



Solution Brief

Discover Breakthrough Business Performance

Intel® Xeon® Scalable processors and the SAP HANA® 2 platform are a powerful combination that can enable you to outperform your competitors in today's digital economy.

Digital transformation is no longer new, nor is it this week's business buzzword. It is a pressing business reality. According to the "SoftServe Digital Transformation Report 2017," forty-five percent of respondents have already implemented some level of digital transformation.⁵

If the remaining 55 percent of businesses haven't started their own digital transformations, it is time. And to maximize competitiveness and effectiveness, a business needs top-performing solutions that support digital agility. The SAP HANA® 2 platform, powered by Intel® Xeon® Scalable processors, provides just such a solution.

Many businesses have yet to move to the SAP HANA 2 platform. And one of the best opportunities to outcompete other businesses is choosing to do so now.

The SAP HANA 2 platform is the next-generation of the SAP HANA platform. It delivers the on-premises or in-the-cloud in-memory database and application-development capabilities you have come to expect in the SAP HANA platform. It also offers new functionalities for continuous innovation and was designed for companies that are embracing digital transformation.

As an in-memory database, the SAP HANA 2 platform requires a high-performance CPU along with strong memory capabilities to deliver maximum throughput. This is where Intel Xeon Scalable processors, the latest generation of Intel Xeon processors, are paramount. Intel Xeon Scalable processors are built for mission-critical, real-time analytics, machine learning, artificial intelligence, and multi-cloud workloads. Running the SAP HANA 2 platform on Intel Xeon Scalable processors delivers faster performance and more queries per hour along with technologies that maximize the SAP HANA 2 platform's added capabilities.



More Memory and More Queries per Hour

Intel® Xeon® Scalable processors deliver 50 percent more memory support for online analytical processing (OLAP) and online transaction processing (OLTP) with the SAP HANA® 2 platform and more query executions per hour than the previous Intel Xeon processor E7 v4 family.¹

- 6,578 queries per hour on the Lenovo ThinkSystem SR950* with an Intel Xeon Platinum processor²
- Up to 53.9 percent more query executions per hour on Lenovo servers powered by Intel Xeon Platinum processors compared to those powered by the Intel Xeon processor E7 v4 family^{3,4}

Servers powered by Intel® processors hold more SAP® certified benchmarks than any other available servers.

Why the SAP HANA 2 Platform?

SAP HANA® 2

The SAP HANA 2 platform lets businesses perform both online transaction processing (OLTP) and online analytical processing (OLAP) simultaneously on the same platform. Comparatively, traditional relational databases require different platforms for different processes, such as transactional databases, reporting databases, integration layers, and search, predictive, and web capabilities. Storing all data in memory enables the SAP HANA 2 platform to run at fast speeds and removes the need to sum, index, and aggregate data, which can reduce the database footprint by up to 95 percent.⁶ The SAP HANA 2 database can be used as the underlying database for any number of SAP applications and other solutions. And it delivers concurrent real-time reporting and analysis.

The SAP HANA 2 platform adds a variety of enhancements to the SAP HANA platform's capabilities, including those for database management, data management, analytics intelligence, and application development. The SAP HANA 2 solution empowers businesses to simultaneously build transformative applications and run mission-critical applications with a single platform.

Database-management enhancements in the SAP HANA 2 platform:



- Improve availability, disaster recovery, and backup and recovery capabilities
- Strengthen data security with comprehensive encryption and simplified monitoring of security alerts
- Enable admins to more easily manage multitenant databases as a single database while keeping them securely isolated from each other

Data-management enhancements in the SAP HANA 2 platform:



- Enable the use of extended modeling tools for enterprise architecture and business-process modeling
- Simplify the management and integration of large volumes of data and multiple data sources
- Improve an organization's ability to manage data accuracy and aggregation

Analytics-intelligence enhancements in the SAP HANA 2 platform:



- Incorporate extended search capabilities
- Add text-analytics capabilities for any language that uses a space between words, along with support for natural language
- Add the ability to analyze graph data using visualizations
- Include the SAP HANA 2 predictive-algorithm library, which uses predictive analytics to uncover patterns, relationships, and opportunities and to incorporate machine learning

Application-development enhancements in the SAP HANA 2 platform:



- Support extended application-server capabilities, tools, languages, and APIs to make it faster and easier for businesses to build and run applications

An upgrade from the SAP HANA 1.0 SPS 10, SPS 11, or SPS 12 database requires only a simple update; no database migration is needed. The SAP HANA 2 platform runs all SAP HANA 1.0 SPS 10, SPS 11, or SPS 12 platform-based applications unchanged.

