay as you grow” approach to buying Intel architecture 32-bit and 64-bit high-end xSeries systems. The results: superior levels of availability, flexibility and performance for systems that can be scaled quickly, easily and inexpensively.

## Revolutionary “economies of scalability”

With IBM Enterprise X-Architecture innovation, you'll never have to buy more computing capacity than you need. This new technology offers XpandOnDemand™ scalability through compute nodes whose modular building-block design offers long-term expandability without requiring you to buy everything up front. XpandOnDemand lets you make the most of your IT budget and staff while providing a path for flexible growth into the future.

These scalable enterprise nodes contain 4-way processor complexes that can be assembled building-block style to allow you to increase computing capacity as your enterprise demands it. Each node contains processors, cache, memory, storage and other devices and can stand alone as a single server or be connected to other nodes to become a larger 8-, 12- or 16-way server.



*XpandOnDemand scalability allows you to grow your 4-way server to a 16-way server.*

When you're ready to scale from a 4-way to an 8-way, for example, you won't have to buy a whole new system. Instead, you can protect your initial investment by simply adding another 4-way expansion module. The modules are connected via high-speed scalability ports. These ports make investment in adapters and switches no longer necessary—for even greater cost savings—and

no PCI-X slots are used. The expansion modules can even be clustered with IBM Fibre Array Storage Technology (FAST) products, for high-availability failover of enterprise applications. Thus, the Enterprise X-Architecture blueprint, combining revolutionary scalability and exceptional price/performance, creates the ideal foundation for server consolidation.

The scalability ports—connecting processors together into an 8-, 12- or 16-way server (or an “instant” cluster of 4- or 8-way nodes)—allow nodes to talk to one another at over 30 times faster than what is currently available from even Gigabit Ethernet connectivity. A large Xcel4™ Server Accelerator Cache speeds up even your most complex jobs, allowing the processor to access more data from this cache—up to 64MB—instead of taking the time to access main memory.

In addition to breaking new ground with scalable enterprise nodes, the Enterprise X-Architecture blueprint creates virtually limitless expansion capability of your initial investment through remote I/O. The remote I/O feature can triple your I/O capacity for a single system by using a proven, high-speed interconnect and up to 12 PCI and PCI-X adapter slots. Two servers can even share one remote I/O enclosure. And if your servers are clustered, remote I/O enables better fault tolerance and disaster recovery. Plus, it provides a bridge for future InfiniBand™ technology.

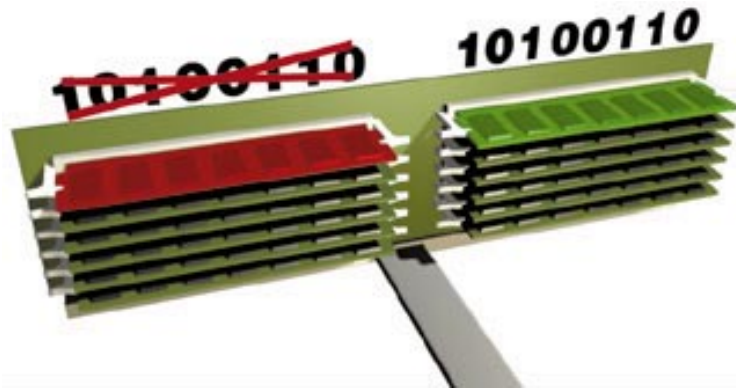
### **OnForever availability**

With the goal of keeping your systems up and running continuously, IBM has produced a myriad of new tools that are designed to substantially reduce scheduled and unscheduled downtime. These technologies include Light Path Diagnostics™ to help you quickly locate and replace faulty components and Active™ PCI to allow you to add and replace adapters without powering down the system. IBM extends high-availability functions in the Enterprise X-Architecture model with enhancements to the memory subsystem. These upgrades make the subsystem more robust, allowing you to reach new levels of availability and help ensure that your systems will be accessible to users 24x7. By incorporating data-protection techniques formerly used only in hard disk drives to the memory subsystem, xSeries servers built with Enterprise X-Architecture technology deliver high system availability.

- Active Memory™—Brings hot-swap and hot-add capability to memory. If any memory requires replacing, or you wish to add more, you no longer have to take down the server to do so.
- Chipkill™ memory—New third-generation Chipkill memory is now integrated into the Enterprise X-Architecture chipset. This new functionality allows multiple errors to be corrected using low-cost, industry-standard ECC memory.
- Memory ProteXion™—Uses spare bits analogous to a hard disk drive hot spare, automatically rerouting data in the event of an on-DIMM chip failure to keep the server running smoothly. Memory

ProteXion is more effective at correcting memory errors than ECC memory. The combination of Memory ProteXion and Chipkill memory is designed to correct virtually all the errors a server is likely to encounter.

- Memory mirroring—Should a server somehow encounter so many errors that Memory ProteXion and Chipkill memory cannot correct them all, mirroring will help keep your system running. Memory mirroring works in a way similar to RAID-1 disk mirroring: Data is simultaneously written to two independent memory cards, but is read only from the memory card designated as active.



