



SQL Server 2012 Technologies for SAP Solutions

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**Summary:** This white paper discusses the Microsoft and SAP partnership, focusing on how Microsoft SQL Server and SAP NetWeaver work together. Specifically, the paper highlights new features of Microsoft SQL Server 2012 and other key SQL Server capabilities that are relevant to SAP NetWeaver 7.0 (SR3) and 7.1 products.

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## Executive Summary

Microsoft® and SAP® have partnered for more than 18 years to ensure that the Microsoft platform and SAP solutions work well together. SAP certification for Microsoft Windows Server® 2008 and Microsoft SQL Server® 2012 and 2008 R2 is the technical “stamp of approval” for the partnership’s work.

Worldwide, the number of organizations implementing SQL Server for SAP continues to grow, accelerated by the adoption of 64-bit as the standard for Microsoft Windows®-based servers and the dramatic increases in the throughput and performance of industry-standard hardware. Further, in recent years, many organizations have decided against UNIX proprietary hardware for their SAP applications in light of the improved industry-standard hardware, as well as the substantial cost of UNIX servers. Instead, these organizations have opted for Windows as the operating system and SQL Server as the database to run their SAP landscape.

SQL Server 2012 can deliver specific functionality by drawing on new hardware technologies and a robust set of capabilities. This means that SAP customers can significantly improve high availability and disaster recovery. Moreover, the SQL development team has implemented a native columnstore into the SQL Server 2012 relational database management system (RDBMS) engine. This columnstore can be used in combination with SAP NetWeaver® Business Warehouse (SAP NetWeaver BW) to improve query performance and space consumption by factors. In addition, SQL Server 2012 offers sets of functionality, which can increase platform availability and extend monitoring and auditing capabilities for SAP applications.

## Who Should Read This Paper

This white paper is intended for IT professionals and technical decision makers who are looking for a database solution to run their SAP applications.

## Topics Covered in This Paper

This white paper discusses the new features and enhancements to SQL Server 2012 that solidify the position of SQL Server as an enterprise-ready platform for SAP. The paper is organized into four sections: The first reviews the current market landscape; the second provides an overview of the Microsoft and SAP partnership; the third examines features new to SQL Server 2012; and the fourth discusses enhancements to features found in earlier versions of SQL Server.

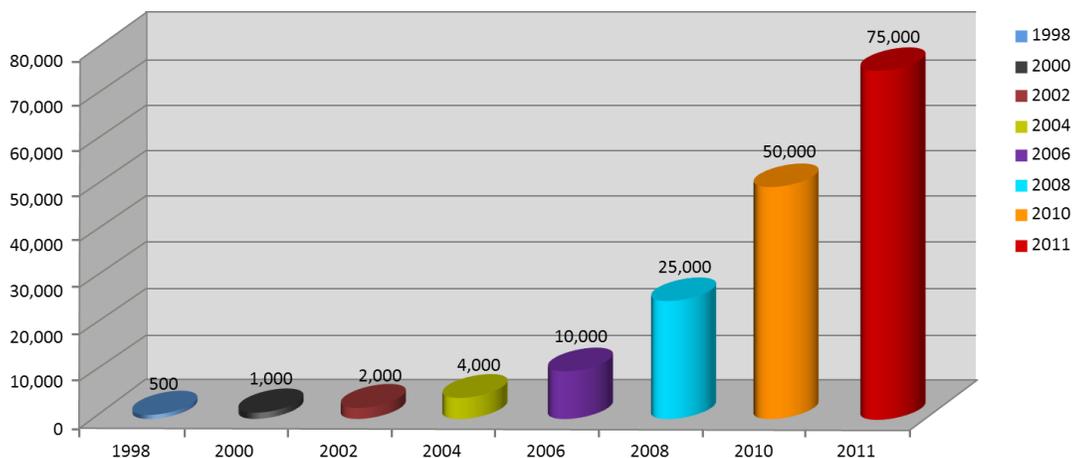
## Market Landscape

In the early 2000s, one trend in processor development slowly took hold: Increasing the frequency of processors in order to speed processing and significantly increase the throughput of a server. However, there were limits to what a server with a number of processors could do. From here, it became clear that making the gates in the processors' silicon smaller could provide the headroom needed to advance the technology. By making the basic elements in the silicon smaller, Intel, AMD, and other manufacturers were able to create more complex processors and, finally, to build multiple processor cores within one physical processor.

At the same time, 64-bit became a standard for commodity servers, which opened these servers to extremely large implementations of enterprise applications like SAP ERP. Traditionally, these applications have high demands for memory on both the database management system (DBMS) and application sides.

By 2004, the combination of more powerful processors, the 64-bit standard, and the higher quality and reliability of industry-standard servers provided a catalyst for customers to begin to change their thinking about how to deploy large SAP systems. Consequently, over the last decade, organizations have been moving away from specialized servers to commodity hardware.

- Decline in proprietary hardware: Sales of proprietary hardware are declining dramatically, in favor of a growing movement to commodity hardware. This trend is evident across server manufacturers, and with hardware running a variety of operating systems.
- Commodity hardware improvements: SAPS is a sizing unit for SAP deployments that is derived from SAP SD Standard benchmarks. Figure 1 shows the growth in SAPS numbers achieved for four-socket servers over the last 12 years. In general, these numbers illustrate the dramatic improvement in the performance of commodity hardware during this time. For a more detailed look at benchmark results and history, go to: <http://www.sap.com/benchmark>.



**Figure 1:** Improving performance of SAP on commodity hardware

- **Multi-core processors:** With leading-edge technology for multi-core processors, organizations like Intel and AMD have been able to significantly increase the scalability and throughput capabilities of commodity hardware.

With advancements in technology, commodity hardware is quickly replacing proprietary hardware architectures—with commodity servers becoming the platform for organizations' consolidation and virtualization requirements. Likewise, Microsoft, in collaboration with SAP, has achieved significant performance enhancements on commodity hardware.

## Microsoft and SAP Partnership

Microsoft and SAP have been partners since 1993. The partnership was formed around implementing SAP R/3 on Windows, and it expanded to include SQL Server and various integration areas across the software portfolios of each. The partnership has grown to include Duet Enterprise as a joint product offering.

For operating systems and DBMS platforms, a collaborative Microsoft-SAP team helps to ensure that the adaptation of SAP software to new platform releases happens early in the development cycle. As a result, new releases of Windows Server and SQL Server are supported very early and without long delays. Further, the team rigorously tests new releases in development to verify that Windows Server and SQL Server are ready at release to run the most challenging SAP systems. As a final step of testing for upcoming releases of Windows Server and SQL Server, the team relies on the help of Microsoft IT: Microsoft runs a large SAP landscape of various SAP products. The center of the Microsoft SAP landscape is the SAP ERP system that runs business-critical processes. Before new versions of Windows Server or SQL Server are released to the public, they must run Microsoft's SAP ERP system successfully.

