

Achieving Better Long-Term TCO for High-Volume SAP HANA® Workloads

Scalability proves to be the key to hardware value for SAP HANA workloads at 12 TB and larger

Executive Summary

As the volume of data available to businesses grows ever greater, large-scale in-memory online transaction processing (OLTP) and analytical workloads require a previously unseen scale of memory. A principle software platform for using data at this scale is SAP S/4HANA®. Prowess Consulting examined three competing scale-up hardware solutions for the SAP HANA® platform with memory sizes of 12 TB or more to determine the most cost-effective solution. Due to its unique method of scaling memory, we found that the Lenovo™ Scalable Solution for SAP HANA scaled more readily, and to a greater capacity, than any competing alternative. Such capabilities for scaling translate into a solution that is best positioned for a typical five-year lifecycle. Moreover, the Lenovo™ solution costs less upfront and provides managed services that can reduce operating expenses and complexity.



Up to 19%

less expensive server-to-server than comparable or smaller-memory SAP HANA® Tailored Datacenter Integration (TDI) offerings.¹



Up to 26%

less expensive than comparable or smaller-memory appliances.²

Market and Technology Trends

There can be compelling reasons to move database and analytical workloads off disk and into memory. Performance is a primary factor, but cost is important too: a Forrester study commissioned by SAP in 2014 indicated that simply moving large-scale enterprise resource planning (ERP) workloads into memory saved 15 percent on hardware costs (and even more on software and administration).³ The size of in-memory workloads is important; a 2017 Gartner CIO Agenda survey revealed that analytics and ERP are top CIO priorities.⁴ And in-memory analytics and databases will likely grow much larger still: Forrester estimates that 70 percent of data in the enterprise still goes unused, suggesting much untapped potential.⁵

However, as the size of these in-memory database workloads grows, obtaining enough memory to accommodate them can become a problem. Scaling out in-memory database workloads across nodes in a cluster is a viable solution for some workloads, such as SAP® Business Warehouse (SAP® BW) on the SAP HANA platform and SAP® BW/4HANA. But for workloads like SAP® Business Suite on the SAP HANA platform and SAP S/4HANA, scaling up memory can be the only viable approach.

Scale-up SAP HANA appliances—particularly those with 12 TB or more of memory—can represent a significant investment. Prowess Consulting evaluated five systems that are currently certified for the SAP HANA platform to find which one provides the lowest total cost of ownership (TCO). The clear winner was the Lenovo Scalable Solution for SAP HANA, based on Lenovo™ System x3950 X6 and Lenovo System x3850 X6 servers. Not only did the Lenovo Scalable Solution for SAP HANA have the lowest costs to acquire and operate, but it also provided the most flexibility for scaling up memory after purchase.

What Is SAP S/4HANA®?

SAP S/4HANA is a new generation of SAP® Business Suite that includes simplifications, increased efficiency, and new features, such as planning and simulation options in many conventional transactions. The analytical capabilities of SAP S/4HANA enable organizations to find new insights in data to make their businesses more effective.

Study Overview

For this study, Prowess Consulting evaluated four large-memory scale-up configurations for the SAP HANA platform:

- HPE™ ConvergedSystem 900 for SAP HANA Scale-up Configurations
- HPE™ Integrity MC990 X Server
- Huawei KunLun® 9016
- Lenovo Scalable Solution for SAP HANA (Lenovo System x3950 X6 and System x3850 X6)

All of the systems evaluated support at least 12 TB of memory and up to 18 TB. The scope of this study excluded the configurations of the HPE Integrity MC990 X Server and the Lenovo Scalable Solution for SAP HANA that support up to 20 TB and 36 TB of memory, respectively. (For full specifications of the hardware evaluated in this study, see the [appendix](#).)⁶

Study Details

In our study, we looked at initial acquisition costs. We found that the initial price is favorable for the Lenovo Scalable Solution for SAP HANA compared to the HPE alternatives.

The ability of a system to scale with inevitable data growth over a typical lifecycle is also a key aspect of the TCO. In this department, Lenovo's approach to large, contiguous-memory SAP HANA systems enables its solution to scale up beyond any other SAP HANA platform-based appliance currently on the market. This gives the Lenovo solution a longer, more reliable lifespan for the SAP HANA platform than its competitors do.

