

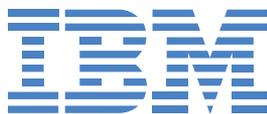
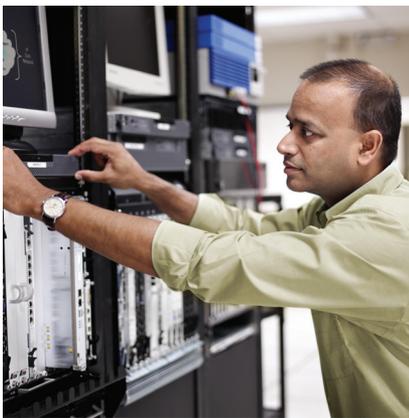
## CASE STUDY

Intel® Xeon® Processor 7500 Series  
IBM® DB2® pureScale™ on Intel® Xeon®  
processor 7500 series-based IBM  
System x® servers



# Anixter International Keeps Orders Flowing with a Powerful, Highly Available Database Cluster of Intel® Xeon® Processor 7500 Series-based IBM System x® Servers

IBM® DB2® pureScale™ on Intel® Xeon® processor 7500 series-based IBM System x® servers helps Anixter provide uninterrupted data access for mission-critical applications.



<b>Challenge</b>	Ensure uninterrupted data access for mission-critical applications supporting users in more than 50 countries.
<b>Solution</b>	A simple, powerful, highly available database cluster: <ul style="list-style-type: none"><li>▪ IBM® DB2® pureScale™ running on three 2-socket IBM System x3690 X5 servers based on the Intel® Xeon® processor 7500 series.</li></ul>
<b>Benefits</b>	Exceptional performance and high availability: <ul style="list-style-type: none"><li>▪ Little or no cluster latency, and recovery from a failed node in just seconds</li><li>▪ The leading scalability and reliability of IBM x3690 X5 servers</li><li>▪ The scalable performance and advanced reliability features of the Intel Xeon processor 7500 series</li></ul> Easy testing, deployment, and management: <ul style="list-style-type: none"><li>▪ No application changes required</li><li>▪ No need to tune the database or manually balance workloads</li></ul> Flexibility and scalability for the future: <ul style="list-style-type: none"><li>▪ Intelligent, expandable performance that automatically adapts to changing requirements</li><li>▪ Servers can be added to the cluster quickly and easily</li><li>▪ Applications can be added or removed with minimal effort</li></ul>

As a Fortune 500 global distributor of communication and security products, electrical and electronic wire and cable, and fasteners, Anixter International maintains a complex inventory of more than 425,000 products. To keep revenue flowing, Anixter sales teams around the world need fast and highly reliable access to information about these products and to the company's inventory and ordering systems. Even brief interruptions can be costly and disruptive for both Anixter and its customers, many of whom rely on Anixter to provide time-critical products and materials.



When business teams at Anixter wanted to deploy mission-critical applications that were essential to its sales, ordering, and invoicing processes, they needed a solution that would deliver rock-solid reliability for the underlying database. Anixter found that solution in IBM® DB2® pureScale™ running on IBM System x® X5 servers, powered by the Intel® Xeon® processor 7500 series. This simple, powerful database clustering solution not only meets the company's performance and high availability requirements, but also provides exceptional flexibility and nearly unlimited scalability for future growth.

Three applications would be supported by the new database cluster:

- Global Tax, a new third-party vendor application that calculates taxes across the company's diverse global markets and integrates with the Anixter ordering system.
- PCM, an Anixter application based on third-party code that originates all product and parts information. PCM also populates Anixter's online and print catalogs, brochures, and other key sales and marketing publications.
- elnvoice, another Anixter application based on third-party code that publishes invoices for reprints and research. Unlike Global Tax and PCM, elnvoice operates in batch mode, creating electronic images of all invoices and filing them at the end of each day.

According to Bernie O'Connor, Director of Information Technology at Anixter, "Performance and scalability are important

for all three applications. High availability is even more critical. Downtime would be disruptive to our sales, ordering, and invoicing processes. It could also impact our customers in negative ways, so we absolutely need to keep these applications up and running." To address these requirements, Anixter is deploying DB2 pureScale running on IBM System x3690 X5 servers based on the Intel Xeon processor 7500 series.

