

September 2024

# SAP Migration on Microsoft Azure powered by Intel® Xeon® Processors

The business benefits of migrating SAP to Microsoft Azure powered by Intel technology



intel®



Microsoft Azure

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# Key Takeaways

## Cloud Accelerates SAP Business Transformation

Businesses are migrating their SAP workloads to the cloud to improve scalability, performance, and cost efficiency, and to accelerate insights and innovation.

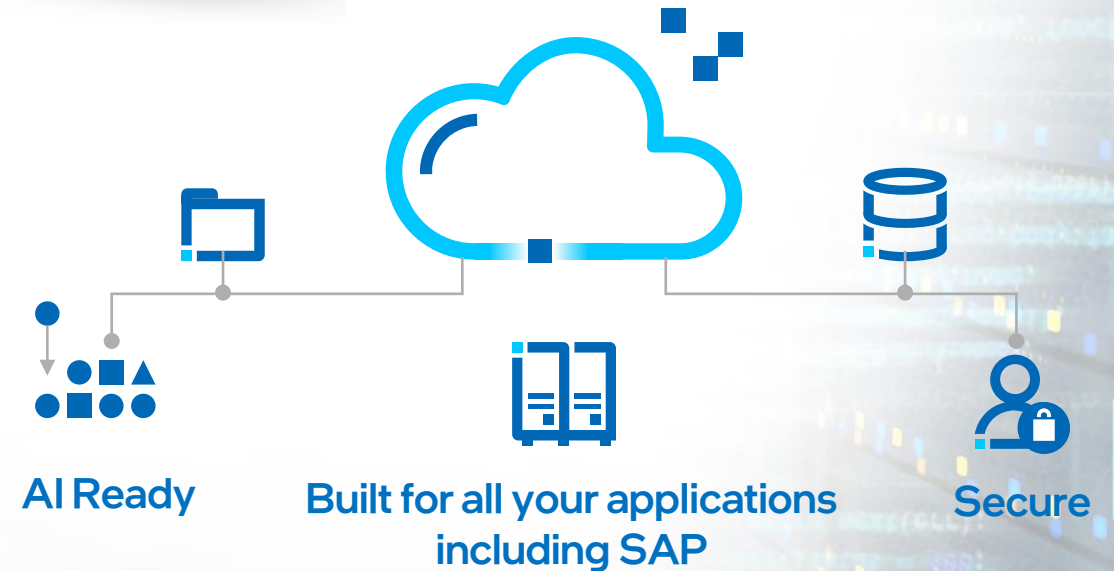
Microsoft Azure and Intel continue to provide state of the art instances, **optimized for SAP landscapes.**

### Business Opportunity

- **99 of world's 100 largest companies are SAP customers<sup>2</sup>**
- **SAP customers generate 87% of total global commerce<sup>2</sup>**



**Now up to 159 SAP HANA certified instances on Azure<sup>1</sup>** and early access to the latest Intel technologies to increase performance and efficiency while reducing costs



<sup>1</sup><https://www.sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/#/solutions?filters=v:deCertified;jaas;ve:24>

<sup>2</sup>"SAP Corporate Fact Sheet," April 22, 2024.

# Key Takeaways

Meet mission-critical business needs with Azure instances on 4th Gen Intel® Xeon® processors

Microsoft Azure Mv3 family introduces  
**4th Gen Intel® Xeon® processors\***  
resiliency and performance

Microsoft Azure Mv3 high memory will  
provide up to **32TB scale-up capacity**  
for your SAP HANA Database

Better performance

Up to  
**2.3x**  
OLAP performance<sup>1</sup>

Larger databases

Up to  
**1.5 TB**  
memory/socket (OLAP)

Built to scale up to 16S

Up to  
**32 TB**  
memory/server (OLTP)

Up to  
**2:1**  
consolidation gen-  
vs.-gen

Intel® Xeon® CPU is the only  
x86 CPU certified  
for SAP HANA



Up to  
**480**  
cores per  
server (8S)

**8S-4L**  
Intel UPI 2.0, performance-  
optimized topology

Modernize your SAP landscape with 4th Gen Intel® Xeon® Processors  
leveraging the [largest SAP certified ecosystem](#) for improved  
performance and optimized TCO on Microsoft Azure

<sup>1</sup>See speaker notes & backup slide for disclaimers and configurations— results may vary

\*5th Gen Intel® Xeon® SAP-certified Azure instances COMING SOON



# What's Happening in the Cloud Market?

# 5 Cloud Predictions and Opportunities for 2024

Cloud computing is set for a transformative year. Navigate trends, future decisions, and customer conversations with these top cloud predictions.

