SAP Solution in Detail
SAP HANA

SAP HANA®: The Only Platform for the Intelligent Enterprise

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Quick Facts

Summary
SAP HANA® is a comprehensive platform that combines a robust database with services for creating innovative applications. It enables real-time business by converging transactions and analytics on one in-memory database. Running on premise or in the cloud, SAP HANA untangles IT complexity and democratizes in-memory computing, bringing significant savings in data management and empowering decision-makers with new insight and predictive power.

Objectives
- Accelerate response and analysis while simplifying IT
- Acquire and integrate data from a wide range of sources to boost visibility
- Uncover new insights to help stakeholders work smarter
- Ride the next wave of change with innovative new applications
- Maintain security and business continuity

Solution
- Advanced in-memory processing to reduce latency to a minimum
- Real-time insight from Big Data and the Internet of Things
- Integrated data replication and virtualization that increase scalability and lower complexity
- Support for modern applications that use multimodel data such as geospatial and streaming data
- Tools to help keep business secure, minimize downtime, and support compliance with security standards

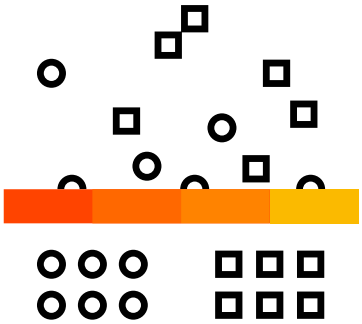
Benefits
- Accelerate data processing for real-time insight and action
- Draw insight from complex data sets and ongoing transactions without compromising data privacy
- Reimagine business processes and create innovative applications
- Achieve business agility and streamline IT

Learn more
For more on using SAP HANA, visit us **online**.

Accelerate with Simplicity

An intelligent enterprise requires a business-ready data platform that helps you **find the signal in the noise and unleash your data's potential** for better business outcomes. SAP HANA® provides the next-generation data management foundation for SAP® solutions. It also helps you develop applications that deliver intelligent solutions for the enterprise quickly.

SAP HANA is one of the first data management platforms to handle both transactions and analytics in-memory on a single data set. It converges a future-proof database with advanced analytical processing and capabilities for application development, data integration, and data quality. Embedded in a robust, modern security framework, it supports compliance with the latest security standards and data protection regulations. You gain a single secure environment for your mission-critical data assets. You can manage large volumes of structured and unstructured data efficiently, leveraging the value of your business data while improving total cost of ownership (TCO).



With SAP HANA, you can **manage large volumes of structured and unstructured data** efficiently, leveraging the value of your business data.

Reimagine Your Database

SAP HANA is built on an in-memory columnar store optimized for both transactional and analytical workloads, enabling the benefits of multicore processing, modern storage technology, and the single-instruction, multiple-data-instruction set. It's compliant with requirements for the atomicity, consistency, isolation, and durability (ACID) standards.

Intuitive modeling tools and preconfigured function libraries let you run complex business logic directly inside the database. That means you avoid latencies from moving data between the database and application server tiers.

Multitenant databases can be managed as one while maintaining their isolation from one another. The data-tiering capabilities of SAP HANA, such as extension nodes, allow you to maximize your value by balancing performance and cost of data storage. This enables administrators to control which data is kept in-memory and which is kept in alternative persistent data storage. At the same time, the multistore tables in SAP HANA mean that where and how data is stored is transparent to consuming applications.

The SAP HANA native storage extension optimizes the cost-to-performance ratio for warm data access by providing simplified, scalable data tiering for various data types and workloads in both scale-up and scale-out configurations. The feature loads warm data from a disk into memory automatically when queries need to access it. A data tiering advisor maintains database-access pattern statistics and gives recommendations on which database objects to tier to warm storage. The data lake of the SAP HANA Cloud data platform enables petabyte-scale storage and access through standard SAP HANA Cloud clients. With this data lake, you can expand your data storage into the cloud, whether you run SAP HANA on premise or in the cloud.