### Unlimited Scalability and High-Availability for Mission-Critical Databases

As more business-critical applications migrate to Intel Xeon processor-based servers, it is becoming increasingly important to deliver solutions capable of supporting the most demanding performance, scalability, and high-availability requirements. The Intel Xeon processor 7500 series is engineered specifically to meet these needs. It provides the biggest performance gain in the history of Intel Xeon processors—roughly 3x across a broad range of industry benchmarks versus its predecessor,<sup>1</sup> and up to 20 times the performance of comparable single-core servers of just a few years ago.<sup>2</sup> The Intel Xeon processor 7500 series also includes more than 20 advanced reliability features to improve system resilience and data integrity in mission-critical environments.

Fifth-generation enterprise X-Architecture™ (eX5) scalable IBM System x servers<sup>3</sup> configured with these processors provide exceptionally powerful and robust support for mission-critical databases. Customers can scale processor, memory, and input/output (I/O) resources independently and take advantage of advanced system-level features (such as

### Spotlight: Anixter International

- Global distributor of communication and security products, electrical and electronic wire and cable, and fasteners.
- More than 100,000 customers in more than 50 countries.
- \$5.5 billion in sales.<sup>5</sup>

Anixter combines superior product offerings with unparalleled technological expertise and innovative supply chain services to provide customized solutions for each customer. The company's innovative inventory management programs, 218 warehouses with more than 7 million square feet, and highly specialized sales forces are instrumental in helping its customers find best-fit solutions, improve efficiency, and reduce total costs.

error management, node partitioning, and automatic failover) to improve utilization and uptime for mission-critical workloads. DB2 pureScale adds yet another level of mission-critical capability, providing the following:

- Exceptional performance with almost unlimited scalability—Multiple IBM System x eX5 servers can be combined into a single cluster with near-linear scalability. A new server can be added with just a few commands, and with no need to tune the database or rebalance workloads.

- **High-availability**—If a server goes down, failover is fully automated and almost instantaneous. Operation continues seamlessly and all interrupted transactions are typically recovered or rolled back in a matter of seconds.
- **Application transparency**—Applications do not have to be “cluster-aware.” Any application that can run on Intel Xeon processor 7500 series-based servers can run on a DB2 pureScale cluster without any changes. Given the broad range of applications supported by Intel x86 architecture, this gives businesses a high level of flexibility for integrating new applications and functionality to make better use of enterprise data.

### Verifying Performance and High Availability in the Anixter Environment

Solution architects in Anixter IT were intrigued by the potential value of simple, high-performance database clustering on Intel Xeon processor 7500 series-based IBM System x eX5 servers. According to Bernie O'Connor, “We have a long-standing and very satisfactory working relationship with IBM and Intel. Our experience with their products and technologies has been very positive, and I was excited to set up a cluster and see what it could do.”

To test the solution, Anixter set up a database cluster using a pair of 4-socket IBM System x3850 X5 servers based on the

Intel Xeon processor 7500 series. Since the DB2 pureScale clustering solution is completely transparent to applications, Anixter didn't need to modify the applications in any way, which not only simplified setup but significantly reduced testing requirements.

Anixter tested both performance and failover for the clustered solution using workloads that closely mirrored the company's production environment. O'Connor was more than happy with the results. “Performance is very impressive, and so is the resilience of the cluster. If a server goes down, we have continuous access to the data through the remaining servers and the failing server typically recovers in seconds. In most cases, this solution will completely shield our customers from a partial outage in our data center.” The solution will also help reduce planned downtime, since it enables rolling maintenance of the operating system and servers without bringing down the cluster.

### Moving into Production

Following successful tests, Anixter will move to deploy DB2 pureScale in its production environment on three x3690 X5 servers, each configured with Intel Xeon processor 7500 series and running Linux\*. The IBM DB2 and the DB2 pureScale software components will reside on all servers in the cluster to provide three-way redundancy. Nine cores per server will be dedicated to DB2 pureScale and two to the IBM DB2 cluster caching facility, which manages the cache and locks.

The clustered servers will be connected with a high-speed InfiniBand\* switch and remote direct memory access (RDMA) to provide each server with a high-bandwidth, low-latency connection to the DB2 pureScale cache and locking mechanism. This unique mechanism is based on proven IBM mainframe technology and is the “secret sauce” to the exceptional performance, scalability, and application transparency of DB2 pureScale. By providing every server in the cluster with direct and almost instant access to all cached data and locking information, it eliminates the complex node-to-node communications that create performance and tuning challenges in traditional database clusters.

