Lenovo Solutions for

SAP HANA

Innovative Solutions for the Intelligent Enterprise

Enabling the Digital Enterprise

Enabling the digital enterprise and developing business analytic solutions are the key to understanding challenges and responding to them proactively. To develop successful strategies in today's challenging environment, you need more access to critical enterprise insights than ever before.

And because data volumes are growing exponentially, your technology solutions must easily scale performance, manage huge volumes efficiently and operate reliably. These are complex demands. But breakthrough technologies can help you meet all these difficult demands now, while still accommodating for future growth.

Lenovo Solutions for SAP HANA® provide outstanding capability for SAP HANA to drive enterprise-critical insights in real time. Powered by a wide range of ThinkSystem and ThinkAgile servers, the solutions are designed to improve your SAP HANA data foundation and help lower total cost of ownership. Available as appliances or custom Tailored Datacenter Infrastructure (TDI), Scale Up or Scale Out, traditional CapEx or OpEx, large enterprise or SMB, Lenovo Solutions for SAP HANA can support the requirements and growth plans of any business and are backed by Lenovo Services expertise acquired from more than 15,000 SAP HANA systems implementations to date.

SAP's Next Generation Data Platform

SAP HANA is a comprehensive data platform. It enables real-time business by converging transactions and analytics on one in-memory database platform for application development, data integration, and data quality. Running on-premises or in the cloud, SAP HANA empowers decision-makers with new insight and predictive power. Manage large volumes of structured and unstructured data efficiently, leveraging the value of your business data while improving total cost of ownership (TCO). SAP HANA provides a single, secure environment for all your mission-critical data assets, supporting compliance with the latest security standards and data protection regulations.

Highlights:
- Gain insights faster with real-time input and analysis of mission-critical data assets while supporting compliance with the latest security standards and data protection regulations
- Lenovo Solutions for SAP HANA support a wide range of server platforms to fit any environment, and are available in appliance, TDI (customized), and private cloud offerings
- Lenovo TruScale IaaS offers an opex-based cloud consumption model for on-premises infrastructure, better aligning expense with business use
- Lenovo server and storage components are listed in the Certified and Supported SAP HANA Hardware Directory

Key benefits include:

- Gain new insights from advanced analytics for business, text, spatial, graph and series data

- Obtain a complete and accurate view of your business by accessing data from any source – internal or external. Process transactions and analytics data wherever it resides using data virtualization, integration or replication.

- Develop next-generation applications that combine analytics and transactions, and deploy them on any device, with best-in-class development tools

- Take action in the moment by using in-memory database services to process high-speed transactions and analytics

- Keep your communications, data storage, and application services secure with robust identity and access management controls

The SAP HANA platform is the next-generation data management foundation for all SAP business applications, with SAP announcing its business application suite will only support SAP HANA starting in 2027. SAP customers currently on SAP R3 or ECC will need to migrate to SAP S/4HANA by that date.

Robust and Reliable Infrastructure Platform

Lenovo offers a wide range of SAP HANA solutions - from appliances to TDI offerings to a private cloud experience with SAP HANA Enterprise Cloud, customer edition, and Lenovo TruScale Services.

The solutions are based on bare metal ThinkSystem and software-defined ThinkAgile servers - high performance systems that consistently hold numerous SAP world performance benchmarks. Engineered for always-on productivity, ThinkSystem and ThinkAgile servers are ranked high in x86 server customer satisfaction and #1 in x86 server reliability[1].

ThinkSystem Server	SAP Certified Appliances		
	S/4HANA OLTP	BW/4HANA OLAP	Scale Out
SR950	Up to 12 TB	Up to 6 TB	Up to 94 nodes
SR860 V2	Up to 6 TB	Up to 3 TB	
SR650	Up to 3 TB	Up to 1.5 TB	

Appliance Solutions

SAP HANA appliances combine preconfigured SAP software optimized on proven Lenovo ThinkSystem hardware. This approach offers you a solution optimized for the performance needs of an in-memory data platform with fast implementation and full support from both SAP and Lenovo. Lenovo offers SAP certified appliances with ThinkSystem SR950, SR860 V2 and SR650 servers.

SAP HANA appliances with mission-critical Lenovo ThinkSystem SR950 servers help you make faster more informed decisions, even with escalating data loads. The solution is designed to maximize your system performance to provide a smarter, more efficient approach to resource management. This results in excellent SAP HANA application value.

