Performance-Optimized Information Management

Intel and IBM Collaborate to Boost Performance and Lower Power Consumption

Timely, trusted information is the currency of success at all levels of business. But increasing data volumes are making it more difficult to deliver that information. And as data volumes go up, so do the costs of data management. For more than a decade, IBM and Intel have collaborated to optimize enterprise solutions: Complete, cost-effective, performance-optimized stacks of IBM® Information Management software running on servers powered by Intel® processors. Our relentless pursuit of performance has led to some impressive results. Compared to what customers could purchase just over a decade ago, they can now benefit from over 600 times the transaction performance from IBM DB2® on Intel-based servers at nearly 99 percent less cost per transaction.[1]

With IT costs under intense scrutiny, there has never been a better time to upgrade to better-performing and more energy-efficient servers. By coupling IBM DB2 9.7 for Linux, UNIX, and Windows with servers based on the Intel® Xeon® processor 5500 series, enterprises can transform data into useful business insights more quickly and deliver those insights in context, all while lowering costs and power consumption.

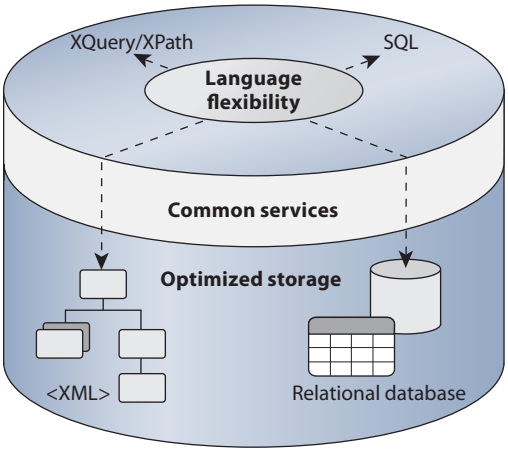

Figure 1. *DB2 9.7 is a hybrid database that integrates native XML and XQuery with relational data and SQL.*

This new combination can unlock even more value from customer investments in data management infrastructure, and begin to transform static data repositories into dynamic solutions that provide information on demand.

Let's see how the design innovations in DB2 9.7 and the Intel Xeon processor 5500 series combine to deliver advanced performance and cost savings for enterprises facing growing XML data volumes.

DB2 9.7: Break Free from High Database Costs

DB2 9.7 represents the next generation of database software, offering sophisticated features designed to increase business performance and flexibility while reducing the operational costs of managing data. It is engineered to process large volumes of data, delivering high performance and cost savings of up to 75 percent on related costs—including energy.[2]

To obtain insight from growing XML data volumes, organizations are incorporating XML data into relational data warehouses and business intelligence systems. DB2 9.7 offers sophisticated XML data management capabilities that are fully integrated with the relational data management features (see Figure 1).

The XML data management capabilities of DB2 9.7 are optimized for data manipulation, query and retrieval, and data storage in a highly scalable,

"UCLA Medical Center has been leveraging DB2 XML to keep more unstructured patient records online and provide more comprehensive health care. The hospital is experiencing the compression benefit, reducing the amount of storage space for patient medical records in XML by 50 percent today. In addition to the UCLA enterprise-wide medical record repository, there are three clinical applications currently under development and being re-architected to implement the DB2 9.7 scalable XML features at the core, as a result of extensive collaboration with the IBM development team. The enhancements will allow UCLA to generate business intelligence using XML data to help meet patient care needs."

—**Charles M. Wang, Ph.D.**
Director of Architecture, Application Development, and Support
UCLA Health System

highly available, and secured architectural framework. Database design options for XML data, such as hash partitioning, range partitioning, and multidimensional clustering, can help improve scalability, help developers exploit parallel processing environments, help simplify the addition and removal of time-sensitive data, and help improve query performance.

To support business collaboration and enhance application programmer and administrator productivity, DB2 9.7 also offers IBM pureXML® data schemas and scripts for major industry-specific XML messages, including Financial Information Exchange Markup Language (FIXML), Health Level 7 (HL7), Association for Cooperative Operations Research and Development (ACORD), News Markup Language (NewsML), and Human Resources XML (HR-XML).