SAP HANA is the first major database optimized for Intel® Optane™ persistent memory, enabling it to process larger volumes of data in real time with increased memory capacity while reducing TCO. This improves business continuity and reduces downtime, as data is persistent in main memory. To learn more, visit us **online**.

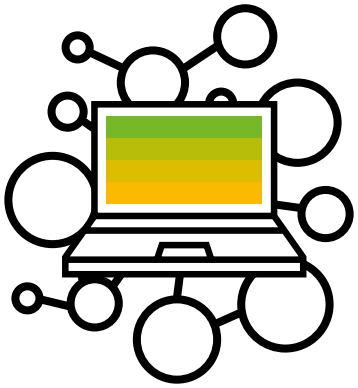
The data lake of SAP HANA Cloud enables **petabyte-scale storage**.

Act with Live Intelligence

SAP HANA provides next-generation hybrid transactional/analytical processing (HTAP) with advanced analytics capabilities to help business leaders understand information in context and achieve situational awareness to act in the moment. This includes native high-performance predictive and machine learning algorithms and integration with TensorFlow for R through native APIs and dedicated machine-learning clients to reveal meaningful patterns in data and build applications that can learn and automate manual business processes. Text analysis and search capabilities help extract real insights from unstructured textual data in many different languages.

Advanced services simplify custom modeling and help accelerate development of location-aware business applications. Services include geocoding, open-source geospatial services and APIs available in the cloud, ready-to-use statistical models, and an intuitive labeling tool based on machine learning. SAP HANA also supports spatial clustering using rectangular grids and density-based spatial clustering of applications with noise (DBSCAN). It further supports hexagon clustering, a method that provides better insights from relational spatial data, for example, connectivity or movement paths. New methods of linear referencing and geometry editing of spatial data are provided for processing large data sets.

SAP HANA can store, query, and apply machine learning to streaming data from sensors, plant equipment, and IoT devices; time-series data such as price fluctuations and information on machine efficiency; and highly interconnected graph data. It provides a JavaScript Object Notation (JSON) document store. These powerful capabilities can be leveraged with standard SQL, enabling data to be combined from standard relational databases, spatial and graph data, and data stored in a JSON document. Many new possibilities can help you reimagine business models.



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Innovate with Confidence

To achieve business insight in real time, SAP HANA helps you innovate with confidence.

SAP HANA connects with existing applications using open standards and offers a choice of ways to build applications that are Web based or based on microservices. SAP Web IDE for SAP HANA offers a comprehensive lightweight tool set for data modeling and application development. SAP business applications and extension applications built natively on SAP HANA can share the same security model. This way you don't have to rebuild the authorization model again on SAP HANA to mirror what has been set up in the SAP application that is already running.

The SAP HANA Cloud data platform is available as an application service on SAP Cloud Platform. You can start with architecture and design and transfer models between on-premise and cloud versions in hybrid cloud environments. ABAP® programming language programmers and users of SAP PowerDesigner® software can exploit the power of SAP HANA with their preferred tools as well.

The application development capabilities of SAP HANA include support for a variety of programming languages, including JavaScript (Node.js), Java, and Python through native APIs, but they also let you bring in additional languages and runtimes. SAP HANA contains several embedded business functions, such as discounted cash flow and interest rate management, to accelerate development. The functions run inside the database for optimal performance and can be called directly from SQL or used within SQLScript. SAP HANA includes a framework that lets you create your own data processing algorithms to run inside the database. You can build enterprise-class non-SQL (NoSQL) applications with support to store schema-flexible data in JSON format. You can combine JSON data with structured data, then query or analyze it using SQL.