The ThinkSystem SR950 is a 4U rack server capable of supporting up to 8 processors. It features a modular system with all components accessible via the front or rear of the server helping to simplify server management and service. The SR950 supports up to 12 NVMe drive bays for increased storage at lower latency and up to 24 hard disk or solid-state disk drive bays for increased storage capacity. Support for 256GB 3DS RDIMMs enables up to 12TB of memory in a four-socket configuration and 36TB of memory in an eight-socket configuration.

Used by SAP for next generation SAP HANA development, the powerful ThinkSystem SR950 mission critical servers are ideal for your most demanding SAP HANA deployments, providing superior capability and greater business value.

The SR950 and SR860 V2 currently hold world record performance for 9 SAP Business Warehouse Edition for SAP HANA benchmarks[2]. The SR950 4-socket and 8-socket system configurations contain Intel® Xeon® Scalable processors and Intel® Optane™ persistent memory and are verified by Intel as **Intel® Select Solutions for SAP HANA**.

SAP HANA appliances with Lenovo ThinkSystem SR860 V2 servers provide the speed, reliability, scalability and workload versatility needed to manage the explosive growth of data.

The ThinkSystem SR860 V2 offers considerable adaptability in order to match system configurations to projected workloads. It is a 4U rack server supporting 2 or 4 processors in a mesh topology. The system design permits rapid upgrades for processors and memory, resulting in greater system performance to handle growing next-generation workloads. The SR860 V2 has a large, flexible storage capacity to keep pace with data growth, supporting up to 48 2.5-inch drives, 24 of which can be NVMe drives - ideal for latency-sensitive applications and storage tiering.
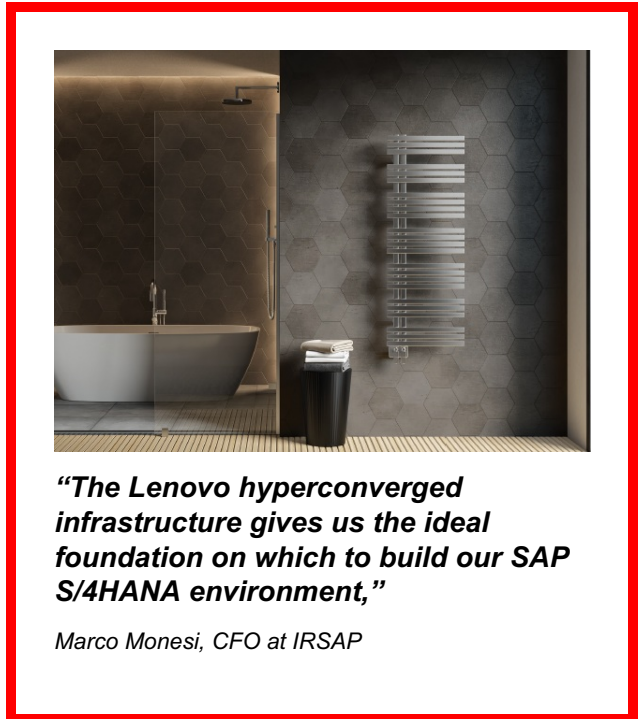
SAP HANA appliances with Lenovo ThinkSystem SR650 provide extensive flexibility to fit almost any customer environment.

The ThinkSystem SR650 is a 2U rack server capable of supporting up to 2 processors. It is designed to handle a wide range of workloads, providing scalable performance, storage capacity, and I/O expansion. It supports up to 4 NVMe drive bays, and up to 24 hard disk or solid-state disk drive bays for storage capacity. Support for 128GB DIMMs enables up to 9 TB of memory.

TDI Solutions

SAP HANA TDI solutions offer more flexibility when integrating an SAP HANA system into your existing data center layout. Costs can be lowered with SAP HANA TDI solutions by using CPUs that better meet business needs using Lenovo expert sizing vs. top tier CPUs required for SAP appliances.

This approach also enables a reduction in hardware and operational costs through the reuse of existing hardware components and operational processes. With TDI implementations, you are responsible for organizing support with the various vendors.

"The Lenovo hyperconverged infrastructure gives us the ideal foundation on which to build our SAP S/4HANA environment,"

Marco Monesi, CFO at IRSAP

Supported Intel Systems

A wide range of Lenovo servers are available for SAP HANA TDI solutions. Many rack-mounted ThinkSystem servers and Flex System server nodes are Certified and Supported SAP HANA Hardware for TDI implementations.

