Numerous Innovations, One Revolutionary Leap Forward

SAP HANA® 2.0 SPS 03 contains numerous innovations to the SAP HANA platform—and it is the first major database solution to support Intel® Optane™ DC persistent memory.

The SAP HANA® platform provides state-of-the-art database and data-management technologies, advanced analytical capabilities, and intuitive application-development tools in an all-in-one, in-memory-first data platform. SAP HANA 2.0 SPS 03 brings several additional innovations to the SAP HANA platform for intelligent enterprises, in addition to ground-breaking support for Intel® Optane™ DC persistent memory.

SAP HANA 2.0 SPS 03 is the first major database platform to support Intel Optane DC persistent memory. Intel Optane DC persistent memory represents an entirely new means of managing data for demanding workloads like the SAP HANA platform. Intel Optane DC persistent memory is non-volatile, so in-memory databases like the SAP HANA platform do not have to completely reload all data from persistent storage to memory, and it runs at near-DRAM speeds, maintaining today's performance expectations. It also delivers greater data density than memory technologies, which enables additional innovation and simpler IT landscapes. Between its persistence, performance, and lower cost per gigabyte than conventional memory, Intel Optane DC persistent memory can help reduce total cost of ownership (TCO), reshape how businesses tier their data for database systems, and open up new use cases for the speed and power of the SAP HANA platform.

**What’s New in SAP HANA 2.0 SPS 03**

SAP HANA 2.0 SPS 03 contains numerous innovations to analytics, development, and the management of data and databases on the SAP HANA platform:

**Database Transformed**

SAP HANA 2.0 SPS 03 provides built-in real-time data anonymization that helps protect sensitive data in real time on a single instance of the data. Data anonymization helps organizations meet increasingly strict data-protection and privacy regulations, such as the European Union’s General Data Protection Regulation (GDPR).

SAP HANA 2.0 SPS 03 also provides improvements to high-availability and disaster-recovery features. These improvements include multi-target replication for backups, fault-tolerant SQL routing, and “secondary time travel” to correct logical errors in the primary database using snapshots from secondary systems.
Analytical Intelligence Transformed
SAP HANA 2.0 SPS 03 provides improved performance through parallel processing improvements for the training and scoring of predictive models, in addition to high-availability and load balancing with TensorFlow integration. New and easy-to-integrate SAP HANA spatial services, available in the cloud, enable the creation of location-aware business applications with advanced spatial capabilities. Improvements to search and text analysis in SAP HANA 2.0 SPS 03 can help you quickly uncover insights from unstructured data, such as by using spatial distance to calculate the relevance of results, which makes geographic data more usable.

Application Development Transformed
Additions to officially supported runtimes in SAP HANA extended application services, advanced model (XSA) in SAP HANA 2.0 SPS 03 provide more options in the application layer to increase productivity with industry-standard runtimes. In addition, SAP HANA 2.0 SPS 03 has native client-interface support for Ruby and Hibernate dialects, which facilitates development using industry standards. Finally, SAP HANA, express edition inherits all of the enhancements from SAP HANA 2.0 SPS 03 and enables fast development on PCs and small servers (in addition to incurring no license fees for apps that use less than 32 GB of memory).

Data Management Transformed
SAP® Enterprise Architecture Designer, Cloud Edition is available as an application service on SAP Cloud Platform, in addition to being a native application on the SAP HANA platform. With this technology, you can streamline planning to execution through collaboration, intuitive design, and development automation of conceptual to physical modelling for hybrid cloud and on-premises environments.

SAP HANA 2.0 SPS 03 also includes support for a variety of data-access types, Apache Spark on SAP Cloud Platform Big Data Services, Microsoft Azure HDInsight, and Cassandra. For performance, cost, and data management, SAP HANA 2.0 SPS 03 provides a number of new features, such as:

- Improved tenant database support
- New data tiering capabilities—like native extension-node support and dynamic tiering improvements
- Support for persistent memory

Intel Optane DC Persistent Memory:
This Revolution Will Be Televised
Support for Intel Optane DC persistent memory in SAP HANA 2.0 SPS 03 is a revolution for enterprise computing because it will change the way IT organizations think about data tiering. Currently, tiering data comes down to an unappetizing choice between investing in more expensive memory or degrading performance by keeping more data in persistent storage. Intel Optane DC persistent memory represents an entirely new means of managing data for demanding workloads like the SAP HANA platform.