1

## Security, cloud and AI will be top focus areas in 2024

In a recent Intel survey, tech executives, developers, and architects selected their top priorities for 2024.

27%<sup>1</sup> Meet security requirements

27%<sup>1</sup> Adopt cloud services and solutions

22%<sup>1</sup> Adapt to new technology

17%<sup>1</sup> Adopt artificial intelligence (AI) / machine learning (ML)

11%<sup>1</sup> Improve efficiency and performance

2

## Decision-makers will increasingly take a "cloud first" approach.

Enterprises are investing in cloud technology to pursue digital transformation and AI opportunities and overwhelmingly prefer cloud solutions when making new purchases.<sup>2</sup>

### Investment in public cloud services is soaring

(US \$1.1 trillion by 2027) and is notably higher than on-premises data center systems spending (US \$275 billion).<sup>2</sup>

### SaaS and cloud services are the top choices

For new application workloads, growing from 77% in 2022 to 91% in 2023.<sup>3</sup>

3

## Enterprises will embrace a mix of workload locations

Organizations are staying flexible with their infrastructure and aren't afraid to distribute workloads.

### Decision makers report that workloads are typically distributed by function:

89% choose cloud for email, collaboration, and content<sup>1</sup>

71% choose on-premises or public cloud for security and confidential computing<sup>1</sup>

12% choose edge or remote locations for application development and deployment<sup>1</sup>

In the last year, 17% of organizations moved at least one workload, service or application back on-premises from cloud, citing:

62%  
Cost savings

42%  
Latency

35%  
Security Concerns

1. Respondents are data scientists and AI professionals. Source: <https://cnvrg.io/ml-insider-results-2023/>

2. "Gartner Says Cloud Will Become a Business Necessity by 2028," Gartner, November 29, 2023, [gartner.com/en/newsroom/press-releases/2023-11-29-gartner-says-cloud-will-become-a-business-necessity-by-2028](https://www.gartner.com/en/newsroom/press-releases/2023-11-29-gartner-says-cloud-will-become-a-business-necessity-by-2028)

3. BCSE: I&A 2016-23 data.

# 5 Cloud Predictions and Opportunities for 2024

Cloud computing is set for a transformative year. Navigate trends, future decisions, and customer conversations with these top cloud predictions.

4

## AI and ML investment will drive new business opportunities

AI and ML continue to gain attention with signs pointing to fast growth of this segment.

More than 70% of CSPs and enterprises predict that **AI/ML will gain importance** for their companies in the next 3-5 years.<sup>1</sup>

Markets with potential for **high AI/ML platform spend** include banking (US \$15 Billion), professional services (US \$12 Billion), and retail (US 8 Billion).<sup>1</sup>

Cloud solution architects are especially interested in **generative AI**, with 97% already using in in some capacity and 61% interested in gaining certifications.<sup>1</sup>

1. Respondents are data scientists and AI professionals. Source: <https://cnvrg.io/ml-insider-results-2023/>

5

## Edge as a Service is the future

Edge as a Service – processing, analyzing, and storing data closer to where it's generated – is gaining increased interest among developers.

**76% of developers are already using or planning to use Edge as a Service** offerings in the next 12 to 18 months.<sup>1</sup>

**Top drivers** for adopting Edge as a Service include privacy and security requirements or concerns (55%), regulatory requirements (50%), and resilience to network faults(47%).<sup>1</sup>

**81% of Edge as a Service offerings are preferred through public and cloud providers** like Amazon Web Services (AWS) Azure, and Google.<sup>1</sup>

# Cloud Accelerates SAP Business Transformation

Innovate, integrate, orchestrate, and manage across your **SAP Cloud Infrastructure**, with **Intel technology**

- Intel-based cloud instances are available across Microsoft Azure instances. RISE with SAP is standardized on Intel® Xeon® processors
- Meet your SAP landscape's needs with a range of powerful SAP-certified, Intel-based instances in the cloud
- Move data to, from, and between your servers with minimal latency and zero cost
- Get the flexibility, speed, and agility to innovate without jeopardizing security

## Today's clouds are powered by Intel

Through co-engineering and business relationships with top CSPs, Intel has delivered five generations of custom silicon built for cloud scale.<sup>1</sup>



## AI ready

Accelerates innovation with your data, all of it, creating new insights with AI

## Built for all your applications including SAP

Intel architecture guides your cloud journey, allowing you to modernize and extend existing applications and build new cloud native apps

