SAP on VMware Performance and Scalability

SAPinsider
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Erik Rieger, Principal SAP Global Technical Alliance Manager & Architect

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In This Session

The topic of SAP HANA performance is complex and can at times be overwhelming. What is "good" HANA performance, and what is the true impact of HANA performance in the context of overall SAP application performance experienced by end-users? This sessions tries to answer this question…

What We'll Cover

- VMware Fast Facts

- vSphere SAP HANA Support Status, Roadmap and Scalability

- SAP HANA on vSphere Performance

  - Definition and Relevance

  - Sizing Translation to VM Config.

  - Overview SAP Benchmarks

- Wrap-Up

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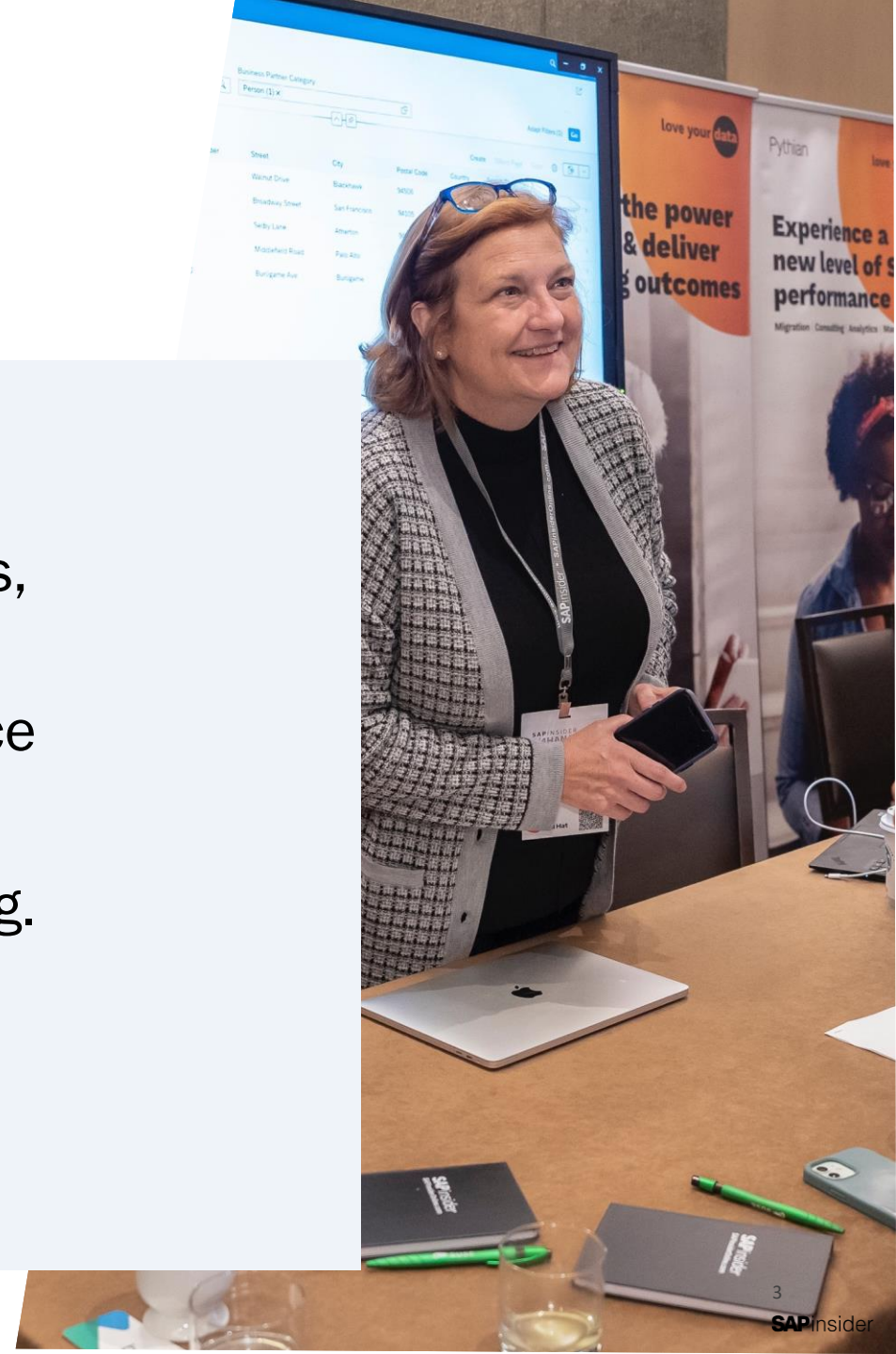
VMware: Fast Facts

VMware is the leading provider of multi-cloud services for all apps, enabling digital innovation with enterprise control. Our software delivers the freedom and flexibility businesses need to build the future.

$13.35B in revenue (USD) in FY2023

Hundreds of thousands of customers worldwide

Chosen by over 99% of Fortune 100; 99% of Fortune 500 and 99% of Forbes Global 2000 companies

37,500+ employees

Extensive partner ecosystem

Owns or controls 5,156 patents*

Recognized on the JUST 100 List of 2023; VMware ranked number one overall in the environment category, leading all companies in the JUST 100 in sustainable products and pollution reduction

