

# Microsoft SQL Server\* 2008 and Intel® Xeon® Processors: Better Together

Microsoft SQL Server 2008, powered by the latest Intel Xeon processors, meets today's database reliability, availability, and serviceability needs in a cost-effective, high-performance package

## Solution Brief

Microsoft SQL Server\* 2008

Intel® Xeon® Processors



<b>Business Challenge:</b>	Provide a solution for businesses that will offer database reliability, availability, and serviceability while reducing operating expenses through energy efficiency, consolidation, and decreased management overhead.
<b>Technology Solution:</b>	Microsoft SQL Server, Intel Xeon Processors

Data management needs have evolved and grown more complex, so today's databases must be built on a combined hardware and software platform that takes advantage of new development features without sacrificing performance, security, or scalability. Moreover, organizations are looking to reduce operating expenses. Regardless of whether your organization is facing the need for data consolidation, seeking to implement a business intelligence (BI) solution, or replatforming from a UNIX or legacy Microsoft\* database environment, the combination of Microsoft SQL Server\* 2008 database software running on next-generation Intel® Xeon® processor-based servers can cost-effectively meet the demands of today's most sophisticated databases.

### The Challenge: Consolidate Data, Increase Business Intelligence, or Upgrade Database Platforms while Decreasing Total Costs

In today's information-overloaded business world, it is all about the data and the value of the data to the business over the life cycle of the data. . Storing growing volumes of data in a manner that makes it easy to organize, protect, sort, and selectively retrieve requires a sophisticated database management system. Organizations want high performance, security, and advanced functionality in a cost-effective package.



The data management model is changing not only because of the increase in the volume of data, but also due to such "game changers" as the need to:

- Support new types of data that don't easily fit into the old management models
- Access data from different locations using many different types of devices
- Store local copies of data that can be synchronized between client and server
- Comply with regulatory requirements that mandate more comprehensive reporting
- Analyze data for business insight

## The Solution: SQL Server 2008 Plus Intel Xeon Processor-based Servers

### SQL Server 2008 New Features and Functionality

#### ▪ Performance and Reliability:

A high-performance, query-processing engine with dynamic caching and read-ahead scanning reduces query time by decreasing the amount of physical disk access. The new Resource Governor feature in SQL Server 2008 makes it easy for administrators to set limits and assign priorities to workloads based on such factors as users, applications, and databases, which optimizes the performance of mission-critical processes. The Performance Studio feature in SQL Server provides end-to-end performance monitoring with low overhead, making it easier to collect and analyze performance information for database systems.

#### ▪ Security:

In addition to the granular, cell-level encryption that came with Microsoft SQL Server 2005\*, SQL Server 2008 introduces transparent data encryption (TDE), which encrypts the entire database without requiring modification to applications and is transparent to the user. Another security technology in SQL Server 2008 is the new extensible key management (EKM), which lets part of the cryptographic key hierarchy be managed by a cryptographic provider, such as a hardware security module (HSM), for a higher level of key protection. SQL Server Audit is another important new feature that helps database administrators meet regulatory compliance obligations with fine-grained auditing, by which audits can be targeted to specific actions against particular objects.

#### ▪ Development:

SQL Server 2008 supports the Microsoft Visual Studio 2008\* Language Integrated Query (LINQ) framework. This means that Microsoft Visual Basic .NET\* and C# developers do not have to be database gurus; developers can work with objects instead of tables and columns.

Data-centric applications can be built based on the Entity Data Model (EDM). Using the Microsoft ADO.NET Entity Framework\*, developers can focus on business solutions instead of worrying about how the data is organized in the database.