In the case of SQL Server 2012, Microsoft moved a pre-release version into the productive SAP ERP system in November 2011. Since that time, the system is running successfully with the features presented in this white paper.

Key highlights of the Microsoft and SAP partnership include:

- **Reduced TCO:** SQL Server and SAP offer reduced total cost of ownership (TCO) for database platforms through increased flexibility with configuration and architecture; higher database administrator productivity; increased hardware utilization; minimized surface area attacks for improved security; and key feature enhancements, such as higher compression and faster failover time. For more information, see the [total economic impact of upgrading to SQL Server 2012](http://download.microsoft.com/download/1/8/5/1858EA16-FD8A-46E6-88C8-4A8275C3AC4F/Total_Economic_Impact_SQL_Server_2012_Upgrade_Mar2012.pdf) ([http://download.microsoft.com/download/1/8/5/1858EA16-FD8A-46E6-88C8-4A8275C3AC4F/Total\\_Economic\\_Impact\\_SQL\\_Server\\_2012\\_Upgrade\\_Mar2012.pdf](http://download.microsoft.com/download/1/8/5/1858EA16-FD8A-46E6-88C8-4A8275C3AC4F/Total_Economic_Impact_SQL_Server_2012_Upgrade_Mar2012.pdf)).
- **Architectural flexibility:** The [AlwaysOn](#) feature of SQL Server 2012 provides greater flexibility when managing SAP configuration and architecture. AlwaysOn provides one primary and four secondaries, with up to two of the secondaries synchronously aligned with the primary. This approach can dramatically improve high availability because there

is no single point of failure and maintenance can be performed offline during normal work hours.

- **Compression capabilities:** SQL Server features native compression technology, which can help SAP customers to reduce costs, increase availability, and improve disaster recovery.
- **Security and scalability:** Ongoing investments in the Windows platform running SAP workloads can help to reduce security risks and increase scalability. With such investments, Windows is well positioned to lead security and scalability on industry-standard servers, placing it ahead of LINUX options in this space.
- **Virtualization:** Microsoft and SAP are aligned to support new industry developments, including virtualization. The virtualization environments of different vendors support virtualization for SQL Server 2012, 2008 R2, and 2008. For more information on Windows virtualization, see SAP note 1409608.
- **Continuous improvement:** Microsoft and SAP steadily work to implement and extend functionalities that can increase the efficiency, scalability, and quality of Windows Server and SQL Server. The partnership also focuses on more seamlessly adapting software to these platforms.

The Microsoft and SAP partnership continues to yield productive work and actionable results. For example, Table 1 illustrates some major features and functionalities implemented in SQL Server for SAP customers in recent years.

SQL Server 2005	SQL Server 2008	SQL Server 2008 R2	SQL Server 2012
<ul style="list-style-type: none"> <li>• Online index maintenance</li> <li>• Database mirroring</li> <li>• Supportability features for SAP x64 release</li> <li>• Table partitioning for SAP NetWeaver BW</li> <li>• Missing index recommendations</li> <li>• Single page restore</li> </ul>	<ul style="list-style-type: none"> <li>• Data and index compression</li> <li>• Backup compression</li> <li>• Minimal logging</li> <li>• In-place upgrade for high availability and disaster recovery scenarios</li> <li>• Transparent data encryption</li> <li>• Automatic repair</li> </ul>	<ul style="list-style-type: none"> <li>• UCS2 compression, reducing space requirements for SAP Unicode implementations</li> <li>• Improved hashkey algorithm for SAP migrations</li> <li>• No data movement during partition merge operation</li> <li>• &gt;64 CPU support</li> </ul>	<ul style="list-style-type: none"> <li>• AlwaysOn: multiple secondaries and backup from secondary</li> <li>• Auditing for non-SAP database access</li> <li>• Columnstore for SAP NetWeaver BW</li> <li>• Extended online table maintenance</li> <li>• 15,000 partitions/table</li> </ul>

**Table 1:** Highlights of the Microsoft-SAP partnership across SQL Server releases

## SQL Server 2012

In March 2012, Microsoft released SQL Server 2012 for SAP NetWeaver 7.0 and above. Built using the proven experience of thousands of SAP customers worldwide, SQL Server 2012 is a trusted, productive, and intelligent data platform that can deliver unprecedented value for SAP installations of many sizes. This release of SQL Server can help organizations to quickly build solutions and extend data across on-premises and public cloud environments, all backed by mission-critical confidence:

- **Mission-critical confidence:** SQL Server 2012 can help to further protect an organization's infrastructure and optimize the investments made in SAP. SQL Server 2012 provides targeted features and high performance at the right price, especially for SAP-based mission-critical workloads.
- **Scalability and performance:** With investments in new technologies like columnstore indexes, SQL Server 2012 can boost SAP workloads, greatly enhancing scalability and performance. For example, report runtimes become markedly faster when using SQL Server 2012 columnstore indexes in SAP NetWeaver BW.

## New Features in SQL Server 2012

SQL Server 2012 includes the following new features for SAP customers. Of particular note are the AlwaysOn and xVelocity memory-optimized Columnstore Index features: AlwaysOn is especially important for meeting industry requirements for high availability, while columnstore indexes can speed data warehouse query performance.

- [AlwaysOn](#)
- [xVelocity Memory-Optimized Columnstore Index](#)
- [Windows Server Core Support](#)
- [Auditing Enhancements](#)

### AlwaysOn

The AlwaysOn feature is a combined form of the high availability and disaster recovery functionalities of SQL Server. This feature delivers uptime of the required 9s, as well as data protection for mission-critical SAP applications. AlwaysOn provides a single, unified solution that addresses high availability and disaster recovery requirements by integrating the disparate tools of database mirroring, clustering, and log shipping. This integration enables the tools to work better together and eliminates much of the setup and tuning that customers previously had to perform. In fact, AlwaysOn can be activated through an easy-to-use wizard, and related dashboards provide quick insight into the status of high availability and disaster recovery. Current SAP releases already support the use of AlwaysOn by SAP NetWeaver-based applications.

Key functionalities of the AlwaysOn feature are:

- **AlwaysOn Availability Groups:** AlwaysOn Availability Groups greatly enhance the basic capabilities of database mirroring and help to ensure the availability of application databases. Availability groups provide an integrated set of options, including automatic and manual failover of a group of databases and support for up to four secondary replicas (compared to one with database mirroring).