## Secure

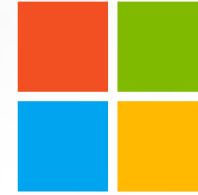
The cloud, powered by Intel, is a secure and trusted foundation for computing





# **Intel - SAP - Azure A Winning Combination**

# A Winning Combination



Proven Leadership & Certified Scalability

Azure is an Early Adopter of Next Gen Intel Technologies

Intel® Platforms are Tuned and Certified for SAP Workloads on Azure



# Why Intel and SAP in the Cloud?

Certified SAP Instances running Intel® Technology designed for performance and/or TCO

## Enable a single source of truth



Grow business value from faster insights

With massive memory capacity, enable near-real-time analysis at the source without having to make multiple copies of data. Get closer to your goal of a single source of truth.

## Run on pre-validated, certified SAP HANA cloud instances



Safe, future-proof cloud investment

Reassurance that your cloud instances are running on modern Intel® technology that has been validated for SAP HANA workloads to perform more optimally and securely.

## Simplify your SAP HANA landscape



Achieve high return on your cloud investment

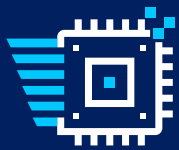
Consolidate your server footprint to realize operational efficiencies for quality assurance (QA), high availability (HA), disaster recovery (DR), and business intelligence (BI). Consolidate your application server landscape.

# Why Intel and Azure for SAP Workloads

Businesses are migrating their SAP workloads to the cloud to improve scalability, performance, and cost efficiency

Now up to **159 SAP HANA certified instances on Azure<sup>1</sup>** and early access to the latest Intel technologies to increase performance and efficiency while reducing costs

## Meet Heavy SAP Compute & Memory Demands



**2x increased** HANA database capacity vs. 2nd Gen Xeon<sup>®</sup> via 8 DDR5 channels

Up to **32 TB memory** per server (OLTP) with HANA scale-up to 16S server with 2 TB per socket<sup>2</sup>

## Faster Insights



Up to **2.3x** OLAP performance with 4th Gen Xeon<sup>®</sup> processors vs. 2nd Gen Xeon<sup>®</sup> processors<sup>3</sup>

Up to **30% faster** SAP HANA database load times with Mv3 instances vs. Mv2 instances<sup>4</sup>

## Reduce TCO



**Save money** by selecting the right size and infrastructure for your SAP needs

Up to **15% higher performance** per core for SAP OLTP workloads with Mv3 instances vs. Mv2 instances<sup>4</sup>

## Outstanding Security and Availability



**90+** international and industry certifications, with more compliance certifications than any other public cloud<sup>5</sup>

**Enhanced security** by running storage and networking services separately from the host

<sup>1</sup><https://www.sap.com/dmc/exp/2014-09-02-hana-hardware/enEN/#/solutions?filters=v:deCertified;iaas:ve:24> <sup>4</sup><https://techcommunity.microsoft.com/t5/running-sap-applications-on-the-introducing-new-powerful-infrastructure-for-running-sap-hana-on/ba-p/3986210>

<sup>2</sup>Intel supports up to 4 TB/socket; SAP hardware reference architecture limits OLTP workload to 2 TB/socket.

<sup>3</sup>2.3x OLAP Performance for SAP BW4HANA 4th Gen Intel Xeon Processor (SPR) System Configuration

<sup>5</sup><https://dpgresources.intel.com/asset-library/intel-azure-proof-points-real-time-insights-and-innovation-from-sap-hana>

# SAP on Azure Performance Benefits

Meet business needs with Azure instances on 4th Gen Intel® Xeon® processors

## Better performance

Up to

# 2.3x

OLAP performance<sup>1</sup>

Via more cores balanced with memory bandwidth, Intel® AVX-512, Intel® TSX, and VBMI

## Larger databases

Up to

# 1.5 TB

memory/socket (OLAP)

Increased SAP HANA database size from 768 GB/socket via more DIMMS/socket—8 channel DDR5

## Built to scale up to 16S

Up to

# 32 TB

memory/server (OLTP)

For 16S server, with 2 TB/socket 4 UPI links/socket for scale up performance; larger PAVA

Up to

# 2:1

consolidation  
gen-vs.-gen

Intel® Xeon® CPU is the  
only x86 CPU certified  
for SAP HANA



Up to

# 480

cores per  
server (8S)

# 8S-4L

Intel UPI 2.0, performance-  
optimized topology

[Learn more](#)



# Reach Sustainability Goals

with 4th Gen Intel® Xeon® Scalable Processors

## SAP HANA

Rehost/Relocate/Replatform



At constant Query  
Rate, 4th Gen  
allows up to

**27%**

CPU power savings\*

**Intel Performance Measurements  
based on SAP BW4HANA Scenario**

## SAP Application Server

Rehost/Relocate/Replatform



At constant SD User  
Rate, CPU power  
savings of

**22%**

can be achieved\*

**Intel Performance Measurements  
based on SAP SD Scenario**

\*See backup for workloads and configurations. Results may vary.