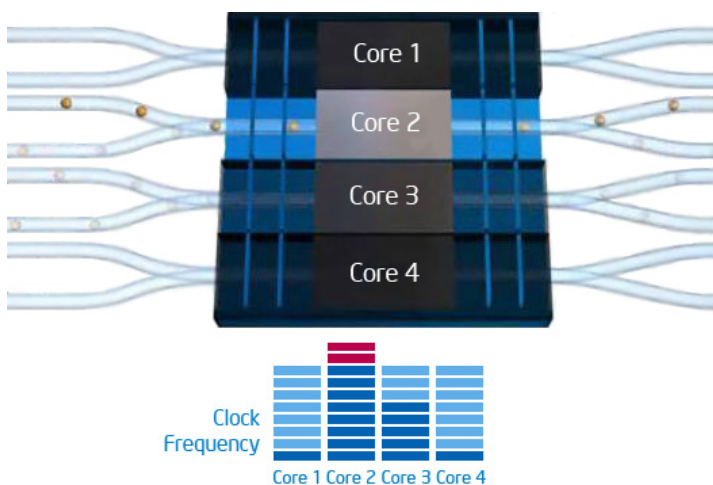
## Powered by Intel Xeon Processors

### Intel Xeon Processor 5500 Series

The next-generation Intel Xeon processors are built using the new Intel® Core™ microarchitecture, which is based on 45-nanometer (nm) Hi-K metal gate silicon technology with hafnium circuitry. The design focus is on performance and scalability, built on a foundation of rock-solid reliability with an added bonus of cost savings made possible by the reduction in energy usage.

#### ▪ Performance

The new Intel microarchitecture replaces the front-side bus with Intel® QuickPath Technology, which maximizes data transfer performance for multi-processor and/or multi-core platforms with two-way interconnects between processors that can reach speeds up to a blazing 25.6 gigabytes (GBs) per second.



The Intel® Turbo Boost lets processor cores run faster than base operating frequency when below specified thresholds.

Additional performance improving features include:

- More instructions per cycle – provides for greater parallelism
- Enhanced branch predictions – reduces waiting for a branch to be resolved
- Simultaneous multi-threading – delivers enhanced Hyper-Threading technology
- Multi-level shared cache (Smart Cache) – adds an inclusive L3 (last-level) cache that is shared across all cores
- New Application Targeted Accelerators – provides for the parsing of XML strings and text at much higher speeds

#### ▪ Energy Efficiency

Intel® microarchitecture was designed to meet strict power and performance efficiency guidelines. The hafnium-insulated transistor design decreases resistance and reduces the amount of energy wasted, reducing power consumption. Simultaneous multi-threading provides a performance increase up to 30% with only a slight increase in power consumption. Different cores can run at different clock rates to save energy, and the embedded power controller can shut down or "park" idle cores.

## Intel Xeon 7400 Series

The Intel Xeon 7400 series is part of the Intel Xeon EX family of processors, which feature the enhanced 45nm Intel Core microarchitecture that allows for leading expandability at a lower power footprint. The Intel Xeon 7400 processor series was uniquely architected for data-driven applications, virtualization, and server consolidation. This processor series supports four or six cores; it is available in a four-socket platform, providing up to 24 threads per processor.

In terms of performance, the Intel Xeon 7400 processor series features 8 to 16 megabytes (MBs) of L3 cache, a 1066 MBx front-side bus, and leading I/O capabilities. The increased efficiencies delivered by the cache-to-core data transfer maximizes bandwidth from the main memory to the processor and reduces latency by storing larger data sets closer to the processor. The Intel Xeon 7400 processor series is an ideal choice for ultra-dense virtual machine deployments.

The Intel Xeon 7400 processor series provides significant energy efficiency, offering one of the industry's lowest watt-per-core platforms in the available 65-watt processors. This blend of performance, scalability, and efficiency make the Intel Xeon 7400 processor series an ideal choice for high-use, high-scale environments.

## Better Together

Upgrading to SQL Server 2008 from Microsoft SQL Server 2000\* or SQL Server 2005 delivered an anticipated return on investment (ROI) of between 162% and 181% when taking into account the total economic impact. Industry-standard benchmark results show that SQL Server 2008 delivers excellent performance even when running some of the world's largest workloads for companies such as Citi, Barclays Capital, and Siemens. To achieve optimum performance, the underlying hardware must be capable of handling the load. Intel Xeon processors' performance features do the job, making employees more productive.