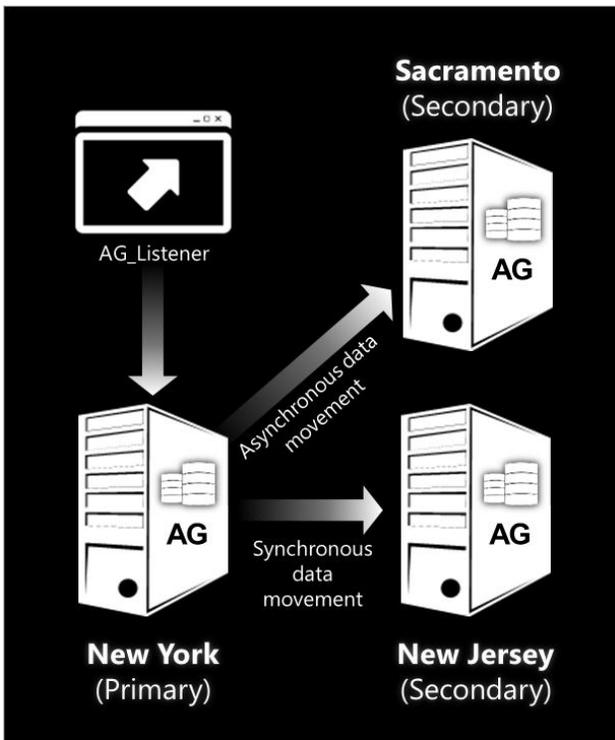
As with database mirroring, availability groups provide fast application failover and automatic page repair between primary and secondary replicas of SAP databases. Deployment involves creating and configuring one or more availability groups. Each availability group is a container for a discrete set of one or more SAP databases, known as availability databases, that fail over together. An availability group can have multiple possible failover targets (secondary replicas). The transaction log records between the primary replica of the SAP database and the secondary replicas are replicated in either a synchronous or asynchronous manner. On the secondary replica side, the changes (as documented in the transaction logs) are applied to the database in a steady manner. Such data replication between a primary and secondary replica is superior to storage replication technologies because it reduces the amount of data that needs to be transferred and maintains a physical separation between the two storage frames. Moreover, secondary replicas can be configured to support read-only access to secondary databases, as well as perform backups on secondary databases.

The addition of availability groups with multiple secondary replicas eliminates the need to use different functionalities for high availability and disaster recovery to meet an organization's specific needs (for example, a synchronized local copy of an SAP ERP database and an asynchronous copy in a disaster recovery site far from the main data center).

- **AlwaysOn Failover Cluster Instances:** AlwaysOn Failover Cluster Instances enhance SQL Server failover clustering and support multi-site clustering across different subnets. They serve as an extension that can help to enable failover of SQL Server instances across data centers. Fast and predictable instance failover can help to ensure rapid application recovery.
- **Backup from active secondaries:** With backup from active secondaries, customers can perform full online and transaction log backups from secondary replicas. This can be especially helpful when customers need backups in a data center where the primary replica is not running in order to refresh an SAP test system with a production image. Often, this requirement is necessary when SAP customers move the test instances of their productive SAP applications into disaster recovery sites (to promote them to production instances in case of failover). By establishing secondary database replicas of productive SAP applications in disaster recovery sites, customers can perform full database backups from the secondary replicas. This reduces the need to copy terabytes of backup data from the main data center to the disaster recovery site.

- **AlwaysOn Availability Group Listener:** A virtual name, the AlwaysOn Availability Group Listener is used by an SAP application to connect against the SQL Server 2012 AlwaysOn configuration. In earlier releases of SQL Server, the primary and single secondary names were included in the SAP profiles, but AlwaysOn presents the configuration of the SAP database with one virtual name, independent of which servers run the primary replica image. The listener name also allows for the integration of different subnets into the AlwaysOn configuration. In this way, the subnet where the primary replica is running is transparent to the SAP application. No special requirements or adaptations are needed for the SAP application when failing over the primary database replica between different subnets.
- **Faster recovery:** AlwaysOn enables faster failover and improved scalability. By taking advantage of the vast memory available on current industry-standard servers, SQL Server 2012 can allocate more memory for caching data that was persisted in the transaction log. This means that AlwaysOn replication data can be served out of the cache. In addition, in case of failover, faster crash recovery can occur because most of the data is still kept in cache on secondary replicas.
- **Reduced downtime:** AlwaysOn can help to minimize the impact of planned downtime. When designing high availability and disaster recovery configurations, customers often want to cover all possible unplanned downtime cases. However, in the modern SAP landscape—with industry-standard server and storage hardware, Windows, and SQL Server—hardly any unplanned downtime creeps into the system. It is not rare to have customers running with four or five 9s of availability in regard to unplanned downtime. Increasingly, it is the planned downtime for applying SAP Support Packages or changes in the infrastructure that require more consideration.

AlwaysOn provides easy functionality for negotiating planned downtime due to infrastructure changes (Figure 2). Synchronous replicas can be paused and resumed, making them an ideal method for moving DBMS servers between different locations or introducing new DBMS hardware into the system. At any point, a secondary replica can be moved onto a new hardware or storage infrastructure. After AlwaysOn successfully synchronizes a secondary replica, a manual failover to that secondary replica can move the role of the primary replica to the new hardware/storage with a downtime of a few seconds. Further, now the former primary replica's hardware can be modified or maintained. There is no rush to execute infrastructure changes in downtime at night or on the weekend; changes can be made during normal working hours.



**Figure 2:** Using AlwaysOn functionalities to reduce planned downtime in a unified high availability solution, with primary and secondary replicas in three locations. High availability is improved because there is no single point of failure and maintenance can be performed offline at any time.

### xVelocity Memory-Optimized Columnstore Index

The new xVelocity memory-optimized Columnstore Index feature in SQL Server 2012 can deliver breakthrough performance gains for data warehouse queries. SQL Server 2012 is the first mainstream RDBMS to integrate a memory-optimized columnar data storage capability into the relational database engine. For customers who generate reports in SAP NetWeaver BW, using columnstore indexes means that runtimes can be decreased dramatically.

The xVelocity Columnstore Index feature unites the Microsoft VertiPaq technology that was developed in Microsoft Analysis Services (and is the crucial foundation for Microsoft PowerPivot) and a new query execution paradigm called *batch processing*. The feature can provide nearly immediate results for common data warehouse queries. As delivered in SQL Server 2012, columnstore indexes build a column-oriented representation of a table. However, the row-oriented table remains untouched and is stored in the database. Depending on the query type, the SQL Server Query Optimizer decides whether to use the row representation of the table or the columnstore index to execute the query. Typical queries benefitting dramatically from data being stored in columnar form are those that aggregate a small number of columns over many rows.