# Case Studies



Coca-Cola HBC turned to [Microsoft Azure, Mv2-series virtual machines](#) on Intel® Xeon® Scalable processors, and [SAP applications on Azure](#) to support its massive prototyping workloads and development environment. Azure and Intel together led to the technology stack needed to accommodate Coca-Cola HBC's expansive enterprise landscape that continues to scale while performing better, and at a lower cost, than previously possible.

[READ MORE](#)








[Atos](#) decided to migrate all its internal information management resources to [Microsoft Azure](#) to harness the benefits of a more secure, robust, and agile solution. Moving from its on-premises infrastructure to a private cloud, Atos will have greater adaptability, scalability, and ease of integration in Azure.

[READ MORE](#)

# Introducing Azure Mv3 family for SAP Landscapes

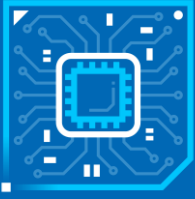
[Azure M-series Mv3 family](#), the next generation memory optimized virtual machines, **give customers faster insights, more uptime, a lower total cost of ownership and improved price-performance** for running SAP HANA workloads with Azure IaaS deployments and SAP RISE on Azure.

SAP Landscape	Optimized Costs	Flexibility	Enhanced Resiliency	Workload Optimized
 <p>SAP Certified and supported for SAP Application Server in 2-tier &amp; 3-tier configs and pure database.</p> <ul style="list-style-type: none"><li>• MS SQL Server</li><li>• SAP ASE</li><li>• DB2</li><li>• Oracle DB</li><li>• SAP HANA</li></ul> <p>Supports SAP ECC Lift &amp; Shift Scenarios Supports SAP S4/HANA Migration Scenarios</p>	 <p>Powered by latest 4<sup>th</sup> Gen Intel<sup>®</sup> Xeon<sup>®</sup> Processor</p> <ul style="list-style-type: none"><li>• Mv3 Medium Memory</li><li>• Up to 1:20 ratio of vCPU to Memory</li><li>• Up to 176 vCPU (as of November 2023)</li><li>• Up to 3.9TB SAP HANA DB Capacity (as of November 2023)</li></ul>	 <p>Flexibility in choosing from 11 sizes today in Azure Regions:</p> <p>West Europe, North Europe, East US 2, East US and West US 2</p>	 <p>Increased resilience against failures in memory, disks, and networking based on intelligence from past generations.</p>	 <p>4<sup>th</sup> Gen Intel<sup>®</sup> Xeon<sup>®</sup> Processor optimized for SAP landscapes</p> <ul style="list-style-type: none"><li>• ~25% improved network throughput<sup>1</sup></li><li>• ~50% improved remote storage throughput<sup>2</sup></li><li>• Reduced RTO with 31% faster SAP HANA data load times<sup>3</sup></li></ul>

<sup>1 2 3</sup> <https://azure.microsoft.com/en-us/updates/generally-available-azure-mv3-medium-memory-mm-virtual-machines/>