*As of March 1, 2023

Global Leaders Rely on VMware

Navigating change and innovation for global organizations

300K
Organizations globally

85M
Enterprise workloads on VMware

5M
Developers building on VMware today

Supported by a global ecosystem of **30K** partners

10 of Top 10
Largest Global Banks

9 of Top 10
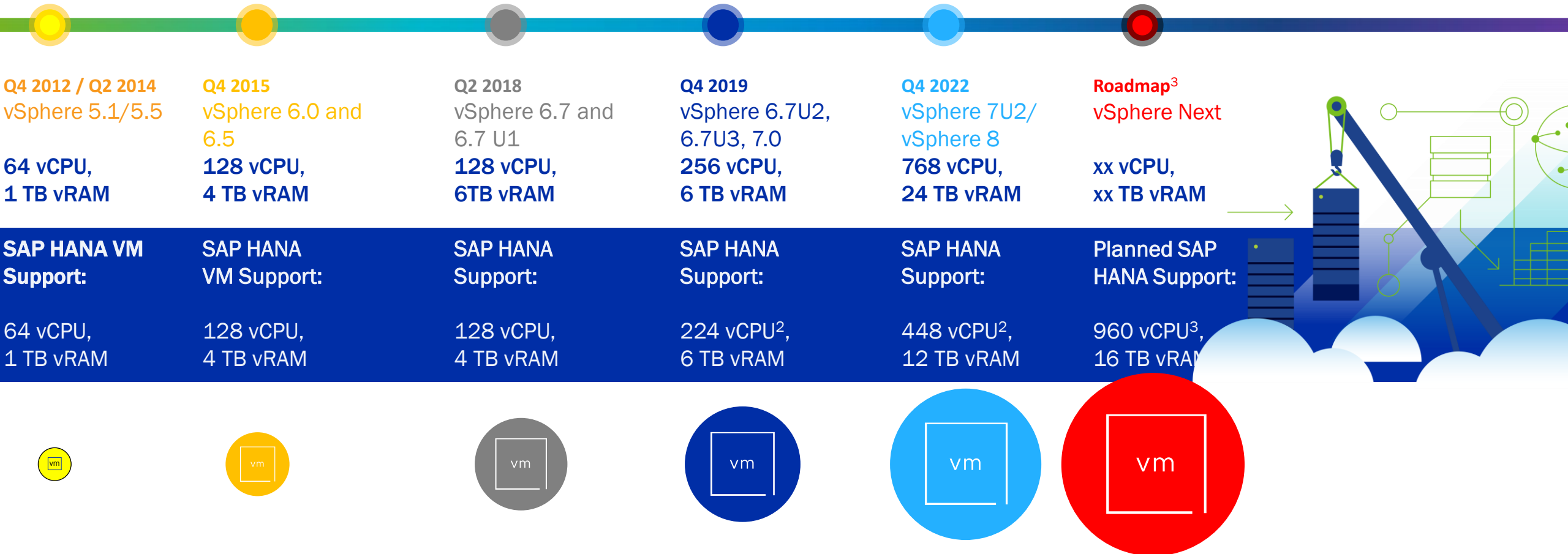World's Best Hospitals

100%
of U.S. Federal Agencies

19 of Top 20
Global Retailers

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vSphere SAP HANA Support Status and Scalability

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SAP HANA VM Size Evolution from 2012[1] till Today

SAP HANA vSphere VM size aligned to increased CPU capabilities, >=15 more compute and memory since initial support!

Q4 2012 / Q2 2014 vSphere 5.1/5.5	Q4 2015 vSphere 6.0 and 6.5	Q2 2018 vSphere 6.7 and 6.7 U1	Q4 2019 vSphere 6.7U2, 6.7U3, 7.0	Q4 2022 vSphere 7U2/ vSphere 8	Roadmap[3] vSphere Next
64 vCPU, 1 TB vRAM	128 vCPU, 4 TB vRAM	128 vCPU, 6TB vRAM	256 vCPU, 6 TB vRAM	768 vCPU, 24 TB vRAM	xx vCPU, xx TB vRAM
SAP HANA VM Support:	SAP HANA VM Support:	SAP HANA Support:	SAP HANA Support:	SAP HANA Support:	Planned SAP HANA Support:
64 vCPU, 1 TB vRAM	128 vCPU, 4 TB vRAM	128 vCPU, 4 TB vRAM	224 vCPU[2], 6 TB vRAM	448 vCPU[2], 12 TB vRAM	960 vCPU[3], 16 TB vRAM

[1]2012, SAP announced initial support for single Scale-Up SAP HANA systems on vSphere 5.1 for non-production environments
[2]The usable number vCPU's per VM depends on the used CPU. E.g. The top bin Cascade Lake CPU has only 28 cores / 56 threads. A 4-socket wide VM on a Cascade Lake server has therefore only 224 threads available, or when running on an 8-socket server only 448 vCPUs are available per SAP VM on this server. [3]Sapphire Rapids CPUs support up to 60 cores / 120 threads and therefore the maximum size of an SAP HANA VM on an 8-socket SPR host will support up to 960 vCPUs. vSphere support for 960 vCPUs, 16 TB per VM is planed, no commitments or obligation to deliver.

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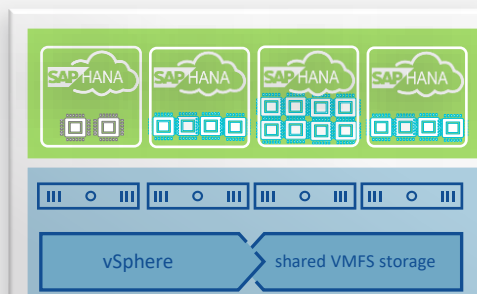# SAP on VMware vSphere - Deployment Options (vSphere)

SAP HANA Single-VM up to ≤ 12 TB

Appliance or TDI approach

2-, 4- and 8-socket ESXi host, VM maximal the size of the host, ≤ 12 TB, 448 vCPUs per single SAP HANA VM

Storage must meet HANA KPIs.

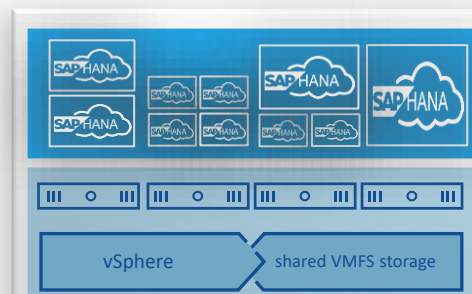SAP HANA HCI and VCF deployments are supported as well!

SAP HANA Multi-VM ≥ 128 GB up to ≤ 12 TB

Appliance or TDI approach

Half-Socket support (2 VMs per physical CPU socket), minimal 128 GB and 8 vCPUs per VM, 2-, 4- and 8 ESXi host support.

Compute, storage and network res. must not get overcommitted!

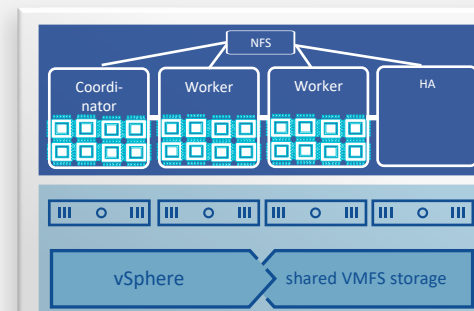SAP HANA HCI and VCF deployments are supported as well!

SAP HANA Scale-out up to ≤ 48 TB

TDI approach required, ESXi host must be 4- or 8-socket. Storage and Network Scale-Out TDI KPIs must be met.

VM must be ≥ 4 sockets, maximal 8-socket, VM vRAM up to 6 TB per VM on 8-socket.

SAP HANA HCI and VCF deployments are supported as well!

SAP NetWeaver / AnyDB Server and Non-SAP HANA

Non-SAP HANA VMs, like SAP NetWeaver App servers or Oracle, DB2 or MSSQL DB VMs can run consolidated on one platform leveraging VMware vSphere.

When SAP applications get deployed then the ESXi host must be an SAP supported server.

SAP HANA HCI and VCF deployments are supported as well!
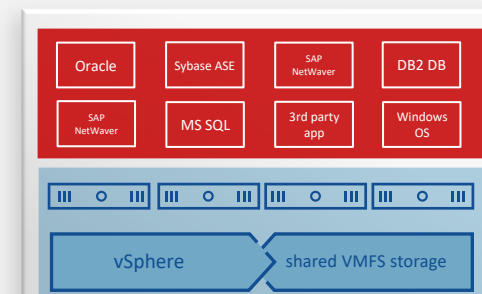
- All SAP HANA Scale-Up VMs can get configured as half socket VMs, maximal 2 half socket VMs per NUMA node!
- Single host is technically possible, but not recommended!

Relevant SAP HANA on vSphere Sizing and Support Information

SAP Notes:

- vSphere 7.0 (incl. U3c) support for SAP NetWeaver Windows (SAP Note 1409608) and Linux (SAP Note 1122387) deployments.