For SAP NetWeaver BW, in particular, columnstore indexes are enabled for the E-Fact tables of the SAP NetWeaver BW cubes. Currently, E-Fact tables are read-only, but columnstore indexes will be implemented for them in the future. Testing of typical SAP NetWeaver BW queries using columnstore indexes against E-Fact tables revealed average performance improvements that could be measured in factors.<sup>1</sup> Columnstore indexes can produce faster results with SAP applications for several reasons, including:

- **Aggregated columns:** Only the columns that are aggregated need to be read. It is not necessary to read full rows, pick the correct columns, and then read just those columns, as is done in a row-oriented table. Therefore, less data is read from disk to memory and later moved from memory to processor cache.
- **Reduced space consumption:** Columnstore indexes save space in multiple ways:
  - SAP NetWeaver BW customers running previous versions of SQL Server already experience impressive compression factors of 5-8 when applying SQL Server Page Dictionary compression to SAP NetWeaver BW cubes. However, in addition to this Page Dictionary compression, the columnstore index further reduces space consumption.
  - More space is saved by simply skipping all additional indexes against the E-Fact table of an SAP NetWeaver BW cube. Instead of up to 16 indexes, there are only 2 indexes, one of which is the columnstore index.
  - SAP NetWeaver BW aggregates are no longer necessary against the E-Fact table, which again reduces storage needs.
- **Parallel execution:** The columnstore index technology enables better parallel execution of queries than traditional indexes. This is because columnstore indexes are better partitioned and align more closely with the many CPUs that industry-standard servers can have today.
- **Batch processing:** With advanced query execution technology, columnstore indexes process chunks of columns, or batches, in a streamlined manner—helping to reduce CPU usage and provide faster aggregation of data.

For more information, see [Columnstore Index feature of SQL Server 2012](http://msdn.microsoft.com/en-us/library/gg492088(v=sql.110).aspx) ([http://msdn.microsoft.com/en-us/library/gg492088\(v=sql.110\).aspx](http://msdn.microsoft.com/en-us/library/gg492088(v=sql.110).aspx)).

### Windows Server Core Support

SQL Server 2012 supports Windows Server Core deployment. This can help to lower management and maintenance requirements, reduce the attack surface, and decrease the need to reboot after patching. According to an internal review with customers who use the Windows

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<sup>1</sup> Microsoft Corporation, [xVelocity in SQL Server 2012 Delivers Order-of-Magnitude Gains for Data Warehouse Queries](http://download.microsoft.com/download/7/2/E/72E63D2D-9F73-42BB-890F-C1CA0931511C/SQL_Server_2012_xVelocityBenchmark_DatasheetMar2012.pdf), March 2012: [http://download.microsoft.com/download/7/2/E/72E63D2D-9F73-42BB-890F-C1CA0931511C/SQL\\_Server\\_2012\\_xVelocityBenchmark\\_DatasheetMar2012.pdf](http://download.microsoft.com/download/7/2/E/72E63D2D-9F73-42BB-890F-C1CA0931511C/SQL_Server_2012_xVelocityBenchmark_DatasheetMar2012.pdf).

Server 2008 R2 Core of Windows Server in their deployments, reboots triggered by Windows patches were not necessary for up to 13 months. For future releases of Windows Server, the Core installation will be an important method of reducing patches and reboots triggered by patching. Microsoft Private Cloud and Dynamic Datacenter strategies built on Windows Server, as well as the Microsoft Hyper-V® technology, will use the Windows Server Core installation to a high degree.

The main characteristics of the Windows Server Core deployment of SQL Server 2012 are:

- **Reduced patches:** Because Windows Internet Explorer® and tools with graphical user interfaces are not used, the need for patches is reduced by 50 to 60 percent, depending on the activated Windows roles.
- **Reduced reboots:** The decreased need for patches leads to a dramatic reduction of reboots triggered by patches that apply to Windows Core installations.

For more information, see [SQL Server 2012 support for the Windows Server Core installation](http://msdn.microsoft.com/en-us/library/hh231669(v=sql.110).aspx) ([http://msdn.microsoft.com/en-us/library/hh231669\(v=sql.110\).aspx](http://msdn.microsoft.com/en-us/library/hh231669(v=sql.110).aspx)).

### Auditing Enhancements

SAP applications usually run an organization's most business-critical processes. Therefore, databases underneath these applications often contain sensitive data, which results in stringent auditing requirements. Former versions of SQL Server offered a flexible auditing framework that could be used to track specific activities against specific objects in a database or against entire databases. However, it was difficult to distinguish if activity was triggered by the SAP application or by other applications or users (such as administrative staff logging on directly to database instances).

SQL Server 2012 provides additional flexibility for auditing and security management across SQL Server environments, helping organizations to meet increasingly strict compliance policies. Extensions in the SQL Server Audit Framework can distinguish between activity performed by the SAP application and that performed by other applications. The enhanced functionality of the SQL Server Audit Framework includes:

- **SQL Server audit for all editions:** Organizations can expand the benefits of the SQL Server Audit Framework from the Enterprise edition to all editions, enabling more thorough auditing practices across SQL Server databases. Benefits include audit standardization, better performance, and richer features.
- **User-defined audit:** This audit allows the application to write custom events into the audit log, providing more flexibility for storing audit information.
- **Audit filtering:** Organizations can filter unwanted events, such as when database administrators access SAP databases, into an audit log. Such events can be filtered out for auditing, thus avoiding enormous logs created by access to SAP databases through SAP applications.

- **Audit resilience:** With audit resilience, organizations can recover auditing data from temporary files and network issues.

## Feature Enhancements in SQL Server 2012

SQL Server 2012 provides the following feature enhancements for SAP customers. These enhancements are actively used by SAP coding. That is, they are transparent to SAP applications and need no further changes in the SAP code.

- [Data Compression in SQL Server](#)
- [Backup Compression](#)
- [Support for Up to 15,000 Table Partitions](#)
- [Transparent Data Encryption](#)
- [Encrypted Connections Using Secure Sockets Layer](#)
- [SQL Server File Handling](#)
- [Dynamic Threshold for Update Statistics](#)
- [Enhanced Online Operations](#)

### Data Compression in SQL Server

As introduced in SQL Server 2008 R2 and 2008, database compression technology became a main driver of significantly lowering TCO for SAP systems running against SQL Server. By examining hardware and life cycle costs in the mission-critical SAP space, analysts found that most infrastructure investment was spent in highly scalable and reliable storage systems. The need for high availability, as well as the ability to move to disaster recovery sites, often substantially increased the number of copies of production SAP applications. It was not uncommon for customers to keep 6 to 10 copies of productive SAP databases in production, quality test, and sandbox systems. Consider the impact of this environment on storage costs for the SAP landscape: many customers with database volumes between 5 and 10 TB, and multiple copies of these databases.

