The Perfect 4-Socket and 8-Socket Servers for SAP HANA

Article

SAP HANA is an in-memory data platform that is deployable as an on-premise appliance, with certified server and storage hardware through a Tailored Datacenter Integration (TDI), or in the cloud. It is a revolutionary platform, which is best suited for performing real-time analytics, and developing and deploying real-time applications. SAP HANA is a combination of the SAP HANA Database, Data Modeling, SAP HANA Administration and Data Provisioning in one single suite.

Lenovo SAP HANA Solutions include:

SAP HANA with ThinkSystem servers - Drive your business forward with a server that matches your needs. Reduce costs and complexity by investing in a system that handles your organization's SAP HANA requirements today and expands to accommodate future growth.

SAP HANA with ThinkAgile hyperconverged systems - ThinkAgile hyperconverged solutions help speed deployment, simplify management and deliver dramatic data-center efficiency for SAP HANA workloads in Nutanix-based or VMware-based clusters

SAP HANA cloud offerings with TruScale - SAP S/4HANA Cloud, private edition, customer data center option is an SAP offering that utilizes Lenovo TruScale and proven Lenovo server and storage systems to provide an on-premises, opex-based, cloud subscription offering from SAP monitored and managed by Lenovo and SAP white-glove services.

This article will focus on SAP HANA with 4S & 8S ThinkSystem servers

Figure 1. Lenovo ThinkSystem SR860 V2

SAP and Lenovo Partnership

For years, Lenovo systems have provided differentiating advantages for diverse SAP application workloads powering the digital economy. Whether your business is a large enterprise with a high-performance data center or a small office, the Lenovo portfolio of x86 servers, storage, and software can help your organization to align and integrate processes, communicate with employees, partners, suppliers, and customers in new ways, improve efficiency, and fully use your IT investment to increase the value of your business.

SAP and Lenovo have enabled several innovative solution offerings around SAP applications including SAP HANA and the companies continue to drive joint innovation to deliver new strategic solutions. Lenovo is a SAP HANA market leader and has shipped over 16,000 systems to customers worldwide.

The Lenovo solutions for SAP HANA are architected and designed for:

- Better business outcomes with industry leading SAP applications
- Simplified acquisition and deployment with best practice, optimized and proven with end-to-end documentation
- Enhanced service and support throughout the solution lifecycle

SAP and Lenovo have a 360-degree relationship

- Lenovo is a global technology partner of SAP – including joint collaboration on new solutions, benchmark testing and hardware certifications.
- SAP is a customer of Lenovo – leveraging Lenovo infrastructure their SAP S/4HANA Cloud service
- Lenovo is a customer of SAP - with one of the largest SAP HANA deployments in the Asia Pacific region, SAP real-time analytics and mission critical SAP applications (procurement, ecommerce)
- Lenovo is a supplier to SAP – Providing high performance SAP HANA Certified and Supported servers and TruScale IaaS for SAP's S/4HANA Cloud, private edition, customer data center (pe cdc) solution. The pe cdc solution provides a public cloud experience with infrastructure on-premises.

SAP HANA Use Cases

Here are typical use cases for SAP HANA.

SAP S/4HANA

The core use case is the combination of Analytics and Transactions in the environment of one SAP S/4HANA system. This results in data that is operational and available in real-time.

Transactional Systems

- Many Users
- Low data amount
- High Reliability

Transactional Applications include:

- Product planning
- Inventory management
- Shipping and payment
- Sales force automation
- Supply chain management
- Customer relationship management

The transitions to SAP S/4HANA typically fall into one of 3 transition scenarios:

- New Implementation – new or existing SAP customer implementing a new SAP HANA S/4HANA with initial data load.
- System Conversion – complete conversion of an existing SAP Business Suite to SAP S/4HANA.
- Landscape Transformation – consolidation of current regional SAP Business Suite applications or selective data transformation into one global SAP S/4HANA system.

SAP BW/4HANA

The core use case is managing consolidated data across the entire enterprise using a standardized data model to support real time decision making.