- SAP Note 2937606 - SAP HANA on VMware vSphere 7.0 in production (up to 6 TB)

- SAP Note 3102813 - SAP HANA on VMware vSphere 7.0 incl. U3 with up to 12 TB 448 vCPUs VM sizes

- SAP Note 2718982 - SAP HANA on VMware vSphere and vSAN

- vSphere 6.7 and 7.0 (incl. U3) support for SAP SAP HANA 2 SPS 4 (or later) on 4-socket hosts with Persistent Memory (Intel Optane PMem Series 100), SAP Note 2913410.

Best Practice Guides:

- SAP HANA on VMware vSphere Best Practices and Reference Architecture Guide

- SAP HANA on Hyperconverged Infrastructure (HCI) Solutions Powered by VMware vSAN

Blogs and SAP Wikis:

- SAP VMware WIKI: https://wiki.scn.sap.com/wiki/display/VIRTUALIZATION/SAP+on+VMware+vSphere

- VMware SAP related blogs: https://blogs.vmware.com/apps/sap

SAP HANA on vSphere Performance and Relevance of Benchmarks

Benchmarking, Validation/Certification, Sizing and "Performance"

SAP Benchmarking:

As of SAP*:

"Originally introduced to strengthen quality assurance, the SAP Standard Application Benchmarks can also be used to test and verify scalability, concurrency, power efficiency, and multi-user behaviour of system software components, RDBMS, and business applications."

"SAP Standard Application Benchmarks help customers and partners find the appropriate hardware configuration for their IT solutions."

*Source:

https://www.sap.com/about/benchmark/appbm.html
https://www.sap.com/about/benchmark.html

Platform Validation / Certification:

SAP VMware Validation:

Ensures that SAP solutions running on VMware products run stable, performant, predictable and meet SAP specified KPIs. Used tools are public SAP benchmarks and SAP defined internal tests. Examples: SAP HANA vSphere and vSAN validations.

SAP VMware Certifications:

Ensures that SAP solutions running on VMware products can get SAP monitored, licensed, supported and fulfil SAP's contractual and legal requirements. Examples: SAP NetWeaver and SAP HCI partner certifications.

SAP Sizing:

As of SAP*:

"Sizing means determining hardware requirements such as memory, CPU power, disk space, I/O capacity, and network bandwidth. It is an iterative process to translate business requirements into hardware requirements and is usually performed early in the project."

Sizing does not get performed by VMware, but by SAP or SAP sizing partners. VMware helps to translate an SAP sizing to a VM configuration and helps to determine the needed ESXi host hardware.

*Source:

https://www.sap.com/about/benchmark/sizing.html

Performance:

As of SAP:

"Performance refers to the total effectiveness of a computer system, including throughput, individual response time, and availability.

Source:

https://www.sap.com/about/benchmark/sizing/performance.html

SAP HANA on VMware – Validation Test KPI Examples

- Performance barrier tests to detect CPU and Memory BM vs. VM deviations

- Storage and network related KPIs to test latency and throughput

- Functional and operational tests to test VMware specific features like vMotion

- Resilience and resiliency tests e.g., for vSAN (data consistency) and HA (failure recovery)

- Internal and publicly available SAP benchmarks to define virtualization costs for SAP workloads, e.g., vSAPS sizing figures, target is to be below 10% deviation to BM.

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SAP HANA on VMware – Workload Validation Test Setup

Right side shows an overview of a typical SAP HANA OLTP and OLAP mixed workload test setup.

In a SD benchmark setup, normally a two-tier configuration gets built, in the SAP HANA mixed workload test, a 3-tier validation setup gets used.
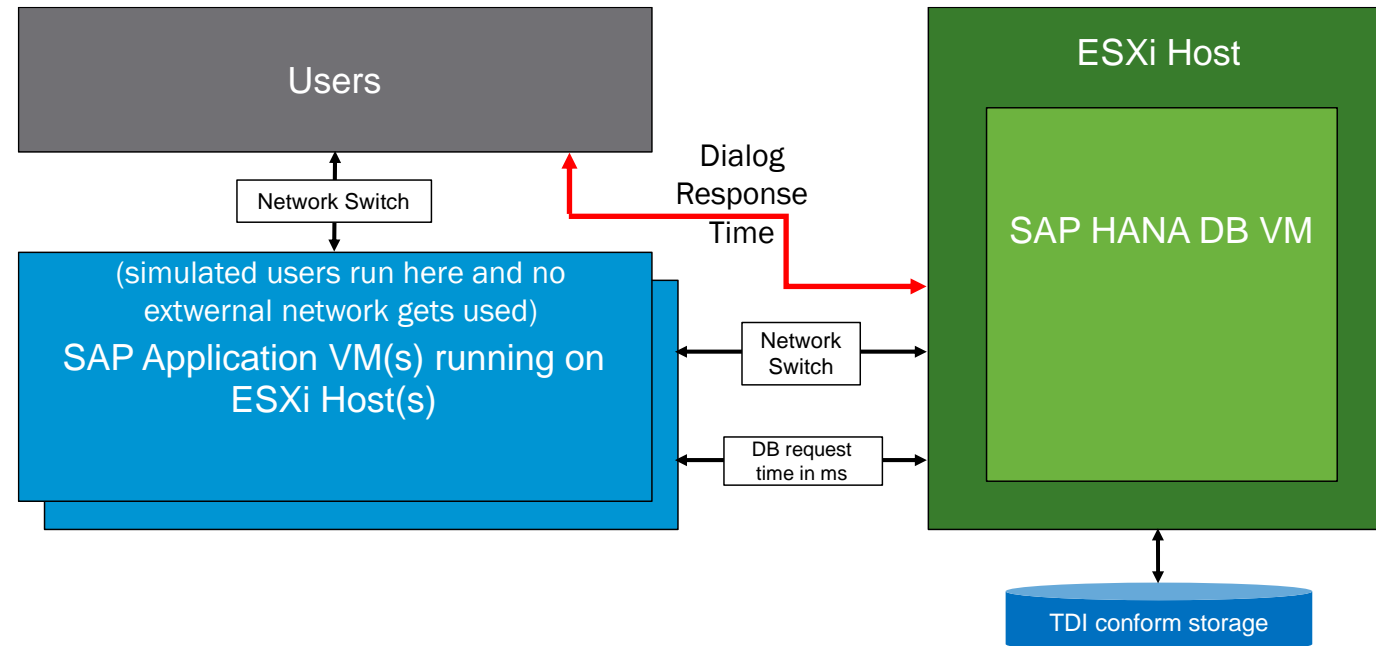
In both cases, users get simulated on the app server(s) and execute, with a 10 second think time, selected SAP Sales & Distribution and OLAP transactions.

A SD benchmark measures the OLTP throughput in SAPS, while maintaining a dialog response time of 1000 ms.

While comparable, SAP HANA validations concentrate on the SAP HANA database only, a SAP SD benchmark measures also the SAP application tier.

Beside the OLTP throughput (TPH), also OLAP throughout (QPH) gets measured. In addition, SAP also validates the average total database time in ms of OLTP/OLAP transactions (complete TCODEs). All measurement values, when running virtualized, should be within a maxim deviation to BM of 10%.

