Real-Time Intelligence Moves Business Forward

SAP In-Memory Appliance Software (SAP HANA™) uses SAP In-Memory Computing technology and the computing power of the Intel® Xeon® processor E7 family to deliver real-time business intelligence.

Increasingly sophisticated business-decision models demand real-time manipulation and analysis of massive data stores. Traditional disk-based systems often cannot meet those requirements, creating a lag between data gathering and interpretation that limits solution value.

SAP In-Memory Appliance Software (SAP HANA™) delivers SAP In-Memory Computing technology through an ongoing engineering collaboration between SAP and Intel to provide optimized performance and reliability on Intel® architecture, including the Intel® Xeon® processor E7 family.

The Next Generation of Business-Data Analysis

SAP HANA is a multi-purpose appliance based on SAP software components installed on servers based on the Intel Xeon processor.

Because it is data-agnostic, SAP HANA is designed to be implemented without affecting existing applications or systems. The solution provides a flexible, cost-effective, real-time approach for managing and deriving maximum value from large data volumes.

In the future, SAP HANA will act as the technology foundation for new, innovative business applications for planning, forecasting, operational performance, and simulation.
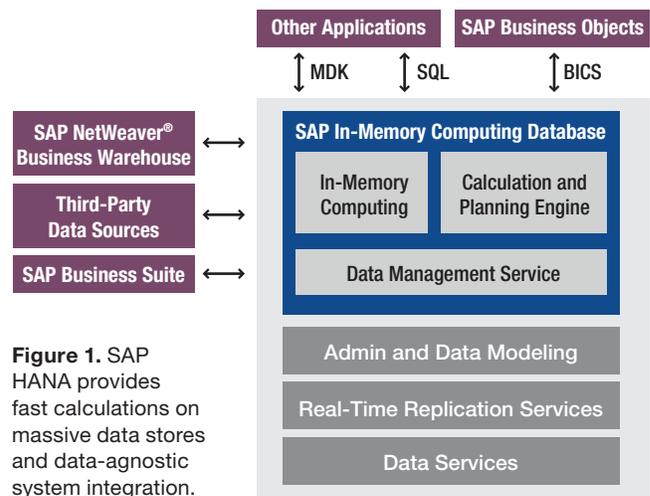

Figure 1. SAP HANA provides fast calculations on massive data stores and data-agnostic system integration.

"Intel and SAP engineering teams have collaborated extensively on SAP HANA™ and SAP In-Memory Computing technology. Comparing the in-memory system performance with a classical relational database the query time was reduced from 77 minutes to 13 seconds when run on the Intel® Xeon® processor 7500 series. We are thrilled with this result and it showcases once again the powerful impact of joint problem solving between our two companies."

- K. Skaugen, Intel Vice President and the General Manager of the Data Center Group

HARDWARE/SOFTWARE SYNERGIES	
Intel® Xeon® Processor E7 Family Architecture	**SAP HANA Architecture**
• **Extensive parallelism** delivered by up to 10-core designs and Intel® Hyper-Threading Technology supports 20 threads per socket, providing enormous computation resources. • **High memory capacity**, up to 32 GB DIMMs (2 TB for a four-way server), increases the ability of SAP HANA to hold large amounts of data for in-memory computation. • **Large last-level cache**, up to 30 MB, enables SAP HANA to hold very large data sets close to the processing engines, for fast access without reading from DRAM.	• **SAP In-Memory Computing** stores computational data in system memory instead of on disk, removing the latency associated with disk reads and writes for very high performance. • **Column-based storage** provides efficiency advantages over conventional row storage in many cases, including better compression and cache utilization. • **Data-agnostic integration** includes SQL and MDX interfaces to access SAP and non-SAP data sources, simplifying the utilization of business information wherever it resides.

Optimizations for the Intel® Xeon® Processor E7 Family

SAP HANA takes excellent advantage of Intel Xeon processor E7 family platform features:

- **Intel® Hyper-Threading Technology (Intel® HT Technology)** enables each processor core to handle two instruction streams simultaneously. SAP HANA takes advantage of this feature by performing work in parallel where possible and avoiding sequential processing.

- **Non-Uniform Memory Access (NUMA)** decreases contention among processors for memory-access bandwidth. SAP HANA™ takes advantage of NUMA through the assignment of processor affinity and data placement.

- **Intel® Turbo Boost Technology**[1] allows processor cores to run faster than the base operating frequency under certain conditions. SAP HANA takes advantage of this feature automatically.

"For over 10 years, SAP and Intel have collaborated to create visionary solutions that enable customers to gain competitive advantage and run better. The SAP In-Memory Appliance (SAP HANA™), delivered on the Intel® Xeon® processor, provides customers with real-time results from analyses and transactions that enable better decisions and improved operations. It's just the latest example of how game-changing innovation between industry leaders can alter how enterprises do business and succeed."

- Stefan Sigg, Senior Vice President, In-Memory Platform, SAP

Advances from In-Memory Computing

SAP HANA puts data at the service of business users, giving them the power to create rich, ad hoc reports and analyze operational data. Conventional database systems are typically performance-limited by the latency associated with reading data from disk before a calculation and writing it back to disk afterward. SAP HANA overcomes that limitation by storing the primary data copy in memory, rather than on disk.

Using main memory as the primary data store lets SAP HANA deploy transactional and analytic engines together, speeding up performance and letting users perform ad-hoc data mining and decision-support functions. That transforms business intelligence for a better future.

Real-World Success: Redefining Business Intelligence at Hilti Corporation

IT systems based on SAP technology play a vital role in the operations of Liechtenstein-based Hilti Corporation, a provider of equipment and technology to the global construction industry.

Testing with SAP HANA™ reduced the time required for search and analysis of 53 million customer data records from two or three hours to two or three *seconds*![2] This capability is positioned to revolutionize the ways that sales employees turn information into intelligence:

- **Faster time to insight**
- **Robust real-time reporting**
- **Mobile access from the field**

Rapid analysis and business intelligence support business decisions where and when they are needed, so sales teams are more successful.

Learn more about SAP HANA™:
www.sap.com/platform/in-memory-computing

Learn more about Intel® Xeon® processors:
www.intel.com/xeon

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