Price of Acquisition

The Lenovo Scalable Solution for SAP HANA is less expensive up front. For example, a 12-TB configuration is 17–26 percent less expensive than a 12-TB HPE ConvergedSystem 900 for SAP HANA appliance. And an 18-TB Lenovo Scalable Solution for SAP HANA is 20 percent less expensive than a 16-TB HPE ConvergedSystem 900 for SAP HANA appliance and comparably priced to Huawei KunLun 9016 appliances, providing more memory for less cost (Figure 1).²

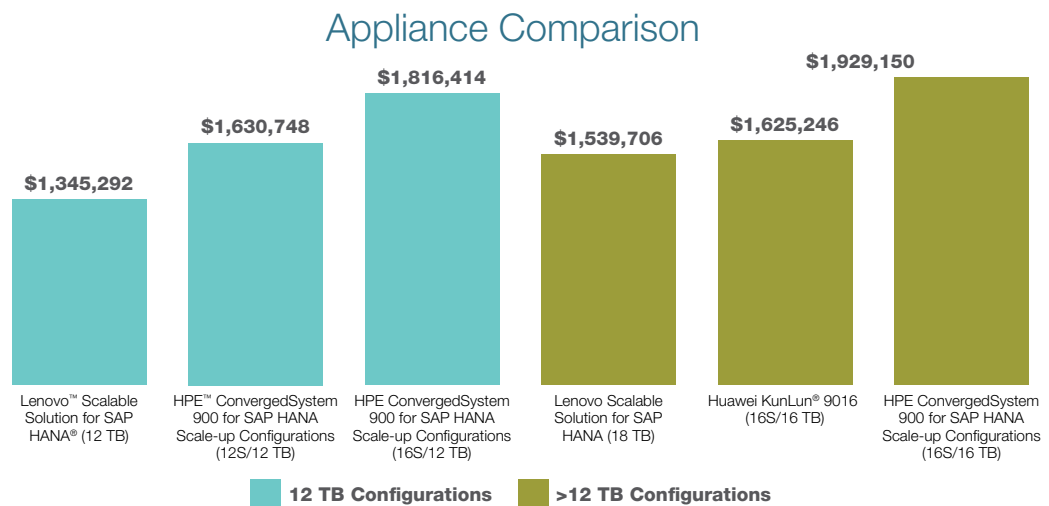


Figure 1. Comparison of the up-front costs for the Lenovo™ Scalable Solution for SAP HANA® (12-TB and 16-TB configurations) versus HPE™ ConvergedSystem 900 for SAP HANA Scale-up Configurations (12S/12 TB, 16S/12 TB, and Huawei KunLun® 9016 (16S/16 TB appliance)

As an added benefit, the Lenovo configuration comes with managed services that provide remote monitoring and management for the solution, in addition to integrated SAP support. All of this can lower operating costs and simplify running workloads like SAP S/4HANA on the Lenovo Scalable Solution for SAP HANA.

When we compared servers instead of appliances, we found similar results. The compute, memory-donation, and storage components of a 12-TB configuration of the Lenovo Scalable Solution for SAP HANA are 12 percent and 15 percent less expensive than the 12-socket and 16-socket 12-TB configurations of the HPE Integrity MC990 X Server, respectively. Moving beyond a 12-TB configuration of the Lenovo Scalable Solution for SAP HANA, the difference is more dramatic. The compute, memory-donation, and storage components of an 18-TB configuration of the Lenovo Scalable Solution for SAP HANA are 19 percent less expensive than those of a 16-TB HPE Integrity MC990 X Server (Figure 2).⁷

Server-to-Server Comparison

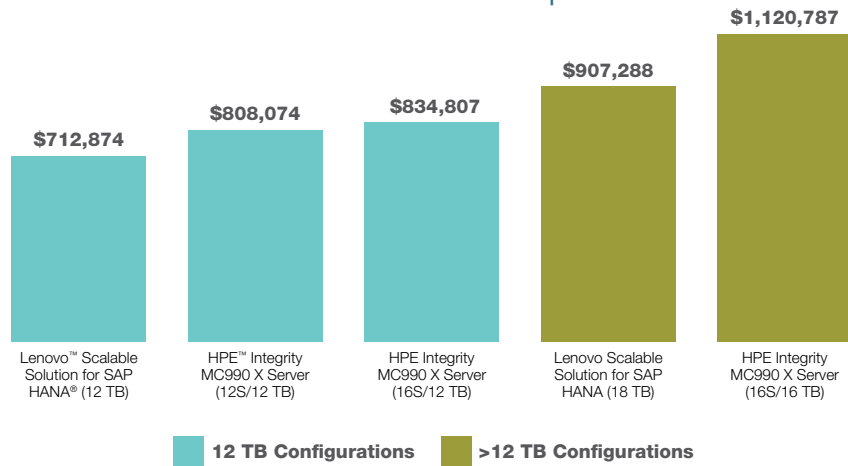


Figure 2. Comparison of the cost of the compute, memory-donation, and storage components of the Lenovo™ Scalable Solution for SAP HANA® (12-TB and 18-TB configurations) versus the server and storage components of the HPE™ Integrity MC990 X Server (12S/12 TB, 16S/12 TB, and 16S/16 TB) solutions