Certified HCI Systems

The Lenovo ThinkAgile HX (Nutanix-based) and VX (VMware-based) hyperconverged servers enable you to dramatically simplify your server, storage and virtualization deployments and pool your resources into a single virtualized infrastructure for more flexible and efficient utilization and management.

Recent enhancements include:

- **8-socket ThinkAgile VX support**. Lenovo is the only vendor with an 8-socket vSAN solution supported by SAP for OLTP environments up to 12 TB of memory.

- **ThinkAgile HX support for SAP HANA with VMware ESXi**. Customers now can run their SAP HANA and SAP applications in a VMware virtualized environment with Lenovo ThinkAgile HX. Previously, SAP HANA was only supported with Nutanix' Acropolis (AHV) hypervisor.

Certified Enterprise Storage

Lenovo offers certified solutions that leverage external SAN and unified storage or maximize internal server storage for your SAP HANA data needs. The result is choice and simplified infrastructure for your SAP HANA applications.

ThinkSystem DM Series

The ThinkSystem DM Series improves customer TCO and time to value with their advanced data management features offered through ONTAP. The Unified Architecture of block and file workloads allows customers to reduce their hardware requirements and utilize one management system for both NAS and SAN deployments.

Users will benefit from backup and recovery based on storage Snapshot copies using ONTAP SnapCenter. The built-in Asynchronous and Synchronous replication provide storage-based Disaster Recovery capabilities. When running SAP HANA on the DM Series All Flash Arrays, customers are protected from unexpected events by simply utilizing the included features on DM Series. The DM7100F significantly improves customer performance with NVMe support.

ThinkSystem DE Series

The ThinkSystem DE Series provides excellent performance at an affordable price, making it the ideal solution for cost-conscious businesses. The DE Series deliver up to 1.0M sustained IOPS and response times measured in mere microseconds. They also generate up to 21GBps of read throughput, enough for even your most bandwidth-intensive workloads.

Availability features on the DE Series include:

- Fully redundant architecture with automated failover
- Intuitive storage management with comprehensive tuning functions
- Advanced monitoring and diagnostics with proactive repair
- Snapshot copy creation, volume copy, and asynchronous mirroring for data protection.

IBM Spectrum Scale

IBM Spectrum Scale™ software allows you to move beyond simply adding storage to optimizing SAP HANA data management. Spectrum Scale allows seamless capacity expansion in order to handle the explosive growth of SAP HANA data.

When Spectrum Scale is coupled with the workload-optimized ThinkSystem SR950 server, you can create multi-node, scale-out configurations that enable you to achieve larger SAP HANA memory sizes by simply adding server compute nodes.

These multi-node, scale-out configurations support up to 94 nodes for SAP Business Warehouse and data mart workloads as well as up to four nodes for SAP S/4HANA workloads.

"With SAP HANA on Lenovo systems, we can provide decision-makers with the real-time insight they need to make the best business decisions."

Anwar Raafat, Solutions Director at Integrated Diagnostics Holdings

Resilient Enterprise Platform

Speed and scalability are vital to your system's success. Yet unplanned or excessive system downtime can neutralize performance and agility advantages, so system availability and dependability are equally important. That is why you need a highly available solution designed to keep your system up and running and your business thriving.

Lenovo servers offer superior reliability, availability and serviceability features for SAP HANA customers. Self-monitoring, error detection, self-healing, and predictive failure analysis help protect the system against consumed errors that could reach critical applications. Lightpath diagnostics, corrupt data containment and Fault Resilient Boot help predict and quickly identify issues which helps decrease system downtime. The result of built-in system protections is outstanding system resilience.

When Lenovo servers are combined with ThinkSystem DM Series, or Spectrum Scale, the resulting Lenovo solutions for SAP HANA help:

- Ensure business resiliency through integrated high availability and disaster recovery capabilities to/from the cloud

- Perform maintenance and serviceability faster

- Eliminate restarts by minimizing the number of system "touches"

- Reduce downtime with self-healing architectures

- Maintain high availability by eliminating production outages

- Secure information with comprehensive data protection capabilities

Deploying SAP HANA in a modular, multi-node scale-out configuration allows a high availability (HA) approach that is exclusive to Lenovo. Including an additional HA node in your configuration, enables Spectrum Scale replication and automatic failover capabilities using the additional stand-by node to protect against unplanned outages.