In this environment, the introduction of basic compression methods in SQL Server 2008 had a significant effect. Then, to support SAP's moving the customer base to Unicode, SQL Server 2008 R2 introduced UCS2 compression. UCS2 compression was transparent to the application and seamlessly interoperated with existing SQL Server database compression methods. With this development, customers got the "best of both worlds":

- UCS2 Unicode encoding is more CPU-efficient than the UTF8 encoding used by some competitors.
- Space consumption is equivalent to or better than the UTF8 space consumption on disk.

Microsoft and SAP also worked together to introduce the highly space-efficient SQL Server Page Dictionary compression—unrestricted for data and indexes—for SAP NetWeaver applications based on the SAP ABAP stack. Many customers have reported positive experiences with Page Dictionary compression, with benefits that include:<sup>2,3</sup>

- Dramatic reduction (70 to 80 percent) in the database volume of SAP NetWeaver Unicode applications, when compared to using no compression.
- No significant overhead with Page Dictionary compression on data and indexes.
- No need to exclude certain tables or indexes from Page Dictionary compression.
- Better response times and run times due to significantly decreased input/output (I/O).
- Significant increase in efficiency using memory.
- One-time change with no repetition: Once a table is built with Page Dictionary compression, there is no need to rebuild it in order to apply compression to new content. As data is inserted, it is compressed in the pages automatically, without help from the database administration side.
- Database volume often reduced by half with migrations from competitive platforms.

Installing new SAP products against SQL Server means that all SAP database content can be Page Dictionary compressed. Based on customers' feedback and industry comparisons of DBMS platforms that support SAP systems, SQL Server was found to offer unparalleled out-of-the-box space efficiency and ease with SAP installation and platform migration tools.

It is important to note that efficiency gains are not restricted to new installations. Microsoft and SAP also offer functionality to [compress existing large databases using an online approach](http://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/50c5de8f-282a-2e10-cb8a-a5859a0994a4?QuickLink=index&overridelayout=true) (http://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/50c5de8f-282a-2e10-cb8a-a5859a0994a4?QuickLink=index&overridelayout=true).

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<sup>2</sup> MSDN, [CLP \[China Light and Power\] Optimize Storage, Improve Performance, and Streamline DBA Tasks with SQL 2008 R2 + PAGE Compression](http://blogs.msdn.com/b/saponsqlserver/archive/2011/02/21/clp-optimize-storage-improve-performance-amp-streamline-dba-tasks-with-sql-2008-r2-page-compression.aspx), February 2011: http://blogs.msdn.com/b/saponsqlserver/archive/2011/02/21/clp-optimize-storage-improve-performance-amp-streamline-dba-tasks-with-sql-2008-r2-page-compression.aspx [representative example].

<sup>3</sup> Microsoft Case Studies: Quanta Computer, [Quanta Facilitates Data Growth, Savings, and Performance with Microsoft Platform](http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Enterprise/Quanta-Computer/Quanta-Facilitates-Data-Growth-Savings-and-Performance-with-Microsoft-Platform/4000010953), August 2011: http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Enterprise/Quanta-Computer/Quanta-Facilitates-Data-Growth-Savings-and-Performance-with-Microsoft-Platform/4000010953 [representative example].

Finally, as further evidence of the benefits of SQL Server database compression, Table 2 demonstrates compression ratios achieved with SAP ERP Unicode systems in lab-based testing.<sup>4</sup>

Compression Type	Percentage of Original
No compression	100 percent*
Former SAP standard installation: row compression on data only using SQL Server 2008	83.35 percent
Former SAP standard installation: row compression on data only using SQL Server 2012 and 2008 R2	64.28 percent
SAP standard installation: everything page compressed using SQL Server 2012 and 2008 R2	24.88 percent
* Completely reorganized database with no compression = 100 percent	

**Table 2:** Compression ratios with SQL Server and SAP ERP Unicode

For more information on Page Dictionary compression, see the [Running SAP Applications on SQL Server](http://blogs.msdn.com/saponsqlserver) blog (<http://blogs.msdn.com/saponsqlserver>) and [SAP on SQL Server](http://www.sdn.sap.com/irj/sdn/sqlserver) community network (<http://www.sdn.sap.com/irj/sdn/sqlserver>).

### Backup Compression

Backup compression, as first deployed with SQL Server 2008, dramatically reduced effort, run time, and disk space consumption for full database backups. Independent of the use of database compression, backup compression showed compression factors of 4 to 5 when backups of SQL Server databases were conducted. As with most SQL Server functionality, backup compression does not require tuning or configuration. In tests conducted with a large variety of customer scenarios, workloads, and configurations, backup compression presented a solid compromise between compression rate and resource (CPU) consumption.<sup>5</sup>

### Support for Up to 15,000 Table Partitions

With more customers moving their existing SAP applications from proprietary platforms to the Windows and SQL Server platform, Microsoft and SAP saw that the restrictions on the number of partitions by earlier SQL Server releases were too limiting. To accommodate these restrictions, customers had to execute several steps on their source systems that ran on non-SQL Server platforms to reduce the number of partitions in their SAP NetWeaver BW fact tables. To remediate this issue, Microsoft shipped extensions in service packs for SQL Server

<sup>4</sup> Martin Merdes (Microsoft Corporation), [Using SQL Server Database Compression with SAP NetWeaver](http://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/50c5de8f-282a-2e10-cb8a-a5859a0994a4?QuickLink=index&overridelayout=true), May 2011: <http://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/50c5de8f-282a-2e10-cb8a-a5859a0994a4?QuickLink=index&overridelayout=true>.

<sup>5</sup> MSDN, [CLP \[China Light and Power\] Optimize Storage, Improve Performance, and Streamline DBA Tasks with SQL 2008 R2 + PAGE Compression](http://blogs.msdn.com/b/saponsqlserver/archive/2011/02/21/clp-optimize-storage-improve-performance-amp-streamline-dba-tasks-with-sql-2008-r2-page-compression.aspx), February 2011: <http://blogs.msdn.com/b/saponsqlserver/archive/2011/02/21/clp-optimize-storage-improve-performance-amp-streamline-dba-tasks-with-sql-2008-r2-page-compression.aspx> [representative example].

2008 R2 and 2008, which extended the possible number of partitions to 15,000 per table. With SQL Server 2012, this number of partitions is the default limit. Additional scalability for maintenance operations (like building indexes on tables with many thousand partitions) also were improved in SQL Server 2012. With this higher limit, many SAP NetWeaver BW systems running on competitive DBMS platforms have been migrated successfully to SQL Server—without any preparation steps on the source systems required.

Note: For earlier SQL Server releases, SAP has published correction instructions for SAP NetWeaver BW in SAP note 1494789. For more information, see [enabling additional partitions on SQL Server](http://blogs.msdn.com/b/saponsqlserver/archive/2011/03/18/increased-partition-support-of-sql-server-in-sap-bw.aspx) (<http://blogs.msdn.com/b/saponsqlserver/archive/2011/03/18/increased-partition-support-of-sql-server-in-sap-bw.aspx>).