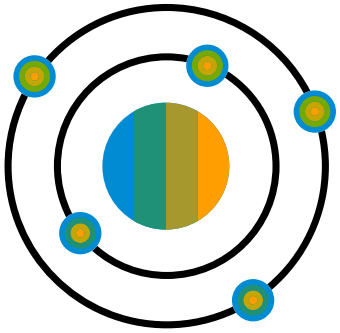
The express edition of SAP HANA is a free developer version that can be used for developing real-time applications directly on your PC, Mac, or in your private cloud. Examples of what you can develop include personal learning, group training, testing, demo, and validation software, as well as software for productive use. The express edition of SAP HANA is updated with each release of SAP HANA, so it always features the latest capabilities, including support for the Kubernetes open-source container-orchestration system. You can **download** the express edition for free. You can also find it listed on AWS Marketplace, where you have the option to extend its memory capacity to 256 GB, and on Google Cloud and Microsoft Azure marketplaces. An additional container image has been added in the Docker Store.

Optimize Data Access, Integration, and Quality Management

SAP HANA offers built-in functionality to virtualize access to data within the enterprise in order to deliver information agility. Data can be integrated, cleansed, and synchronized with SAP HANA. This includes support for connecting to and federating optimized queries to remote sources. It is transparent to the consumer while delivering trusted data to the enterprise.

With smart data access, you can federate queries to external data sources, such as other databases, Web services, files, Apache Hadoop, and Apache Spark, to perform queries without costly data movement. When you need to move data into SAP HANA in batch or real time or from SAP HANA to other software systems, smart data integration helps you do so to support informed decision-making with visibility. With smart data quality, you can parse, standardize, and validate attributes such as name and address; perform geocoding; and identify duplicates and relationships between entities.

Finally, features for remote data synchronization help you synchronize data bidirectionally between SAP HANA and the SAP SQL Anywhere® suite. The remote data may be embedded in devices or applications on the edge, beyond the reach of high-bandwidth connections. That means you can synchronize data on the edge and shorten response times across the enterprise.



With SAP HANA smart data access, you can **federate queries to external data sources**, such as other databases, Web services, files, Apache Hadoop, and Apache Spark, to perform queries without costly data movement.

Achieve Cloud Freedom

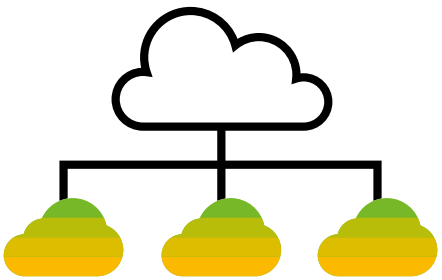
To help you maintain agility, SAP HANA scales up and out to support many deployment scenarios and is available for use in public and private cloud environments. For on-premise installations, SAP HANA supports performance-optimized deployment on hardware appliances from SAP partners, as well as the tailored data-center integration model, which lets you use existing hardware and infrastructure components for your deployment of SAP HANA software.

A hyperconverged infrastructure (HCI) provides an IT framework for software-based, centralized management of computing, storage, network, and other components in a single environment. This simplifies management of your private cloud deployment, builds the bridge to the public cloud, reduces data center complexity, and increases scalability. See the **hardware directory** for a choice of certified and supported hardware from SAP partners.

With the multi-cloud capabilities of SAP HANA, you can develop once and deploy elsewhere. You can manage, deploy, virtualize, move, and scale from on-premise, hybrid, or any cloud infrastructure supported by SAP or third-party software. As a result, you can avoid vendor lock-in and integrate with other cloud-native services to build composite applications.

SAP HANA Cloud is a cloud-native data platform providing a single access point to your data. It offers multi-cloud connectivity, multitemperature data storage, and a multipetabyte data lake. Sign up for a free SAP HANA Cloud trial **here**.

SAP HANA Cloud is consumable through SAP Cloud Platform and the SAP HANA Enterprise Cloud service, a managed private cloud offering from SAP, or through other third-party cloud services. Examples include Amazon Web Services, Google Cloud, IBM Cloud, and Microsoft Azure. For details on deployment options for SAP HANA, refer to the "**Landscape Definition Guide for SAP HANA**."