DB2 9.7 also offers Deep Compression features designed to enhance storage efficiency and manage costs associated with growing data volumes. For example, compressing XML data can improve I/O performance, and can reduce disk space requirements by 60–80 percent.[3]

In addition, DB2 9.7 helps eliminate performance tuning guesswork and enhance administrator productivity by automating many configuration, tuning, and recovery activities. Businesses can realize further cost savings through DB2 support for multiple workloads as customers move toward cloud and virtualized architectures.

Key benefits of DB2 9.7 include:

Performance	DB2 9.7 enables high data processing throughput for transactional and analytical workloads.
Flexibility	The new version includes comprehensive support for data management across various data types.
Lower Costs	DB2 9.7 helps reduce costs through storage efficiency, highly automated processes, and prebuilt industry data schemas.

Intel Xeon Processor 5500 Series: A New Generation of Intelligent Servers

The Intel Xeon processor 5500 series is not just another processor. Based on the most significant new server architecture in over a decade, it enables a new generation of intelligent servers with innovative technologies that allow them to dynamically adapt to workload demands and customer needs. The Intel Xeon processor 5500 series can automatically adjust server performance and power consumption, or allow manual IT control to meet unique service-level requirements. The new processors deliver up to 9x performance per server over single-core servers, enabling 9:1 server consolidation, up to 90 percent lower operating costs, and an estimated 8-month return on investment.[4]

"We have a long history of working together, creating unique innovation where we can get the best of DB2 working together with the best of Intel. The goal is, of course, to have the fastest performance on Intel® processors with the least amount of effort for DB2 development. So we've selected the Intel compiler both because of [Intel's] excellent support and the outstanding performance that it generates. We have delivered a whole new level of innovation with DB2 9.7 on the Intel Xeon® 5500."

—**Berni Schiefer**
Distinguished Engineer
IBM

Key benefits of the Intel Xeon processor 5500 series include:

Intelligent Performance	Intel® Turbo Boost Technology increases processor core speeds for more performance when workload conditions demand it.
Energy Efficiency	Intel® Intelligent Power Technology lowers energy costs by automatically switching the processor and memory into the lowest available power state without sacrificing workload requirements.
High Throughput	Intel® QuickPath Technology significantly lowers system latency and increases transaction processing bandwidth.

Measuring Database Performance for XML Data Processing: The TPoX Benchmark

Transaction Processing over XML (TPoX) is an application-level XML database benchmark based on a financial application scenario. It is used to evaluate the performance of XML database systems, focusing on XQuery, SQL/XML, XML storage, XML indexing, XML Schema support, XML updates, logging, concurrency, and other database elements.

In comparing the TPoX benchmark performance of DB2 9.7 on the Intel Xeon processor 5400 series and the Intel Xeon processor 5500 series,[5] several things stand out:

- DB2 9.7 delivers excellent out-of-the-box performance without hand tuning
- Performance improves by 1.78x when running DB2 9.7 on the Intel Xeon processor 5500 series (see Figure 2)
- Dramatic improvement in performance per watt (1.52x) occurs when running DB2 9.7 on the Intel Xeon processor 5500 series (see Figure 2)

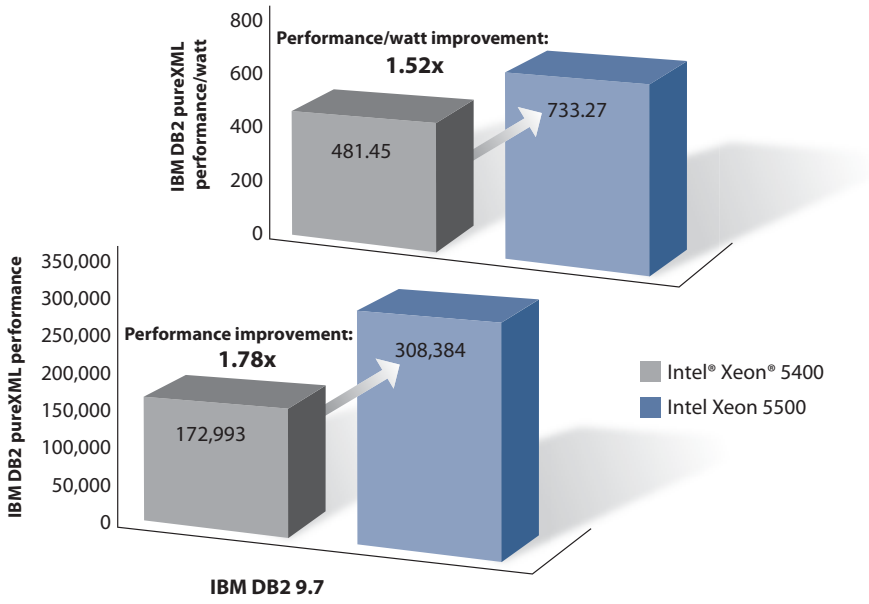

Figure 2. *Running DB2 9.7 on the Intel® Xeon® processor 5500 series delivers performance and energy efficiency improvements over the Intel Xeon processor 5400 series.*