Analytical Systems

- Fewer users
- Huge data amount
- High performance

SAP Business Warehouse and analytics applications typically include:

- Business planning & analytical services
- Enterprise reporting, query, and analysis
- Enterprise data warehousing
- Data from SAP & non-SAP applications
- Native SAP HANA as a technology platform

Moving to SAP HANA

All SAP Business Suite customers will need to migrate their applications to S/4HANA (optimized for the HANA database) in addition to the database. 2027 marks SAP's EOS (End of Service) for all databases other than SAP HANA.

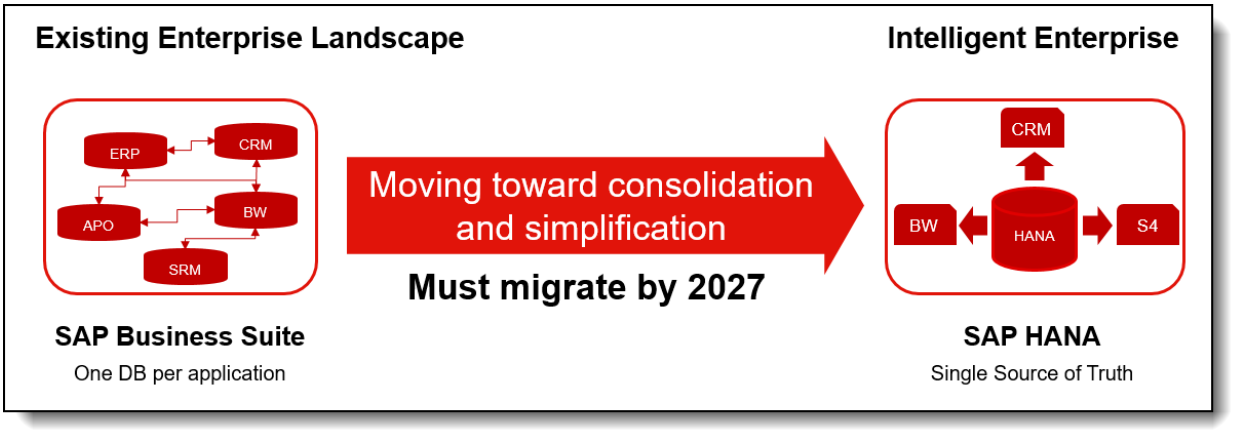

Figure 2. Moving to SAP HANA

So what happens if you don't move to SAP HANA?

- Regulatory Compliance

  Outdated software won't be updated to adhere to new data management regulations, creating compliance risk - especially critical for highly regulated industries: healthcare, finance, etc.

- Decreased Reliability

  As the software becomes ever-more obsolete; unfixable code bugs and incompatibility with related applications lead to more crashes and lost productivity.

- No New Application Functionality

  Staying down level on SAP applications means companies will be missing out on new application functionality, stalling their business transformation and limiting innovation.

- Higher Cost

  Higher costs associated with lost productivity coupled with expensive maintenance packages from either the source application owners or 3rd party service providers.

Lenovo Solution for SAP HANA Overview

With the Lenovo Solution for SAP HANA, your organization will be able to instantly access, model, and analyze all of your SAP business transactional and analytical data from virtually any data source in real time fully enabling the digital enterprise.

The Lenovo Solution for SAP HANA consists of the components shown in the following figure.