*With memory mirroring data is simultaneously written on two independent memory cards.*

And memory isn't the only area to have experienced a renaissance in xSeries servers as part of the Enterprise X-Architecture blueprint. IBM offers life cycle tools that integrate with IBM Director to help you manage your systems effectively with fewer IT staff and minimize downtime.

The capabilities of IBM Director, a collection of software tools included at no extra cost with most xSeries servers, are being extended to eventually help you manage server clusters and capacity and reduce bottlenecks—part of the ongoing IBM drive to deliver comprehensive server solutions that include highly advanced systems management functions. Self-managing and self-healing technologies are evidence of IBM Project eLiza—a new initiative to create servers that manage themselves and require little or no human intervention—and are offered for the first time in xSeries servers as part of the Enterprise X-Architecture concept. Innovations such as Memory ProteXion and Software Rejuvenation and future enhancements to IBM Director will create true hands-off reliability and reverse the money-time-personnel drain of systems requiring

perpetual maintenance. These smart new tools are helping you get closer and closer to continuous data center operation.

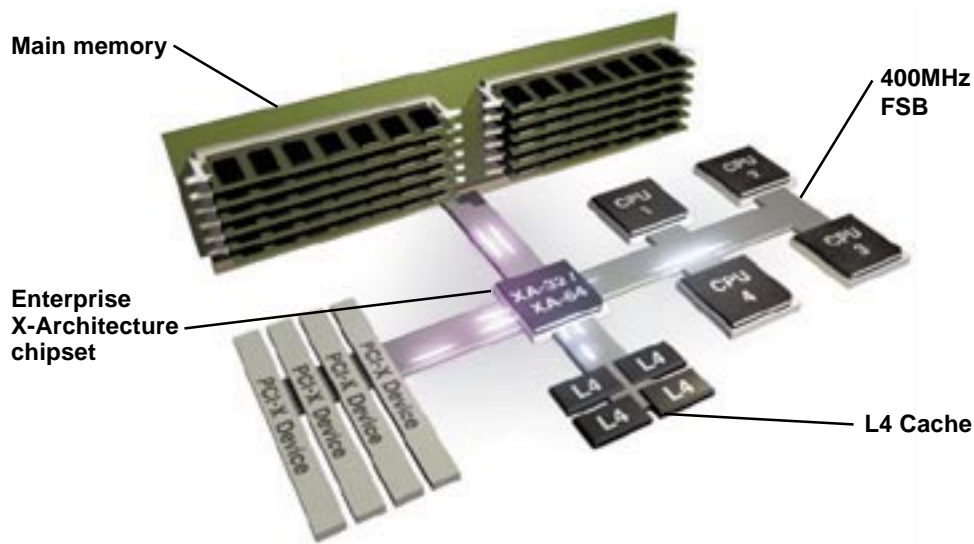
### **Unmatched flexibility**

Server consolidation doesn't have to limit your choice in operating system. The application flexibility offered by Enterprise X-Architecture technology enables system partitioning, another mainframe-inspired feature brought to industry-standard servers by IBM. System partitioning allows each node to run its own combination of operating systems and applications for easy hardware consolidation and software migration.

Plus, high-speed scalability ports power ultrafast interconnects for scalable clusters or 16-way SMP to yield the ultimate in network flexibility and performance. Not only can you scale up by adding an expansion module for demanding enterprise applications, you can also scale your storage proportionally with our FASTT products. This allows you to easily grow your clusters. Because it allows multiple servers to be connected and back up one another, clustering offers exceptional availability. And cluster

solutions reach an even higher level of availability with the Enterprise X-Architecture blueprint due to the increased reliability of the hardware. Scalable clusters with this new technology are optimized to achieve new heights of availability, because the technology enables multipartitioned servers with up to 16 processors to be built, allowing more systems and more processors to support a given workload.

Finally, the Enterprise X-Architecture model delivers unmatched flexibility by using a common design. Because 80% of the chipset design is shared by the IBM Enterprise X-Architecture 32-bit and 64-bit chipsets, your strategic transition to Intel architecture 64-bit computing will be easy. And you can rely on the solution as a tested and proven one. In fact, xSeries systems with Enterprise X-Architecture features were used by Intel as the validation platform for its new family of Xeon™ MP processors, and IBM will be the first to market with a chipset fully tested and ready for use with them. By implementing an IBM Enterprise X-Architecture solution, you'll be a step ahead with cutting-edge, industry-leading and proven technology.



*Enterprise X-Architecture system design provides exceptional price/performance.*

### Summary

IBM Enterprise X-Architecture technologies represent the dawn of a new age in industry-standard computing. By bringing the best of the mainframe-inspired capabilities to the Intel-based server platform, IBM is able to offer proven, high-performance solutions in a new building-block design that allows for easy expansion. With each new Enterprise X-Architecture feature designed with protection of your server investment in mind, you'll grow your enterprise with the confidence

that your technology will not only be able to handle increasing storage and computing capacity, but also manage the growth for you. When you build your network based on this blueprint, your enterprise will experience revolutionary scalability, availability and flexibility—while helping to decrease the costs of servicing and simplifying overall server management. Do more with your IT dollars. Do more with your IT staff. Do more with your data center. Do it with Enterprise X-Architecture technology.

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10% recovered post-consumer fiber.