Memory Upgrade Options

The scalability of each solution is paramount to assessing its TCO over a typical five-year cycle. In-field memory upgrades are possible with the HPE ConvergedSystem 900, but only up to 12 TB of memory.⁸ In-field memory upgrades are not available for HPE Integrity MC990 X Server scale-up configurations certified for the SAP HANA platform.

In contrast, not only does the Lenovo Scalable Solution for SAP HANA enable large contiguous-memory configurations (up to 36 TB), the modular approach to memory scalability in the Lenovo solution also means that customers do not have to confront the dilemma of either buying an SAP HANA system that they might soon outgrow or paying for additional memory headroom that they might not ever use.



Lenovo™ System x 3950 X6

Modular Scale-up Through Software-Defined Memory

The key to Lenovo's modular approach to large-memory SAP HANA® solutions is software-defined memory. The Lenovo™ Scalable Solution for SAP HANA is based on a central compute node that works like a conventional SAP HANA system. Customers can add more memory to the system with memory-donor nodes. The memory pool, when thus enlarged, is completely transparent to the SAP HANA in-memory databases.

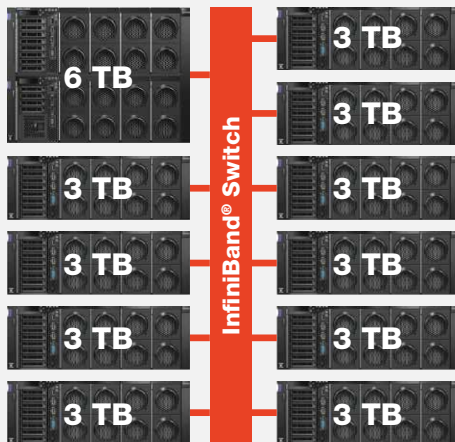


Figure 3. Illustration of a fully scaled-up 36-TB configuration of the Lenovo™ Scalable Solution for SAP HANA®

The software-defined approach enables the use of common server building blocks and eliminates the need to invest in 16-socket or larger symmetric multiprocessing (SMP) systems. The Lenovo Scalable Solution for SAP HANA is centered on a single eight-socket Lenovo™ System x3950 X6 server with a 6-TB compute node connected in an InfiniBand® fabric with up to 10 four-socket Lenovo System x3850 X6 servers with 3-TB memory-donor nodes. The aggregated solution provides a single system image with one operating system spanning all of the constituent systems. The end result is a single scale-up system with up to 36 TB of system memory.

Conclusion

Our findings indicate that the Lenovo Scalable Solution for SAP HANA helps customers avoid the expense of paying extra for headroom to accommodate uncertain growth in the future—headroom that conceivably might never even be used before the system is replaced. The Lenovo solution also costs less than comparable SAP HANA systems up front. Furthermore, the Lenovo Scalable Solution for SAP HANA implements a unique method of scaling that not only provides plenty of future headroom for data growth, but that also significantly reduces the risk and cost of having to “lift and shift” large, business-critical workloads like SAP S/4HANA before hardware has reached the end of its normal refresh cycle.

Appendix

HPE™ ConvergedSystem 900 for SAP HANA® Scale-up Configurations				
Component	Description	12 TB	12 TB	16 TB
Processor	Intel® Xeon® processor E7-8880 v4	12	16	16
Memory	64 GB DDR4	192	192	256
Storage	HPE™ 3PAR® StoreServ® 8000 Storage, 1.8 TB+SW 10K small-form-factor (SFF) HDD	48	48	48
	HPE 600 GB SAS 10K SFF SC HDD	4	4	4
	HPE 1.2 TB SAS 10K SFF SC HDD	2	2	2
Operating System	SUSE® Linux® Enterprise Server			