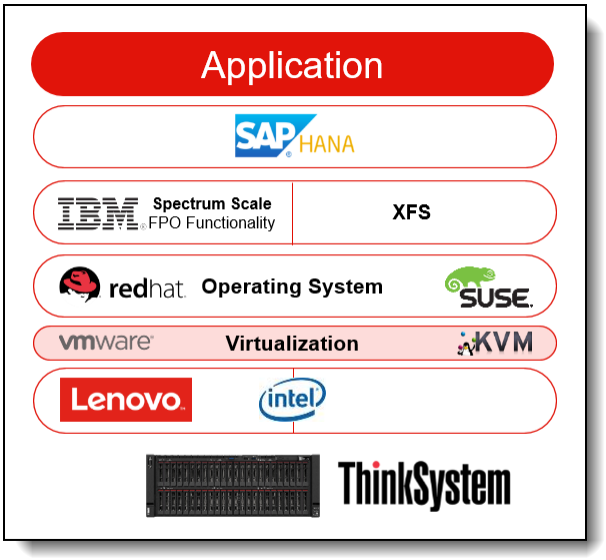

Figure 3. Components of the Lenovo & SAP HANA solution

The Lenovo Solution for SAP HANA helps you make faster more informed decisions, even with escalating data loads. The reason is that the solution is designed to maximize your system performance to provide a smarter, more efficient approach to resource management and scalability. This results in excellent SAP HANA application value and on-going investment protection.

Running on fast and powerful ThinkSystem servers, SAP HANA software can play a critical role in providing the business insights you need from your SAP Business Warehouse (BW), SAP ERP, SAP S/4HANA and other SAP application data. The ThinkSystem servers are designed to provide faster performance and support for more memory. The Lenovo Solution for SAP HANA is purpose-built to support large-scale SAP HANA deployments

Large memory configurations are available for SAP S/4HANA applications. You can scale up memory and also easily create multi-node, scale-out configurations by networking multiple nodes together enabling support for larger SAP HANA memory sizes. This modular approach enables you to grow your infrastructure as your SAP HANA environment grows. In addition, the Lenovo solution integrates high availability with automatic failover features eliminating the need for SAN storage often required in other vendor solutions.

Lenovo also provides the flexibility to choose from a preconfigured solution or a custom Tailored Datacenter Integration (TDI) solution.

SAP HANA Certified 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. The recommended Lenovo 4S and 8S Appliance systems are the SR860 V2 and SR950 servers.

SAP HANA TDI

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. The recommended Lenovo 4S TDI systems are the SR850 V2 servers.

Advantages of the Lenovo Solution

Lenovo has several options and advantages with its SAP HANA solutions.

ThinkSystem SR860 V2 Server Advantages

SAP HANA solutions with Lenovo ThinkSystem SR860 V2 servers provide the speed, reliability, scalability and workload versatility needed to manage the explosive growth of data. The new SR860 V2 provides the highest performance for SAP HANA among 4-socket servers.

The ThinkSystem SR860 V2 offers considerable adaptability in order to match system configurations to projected workloads.

- The SR860 V2 is a 4U rack server supporting two or four, 3 rd Generation Intel Xeon 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.
- Predictive Failure Analysis—Identifies a failing component prior to failure, to enable scheduled parts replacement—rather than reacting after a failure—and minimize or avoid downtime. PFA alerts are available for all major components, including CPUs, DIMMs, adapter slots, fans, PSUs, storage devices, and voltage regulators.
- Light path diagnostics—Onboard component LEDs to instantly identify components needing replacement (based on PFA alerts), for faster serviceability and reduced downtime.
- The latest Intel® Optane™ Persistent Memory 200 Series accelerates performance for in-memory databases and applications, reducing downtime and increasing the availability. High I/O bandwidth coupled with a generous number of PCIe expansion slots provides the additional connectivity scalability as your business and workload demands increase.One or two (mirrored) 7mm or M.2 drives provide rapid OS boot that's faster and more secure than either USB keys or SD cards, and free up drive bays for data storage.
- Up to 4 full size, 300W, double wide GPUs for next generation workloads.
- Predictive Failure Analysis—Identifies a failing component prior to failure, to enable scheduled parts replacement—rather than reacting after a failure—and minimize or avoid downtime. PFA alerts are available for all major components, including CPUs, DIMMs, adapter slots, fans, PSUs, storage devices, and voltage regulators.
- Light path diagnostics—Onboard component LEDs to instantly identify components needing replacement (based on PFA alerts), for faster serviceability and reduced downtime.