### Transparent Data Encryption

Starting with SQL Server 2008, customers have the ability to encrypt an entire database using transparent data encryption (TDE). The encryption itself is transparent to applications because access to an encrypted database is now at the SQL Server instance. This means that once a SQL Server instance opens an encrypted database, every application or user can access the data in this database. It also means that encryption is not a mechanism to control user access or prevent some users from obtaining content. The encryption and decryption of TDE is done in the I/O path. Therefore, data is in a non-encrypted state in the SQL Server buffer pool and can be used fully for indexing and index searches.

Transparent data encryption includes the following capabilities:

- Four encryption algorithms: AES\_128, AES\_196, AES\_256, and TRIPLE\_DES.
- Encryption of all new pages written to disk and the triggering of background threads to encrypt the rest of the database.
- Improved throughput and reduced overhead with AES algorithms.
- Hardly measurable overall impact.
- Automatically encrypted backup when an encrypted database is backed up.
- Negligible backup compression on an encrypted database using SQL Server or third-party backup compression.
- Ability to use TDE and Secure Sockets Layer (SSL) in conjunction with one another. (For more information, see SAP note 1570930.)
- Ability to use TDE, backup compression, SSL, database compression, and other technologies in conjunction with one another. (For example, SQL Server fully supports the use of a TDE database that is page compressed for backup compression and SSL.)

**Note:** SAP supports TDE, as documented in *SAP note 1380493*. Many SAP customers deploy TDE as one of the steps to hardening the SAP system landscape. Customers deploying TDE usually choose to use an Encryption Key Manager (EKM) system to manage encryption keys because the efforts of TDE are not restricted to one SAP application only.

### Encrypted Connections Using Secure Sockets Layer

Another step in hardening an SAP system that includes SQL Server is to encrypt the communication between the SAP application and SQL Server. Customers in specific industries—such as defense, security, public safety, government, and finance—especially require additional protection from data interception and other security threats. With SQL Server, customers can encrypt the communication channel between SQL Server and the client application using SSL. The encryption mechanism is handled between the SQL Native Access Client (SNAC) and SQL Server and, therefore, is transparent to the application layer.

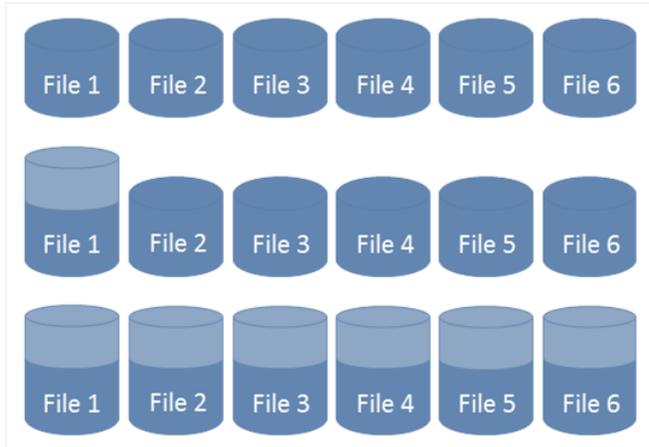
For more information, see [setting up SSL network encryption between SQL Server and SAP](http://blogs.msdn.com/b/sapnsqlserver/archive/2011/03/09/sql-server-network-encryption-with-sap.aspx) (<http://blogs.msdn.com/b/sapnsqlserver/archive/2011/03/09/sql-server-network-encryption-with-sap.aspx>) and *SAP note 1570930*.

### SQL Server File Handling

In 1998, Microsoft and SAP worked jointly to move SAP to the new SQL Server 7.0 release. This measure helped to lower the administrative costs of running SAP on SQL Server. At that point, database administrators managing SAP databases on competitive DBMS platforms were required to negotiate masses of files distributed into many table spaces, with different workloads applied to those. In short, managing files and their distribution turned into major administrative overhead.

SQL Server departed from this approach by not using different SQL Server file groups, but instead spreading table data across several data files within one file group. This approach aligns a number of equally sized data files to a number of equally configured storage volumes, and then uses the SQL Server Proportional Fill functionality to evenly spread the data throughout the data files. Once set up, the SQL Server file group provides an even workload across all data files and storage volumes, making it easy to manage and eliminating the need to steadily balance.

Now, this approach can be disturbed by the SQL Server Autogrowth functionality. Usually, all data files are the same size, and they get filled in even proportions. The problem occurs when all files are running full. In this case, the algorithms grow by one file at a time. This kind of autogrowth behavior, which destroys the even fill that is ideal for different data files, can be addressed by setting trace flag 1117 (Figure 3).



**Figure 3:** Using trace flag 1117 to adjust autogrowth behavior

Since SQL Server 2008, customers can change autogrowth behavior so that all data files are grown to the same size (assuming the autogrowth rate is set consistently), instead of growing only one data file at a time. Further, with SAP installations on SQL Server 2012, the proportional autogrowth behavior described with trace flag 1117 is set automatically. For more information about proportional file autogrowth, see *SAP note 1238993*.

### Dynamic Threshold for Update Statistics

With the release of SQL Server 7.0, customers could take advantage of a new functionality that automatically updated the statistics for indexes and columns. With SQL Server 2008 R2 SP1, Microsoft built on this idea by offering the dynamic threshold functionality, where the fixed rate of the threshold could be changed to a dynamic percentage rate. Now, with SQL Server 2012, the dynamic threshold functionality is fully transparent: Installing SAP NetWeaver applications on SQL Server 2012 automatically switches SQL Server behavior to the dynamic threshold functionality.

The history of this novel approach to updating statistics starts with SQL Server 7.0. Unlike products where database administrators had to execute these updates, SQL Server updated the statistics automatically, based on the percentage of rows experiencing changes. These statistics, in turn, were used to decide which indexes to take when accessing a table to retrieve a number of rows—and, usually, the more accurate the statistics, the more accurate the resulting access paths to the data in a table. Over time, Microsoft and SAP realized that with SAP customers accumulating up to several billion rows in one table, the statistics would be updated less frequently (because the threshold triggering an update was a constant percentage of the number of rows in the table). Therefore, the more rows in a table, the longer it would take until an update of the vital statistics would occur.

To address this issue, Microsoft released the dynamic threshold functionality in SQL Server 2008 R2 SP1—and enhanced its use with SAP NetWeaver in SQL Server 2012. With this functionality, the fixed rate of the threshold can be changed to a dynamic percentage rate, which significantly improves the stability and determinism of query response time. The higher the

number of rows in a table, the lower the threshold (in percent of the number of rows) becomes. For example, under traditional conditions, a table with 1 billion records needs 200 million changes (20 percent) before an update is triggered. However, with the dynamic threshold value, the same table needs just 1 million changes to trigger the update. For more information, see the [dynamic threshold blog entries](http://blogs.msdn.com/b/saponsqlserver/archive/2011/09/07/changes-to-automatic-update-statistics-in-sql-server-traceflag-2371.aspx) on MSDN (<http://blogs.msdn.com/b/saponsqlserver/archive/2011/09/07/changes-to-automatic-update-statistics-in-sql-server-traceflag-2371.aspx>).