To note is that in each tests users get simulated, therefore the measured results are optimized results which get measured in an environment that tries to eliminate external impacts like user to app server network.

Users

Network Switch

(simulated users run here and no extwernal network gets used)

SAP Application VM(s) running on ESXi Host(s)

Dialog Response Time

ESXi Host

SAP HANA DB VM

Network Switch

DB request time in ms

TDI conform storage

While the measured OLPT times when running with massive number of concurrent users (ranging from 15-91k) we measure a higher latency with VMXNET3 when compared to BM or PT NIC configurations that are outside the 10% goal. This got documented in the relevant SAP notes with an increased latency of 100 ms.

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SAP NetWaver and SAP HANA Benchmark Test Examples, relevance of the mixed workload increased network latency and 10% sizing figure*

NetWeaver / AnyDB

Measured vSphere SD overhead <mark>6.3% to BM**</mark>.

Based on cert. 2020041 and cert. 2019042

(299580 SAPS VM vs. 319580 SAPS with **Intel Cascade Lake** 8280 CPUs and DB2).

Measured vSphere SD overhead **3,8% to BM** .

Based on cert. 2023010 and cert. 2021056

(237080 SAPS VM vs. 246530 SAPS with **Intel Ice Lake 8380** CPUs, DB2 and Windows).

SAP HANA BWH Scale-Up***

Measured vSphere overhead to BM (most recent tests).

Phase 1 (load time –is better):

- 8S +1.93% VM to BM delta (12 TB)
- 2S + 6.7% VM to BM delta (4 TB)

Phase 2 (throughput + is better)

(Class M sizing / 2 x mem. size):
- 8S <mark>-9.4% VM</mark> (4676 QPH) to BM (5151 QPH) delta (12 TB)
- 2S -2.3% VM (3145 QPH) to BM (3219 QPH) delta (4 TB)

Phase 3: (answer time – is better)

- 8S +8.76% VM to BM delta (12 TB)
- 2S +1.9% VM to BM delta (4 TB)

Scale-Out:

Max. deviation 4.66% with 4x8S,6TB RAM

Internal SAP HANA Mixed Workload Tests

Internal validation tests:

CPU Utilization: 35%

- 8S -0.04% (TPH) / -0.07% (QPH)
- 2S -0.07% (TPH / -0.05% (QPH)

CPU Utilization: 65%

- 8S -1.04% (TPH) / -1.03% (QPH)
- 2S -0.97% (TPH / -0.77% (QPH)

CPU Utilization: Max.

- 8S <mark>-8.32%</mark> (TPH) / <mark>-8.32%</mark> (QPH)
- 2S <mark>-6.03%</mark> (TPH / -5.85% (QPH)

Note: Database OLTP request time with VMXNET3 up to +36% CPL and 24% (Ice Lake), PT within 10%.

Scalability of Todays X86 Platforms – virtualization "costs" <10%

IBM Power 10 – 4-Socket SAP ERP 6.0 SD Benchmark (physical)

Number of SD Users: 134,016

SAPS: 736,420

SAPS per CPU: 184,105

OS: AIX 7.3

RDBMS: DB2 11.5

Configuration:

IBM Power® E1050, 4 processors / 96 cores / 768 threads, Power 10, 2.95 GHz, 4,096 GB main memory

Cert. 2022018

First Intel 8480+ (Sapphire Rapids)* - 2-Socket SAP ERP 6.0 SD Benchmark (physical)

Number of SD Users: 72,250

SAPS: 394,920 (4-socket assumption: 750,000+ SAPS

SAPS per CPU: 197,460

*Assumption**: virtualized results between 175,000 and 190,000 SAPS per CPU*

OS: SLES 15

RDBMS: SAP ASE 16

Configuration:

Dell PowerEdge R760, 2 CPUs / 112 cores / 224 threads, Intel Xeon Platinum 8480+ processor, 2.00 GHz, 2,048 GB main memory, cert. 2022029

Intel 8380 (Ice Lake) - 2-Socket SAP ERP 6.0 SD Benchmark (virtualized)

Number of SD Users: 43,338

SAPS: 237,080

SAPS per CPU: 118,540

OS: Windows 2019 DC on VMware vSphere 8

RDBMS: DB2 11.5

Configuration: Dell PowerEdge R750, 2 processors / 80 cores / 160 threads, Intel Xeon Platinum 8380 processor,1,024 GB main memory, VM: 160 vCPUs and 928 GB vRAM

Measured **vSphere 8** SD overhead **3,8% to BM**. Based on cert. 2023010 and cert. 2021056

SD benchmark overview and comparison of different CPUs / generations. Intel CPU on par with Power CPU (+7.3% per CPU), latest public Ice Lake based vSphere 8 benchmark shows only a 3.8% to BM deviation.

Note: First published SD benchmark with 2-socket SPR, SPR will be avoiualble as 2, 4, and 8-socket. ** virt. Overhead assumtion is between -4% to -10%.

Also available: AMD EPYC 9654, SD benchmark, cert. 2022029: Number of SD Users: 148,000, **SAPS: 809,570**

Translate a SAP HANA Sizing into a VM Configuration

SAP HANA Memory Requirements Source:

- SAP HANA QuickSizer
- SAP HANA Migration Reports
- SAP T-Shirt sizing's

Formulas:

- SAP HANA physical System Memory = SAP HANA VM vRAM size
- Total available RAM for SAP HANA VMs = Total RAM host - ESXi Host RAM need
- Alternatively: Needed RAM: SAP HANA System Memory + ESXi

Example:

4-Socket Server, with 6 TiB:

- Available RAM for VMs = 6016 GB (6144 GB – 128 GB RAM)
- Per NUMA node up to 1504 GB vRAM (6016 GB / 4) are (theoretically) available for the sizing approach.
- Alternatively: Needed RAM = 3750 GB SAP System Mem + 256 GB = 4006 GB

Estimated ESXi Host RAM need for SAP HANA Servers:

- 2-Socket Server 64 GB
- 4-Socket Server 128 GB
- 8-Socket Server 256 GB

Estimation based on experience and may differ depending on the actual HW configuration!

Physical SAPS to Virtual SAPS Example Calculation:

Certified SAP HANA CPU	Physical SAPS per CPU incl. HT @100% CPU Utilization	Physical SAPS per core with HT @100% CPU Utilization	Virtual SAPS 2 vCPUs per core to utilize HT @100% CPU Utilization*	Virtual SAPS 1 vCPUs per core @100% CPU Utilization***	SAP Supported max. mem per CPU
			With Hyperthreading	Without Hyperthreading	
Intel Xeon Platinum 8380 (Ice Lake) Cert. 2022009	129,065	÷40 → 3227	-10% → 2904	-15% → 2469	2048 GB
Intel Xeon Platinum 8280 Cert. 2021009	90,970	÷28 → 3249	-10% → 2924	-15% → 2485	1536 GB

CPU Cores — ESXi Resource Consumption (-10% sizing figure, not real costs) — Hyper-Threading Gain**

*set numa.vcpu.preferHT=TRUE (per VM setting) to ensure that only NUMA node local threads get used!
** Hyperthreading gain depends on how SAP HANA gets used and can be range from 13.5% - 30%. In above example we calculate with 15% HT gain.
*** that's the performance estimation if you do not use hyperthreads like in the 2 vCPU per core configuration and only leverage physical CPU cores.