The SR860 V2 has several 2S and 4S SAP HANA Appliance certifications:

- 2S Scale-up BWoH/BW4H/DM/SoH/S4H - 192GB
- 2S Scale-up BWoH/BW4H/DM/SoH/S4H - 384GB
- 2S Scale-up BWoH/BW4H/DM/SoH/S4H - 576GB
- 2S Scale-up BWoH/BW4H/DM/SoH/S4H - 768GB
- 2S Scale-up BWoH/BW4H/DM/SoH/S4H - 1152GB
- 2S Scale-up BWoH/BW4H/DM/SoH/S4H – 1.5TB
- 4S Scale-up BWoH/BW4H/DM/SoH/S4H – 2304GB
- 4S Scale-up BWoH/BW4H/DM/SoH/S4H – 3TB
- 2S Scale-up SoH/S4H – 3TB
- 4S Scale-up SoH/S4H – 6TB

ThinkSystem SR950 Server Advantages

The ThinkSystem SR950 mission critical servers are ideal for your largest and most demanding SAP HANA deployments, providing superior capability and greater business value. The SR950 is the recommended platform for 8 socket or 4 socket with the expectation to upgrade to 8 socket.

The 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 increase storage at lower latency and up to 24 hard disk or solid state disk drive bays for increased storage capacity. Support for 128GB 3DS RDIMMs enables up to 12TB of memory in an eight socket configuration.

The SR950 has several 2S, 4S and 8S SAP HANA Appliance certifications. In addition to the memory sizes offered by the SR860 V2, the SR950 also provides:

- 4S Scale-up SoH/S4H – 4.5TB
- 8S Scale-out BWoH/BW4H/DM – 6TB
- 8S Scale-out S4H – 6TB
- 8S Scale-out S4H – 9TB
- 8S Scale-out S4H 12TB
- 8S Scale-up BWoH/BW4H/DM/SoH/S4H 4.5TB
- 8S Scale-up BWoH/BW4H/DM/SoH/S4H 6TB
- 8S Scale-up SoH/S4H – 9TB
- 8S Scale-up SoH/S4H – 12TB

ThinkSystem SR850 V2 Server – TDI Advantage

The SR850 V2 supports SAP HANA via a Tailored Data Center (TDI) approach. While an SAP HANA Certified Appliance with SR860 V2 or SR950 is simple and comfortable, it might introduce some limitations regarding hardware flexibility and it may require changes to your established IT operation processes. TDI provides flexibility regarding the hardware components required to run SAP HANA.

SR850 V2 Key Features:

- 4S Density – 2U, 4S dense server
- High Memory and - up to 48 DIMM and 12TB of memory
- Compute and Memory Scalability – scale from 2 CPUs to 4 CPUs, up to 48 DIMM and 7x PCI
- Storage Capabilities – Up to 24 storage bays and up to 24 NVMe

Lenovo Storage Advantage

Lenovo also offers several storage options for SAP HANA, including:

- IBM Spectrum Scale (with SR950)
- SAN Storage based on ThinkSystem DM or DE Series arrays

Lenovo offers the DM and DE Series storage arrays. ThinkSystem DM and DE Series storage can be deployed as part of a SAP HANA tailored data center integration (TDI). The DM and DE Series storage arrays are well equipped for demanding SAP HANA environments. These elite storage systems deliver on the customer requirements for an SAP HANA deployment, which include: Lower TCO, Fast Time to Value, High Service Levels and Efficient Disaster Recovery capabilities. They also offer superior reliability through their six 9’s of availability and serviceability features.

When IBM Spectrum Scale is coupled with the workload-optimized ThinkSystem SR950 server, you can combine multiple server models to create multi-node, scale-out configurations. Multi-node, scale-out configurations enable you to achieve larger SAP HANA memory sizes by simply adding server compute nodes. The validated multi-node scale-out configurations do not require a storage area network (SAN), because Spectrum Scale has the unique capability to use the storage contained within each server node.

High Availability

The Lenovo Solution for SAP HANA offers superior reliability, availability and serviceability features. Consistently ranked #1 in reliability by ITIC , Lenovo servers offer capabilities to protect the system against consumed errors that could reach critical applications. Self-monitoring, error detection, and self-healing along with predictive failure analysis. Light path 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.