Every server in the cluster will have access to all data and be able to perform any transaction. If a server goes down, no information will be lost or unavailable. The production cluster will continue running at two-thirds capacity, and workloads will be automatically rebalanced to optimize performance across the remaining two servers. Based on Anixter's current workloads, the surviving two-server configuration will be sufficient to meet service level agreements. Once the failed server is reconnected, workloads will be automatically rebalanced once again, and the restored cluster will continue to deliver optimized performance.

Anixter is currently evaluating an upgrade to the Intel Xeon processor E7 family for the clustered database servers. These new processors provide more compute resources (cores, threads, and cache) and

support twice the memory capacity. The added resources would allow the database cluster to support heavier workloads without increasing the data center footprint or overall power consumption. The Intel Xeon processor E7 family also provides additional reliability, availability, and serviceability (RAS) features, as well as new security features, including Intel® Advanced Encryption Standard-New Instructions (Intel® AES-NI), which reduces the overhead of encryption.<sup>4</sup> With this support, Anixter could potentially use encryption more pervasively to protect business data, without overloading the database servers or slowing response times.

## A Foundation for Flexible and Unlimited Growth

O'Connor chose the IBM clustered database solution first and foremost to meet the stringent high-availability requirements of his mission-critical applications. The scalability and flexibility of the solution are added bonuses. "Our database isn't all that big right now, but the scalability and transparency of the cluster could ultimately be huge for us. It means we can add capacity and integrate new applications at any time, with no coding and without having to retune the database or manually rebalance workloads. If we spin off a new business, or even if

we just continue to grow at our historical rate, this gives us a lot of flexibility going forward."

With DB2 pureScale running on IBM System x3690 X5 servers based on the Intel Xeon processor 7500 series, Anixter has found a powerful, flexible, and cost-effective database solution for supporting mission-critical applications for its global users. It has also established a foundation for supporting unpredictable growth and change in the future. With today's growing dependence on real-time, data-intensive business processes, that combination could provide substantial value for many other large and growing companies.

<sup>1</sup> Average performance improvement of 3x claim is based on the geometric mean of four industry-standard, common enterprise benchmarks (SPECjbb2005, SPECint\*\_rate\_base2006, SPECfp\*\_rate\_base2006 and TPC Benchmark\* E) comparing the best published/submitted results on a 4-socket Intel Xeon processor X7560-based server platform to the best published results on a 4-socket Intel Xeon processor X7460-based server platform, as of March 26, 2010. Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information, visit [www.intel.com/performance/server/xeon\\_mpl/summary.htm](http://www.intel.com/performance/server/xeon_mpl/summary.htm).

<sup>2</sup> Intel performance comparison using SPECjbb2005\* business operations per second between 5-year-old single-core Intel® Xeon® processor 3.33GHz based servers and one new Intel Xeon processor X7560 based server. Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information, visit [www.intel.com/performance/server](http://www.intel.com/performance/server).

<sup>3</sup> Systems include the 2-socket System x3690 X5 rack server, the 4-to-8 socket System x3850 X5 and x3950 X5 rack servers, and the 2-to-4 socket IBM BladeCenter® HX5 blade server. All can be scaled with an external IBM MAX5 memory expansion unit to add as much as an additional 1TB of DDR3 DRAM.

<sup>4</sup> Intel® AES-NI requires a computer system with an AES-NI-enabled processor, as well as non-Intel software to execute the instructions in the correct sequence. AES-NI is available on select Intel® Core™ processors. For availability, consult your system manufacturer. For more information, see <http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-instructions-aes-ni/>.

<sup>5</sup> Reported by Anixter for the fiscal year that ended on January 1, 2010.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. Go to: <http://www.intel.com/products/processor/%5Fnumber/>

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS OTHERWISE AGREED IN WRITING BY INTEL, THE INTEL PRODUCTS ARE NOT DESIGNED NOR INTENDED FOR ANY APPLICATION IN WHICH THE FAILURE OF THE INTEL PRODUCT COULD CREATE A SITUATION WHERE PERSONAL INJURY OR DEATH MAY OCCUR.

Intel may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Copies of documents which have an order number and are referenced in this document, or other Intel literature, may be obtained by calling 1-800-548-4725, or go to: [http://www.intel.com/#en\\_US\\_01](http://www.intel.com/#en_US_01)

Intel, the Intel logo, Xeon and the Xeon logo are trademarks of Intel Corporation in the U.S. and other countries.

IBM, the IBM logo, ibm.com, BladeCenter, DB2, pureScale, System x, and X-Architecture are trademarks or registered trademarks of IBM in the United States, other countries, or both.

\*Other names and brands may be claimed as the property of others

Copyright © 2011, Intel Corporation. All rights reserved.