Why Intel Xeon Scalable Processors for the SAP HANA 2 Platform?

The SAP HANA platform was developed on Intel® processors, and Intel provided the original reference architecture for the SAP HANA platform. Today, only two server processor vendors have achieved certification in the Certified and Supported SAP HANA Hardware Directory at sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/appliances.html. Of those two vendors, Intel is the CPU architecture used in 1,206 appliances, 20 infrastructure-as-a-service platforms (IaaS), and 104 entry-level systems. That's compared to just eight systems for the other vendor, demonstrating that the Intel® architecture drives choice, differentiation, and a lower total cost of ownership in the SAP HANA ecosystem.

Servers powered by an Intel processor-based architecture achieved world records in SAP benchmarks in both 2016 and 2017. Performance for the other vendor's certified systems didn't come close to the performance with Intel systems, and those systems have never achieved world records. In August 2017, Lenovo delivered 6,578 queries per hour on the Lenovo ThinkSystem SR950* with an Intel Xeon Platinum 8180 processor on the SAP® BW edition for SAP HANA (SAP BW/4HANA) Standard Application Benchmark. This result is up to 53.9 percent more than a Lenovo server's previous record of 4,273 queries on the Intel Xeon processor E7 v4 family.^{2,4,5}

Intel Xeon Scalable processors can deliver these types of results because they are engineered with:

- **50 percent more memory support for OLAP and OLTP workloads** for the SAP HANA 2 platform compared to the Intel Xeon processor E7 v4 family
- **Six times more system memory** and more flexible configurations to better meet requirements for high-capacity, massive streaming workloads compared to the Intel Xeon processor E5 v2 family, launched in 2013

That added memory support is made possible with systems that support up to eight sockets and up to 1.5 TB memory capacity per socket for a total of up to 12 TB in an eight-socket configuration. Intel Xeon Platinum processors also offer more threads, DDR4-2,666 memory with up to six memory channels versus four channels in the Intel Xeon processor E7 v4 family, and eight more lanes of Peripheral Component Interconnect Express* (PCIe*) 3.0 bandwidth—48 compared to 40 in the Intel Xeon processor E7 v4 family.



Figure 1. The Intel® Xeon® Scalable processor line includes Intel Xeon Platinum processors, Intel Xeon Gold processors, Intel Xeon Silver processors, and Intel Xeon Bronze processors

A Feature-Rich, Highly Scalable, Future-Forward Infrastructure Platform

In addition to having more cores and threads than the previous generation, Intel Xeon Scalable processors are architected with an all-new microarchitecture, the Intel mesh internal microarchitecture, which improves performance relative to the earlier "ring" architecture. A uniform shape for all CPUs with the new microarchitecture enables any CPU to fit into the same Intel Socket P socket type. This means systems can scale from two sockets to four and on to eight without external chipsets from third parties.



50 percent

more memory support for OLAP and OLTP workloads for the SAP HANA 2 platform



6x

more system memory and more flexible configurations

The new microarchitecture is one part of the benefits of Intel Xeon Scalable processors. An array of enhanced and all-new technologies engineered into Intel Xeon Scalable processors adds to the memory capabilities and new architecture to maximize performance, reliability, availability, serviceability, and manageability.

- **Intel® Advanced Vector Extensions 512 (Intel® AVX-512)** offers workload-optimized performance and throughput increases for advanced analytics, high performance computing (HPC) applications, and data compression.
- **Intel® Ultra Path Interconnect (Intel® UPI)**, the successor to Intel® QuickPath Interconnect (Intel® QPI), has up to three Intel UPI channels to enable connecting Intel Xeon processors across a high-speed, low-latency path to increase scalability up to eight sockets and to improve bandwidth for input/output (I/O)-intensive workloads.
- **Integrated Intel® QuickAssist Technology (Intel® QAT)** enables hardware-assisted acceleration for critical workloads, such as data compression and cryptography, across servers, storage, and networks in software-defined infrastructures.
- **Integrated Intel® Omni-Path Architecture (Intel® OPA) Host Fabric Interface** is integrated into the CPU package and enables a high-bandwidth, low-latency fabric that optimizes performance and eases deployment of HPC clusters by eliminating the need for a discrete host fabric interface card.
- **Integrated Intel® Ethernet Controllers (up to four 10 gigabit Ethernet [GbE] ports) with Internet Wide Area Remote Direct Memory Access (RDMA) Protocol (iWARP)** delivers high-speed Ethernet capabilities for high data throughput and low-latency workloads to make the transfer of large storage blocks and virtual-machine (VM) migration faster.
- **Storage innovations**, including support for Intel® Optane™ Solid-State Drives (SSDs) and Intel® 3D NAND SSDs, enable improved efficiency and performance for data-hungry workloads.
- **Enhanced Intel® Run Sure Technology** delivers advanced reliability, availability, and serviceability (RAS) features and server uptime for the most critical workloads.