Optimized Configurations

Lenovo has designed and tested several configurations of SAP HANA. These configurations are optimized for performance and scalability. They can be used as is, as building blocks for larger installations, or as a base from which customizations can be made. The current Solution configurations include:

Solution Type	Description
Scale-out Appliance	Supporting high growth, memory intensive workloads in a clustered environment
Scale Up Appliance	Simplified and highly performant single node environment. Faster restarts and extended memory available with Intel Optane PMem.
TDI	Cost-effective option with potential use of existing infrastructure and components that are a better fit for business requirements
Hyperconverged	Cloud-like provisioning and management of compute and storage resources
Business One	Ideal for Small and Medium Business (SMB) customers

These recommended configurations can be found on Lenovo's Data Center Configurator tool at dcsc.lenovo.com. Just select "Deployment Ready Solutions" and then "Databases".

"We are planning to move our SAP application landscape from Microsoft SQL Server to the SAP HANA in-memory database in the near future, so needed a platform certified to support these workloads. The Lenovo ThinkAgile HX Series includes appliances specifically certified for SAP HANA, which put our mind at ease regarding future expansion."

Christian Leoni, Project Leader, Empresa Pública Metropolitana Metro de Quito

Bringing the Cloud to You

For customers wanting to run SAP HANA in the cloud, SAP offers the SAP S/4HANA Cloud, which can be deployed in SAP data centers, using hyperscalers, or in a customer's own data center. This customer data center option is called **SAP S/4HANA Cloud, private edition, customer data center option** (formerly SAP HANA Enterprise Cloud, customer edition) and includes Lenovo server and storage infrastructure and Lenovo TruScale IaaS.

Available only through SAP, private edition delivers a turnkey, OPEX, cloud subscription on Lenovo servers and storage that are SAP HANA certified and supported. It is less disruptive to operations vs. a move to a public cloud provider and offers the merits of an operating expense (OPEX) business model, elastic computing, and is monitored and managed by Lenovo and SAP white-glove services. SAP Cloud Application Services will support the day-to-day running of the applications and help customers with adoption of SAP S/4HANA on their path to the Intelligent Enterprise. Lenovo will supply, install, and manage the required infrastructure for the customer's landscape in a secured environment and utilize TruScale services for consumption-based usage.

There are many reasons customers would want to run private edition, including the need for data sovereignty, specific industry compliance, a low risk tolerance, specific company policies, and limited or no access to SAP data centers or hyperscaler infrastructure options. Private edition provides the same concierge services, service level agreement (SLA), Quality of Service (QoS), and operating expense (OpEx) model as SAP S/4HANA Cloud – but is delivered in the customer data center.

In summary, the customer data center option for SAP S/4HANA Cloud, private edition provides SAP HANA-based applications as a private managed cloud service, on high performance and reliable Lenovo TruScale infrastructure as a Service on-premises, in the customer's data center.

Benefits of SAP S/4HANA Cloud, private edition, customer data center option with Lenovo TruScale:

- **OPEX model** - Private edition delivers a subscription-based, agile, elastic and consistent cloud experience. Combined with Lenovo TruScale, which delivers infrastructure on a pay-for-use consumption-based model, the SAP ce solution costs are all operating expense-based, eliminating the upfront infrastructure capital expense of a classic on-premises solution.

- **Assured Security and Compliance** - Business-critical data remains on site, behind company firewalls, enabling compliance with many governmental and industry-specific customer and data privacy rules.

- **Reduced risk** - Private edition helps you eliminate the cost and complexity of SAP entanglement with third-party and roll-your-own applications by simplifying the interoperability without leaving your data center for a remote cloud environment.

- **Better Performance** - Hosting SAP HANA and associated applications together in the same data center provides measurable and accountable performance metrics assuring better performance outcomes. In addition, Lenovo servers provide leadership performance, currently holding several SAP world record performance benchmarks.

Complementary Offerings

The Lenovo solutions for SAP HANA offers a choice of operating system support allowing you to choose the operating system that best fits your datacenter requirements. You can choose **SUSE Linux Enterprise Server for SAP Applications** or **Red Hat Enterprise Linux for SAP HANA**, and the appropriate subscription and support. In addition, you can choose the Spectrum Scale or SUSE Enterprise Storage software license that matches your configuration requirements along with the appropriate software maintenance and support needed to enhance the availability and resiliency required for large production environments.

Single node configurations use the XFS file system included with the Linux operating system. Scale-out cluster configurations use the Spectrum Scale Server and File Placement Optimizer licenses or SUSE Enterprise Storage licenses.