Choice of Operating Systems

The Lenovo Solution for SAP HANA, also 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.

Lenovo Service and Support

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

- Pre-planning, on-site installation and configuration
- On-going maintenance and system updates
- Hands-on skills transfer and detailed post-installation training and documentation

In addition, Lenovo can provide remote Managed Services which includes:

- Integrated solution support
- On-going maintenance and updates to hardware, operating system software and Spectrum Scale 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

SR860 V2 and SR950 SAP HANA World Record Performance

The Lenovo ThinkSystem SR860 V2 and SR950 holds 4 performance world records with the 4 socket SAP HANA BWoH benchmark (as of August 1, 2021). This includes data load, query throughput and query runtime.

SR860 V2 - SAP HANA World Records

1.3 Billion records – All 3 KPI phases (Data Load, Query throughput and Query runtime). Link to Performance Benchmark Result

Summary Config:

- 4x 8380HL CPUs
- 1.5TB DRAM memory

5.2 Billion records – 2 KPI phases (Data Load and Query runtime). Link to Performance Benchmark Result

Summary Config:

- 4x 8380HL CPUs
- 3TB DRAM memory

7.8 Billion records – 2 KPI phases (Data Load and Query throughput). Link to Performance Benchmark Result
Summary Config:

- 4x 8380HL CPUs
- 4.5TB DRAM memory

SR950 - SAP HANA World Records

10.4 Billion records – All 3 KPI phases (Data Load, Query throughput and Query runtime). Review the Performance Benchmark Result

The SAP BW Edition for SAP HANA (BW/4HANA) Standard Application Benchmark is the latest addition to the list of SAP BW benchmarks and goes well beyond the scope and features used in the BW-AML benchmark. The new benchmark is designed to fully utilize the new capabilities of SAP HANA to process the benchmark workload. The benchmark consists of three phases data load, query throughput and query runtime.

The benchmark scenario represents typical mid-size customer scenario and volumes for SAP BW running on SAP HANA. The benchmark simulates a variety of users with different analytical requirements and measures the key performance indicator (KPI) relevant to each of the three benchmark phases.

The three benchmark phases are as follows:

1. Data load phase, testing data latency and load performance
2. Query throughput phase, testing query throughput with moderate complex queries
3. Query runtime phase, testing the performance of running very complex queries

Conclusion

The Lenovo and SAP partnership is continually developing new solutions to solve your data analytics needs. These solutions deliver competitive advantages for SAP HANA platforms. Incorporating the latest processor and memory technology, Lenovo's ThinkSystem and ThinkAgile servers and storage systems provide numerous advantages including high reliability, scalability and World Record SAP HANA and application performance. These certified solutions are available as appliances or standalone systems in a TDI or customized environment. In appliance environments, we recommend the Lenovo SR860 V2 and SR950 4S and 8S systems for large SAP HANA workloads. For customized TDI environments, we recommend the Lenovo SR850 V2.

About the author

Randall Lundin is a Senior Product Manager in the Lenovo Infrastructure Solution Group. He is responsible for planning and managing ThinkSystem servers. Randall has also authored and contributed to numerous Lenovo Press publications on ThinkSystem products.

This article is one in a series on the ThinkSystem SR850 V2 and SR860 V2 servers:

- Five Highlights of the Lenovo ThinkSystem SR850 V2
- Five Highlights of the Lenovo ThinkSystem SR860 V2
- Why Scale-Up With 4S and 8S Servers?
- Unique Intel Features Available with ThinkSystem SR850 V2 and SR860 V2
- ThinkSystem SR860 V2 is the New 4S Performance Leader
- The Value of Refreshing Your 4-Socket Servers with the ThinkSystem SR860 V2 and SR850 V2
- **The Perfect 4-Socket and 8-Socket Servers for SAP HANA**
- Total Cost of Ownership Comparison of Running SAP HANA on Lenovo ThinkSystem Servers

Related product families

Product families related to this document are the following:

- ThinkSystem SR850 V2 Server
- ThinkSystem SR860 V2 Server
- ThinkSystem SR950 Server

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