More Options in Configuring the Network

SAP HANA Tailored Datacenter Integration (TDI) gives businesses more flexibility and choice in their SAP HANA hardware infrastructure, including the choice to continue using existing hardware and processes for the SAP HANA 2 platform. Businesses can choose their preferred hardware vendor and infrastructure components from a broad list of supported hardware. Using their preferred or existing vendor can help significantly lower costs for testing-, development-, and production-based systems while allowing integration of the SAP HANA platform into their data centers.

Intel Xeon Scalable processors enable hardware vendors to certify a broader range of models under the SAP HANA TDI program than with previous processor families. Any Intel Xeon Platinum processors, Intel Xeon Gold processors, Intel Xeon Silver processors, or Intel Xeon processor E7 v4 with eight or more sockets can be certified for use with the SAP HANA 2 platform. This enables customers to tailor their servers to their performance needs using fewer cores and more RAM. The ability for hardware vendors to certify a broader range of models allows businesses to tightly align their data needs with their SAP HANA 2 implementations. Already, two models each of two Intel Xeon Platinum processor SKUs are certified, and three Intel Xeon processor E7 v4 family SKUs are certified. See sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/index.html#details for details and current certified microarchitectures.

Right-Size the SAP HANA® 2 Environment

Every SAP HANA implementation includes memory sizing as the first step. When sizing the largest, most complex environments, engaging an SAP sizing expert is recommended.

Memory sizing provides the basis for the hardware recommendation for an SAP HANA system. Once memory sizing is known, the next step is to check SAP Certified and Supported SAP HANA Hardware at sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/appliances.html for server appliances that match your memory needs.

As of the date of this publication, environments with large memory needs of more than 12 TB might find that using the Intel® Xeon® processor E7 v4 family best meets their memory demands.

Your SAP HANA hardware partner will translate your sizing results into a tailored system configuration for your needs.

Learn more about SAP HANA deployment options at sap.com/products/hana/implementation/deployment.html.

Five hardware vendors have certified 48 appliances in the SAP HANA TDI program that use the four currently certified Intel Xeon Platinum processor models. See sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/appliances.html for those and newer appliance options.

Co-engineered for Digital Transformation

Intel and SAP have collaborated on SAP solutions and Intel processors for more than 20 years and have collaborated on the SAP HANA platform from its beginning. Intel processors are made to run the SAP HANA 2 platform, and the SAP HANA 2 platform is optimized to run on Intel processors. Intel Xeon processors power more than 75 percent of all new SAP deployments.⁷ And together, Intel and SAP are enabling digital transformation for businesses worldwide.

Intel Xeon processors support SAP HANA 2 deployments on-premises, in the cloud, and in hybrid solutions (based on open standards). Five hardware vendors, Cisco, Dell, Fujitsu, HPE, and Lenovo, already offer appliances certified for the SAP HANA 2 platform and powered by Intel Xeon Scalable processors for on-premises implementations.⁸ And SAP, Amazon, Google, Huawei, IBM, and Microsoft offer cloud solutions certified for the SAP HANA 2 platform and powered by Intel Xeon Scalable processors.⁹

Give Digital Transformation a Competitive Edge

The digital age is here. The key to business survival is being competitive. That requires businesses to embrace digital transformation at every available chance to outcompete their rivals. With the SAP HANA 2 platform powered by Intel Xeon processors, you can access data and development solutions that are maximized to fuel business innovations and that can empower your business to be a digital disruptor.