## SQL Server 2008 and Intel Xeon: Business Scenarios

### Data Consolidation Scenarios

Consolidation is a common and effective way to lower costs, from the server rooms of small/midsize businesses to enterprise data warehouses. Consolidation of data services offers a number of immediate advantages:

- Eases end users' search for information they need
- Lowers initial capital expenditures and operating costs
- Centralizes management of data and physical machines
- Increases reliability by making it easier to back up and restore data
- Enhances security by providing a centralized repository

Consolidation can be accomplished several ways:

- You can install multiple database instances running on the same operating system on a single physical machine
- You can combine schemas into a single physical database
- You can use virtualization technologies to install multiple operating systems in virtual machines on a single physical machine

## Business Intelligence (BI) Scenario

SQL Server 2008 features a powerful "beyond relational" database, Analysis Services and Reporting Services, and data-mining capabilities, providing organizations with a BI platform that enables deeper insight and facilitates better decision making.

- Unified access across the enterprise: Create a single view of data across multiple data sources for a true BI solution.
- Data extraction and synchronization: Synchronize data from multiple, disparate data sources, and extract the data relevant to your operation.
- Analysis and reporting: Create an analytical engine for online analytical processing (OLAP) solutions, and enable data mining methods that can use specialized algorithms to identify patterns, trends, and associations.
- Integration with the 2007 Microsoft Office\*: Reach workers through the familiar interfaces of the 2007 Microsoft Office applications.

## Replatforming Scenario

Moving a large database or multiple databases from one platform to another can be a complex undertaking, but many organizations' cost/benefits analyses have indicated that a move to SQL Server 2008 database software is worth the trouble. When your database no longer meets the needs of your growing organization, when it can't provide the business intelligence that you need to make crucial decisions, or when it is costing your company money due to reduced productivity and high administrative overhead, the solution is to replatform from the ground up, using new Intel Xeon-based servers and installing Windows Server\* 2008 and SQL Server 2008.

- "Moving over" from a RISC/UNIX infrastructure to Windows infrastructure: Migrating from a commercial UNIX-based database to SQL Server 2008 running on Windows Server\* can save money, with OLAP, data mining, data compression, partitioning, encryption, and other features included. By deploying SQL Server 2008 on Intel Xeon processors, you can enjoy the performance and manageability advantages without worrying about whether your hardware will be a bottleneck.
- Migrating from a mainframe database: Initial acquisition costs for SQL Server\* running on Intel Xeon processors are lower than the costs for the typical mainframe deployment, and popular mainframe solutions can be five to six times as expensive to license. Since routine database management tasks are automated, streamlined, or eliminated, database administration costs are lower.
- "Moving up" from a legacy Windows\* infrastructure: Upgrade from a legacy Microsoft SQL Server\* data management system (SQL Server 2000 or SQL Server 2005) to SQL Server 2008 to take advantage of the improved performance and reliability, new security features, richer development environment, and support for new data types in SQL Server 2008.

## Summary

SQL Server 2008 provides significant benefits over previous versions of SQL Server and its competitors' database software offerings, enabling the storage and management of new data types and new ways of using that data to gain intelligent insight into all aspects of the business. When combined with next-generation Intel Xeon processors, you get a perfect marriage of hardware and software that works together seamlessly as the foundation upon which you can consolidate databases for greater efficiency, build a comprehensive and integrated business intelligence system, or replatform your old databases for higher performance, more reliability, and better security.

## Related Links, Resources, and Citations

Intel Xeon Processors

[http://www.intel.com/p/en\\_US/products/server/processor](http://www.intel.com/p/en_US/products/server/processor)

Microsoft SQL Server 2008

<http://www.microsoft.com/sqlserver/2008/en/us/default.aspx>

Magic Quadrant for Data Warehouse Database Management Systems

<http://mediaproducts.gartner.com/reprints/microsoft/vol3/article7/article7.html>

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Intel® VT-x supports both 32-bit and 64-bit Intel® Xeon® processor-based solutions (Intel® 64 and IA-32).

Intel® VT-x is included in Intel® Xeon® processors.

Intel® Active Management Technology requires the platform to have an Intel® AMT-enabled chipset, network hardware and software. The platform must also be connected to a power source and an active LAN port.

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