### Enhanced Online Operations

In SQL Server 2012, two new tasks are supported with Online Operations:

- **Extended support for online index building:** Indexes that include LOB columns like `varchar(max)`, `nvarchar(max)`, `varbinary(max)`, and XML can be built, rebuilt, or dropped online. Previously, any index with LOB columns had to be built or rebuilt (a common maintenance task) offline, making that object completely inaccessible to applications or users. Now, indexes with LOB columns can be built online as well, increasing total application uptime. This enables customers to compress the complete, not-yet-compressed SAP databases in an online manner, without the need for downtime.
- **Default values for application upgrades:** Adding columns with default values is now a metadata-only operation, removing the need for painful, long-term table locks. Previously, adding columns with default values in each row required exclusive table locks, where the duration of the operation (and X-Lock) was proportional to the amount of data in the table. This meant that the more data there was, the greater the downtime. Now, because adding a column with default values is a metadata-only operation, an exclusive lock on the object is still needed, but it is for a very short amount of time (likely a sub-second).

## Appendix

This appendix contains links to additional information on topics covered in this paper. The links are grouped into four categories:

- [SAP and SQL Resources](#)
- [SQL Server Case Studies](#)
- [SAP Notes](#)
- [Microsoft Blogs](#)

### SAP and SQL Resources

[SAP Community Network: SAP on SQL Server](#)

<http://www.sdn.sap.com/irj/sdn/mss>

[Microsoft and SAP Alliance](#)

<http://www.microsoft.com/isv/sap/technology/platform/sql.aspx>

[MSDN Blogs: Running SAP Applications on SQL Server](#)

<http://blogs.msdn.com/saponsqlserver/>

[Using SQL Server Database Compression with SAP NetWeaver](#)

<http://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/50c5de8f-282a-2e10-cb8a-a5859a0994a4?QuickLink=index&overridelayout=true>

### SQL Server Case Studies

[Wei Chuan Food Corporation](#): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2012-Enterprise/Wei-Chuan-Food-Corporation/Food-Manufacturer-Keeps-Competitive-Edge-and-Improves-Support-for-Growing-Business/710000000330>

[Microsoft IT](#): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2012-Enterprise/Microsoft-Information-Technology-Group-MSIT/Microsoft-Uses-SQL-Server-2012-5.8-Terabyte-SAP-ERP-Database-to-Run-Its-Global-Business/710000000346>

[Griffin's Foods](#): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/Griffin-s-Foods/Snack-Maker-Strengthens-Competitive-Edge-and-Improves-Database-Performance/210000000081>

[InfoSys](#): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/InfoSys/Infosys-Improves-Competitiveness-and-Cuts-TCO-with-Microsoft-Solution-for-SAP-System/4000011787>

[Partezis](#): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/Partezis/IT-Services-Firm-Migrates-from-Oracle-to-Support-Business-Growth-and-Lower-TCO/4000011532>

[CHINT](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/CHINT/Chinese-Manufacturer-Supports-Growth-and-Cuts-Database-Size-by-More-Than-80-Percent/4000011060): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/CHINT/Chinese-Manufacturer-Supports-Growth-and-Cuts-Database-Size-by-More-Than-80-Percent/4000011060

[Quanta Computer](http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Enterprise/Quanta-Computer/Quanta-Facilitates-Data-Growth-Savings-and-Performance-with-Microsoft-Platform/4000010953): http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Enterprise/Quanta-Computer/Quanta-Facilitates-Data-Growth-Savings-and-Performance-with-Microsoft-Platform/4000010953

[Mitsui](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008/Mitsui-Co.-LTD/Trading-Firm-Standardizes-on-IT-System-Running-in-Innovative-Private-Cloud/4000010234): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008/Mitsui-Co.-LTD/Trading-Firm-Standardizes-on-IT-System-Running-in-Innovative-Private-Cloud/4000010234

[Lenzing AG](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-Enterprise/Lenzing-AG/Keeping-things-simple-How-Lenzing-AG-is-paving-the-way-to-virtualization-by-migrating-from-Oracle-to-SQL-Server/4000010010): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-Enterprise/Lenzing-AG/Keeping-things-simple-How-Lenzing-AG-is-paving-the-way-to-virtualization-by-migrating-from-Oracle-to-SQL-Server/4000010010

[Marcopolo](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-Edition/Marcopolo/Brazilian-Manufacturer-Improves-Scalability-and-IT-Management-with-Database-Solution/4000011100): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-Edition/Marcopolo/Brazilian-Manufacturer-Improves-Scalability-and-IT-Management-with-Database-Solution/4000011100

[Carter Holt Harvey](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005/Carter-Holt-Harvey/Server-Platform-Reduces-Total-Cost-of-Ownership-and-Enhances-Performance/4000010060): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005/Carter-Holt-Harvey/Server-Platform-Reduces-Total-Cost-of-Ownership-and-Enhances-Performance/4000010060

[Bang & Olufsen](http://www.microsoft.com/casestudies/Microsoft-Windows-Server-2003/Bang-Olufsen/Global-Electronics-Firm-Cuts-Costs-by-35-Percent-Boosts-Scalability-and-Capacity/4000009986): http://www.microsoft.com/casestudies/Microsoft-Windows-Server-2003/Bang-Olufsen/Global-Electronics-Firm-Cuts-Costs-by-35-Percent-Boosts-Scalability-and-Capacity/4000009986

[Advansa SASA](http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Enterprise/Advansa-SASA/Textile-Firm-Migrates-Database-to-Cut-Costs-and-Increase-Performance-by-20-Percent/4000009475): http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Enterprise/Advansa-SASA/Textile-Firm-Migrates-Database-to-Cut-Costs-and-Increase-Performance-by-20-Percent/4000009475

[Sandvik Group](http://www.microsoft.com/casestudies/Windows-Server-2008-Enterprise/Sandvik-Group/Sandvik-Boosts-Group-Reporting-Availability-and-Performance-with-Innovative-Solution/4000009313): http://www.microsoft.com/casestudies/Windows-Server-2008-Enterprise/Sandvik-Group/Sandvik-Boosts-Group-Reporting-Availability-and-Performance-with-Innovative-Solution/4000009313