# Intel® Architecture Instance Types on Azure

	General Compute	Confidential Computing	Compute-Optimized	Memory-Optimized/ Large Memory
	Balanced compute, memory, and network resources for general-purpose workloads: analytics, databases, and enterprise applications	Protection for code and data while in use in the cloud using protected enclaves based on Intel® Software Guard Extensions	Enhanced execution resources for compute-bound workloads: data science, ML/AI inference, gaming, high-performance computing	Enhanced memory resources for memory-bound workloads: in-memory databases/ applications/analytics, SQL HANA, SQL Hekaton
5th Gen Intel® Xeon® processors	Dsv6* Ddsv6*			Esv6* Edsv6*
4th Gen Intel® Xeon® processors		DCsv5 ECsv5	ND H100 v5 VM	Mv3
3rd Gen Intel® Xeon® processors	Dv5 / Dsv5 Ddv5 / Ddsv5	DCsv2 DCv3		Ev5 / Esv5 Edv5 / Edsv5
2nd Gen Intel® Xeon® processors	Dv2 / Dsv2 Dv4 / Dsv4 Dv3 / Dsv3 Ddsv4		Fsv2 HC Fx	Ev3 / Esv3 Mv2 Edv4 / Eds4 HLI
Intel® Xeon® processors	Dv2 / Dsv2 Dv3 / Dsv3			Dv2 / DSv2 11-15 Ev3 / Esv3 Mv2
Intel® Xeon® E Processors		DCsv2 DCv3		
Intel® Xeon® v4 Processors	Dv2 / Dsv2 Dv3 / Dsv3			Dv2 / DSv2 11-15 Ev3 / Esv3
Intel® Xeon® v3 Processors	Dv2 / Dsv2 Dv3 / Dsv3			Dv2 / DSv2 11-15 M