Learn More

Enterprises seeking to optimize the performance of their information management solutions must look at the underlying components in a new way. New processing, memory, and database innovations can be leveraged to significantly accelerate the transformation of volumes of data into useful business insights while saving energy costs and meeting customer service-level demands.

An investment in Intel Xeon processor 5500 series–based servers and DB2 9.7 software can help reduce IT infrastructure costs associated with older servers and software. Solutions that combine DB2 9.7 and Intel Xeon processor 5500 series–based servers deliver a performance-optimized foundation for the future of information management.

- More about Intel Xeon processors: **www.intel.com/xeon**
- More about IBM DB2 products: **www.ibm.com/software/data/db2**
- More about lowering data management costs: **www.ibm.com/breakfree**
- More about the TPoX benchmark: **http://sourceforge.net/projects/tpox**

"When you really consider what's going on now with Intel's intelligent performance and you consider what IBM is up to with DB2 9.7, goodness, this is not business as usual. This is really game-changing technology, that when appropriately applied you can get the performance gains that are truly remarkable but do it in such a way that you are managing your power requirements and your other costs as well."

—**Mark Budzinski**
Vice President and General Manager
WhereScape USA, Inc.

[1] **Source:** IBM-published TPC-C results on Intel architecture-based servers between 1996 and 2008.

[2] **Source:** Client-reported savings.

[3] **Source:** Internal IBM tests. www.ibm.com/developerworks/data/library/techarticle/dm-0904db297purexml/index.html.

[4] **Source:** 8-month ROI claim estimated based on comparison between 2S single-core Intel® Xeon® 3.80 with 2M L2 Cache and 2S Intel Xeon X5570–based servers. Calculation includes analysis based on performance, power, cooling, electricity rates, operating system annual license costs, and estimated server costs. This assumes 8kW racks, $0.10 per kWh, cooling costs are 2x the server power consumption costs, operating system license cost of $900/year per server, per-server cost of $6900 based on estimated list prices, and estimated server utilization rates. All dollar figures are approximate. Performance and power comparisons are based on measured SPECjbb2005* benchmark results (Intel Corporation, Feb. 2009). Platform power was measured during the steady state window of the benchmark run and at idle. Performance gain compared to baseline was 9x, while the platform power was 0.8x.
- **Baseline platform:** Intel server platform with two 64-bit Intel Xeon processor 3.80Ghz with 2M L2 Cache, 800 FSB, 8x1GB DDR2-400 memory, 1 hard drive, 1 power supply, Microsoft Windows Server* 2003 Ent. SP1, BEA JRockit* build P27.4.0-windows-x86_64 run with 2 JVM instances
- **New platform:** Intel server platform with two quad-core Intel Xeon processors X5570, 2.93 GHz, 8MB L3 cache, 6.4QPI, 12 GB memory (6x2GB DDR3-1333), 1 hard drive, 1 power supply, Microsoft Windows Server 2008 Ent. SP1, BEA JRockit build P27.4.0-windows-x86_64 run with 2 JVM instances

[5] **Source:** Intel TPoX performance comparison between Intel® Xeon® processor 5570 vs. Xeon processor 5460 platforms.
- **Baseline platform:** Intel server platform with two Intel Xeon processors 5460, 3.16 GHz, 1333 MHz FSB/QPI, 32GB, 8x4GB DDR2-667 FB memory, SuSE Linux 10 SP2, storage: 120 disks data, 15 log. 2 FC 4Gb/s data/log. 15 disks flat files, 1 FC 4Gb/s flat files
- **New platform:** Intel server platform with two Intel Xeon processors X5570, 2.93 GHz, 6.4 GT/s FSB/QPI, 48GB, 12x4GB DDR3-1066, SuSE Linux 10 SP2, storage: 120 disks data, 15 log. 2 FC 4Gb/s data/log. 15 disks flat files, 1 FC 4Gb/s flat files

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