Memory for databases is currently small, expensive, and volatile; Intel Optane DC persistent memory is denser, more affordable, persistent, and performs at speeds close to memory. These features of Intel Optane DC persistent memory can help drive lower TCO through reduced downtime and streamlined data tiering. These same features can also make SAP HANA in-memory databases economically viable for a wider range of use cases: Intel Optane DC persistent memory provides near-DRAM in-memory computing speed in a form factor similar to dual in-line memory modules (DIMMs) at a lower price per gigabyte than DRAM memory. Support for Intel Optane DC persistent memory will be available with the next-generation Intel® Xeon® processor Scalable family.
**Less Downtime**

Because it is non-volatile, Intel Optane DC persistent memory enables you to keep the data in the SAP HANA platform loaded in main memory, even when power is off. Because you don’t have to reload the data back into memory after downtime, restart time for the SAP HANA platform is greatly reduced.

**Upending the Realities of Data Tiering**

Due to the high cost of memory, traditionally only the most frequently accessed, most valuable hot data could be housed there. Less valuable warm data had to be stored outside of main memory at the price of lower performance. Intel Optane DC persistent memory and innovations in SAP HANA 2.0 SPS 03 change these economics, providing new options for data tiering.

Intel Optane DC persistent memory is available in a form factor called *persistent memory modules* (PMMs), similar to DIMMs, but with greater capacity than is available with conventional, volatile memory. Not only can using Intel Optane DC persistent memory reduce the overall price of memory for the SAP HANA platform, it also means that you can place your entire storage-area network (SAN)-based warm-data tier in data modules that act like main memory, which improves performance.

Larger memory configurations in Intel Optane DC persistent memory have the potential to radically reshape data tiering and in-memory processing for your SAP HANA deployment. Larger, less-expensive memory configurations increase the economic viability of use cases that can benefit from the speed of insights available from in-memory databases but that cannot justify the high cost of investing in large amounts of DRAM. Combined with Intel Optane DC Solid State Drives (SSDs), Intel Optane DC persistent memory enables a new, flexible, memory-like tier: valuable data traditionally stranded in slow NAND storage can be activated and acted upon. Intel Optane DC persistent memory opens up new opportunities for companies to cost-effectively gain actionable insights from their data—and gain a competitive edge.

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**SAP HANA® 2.0 SPS 03 is optimized for Intel Optane DC persistent memory:**
- Six years of collaboration and co-engineering between Intel and SAP
- The SAP HANA platform’s innovative in-memory architecture fit so well with persistent memory that it required few changes
- The SAP HANA platform is the first major database platform to support Intel Optane DC persistent memory

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**Figure 1.** Example of updated data tiering using DRAM, Intel Optane DC persistent memory, and Intel Optane DC SSDs; hot data is represented in red, warm data is in orange, and cold data is in blue

SAP HANA 2.0 SPS 03 provides additional new enhancements for data tiering, one of which is native extension-node support. This native support in the SAP HANA platform enables a standard SAP HANA node to be used for warm data storage. Extension nodes are essentially scale-out nodes with relaxed processor and memory requirements for SAP HANA applications. Using extension nodes, a node from a scale-out cluster is set aside just for warm data; this extension node is allowed to store up to four times (as of today) as much data as a hot node in the cluster. Native extension-node support provides key advantages, such as fast in-memory performance when querying warm data, including support for all native data types and advanced analytics engines. This provides customers with an additional option for multi-temperature data management, helping optimize the performance/cost ratio of customers’ SAP HANA systems. Features like this and Intel Optane DC persistent memory provide new, cost-effective means of deriving insights faster and from larger datasets.
The Revolution Is Coming. Don’t Be Left Behind

The improvements and innovations in SAP HANA 2.0 SPS 03 can boost performance and help enterprises do more, more intelligently, with their data. These improvements include incremental steps for better analytics, faster application development, and more efficient data management. With these improvements also comes a radical step forward for database design and management with the SAP HANA platform: support for Intel Optane DC persistent memory. Intel Optane DC persistent memory with SAP HANA 2.0 SPS 03 moves the SAP HANA platform beyond innovative and makes it revolutionary for enterprise data, opening up new possibilities for in-memory databases and new configurations between memory and storage.