Best SAP app-tier performance

Best SAP HANA performance

SAP HANA Sizing options, lower performance

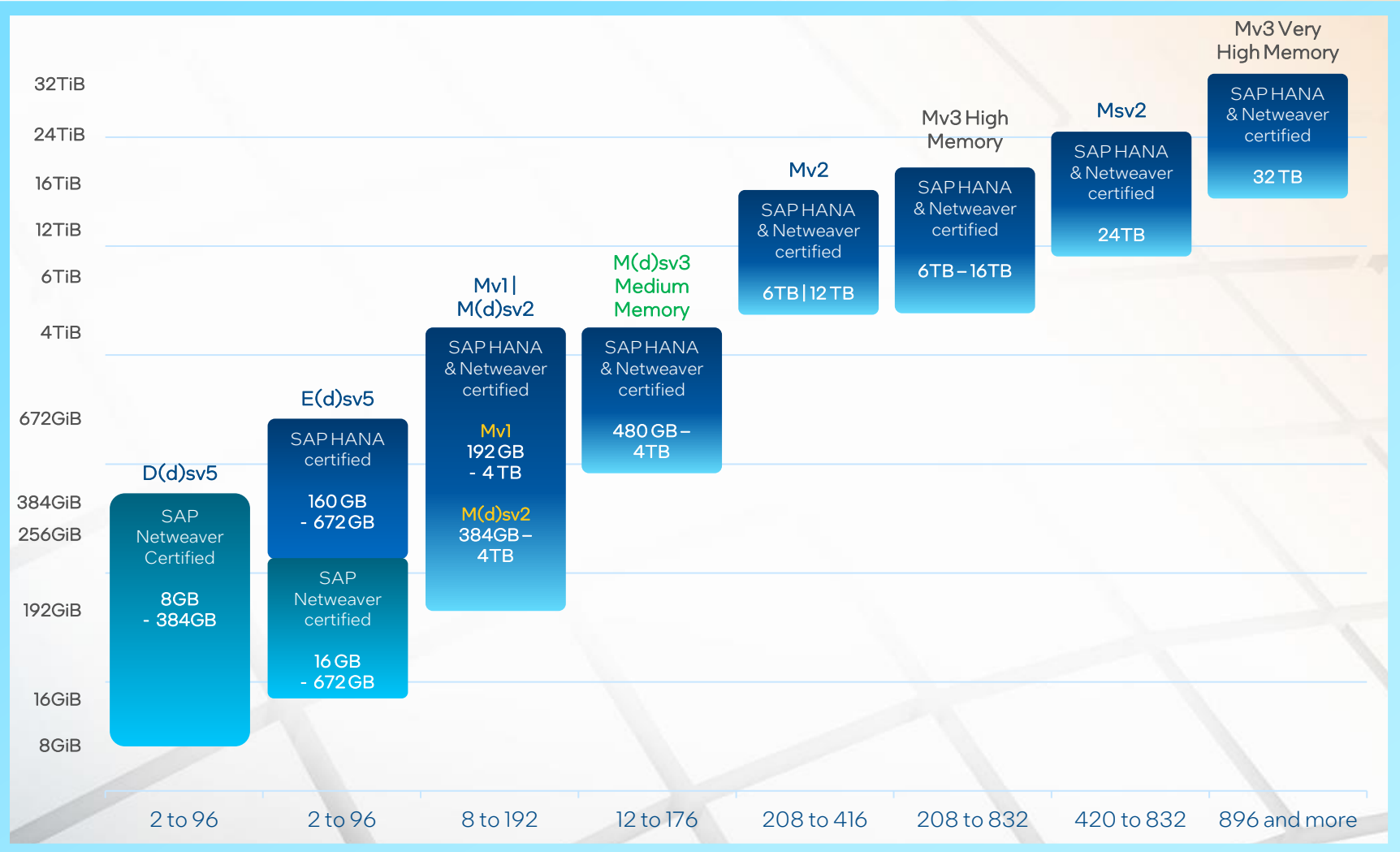
\* GA Coming Soon

# Scalable Compute Options for all SAP Workloads & Sizes

Supports different types of SAP workloads  
OLTP/OLAP/SAP Business One

Mv2 instances provide up to 24 TB for OLTP workloads

Mv3 Very High Memory Instances with up to 32TB



See <https://learn.microsoft.com/en-us/azure/virtual-machines/sizes> for all variations.




# **Intel Technology Value for SAP S/4HANA & SAP ECC**

# Migration of S/4HANA to Azure Mv3 Family

## SAP HANA with ~4TB capacity

**Old**



M128ms

128 vCPU / 3800GB


Intel E7-8890 v3

134,630 SAPS\*

\$6816.83 /Month

Intel® Xeon® E7-8800 v3

**Old**



M192idms\_v2

192 vCPU / 4096GB


2<sup>nd</sup> Intel Gen Xeon

256,750 SAPS\*

\$8190.01 /Month

2nd Gen Intel® Xeon® Scalable Processor

**New**



M176ds\_4\_v3

176 vCPU / 3892GB

4<sup>th</sup> Gen Intel Xeon


257,120 SAPS\*

\$6761.15 /Month

4th Gen Intel® Xeon® Processor

Up to **1.91x** higher SAPS performance at similar cost

**New**



M176ds\_4\_v3

176 vCPU / 3892GB


4<sup>th</sup> Gen Intel Xeon

257,120 SAPS\*

\$6761.15 /Month


4th Gen Intel® Xeon® Processor

Up to **17%** Lower cost for similar capacity and performance.




4th Gen Intel® Xeon® processors enable **faster performance and lower costs\*\***

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Benefit from **1.5x improvement** in remote storage throughput \*\*

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**Increased resilience** against failures in memory, disks, and networking based on intelligence from past generations. \*\*




\* SAP SAPS based on SAP – Azure Note 1928533 (<https://launchpad.support.sap.com/#/notes/1928533>)  
 \*\* <https://azure.microsoft.com/de-de/updates/public-preview-azure-mv3-medium-memory-virtual-machines/>  
 Configurations based on <https://azure.microsoft.com/en-us/pricing/details/virtual-machines/linux/#pricing> Region: US East, 3 Years Reserved. Results may vary.



# Intel Technology for SAP Business Application



# Consolidate SAP Application Server with Azure Mv3 Family\*

**Old**

 <p>M32ms_v2 32 vCPU / 875GB</p> <p>42711 SAPS</p> <p>\$3714.83/Month</p>	 <p>M32ms_v2 32 vCPU / 875GB</p> <p>42711 SAPS</p> <p>\$3714.83/Month</p>	 <p>M32ms_v2 32 vCPU / 875GB</p> <p>42711 SAPS</p> <p>\$3714.83/Month</p>	<p><b>Total</b></p> <p>96 vCPU / 2625GB</p> <p>128113 SAPS</p> <p>\$11144.49/Month</p>
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2nd Gen Intel® Xeon® Processor

**New**


 <p>M96s1_v3 96 vCPU / 974GB</p> <p>140247 SAPS</p> <p>\$5743.67/Month</p>	 <p>M96s2_v3 96 vCPU / 1946GB</p> <p>140247 SAPS</p> <p>\$7656.17/Month</p>	<p>S1 with 49% Reduced Costs</p>	<p>S2 with 31% Reduced Costs</p>	<p><b>Total</b></p> <p>96 vCPU / 974GB   1946GB</p> <p>140247 SAPS</p>
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4th Gen Intel® Xeon® Processor

Additional TCO Savings with Dev/Test Tier Consolidation

 **No Sacrifice; Consolidate SAP App Tier**

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 **Optimize & Reduce your Landscape TCO**

 **Utilize Latest Azure Mv3 Family for SAP Business Applications**

\* SAP SAPS based on SAP – Azure Note 1928533 (<https://launchpad.support.sap.com/#/notes/1928533>)  
Configurations based on <https://azure.microsoft.com/de-de/pricing/calculator/> Region: US East, 3 Years Reserved. Results may vary.