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SAP HANA on vSphere Latest Benchmarks - Overview

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Highest-ever Measured SAP HANA BW Performance on VMware

Virtualization agility with near-bare metal performance and scalability

HANA VM performance within 10% of HANA bare metal in all benchmark runs

SAP BWH benchmark → Real-World SAP BW/4HANA scenario

- Data load via process chain (Phase 1)
- Info cube queries (Phase 2)
- Report generation (Phase 3)

Less than 5-minute difference in Phase 1 time to load **20.8 billion records**

VMware better than Hyperscalers SAP BWH benchmark results

- 20% longer data load time than VMware
- 44% less querier per hour than VMware
- 8% longer report generation time than VMware

New Scalability and Performance Highlights of SAP S/4 and BW/4 HANA 2.0 Workloads
running on VMware vSphere 7.0 U3c and Cooper Lake 8-Socket Systems – June 14, 2023

12 TB 8-Socket CPL 20,8 Billion Records
SAP HANA BWH BM vs. VM
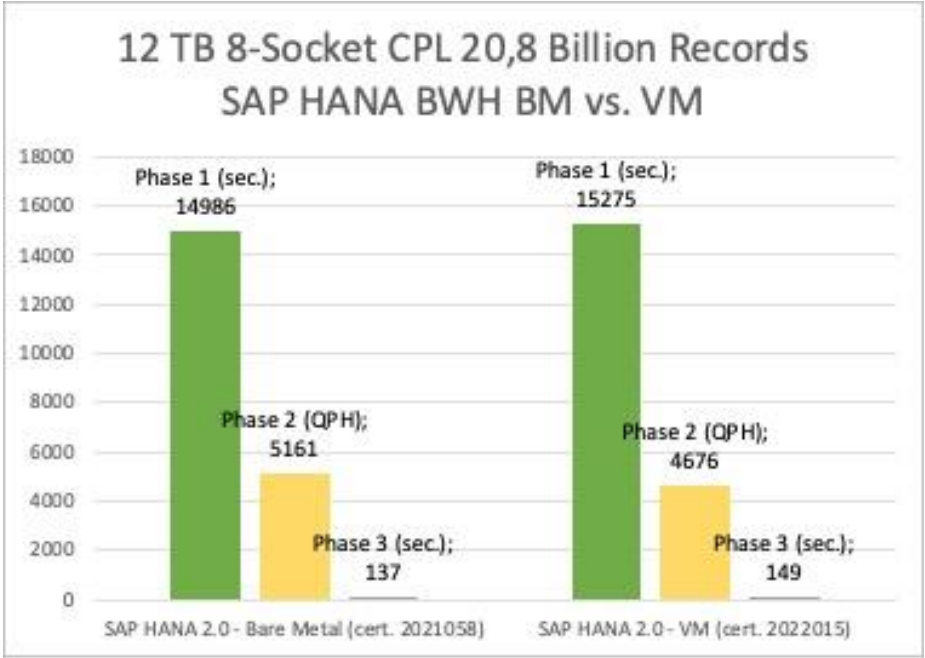
12 TB 8-Socket CPL Server / VM	CPU Threads	MEM	Records	Phase 1 (sec.)	Delta	Phase 2 (QPH)	Delta	Phase 3 (sec.)	Delta
SAP HANA 2.0 - Bare Metal (cert. 2021058)	448	12288	20,800,000,000	14986		5161		137	
SAP HANA 2.0 - VM (cert. 2022015)	448	11776		15275	1,93%	4676	-9,40%	149	8,76%
				"- is better"		"+ is better"		"- is better"	

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Highest-ever Measured SAP HANA Mixed Workload Performance on VMware

Virtualization agility with near-bare metal performance and scalability

HANA VM performance within 10% of HANA bare metal in all benchmark runs
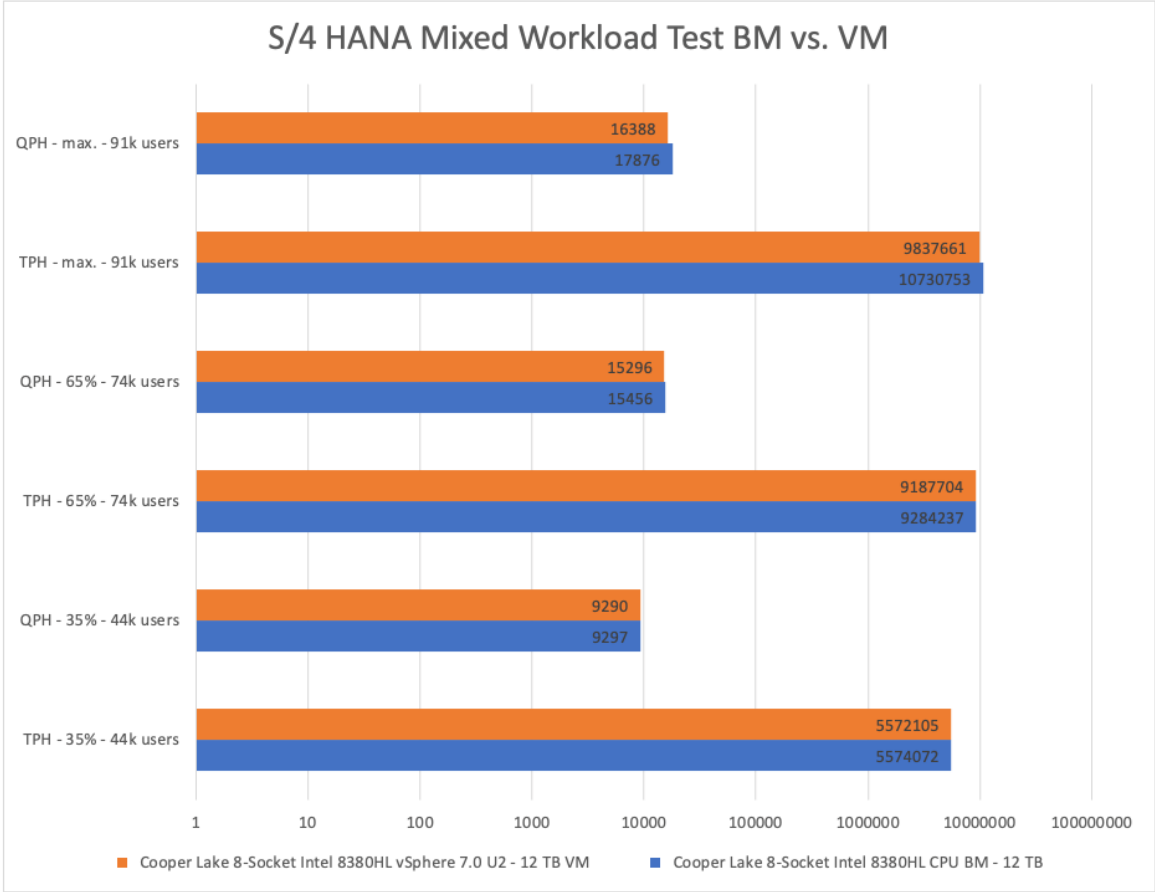
SAP ML4 benchmark → Real-World SAP S/4HANA scenario
- Seven most common SAP transactions + 30 operational reports
  - sales order creation, purchasing, invoicing, material movement