HPE™ Integrity MC990 X				
Component	Description	12 TB	12 TB	16 TB
Processor	Intel® Xeon® processor E7-8880 v4	12	16	16
Memory	64 GB DDR4	192	192	256
Storage	HPE™ Integrity MC990 X, 400 GB base, 1.8" solid-state drive (SSD)	2	2	2
Operating System	SUSE® Linux® Enterprise Server			

Huawei KunLun® 9016		
Component	Description	Quantity
Processor	Intel® Xeon® processor E7-8880 v4	16
Memory	64 GB DDR4	256
Storage	OceanStor® Dorado5000 V3 25 TB AFA	1
Operating System	SUSE® Linux® Enterprise Server	

Lenovo™ Scalable Solution for SAP HANA

Lenovo™ System x3950 X6 (Compute Node)		
Component	Description	Quantity
Processor	Intel® Xeon® processor E7-8890 v4	8
Memory	32 GB DDR4	196
Storage	3.84 TB 6 Gb SAS Enterprise Capacity G3HS MLC SSD	14
	1.2 TB 10K 12 gigabit per second (Gbps) SAS 2.5" G3HS HDD	2

Lenovo™ System x3850 X6 (Memory-Donor Node)		
Component	Description	Quantity
Processor	Intel® Xeon® processor E7-4809 v4	8
Memory	32 GB DDR4	96

Storage Expansion		
Component	Description	Quantity
Storage	Lenovo™ Storage 800 GB, 3 DWD 2.5" SAS SSD	54

Configurations				
Component	Description	12 TB	18 TB	24 TB
Compute Node	Lenovo™ System x3950 X6	1	1	1
Memory-Donor Node	Lenovo System x3850 X6	2	4	6
Solution Storage	Lenovo™ Storage Expansion D1224	1	1	1
Operating System	SUSE® Linux® Enterprise Server			

¹ \$1,345,292 for the Lenovo™ Scalable Solution for SAP HANA® versus \$1,630,748, \$1,816,414, and \$1,929,150 for the HPE™ ConvergedSystem 900 12 S/12 TB, 16 S/12 TB, and 16 S/16 TB configurations, respectively. Prices based on figures received by Prowess Consulting from HPE.

² The server-to-server comparison evaluates the price of just the compute node, four memory-donor nodes, and the storage component of the Lenovo™ Scalable Solution for SAP HANA® (\$907,288) compared to that of the 12 S/12 TB, 16 S/12 TB, and 16 S/16 TB configurations of the HPE™ Integrity MC990 X server (\$808,074, \$834,807, and \$1,120,787, respectively), and the 16S/16 TB configuration of the Huawei KunLun® 9016 server (\$1,625,246). Prices based on figures received by Prowess Consulting from the respective manufacturers.

³ Forrester. "Projected Cost Analysis of SAP HANA." Commissioned by SAP. April 2014. Study summarized at the SAP news site: <https://news.sap.com/forrester-study-savings-potential-sap-hana/>.

⁴ Gartner. "Gartner Survey of More Than 2,500 CIOs Charts the Rise of the Digital Ecosystem." October 2016. www.gartner.com/newsroom/id/3481117.

⁵ Forrester Consulting. "Ultra-Fast Data Access Is The Key To Unleashing Full Big Data Potential." Commissioned by SAP and Lenovo. January 2016. <http://a248.g.akamai.net/n/248/420835/2bbc8f05759a4596bfa5e05402901629c5ee0569e34c6715058800decbe84d61/sapasset.download.akamai.com/420835/sapcom/docs/2016/03/9ea84ab0-647c-0010-82c7-eda71af511fa.pdf>.

⁶ SAP HANA® certification for the Lenovo™ Scalable Solution for SAP HANA listed in SAP® Note (pending as of September 2017). For HPE certifications, see the SAP HANA certification page: www.sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/appliances.html#categories=certified%2CHewlett%20Packard%20Enterprise%2CIntel%20Broadwell%20EX%20E7%2C12%20TB%2C16%20TB.

⁷ HPE™ Integrity MC990 X server also comes in 15-TB and 20-TB configurations certified for the SAP HANA® platform, but HPE declined to provide to Prowess Consulting prices for those configurations.

⁸ HPE. "HPE ConvergedSystem 900 for SAP HANA Scale-up Configurations." www.hpe.com/us/en/product-catalog/detail/pip.specifications.hpe-convergedsystem-900-for-sap-hana-scale-up-configurations.7311041.html.



The analysis in this document was done by Prowess Consulting and commissioned by Lenovo.

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