# Azure Mv3 Summary

Microsoft Azure Mv3 family introduces **4th Gen Intel® Xeon® processors** to provide higher resiliency and performance

Microsoft Azure and Intel continue to provide state of the art instances, **optimized for SAP landscapes**



Microsoft Azure Mv3 high memory will provide up to **32TB scale-up capacity** for your SAP HANA Database



# Strategic Collaboration: Intel and SAP RISE



# Strategic Collaboration: Intel and SAP RISE

Intel and SAP RISE announced a strategic collaboration to deliver a more powerful and sustainable SAP® software landscapes in the cloud. Designed to help customers derive greater scalability, agility and consolidation of existing SAP software landscapes, the collaboration deepens Intel's focus on delivering extremely powerful and secure instances for SAP, powered by Intel® Xeon® processors.

Intel embarks on the SAP RISE Journey in the coming years with the migration to S/4HANA

[LEARN MORE](#)



# RISE with SAP

## Powered by Intel Technology

1

Migrate to S/4HANA

intel.  
**XEON**  
PLATINUM

All Options require SAP Certified Infrastructure

- SAP Certified Appliances (OEMs)
- SAP Certified IaaS (CSPs)
- SAP Certified Hypervisor on Intel x86 (Broadcom/VMWare, Nutanix, SUSE KVM)

Intel powers the worldwide largest ecosystem of SAP certified Infrastructure

SAP RISE  
Commercial Framework

1

RISE with SAP –  
S/4HANA Cloud – Private Edition

Private cloud within Hyperscalers (Azure, AWS, GCP, Alibaba) or SAP DataCenter

2

RISE with SAP  
S/4HANA – Private Edition –  
Customer Data Center Option

Moving Customers to cloud, without moving their data center

Private cloud within Customer Data Center (HPE Greenlake, Dell Apex, Lenovo TruScale, Fujitsu uSCALE)