Result achieved with up to _91,000 concurrent users_

Negligible performance difference in nominal CPU utilization range of 35% - 65%

**Results and high user concurrency achieved on a *single* 8 socket, 12TB virtual machine.**

S/4 HANA Mixed Workload Test BM vs. VM

QPH - max. - 91k users	VM: 16388, BM: 17876
TPH - max. - 91k users	VM: 9837661, BM: 10730753
QPH - 65% - 74k users	VM: 15296, BM: 15456
TPH - 65% - 74k users	VM: 9187704, BM: 9284237
QPH - 35% - 44k users	VM: 9290, BM: 9297
TPH - 35% - 44k users	VM: 5572105, BM: 5574072

Legend: ■ Cooper Lake 8-Socket Intel 8380HL vSphere 7.0 U2 - 12 TB VM   ■ Cooper Lake 8-Socket Intel 8380HL CPU BM - 12 TB

Mixed OLTP and OLAP S/4 HANA 2.0 workload test running on Cooper Lake 8-socket, 12 TB host system				
Configuration	CPU Utilization	Users	TPH	QPH
Cooper Lake 8-Socket Intel 8380HL CPU BM - 12 TB	35%	44000	5.574.072	9.297
Cooper Lake 8-Socket Intel 8380HL vSphere 7.0 U2 - 12 TB VM			5.572.105	9.290
			-0,04%	-0,07%
Cooper Lake 8-Socket Intel 8380HL CPU BM - 12 TB	65%	74000	9.284.237	15.456
Cooper Lake 8-Socket Intel 8380HL vSphere 7.0 U2 - 12 TB VM			9.187.704	15.296
			-1,04%	-1,03%
Cooper Lake 8-Socket Intel 8380HL CPU BM - 12 TB	Max. Out	91000	10.730.753	17.876
Cooper Lake 8-Socket Intel 8380HL vSphere 7.0 U2 - 12 TB VM			9.837.661	16.388
			-8,32%	-8,32%
			"+ is better"	

SAP HANA OLAP Scale-Out Support, up to 48 TB with 8S Hosts

Cert. 2020026 vs. Cert 2020025

Scale-Out SAP HANA BWH with 41,6 billion rec. benchmark environment:

- 4 x Lenovo 8S ThinkAgile VX Cascade Lake 8260L (24 core), 384 thread CPU and 6 TB each
- Pure FC based Flash Storage
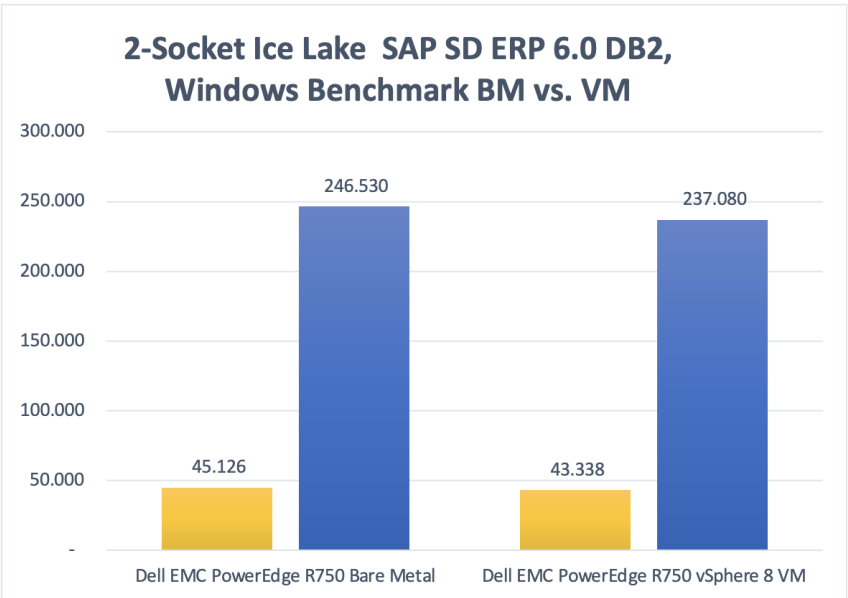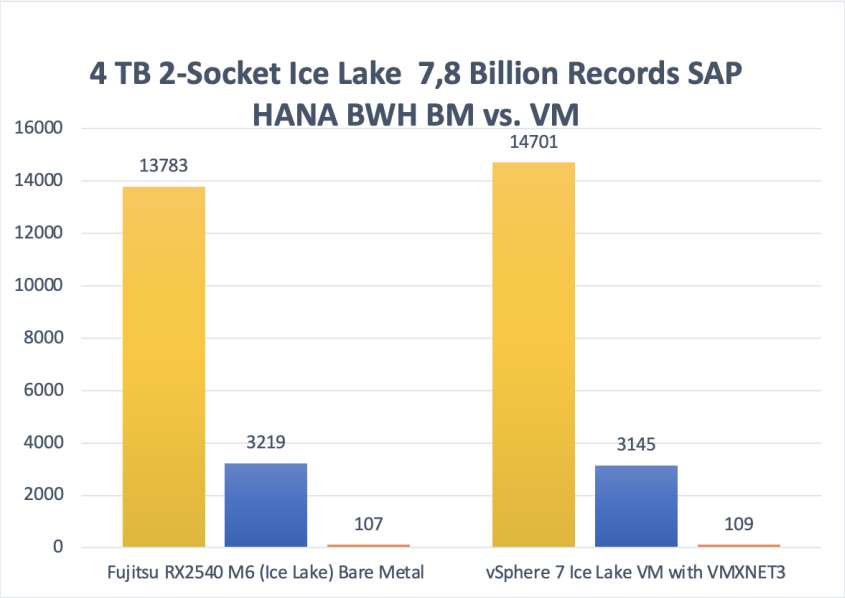- BM and vSphere 7.0 U3 installed SAP HANA Instance on SLES 15.

Maximal deviation 4,66%

Supported configuration will be (once published by SAP) 8 x 6 TB Class-M BWH sizing class (up to 48 TB)

Comparable BM 41,6 billion BWH: Cert 2020025, 8 x 4S 8280M with 3 TB and Phase 2 4348 QPH (used systems had 28 core CPUs, which are 16% more threads as the VMW BWH with 4103 QPH)!