[DTEK](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/DTEK/Utility-Firm-Will-Cut-Downtime-by-20-Percent-and-Boost-Agility-with-Microsoft-and-SAP/4000009335): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-R2-Enterprise/DTEK/Utility-Firm-Will-Cut-Downtime-by-20-Percent-and-Boost-Agility-with-Microsoft-and-SAP/4000009335

[Komplett](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-Enterprise/Komplett/E-Commerce-Company-Speeds-Performance-by-30-Percent-with-Microsoft-IBM-and-SAP/4000008843): http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008-Enterprise/Komplett/E-Commerce-Company-Speeds-Performance-by-30-Percent-with-Microsoft-IBM-and-SAP/4000008843

[Arkas Holding](http://www.microsoft.com/casestudies/Windows-Server-2008/Arkas-Holding/Turkey-s-Shipping-Leader-Cuts-SAP-Platform-Costs-by-Two-Thirds-with-Microsoft-Technologies/4000008485): http://www.microsoft.com/casestudies/Windows-Server-2008/Arkas-Holding/Turkey-s-Shipping-Leader-Cuts-SAP-Platform-Costs-by-Two-Thirds-with-Microsoft-Technologies/4000008485

[CSR Limited](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008/CSR/Australia-s-CSR-Lowers-Costs-by-Migrating-SAP-from-Oracle-to-SQL-Server/4000004133): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008/CSR/Australia-s-CSR-Lowers-Costs-by-Migrating-SAP-from-Oracle-to-SQL-Server/4000004133>

[Kimball International](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-X64-Edition/Kimball-International/Manufacturer-Gets-Lower-Total-Cost-of-Ownership-Moving-SAP-from-Oracle-to-SQL-Server/4000003983): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-X64-Edition/Kimball-International/Manufacturer-Gets-Lower-Total-Cost-of-Ownership-Moving-SAP-from-Oracle-to-SQL-Server/4000003983>

[Arcelik](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008/Arcelik/Turkey-s-Arcelik-Moving-5-Terabyte-SAP-database-from-Oracle-to-SQL-Server-2008/4000002932): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2008/Arcelik/Turkey-s-Arcelik-Moving-5-Terabyte-SAP-database-from-Oracle-to-SQL-Server-2008/4000002932>

[Asklepios](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-Edition/Asklepios/Healthcare-Provider-Boosts-SAP-Performance-by-67-Per-Cent-with-New-IT-Infrastructure/4000001060): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-Edition/Asklepios/Healthcare-Provider-Boosts-SAP-Performance-by-67-Per-Cent-with-New-IT-Infrastructure/4000001060>

[Accenture](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=201156):  
[http://www.microsoft.com/casestudies/Case\\_Study\\_Detail.aspx?CaseStudyID=201156](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=201156)

[QR Limited](http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-X64-Edition/QR-Limited/Moving-SAP-Off-Mainframe-to-SQL-Server-Nets-Australia-s-QR-Limited-U.S.-100-000-a-Month/4000003421): <http://www.microsoft.com/casestudies/Microsoft-SQL-Server-2005-Enterprise-X64-Edition/QR-Limited/Moving-SAP-Off-Mainframe-to-SQL-Server-Nets-Australia-s-QR-Limited-U.S.-100-000-a-Month/4000003421>

[Goethe University Frankfurt](http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Datcenter/Goethe-University-Frankfurt/University-Reclaims-Data-Center-Capacity-and-Enables-Innovation-with-Virtualization/4000007917): <http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Datcenter/Goethe-University-Frankfurt/University-Reclaims-Data-Center-Capacity-and-Enables-Innovation-with-Virtualization/4000007917>

[FUJIFILM Group](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=200059):  
[http://www.microsoft.com/casestudies/Case\\_Study\\_Detail.aspx?CaseStudyID=200059](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=200059)

[Lockheed Martin](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?casestudyid=4000004971_):  
[http://www.microsoft.com/casestudies/Case\\_Study\\_Detail.aspx?casestudyid=4000004971\\_](http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?casestudyid=4000004971_)

## SAP Notes

- 1651862 - Release planning for Microsoft SQL Server 2012
- 1650246 - R3ta: New split method for Microsoft SQL Server
- 1581700 - Page compression support for DDIC and homogenous/heterogeneous system copy
- 1570930 - SQL Server network encryption with SAP
- 1552952 - Parameter maxmarkerCnt increased to 10,000
- 1505884 - R3load compression for table index
- 1494789 - Enabling 1000+ partitions support on SQL Server
- 1491158 - Information about the Microsoft SQL Server license scope

- 1488135 - Database compression for SQL Server
- 1476928 - System copy of SAP systems on Windows 2008 R2 SQL Server
- 1471910 - SQL Server partitioning in system copy and database migrations
- 1459005 - Enabling index compression for SQL Server
- 1458291 - Solution Manager 7.1 Database Warehouse for Microsoft SQL Server
- 1454130 - Data dictionary support for parallel/online index creation
- 1443424 - Migration path to Win2008MSSQL2008 for 4.6C and 6.206.40
- 1398807 - Microsoft SQL Server: JDBS driver support matrix
- 1380493 - SQL Server TDE
- 1298215 - SAP's simple database monitor for SQL Server
- 1297986 - Backup and restore strategy for Microsoft SQL Server
- 1279358 - Cumulative update installation for SQL Server 2008
- 1241751 - SQL Server minimal logging extensions
- 1238993 - Proportional file autogrowth with SQL Server 2008
- 1174635 - TempDB sizing in SAP BW systems on Microsoft SQL Server
- 1158936 - DBACOCKPIT Backup compression option in SQL Server 2008
- 1141630 - Preparations for SQL Server 2008 BW customers
- 1139642 - Hardware requirements in Unicode systems
- 1134345 - Using locked pages for SQL Server
- 1126568 - Enable star join optimization with SQL Server 2008
- 1006887 - Online index creation with SQL Server 2005, 2008, and 2008 R2
- 965908 - SQL Server database mirroring and SAP applications
- 849062 - Optimizer statistics for InfoCubes in BW
- 683447 - SAP tools for Microsoft SQL Server
- 652634 - FOR ALL ENTRIES performance with Microsoft SQL Server
- 600027 - Installing the corrected Microsoft SQL Server collation

- 398136 - Support policy for Microsoft SQL Server
- 363018 - File management for SQL Server
- 142731 - DBCC checks of SQL Server
- 133381 - Database hints in Open SQL for Microsoft SQL Server
- 62988 - Service packs for Microsoft SQL Server
- 28667 - Microsoft SQL Server specific profile parameters

## Microsoft Blogs

[MSDN: Running SAP Applications on SQL Server](http://blogs.msdn.com/saponsqlserver/)

<http://blogs.msdn.com/saponsqlserver/>

[TechNet: Hyper-V Replica](http://blogs.technet.com/virtualization/)

<http://blogs.technet.com/virtualization/>

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