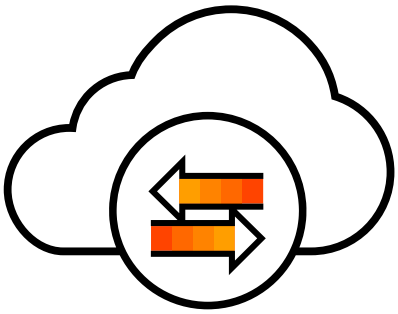
Sign up for your **free trial** of SAP HANA Cloud now.

Maximize Availability and Reduce Administration

SAP HANA protects your business against a broad range of outages, from software error to natural disaster. You can minimize downtime and shorten recovery times using multitier and multitarget secondary system replication options that can change replication paths automatically after system failures. You can offload read-intensive workloads to secondary systems at regional locations with the SAP HANA active/active read-enabled option for additional load balancing, hardware utilization, and local-read access to data. And you can follow the sun and optimize the latency for written transactions across geographically distributed landscapes by rotating the primary system across data centers as business activities come to life in new time zones.

Several tools help you monitor infrastructure health:

- The SAP HANA cockpit is a Web-based tool that lets you manage and monitor multiple instances of SAP HANA and provides recommendations for system optimization and data tiering based on actual operating conditions. A security dashboard in the cockpit helps you meet compliance requirements with confidence and operate applications running on SAP HANA on the same solid security foundation.
- SAP Solution Manager supports holistic monitoring of SAP applications running on SAP HANA.
- A modern tool set for platform lifecycle and performance and landscape management, operations, and automation provides in-depth insights on query execution plans and resource utilization.
- SAP Landscape Management software is a tool to help you monitor your infrastructure health from a single pane of glass.



You can **minimize downtime and shorten recovery times** using multitier and multitarget secondary systems and one of several high-availability and disaster-recovery solutions delivered with SAP HANA.

Comply with Security and Data Protection Regulations

Real-time, embedded data anonymization technology lets you squeeze maximum value from your data while supporting compliance with increasingly strict data protection regulations. Modern data anonymization techniques such as k-anonymity, differential privacy, and l-diversity render personal data disconnected from an individual. This empowers business users and data scientists to "know without seeing" and explore new business opportunities for data as a service.

Robust authentication, user management, and authorization protocols help ensure that users access only the data they have permission to see and handle. Extended Lightweight Directory Access Protocol (LDAP) integration enables automated user provisioning and native LDAP authentication. Combined with sophisticated encryption for data both at rest and in motion, these techniques give SAP HANA solid security against cyberattacks and unauthorized data access. Dynamic data masking for tables and views lets you display only what each user is authorized to see. Data access can be recorded in the standard auditing framework using configurable retention policies. And since complex security authorizations can be easily shared between native applications and extensions running on SAP HANA and SAP business applications, developers can create innovative applications on SAP HANA covered by the same 360-degree security strategy (see the figure on the next page).