41,6 Billion Records SAP HANA BHW BM CLX 8-S, 24 Core CPU, 6 TB Host BM vs. VMware
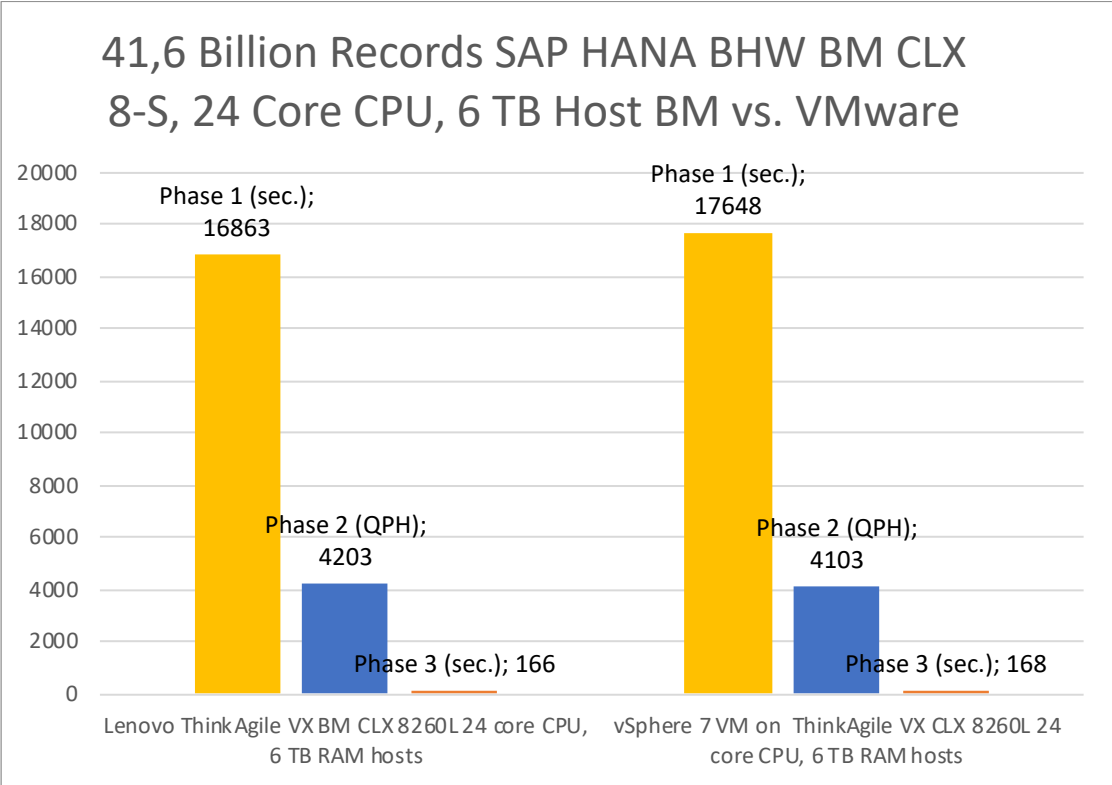
41,6 Billion Records SAP HANA BHW BM CLX 8-S, 24 Core CPU, 6 TB Host BM vs. VMware	CPU Threads	MEM	Records	Phase 1 (sec.)	Delta	Phase 2 (QPH)	Delta	Phase 3 (sec.)	Delta
Lenovo ThinkAgile VX BM CLX 8260L 24 core CPU, 6 TB RAM hosts	384	6144 GB	41.600.000.000	16863		4203		166	
vSphere 7 VM on ThinkAgile VX CLX 8260L 24 core CPU, 6 TB RAM hosts	384	5720 GB		17648	4,66%	4103	-2,38%	168	1,20%
				"- is better"		"+ is better"		"- is better"	

Ice Lake Performance Tests (BM vs. VM)

4 TB 2-Socket Ice Lake 7,8 Billion Records SAP HANA BWH BM vs. VM

2-Socket Ice Lake SAP SD ERP 6.0 DB2, Windows Benchmark BM vs. VM

### Ice Lake BHW Bare Metal vs. vSphere 7 VM Benchmark

| 2-Socket 4 TB Ice Lake Server / VM	Cert	CPU Threads	MEM	Records	BWH Phase 1 (sec.)	Delta	BWH Phase 2 (QPH)	Delta	BWH Phase 3 (sec.)	Delta
Fujitsu RX2540 M6 (Ice Lake) Bare Metal	2022023	160	4096 GB	7,800,000,000	13783		3219		107	
vSphere 7 Ice Lake VM with VMXNET3	2022024	160	3968 GB		14701	6,7%	3145	-2,3%	109	1,9%
					"- is better"		"+ is better"		"- is better"	

Ice Lake SAP SD Bare Metal vs. vSphere 8 VM Benchmark

2-Socket 4 TB Ice Lake Server / VM	Cert	CPU Threads	MEM	SAP SD benchmark users	Delta	SAPS	Delta	SAPS / CPU
Dell EMC PowerEdge R750 Bare Metal	2021056	160	1024 GB	45.126		246.530		123.265
Dell EMC PowerEdge R750 vSphere 8 VM	2023010	160	928 GB	43.338	-4,0%	237.080	-3,8%	118.540
				"+ is better"		"+ is better"		

Positive Environmental Impact by Upgrading aged Systems

2-Socket Ice Lake vSphere 7 VM vs. aged 4-Socket Broadwell vSphere 7 VM
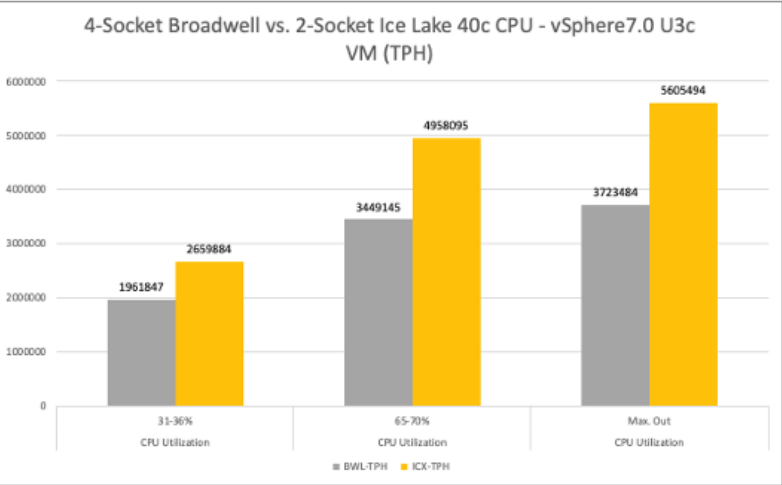
S/4 HANA Ice Lake Bare 160 vCPU VM vs. 176 vCPU Broadwell VM TPH result
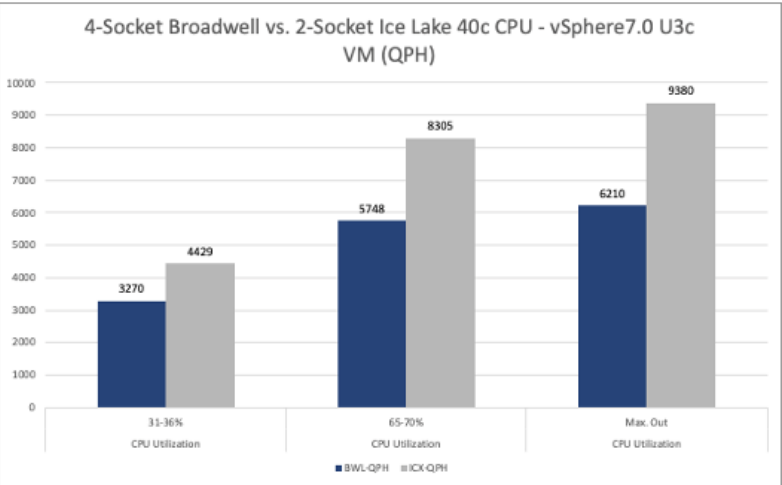
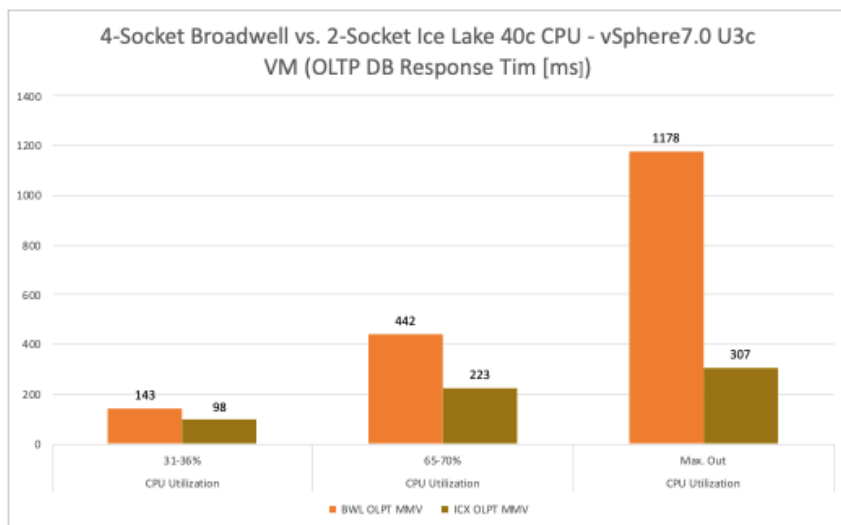S/4 HANA Ice Lake Bare 160 vCPU VM vs. 176 vCPU Broadwell VM QPH result