Lenovo XClarity Administrator is a centralized systems management solution that helps administrators quickly deploy, monitor, and manage their data center infrastructure. This solution integrates easily with Lenovo x86 servers, appliances, certified nodes, Top-of-Rack Ethernet switches, and storage systems. When integrated with **SAP IT Operations Analytics**, the combination offers the best way to monitor data centers with SAP applications running on Lenovo servers.

The **Veeam Availability Platform** combined with best-in-class Lenovo data center infrastructure enables businesses to accelerate their digital transformation: simplify their IT environment, reduce risk, and lower costs with one complete solution for SAP HANA. This includes the SAP HANA certified Lenovo compute platforms, Lenovo HCI platforms (ThinkAgile VX and HX), Lenovo storage platforms (DM and DE Series) and the Veeam Availability Suite. This integration provides customers with the level of data protection they really need and end-to-end availability across all SAP certified Lenovo platforms.

"What impressed us most about Lenovo was that they offer pre-configured server models specially certified for SAP S/4HANA. Because all the hardware components came packaged as a single solution, it took a lot of complexity out of what is a major business transformation project."

Andrés Jiménez, CIO of Aquaservice

Comprehensive Solution Services and Support

To speed deployment and simplify management of your SAP HANA system, Lenovo offers comprehensive solution services and support which include:

- Assessment Services and Design Services
- Hardware installation and deployment services

In addition, Lenovo can provide advanced services including:

- Integrated solution support
- On-going maintenance and updates to hardware, operating system software and Spectrum Scale, ThinkSystem DM Series or DSS-C
- Continuous monitoring of key SAP HANA solution components
- Simplified support processes, with expert consultants assisting with troubleshooting and problem-determination
- Assistance to help improve availability and reduce problem resolution time
- Proactive IT planning and preventative support advice and services

Lenovo Professional Services have an extensive services portfolio to implement your unique SAP HANA solution. Lenovo SAP HANA experts can install, validate hardware and software stack (OS, PFS, SAP), configure networking, basic skills transfer, and provide post-install documentation. You can also ensure your solution is optimized through choosing SAP HANA health-check to assess your environments.

Let Us Help with Old Equipment

Needing to safely and securely dispose of assets? Lenovo Services has the expertise, experience and existing relationships with the best vendors in the ITAD (IT Asset Disposal) industry, allowing us to generate the maximum possible value for your business from this process.

Our expert team will help you meet your corporate and environmental responsibilities, comply with security protocols and **generate unrealized value** from your technology assets.

"Our experience of Lenovo Managed Services has been excellent. We always work with the same dedicated team of consultants, so we have a great relationship with them and they know our systems and our business very well."

Raul Revilla, SAP Basis Administrator at Cheney Brothers

Agile. Scalable. Reliable.

It is no secret your business depends on technology. Therefore, your success depends on how well your mission-critical technology performs. The Lenovo Solution for SAP HANA provides the seamless, scalable and dependable performance needed to extract strategic insights from exploding information volumes helping deliver the bottom-line business results you demand.

Why Lenovo

Lenovo is a leading provider of data center infrastructure solutions. We partner with you to identify, design, install and support the solution that best ensures your organization's needs are met throughout the IT lifecycle. Lenovo complements a portfolio of leading x86 servers with a full range of storage, software, and comprehensive services that provides excellent performance, reliability, and security for your IT environment from the edge to the cloud.

For More Information

To learn more about the Lenovo Solution for SAP HANA, contact your Lenovo Business Partner or visit: www.lenovo.com/sap/hana

Why Intel Select Solutions

Key benefits of investing in an Intel Select Solution from Lenovo include:

- Simplified evaluation. New workload integration and the transition to software-defined infrastructure are two areas where IT managers spend more and more time and money sorting through endless options, searching for optimal solutions. Intel Select Solutions are tightly specified in terms of hardware and software components to eliminate guesswork and speed decision-making.

- Fast and easy deployment. With pre-defined settings and rigorous system-wide tuning, Intel Select Solutions are designed to increase efficiency in IT's testing process, speed time to service delivery, and increase confidence in solution performance.

- Workload-optimized performance. Intel Select Solution configurations are designed by Intel and our partners to deliver to a performance threshold for the workload and are built on the latest Intel® architecture foundation including the recently-launched Intel Xeon Scalable platforms.

[1] ITIC, 2020 Global Server Hardware, Server OS Reliability Report, https://lenovopress.com/lp1117-itic-reliability-study

[2] As of October 20, 2020