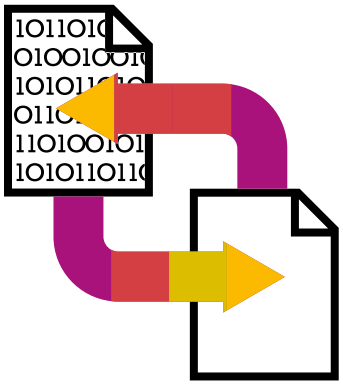


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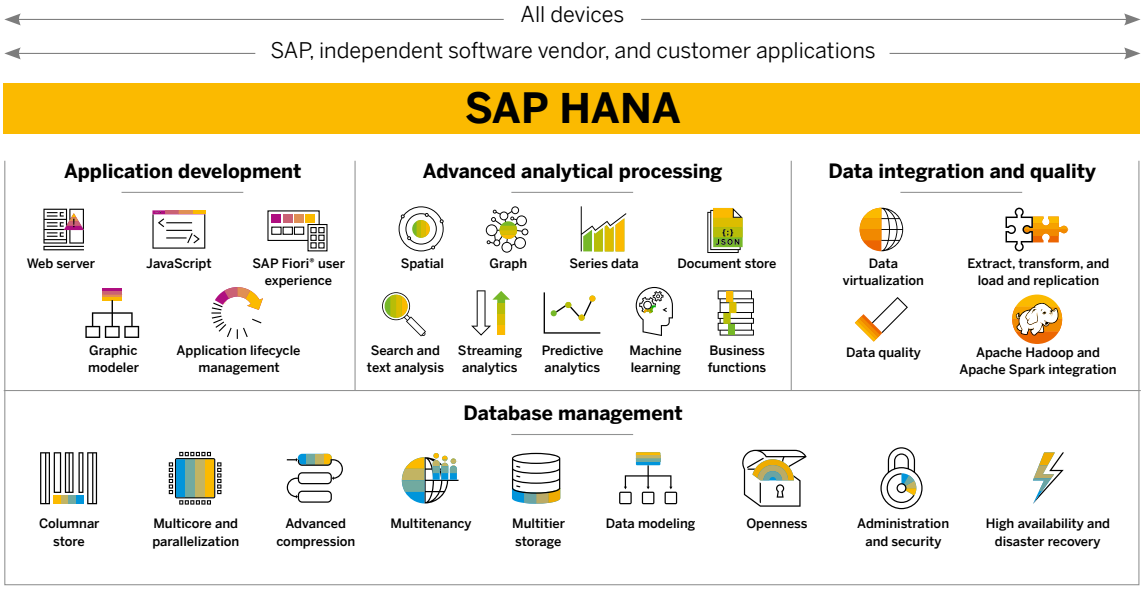
Figure: Building Next-Generation Applications with SAP HANA

The benefits of SAP HANA®

Accelerate with simplicity | Act with live intelligence | Innovate with confidence | Achieve cloud freedom



*Hybrid transactional/analytical processing

Tally the Benefits of Deploying SAP HANA

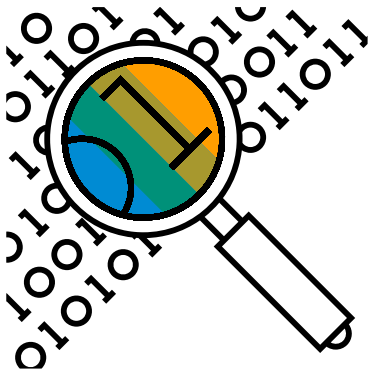
Companies worldwide use SAP HANA to transform their business and create value. To deliver timely action and to accelerate with simplicity, SAP HANA can help you unleash next-level performance with a modern all-in-one, no-compromise business data platform that democratizes in-memory computing.

To support situational awareness, SAP HANA provides next-generation HTAP with advanced analytics, so you can act and decide with live intelligence. SAP HANA allows you to act smarter by developing live, intelligent applications with comprehensive analytical processing, including machine learning.

To innovate with confidence, SAP HANA offers a sophisticated application development framework with advanced real-time data anonymization and privacy that allows you to safely adapt to change and to know without seeing.

To achieve cloud acceleration, SAP HANA is the hybrid and multi-cloud data platform that gives you the freedom to move to the cloud at your own pace without cloud vendor lock-in. SAP HANA allows you to adapt to change safely by embracing a next-generation business data platform for any cloud environment.

At the same time, it lets you simplify your IT landscape and reduce administrative effort by consolidating multiple workloads and multimodel data. With its extensive architecture, SAP HANA gives you real-time insight into live transactional data. With SAP HANA, you can deliver the solutions needed immediately – while reducing complexity and infrastructure demands to a minimum.



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