The 2-socket Ice Lake platform has the same 4TB memory support from SAP as the aged Broadwell platform. This makes Ice Lake a very attractive platform for a hardware refresh since the Broadwell based VMs would be able to maintain the memory configuration. If in addition the 32-core Ice Lake CPUs are leveraged, only two vSphere licenses are required. This allows to cut down the vSphere related license costs by half.

Above figures show how an Ice Lake 2-socket 40c / 160 thread CPU system compares against an aged 4-socket Broadwell 22c / 176 thread CPU system. The tests executed in the same test environment and show significant performance improvements for the Intel Ice Lake platform. **Beside the up to 50% better TPH and QPH results, we also have measured between -70% to -30% lower database request times (see next slide).**

In the case of a lower bin Ice Lake CPU should get used, then the less CPU threads need to get subtracted from the results, e.g., 32 c vs. 40 c Ice Lake CPU has around 20% less TPH/QPH, but also with performance it would be still more than sufficient to replace a Broadwell system.

Ice Lake Mixed Workload Performance Test – DB Response Time

Ice Lake vSphere 7 VM vs. aged Broadwell vSphere 7 VM

S/4 HANA Ice Lake Bare 160 vCPU VM vs. 176 vCPU Broadwell VM OLTP DB Response Time
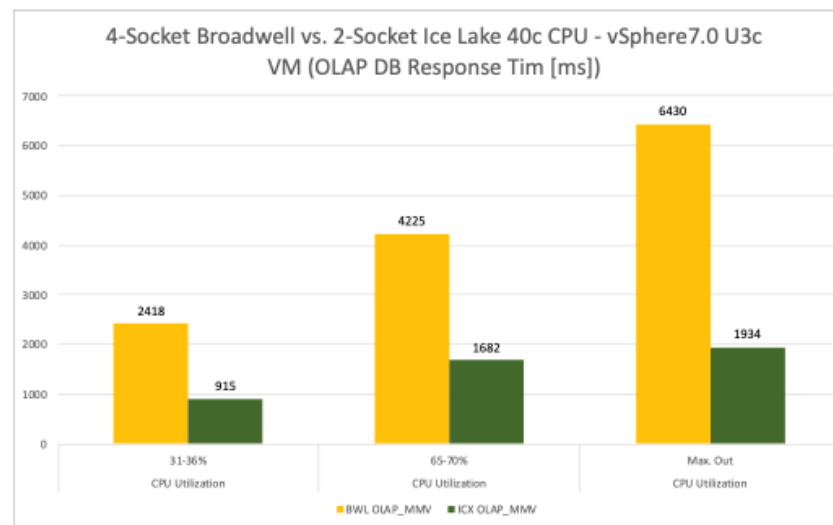
S/4 HANA Ice Lake Bare 160 vCPU VM vs. 176 vCPU Broadwell VM OLAP DB Response Time

- Upgrading from an aged 4-socket Broadwell SAP HANA platform to a new, modern 2-socket Ice Lake platform is **cutting down the energy cost by estimated 50%, by up to 50% better TPH and QPH results, and between -70% to -30% lower database request times (see above).**

- This has a direct positive environmental impact due **and lowers the carbon footprint** of your organization by maintaining or in this case even **improving the overall system performance.**

- Using **VMware vSphere** allows you an easy migration with no or only **very little downtime**.

Wrap Up

- Benchmarks are used to determine the "capacity" / "performance" of a given server HW or VM running SAP applications like ERP (SD/OLTP) or BW (BWH/OLAP)

- Sizing is needed to define the resource requirements of SAP workloads, for SAP HANA memory is one of the main sizing drivers beside CPU.

- VMware virtualized SAP HANA costs are between 4% and 10%. For sizing simplification, we recommend to use 10% as the "sizing figure".

- SAP HANA VMware sizing get performed the same way you size a BM running SAP HANA system. If you have the SAPS requirement, then add 10%. If you have the memory need, then add memory for the hypervisor.

- SAP HANA Validation tests are mainly thought for regression testing and to ensure that SAPs defined KPIs are met. These KPIs may or may not be relevant for customers, e.g., latency numbers when running @65% CPU utilization with 90k+ users.

- Benchmarks use simulated users and eliminate external impacts like app server to user network and are there fore optimized results.

- SAP HANA on VMware - Till today no noticeable real-live impact of virtualization have been reported.

Where to Find More Information

Best Practice Guides:

- [SAP HANA on VMware vSphere Best Practices and Reference Architecture Guide](#)

- [SAP HANA on Hyperconverged Infrastructure (HCI) Solutions Powered by VMware vSAN](#)

Blogs and SAP Wikis:

- SAP VMware WIKI:
  https://wiki.scn.sap.com/wiki/display/VIRTUALIZATION/SAP+on+VMware+vSphere

- VMware SAP related blogs:
  https://blogs.vmware.com/apps/sap

Thank you! Any Questions?

Virtualized SAP!

Please remember to complete
your session evaluation.

Erik Rieger, erieger@vmware.com

https://www.linkedin.com/in/erik-rieger-14728219/

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