Learn More

- See how SAP and Intel work together to empower enterprise infrastructure solutions: intel.com/sap
- Find examples of breakthrough applications and analytics with the SAP HANA® platform: sap.com/innovate-with-hana
- Discover how to modernize an IT environment with the SAP HANA platform: sap.com/modernize-with-hana
- Find details on Intel® Xeon® Scalable processors, including Intel Xeon Platinum processors: intel.com/content/www/us/en/processors/xeon/scalable/xeon-scalable-platform.html
- Get the SAP HANA, express edition free trial download: sap.com/sap-hana-express
- See the Certified and Supported SAP HANA Hardware Directory: sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/appliances.html

¹ Up to 6x greater system memory supported vs. available solutions from four years ago (representing the currently installed data-center base). SAP has certified its SAP HANA® 2 platform for OLAP workloads to support up to 3 TB of memory per system for Intel® Xeon® Scalable processors for a 4-socket configuration (or 6 TB for an 8-socket configuration). Systems available four years ago (representing the typical data center installed base infrastructure) could only support 0.5 TB (or 1 TB in an 8-socket configuration), respectively. For comparative purposes, SAP certifies support for up to 2 TB of memory for the Intel Xeon processor E7 v4 family in a 4-socket configuration, so Intel Xeon Scalable processor-based systems are certified to support up to 50 percent greater system memory than the generation they replace.

² SAP. "Certification 2017034 – SAP Standard Application Benchmarks." August 2017. sap.com/about/benchmark/appbm/netweaver.sap-bw-edition-for-sap-hana-standard-application.html#pdf-asset=16663c9c-ce7c-0010-82c7-eda71af511fa&pdf-page=1.

³ Comparing the Intel® Xeon® Platinum 8180 processor results for the SAP® BW Edition for SAP HANA® (SAP BW/4HANA) Standard Application Benchmark from June 2017 to the Intel Xeon processor E7-8894 results for the SAP BW/4HANA Standard Application Benchmark from February 2017 (see sap.com/documents/2017/02/f2732a32-a77c-0010-82c7-eda71af511fa.html or <https://lenovopress.com/lp0616-x3850-x6-sapbw4hana-benchmark-result-2017-02-07>).

Configurations: Baseline: Lenovo System x3850 X6*, four processors, 96 cores, 192 threads, Intel® Xeon® processor E7-8894 v4, 2.40 GHz, 64 KB L1 cache and 256 KB L2 cache per core, 60 MB L3 cache per processor, 2,048 GB main memory for the SAP BW benchmark in February 2017; query throughput (higher is better): 4,273; query runtime (lower is better): 154; data load (lower is better): 14,939. Compared to: Lenovo ThinkSystem SR950*, four processors, 112 cores, 224 threads, Intel Xeon Platinum 8180 processors, 2.50 GHz, 1,792 KB L1 for the SAP BW/4HANA Standard Application Benchmark in June 2017; query throughput: 5,921 (38.50 percent improvement); query runtime: 143 (7 percent improvement); data load: 14,302 (4 percent improvement).

⁴ This benchmark fully complies with the SAP® Benchmark Council regulations and has been audited and certified by SAP SE under certification number 2017024 (see sap.com/documents/2017/07/f4c4662e-c67c-0010-82c7-eda71af511fa.html). Details can also be obtained from Lenovo and SAP. The benchmark was performed at the Lenovo Data Center Performance Lab in Research Triangle Park, NC, USA, by Lenovo engineers.

Configuration: Lenovo ThinkSystem SR950*, 4 processors, 112 cores, 224 threads, Intel® Xeon® Platinum 8180 processors, 2.50 GHz, 1,792 KB L1 cache, 28,672 KB L2 cache, and 39,424 MB L3 cache per processor, with 1,536 GB main memory.

The SAP® BW Edition for SAP HANA® (SAP BW/4HANA) standard application benchmark is the latest addition to the list of benchmarks for SAP BW. It fully utilizes the capabilities of the SAP HANA platform to process the benchmark workload. Allowed data volumes are a multiple of 1.3 billion initial records and can be run in single-node and multimode setups. This benchmark was released in July 2016.

⁵ SoftServe. "SoftServe Digital Transformation Report 2017." 2017. softserveinc.com/en-us/our-work/softserve-digital-transformation-report-2017/.

⁶ SAP. "The SAP HANA FAQ." <https://blogs.saphana.com/2014/09/09/the-sap-hana-faq/>.

⁷ HP, Intel, SAP, SUSE, and VMware. "Virtualizing Enterprise SAP® Software Deployments." June 2011. suse.com/docrep/documents/04r7to9d2y/virtualizing_enterprise_SAP_software_deployments.pdf.

⁸ SAP. "Find Certified Appliances." June 2016. <https://global.sap.com/community/ebook/2014-09-02-hana-hardware/en/EN/appliances.html>.

⁹ SAP. "Find Certified IaaS Platforms." August 2017. sap.com/dmc/exp/2014-09-02-hana-hardware/en/EN/iaas.html.

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