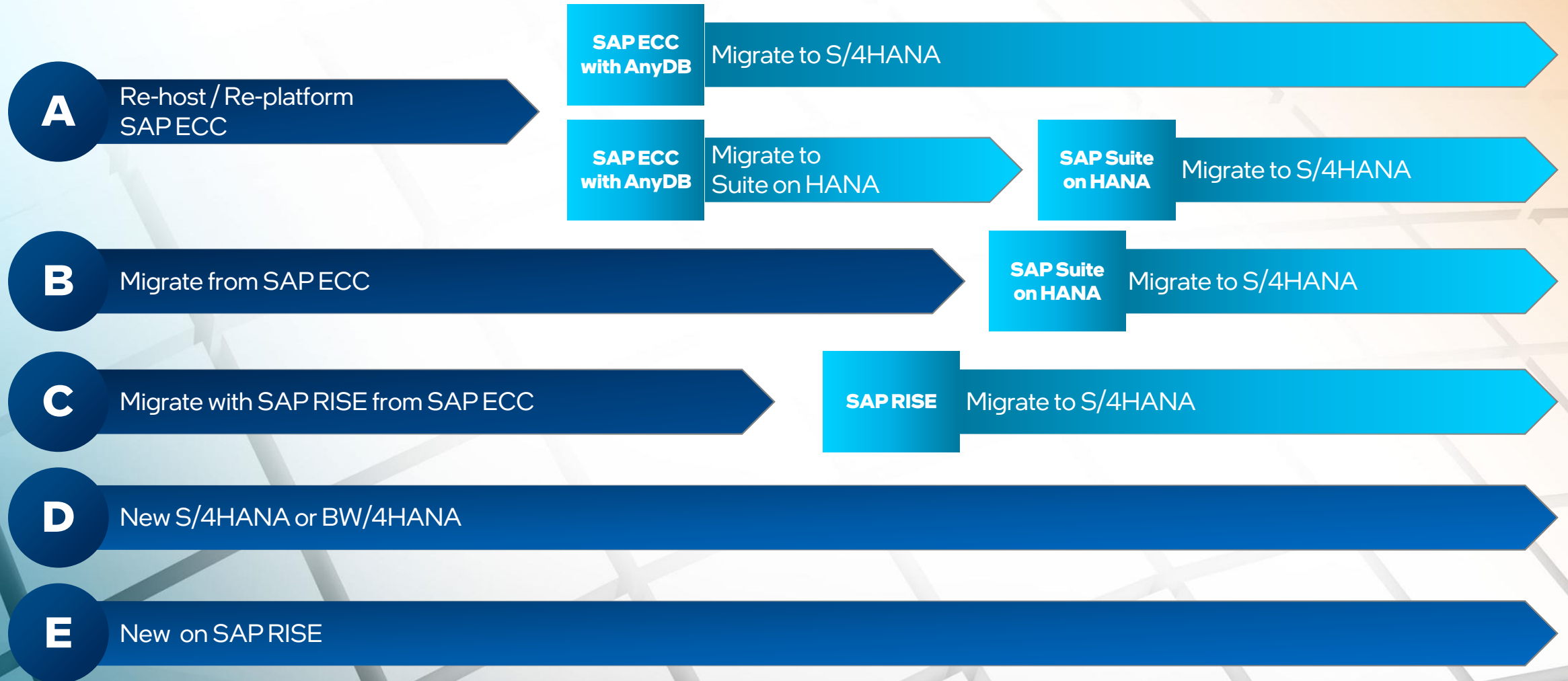
3

S/4HANA / SAPECC

Customer Data Center or Partner IaaS or DCaaS with Co-Location

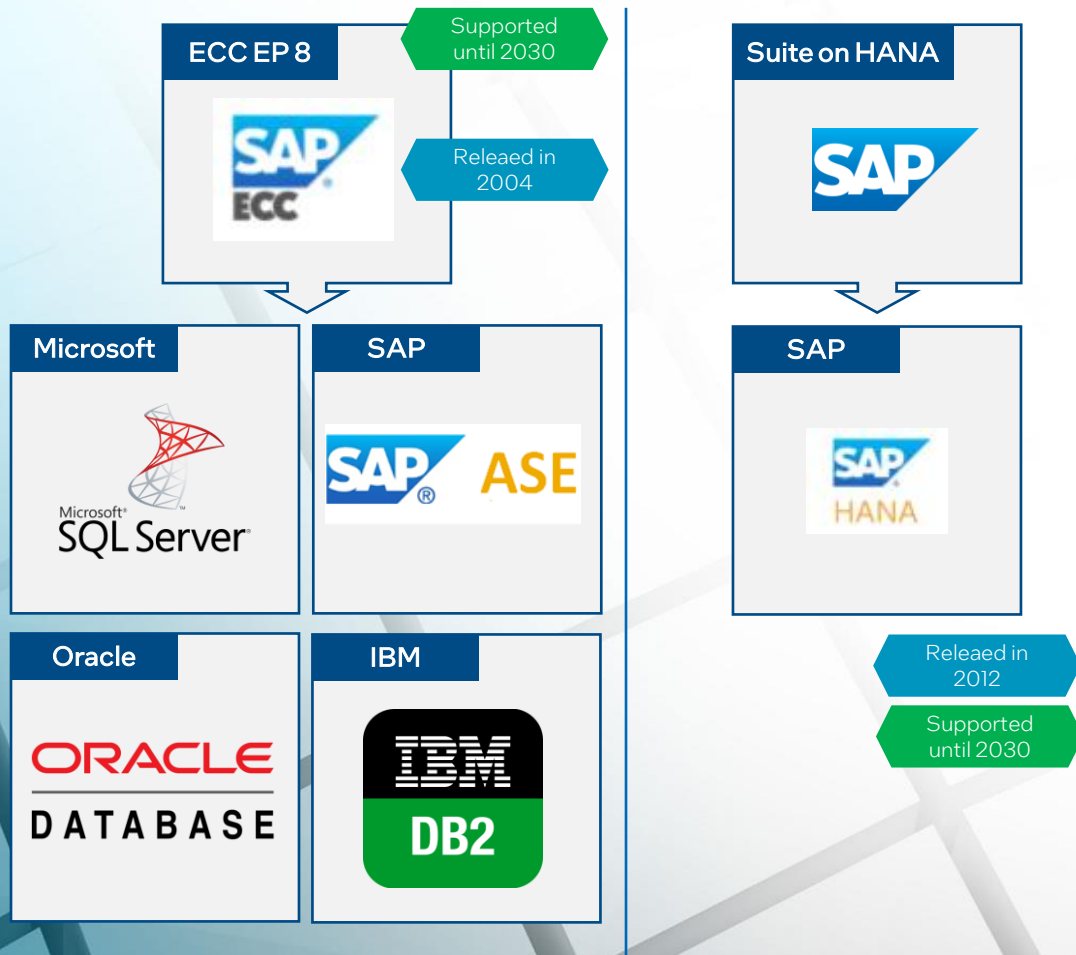
intel.  
**XEON**  
PLATINUM

# Intel Supports the Journey to SAP S4 / HANA

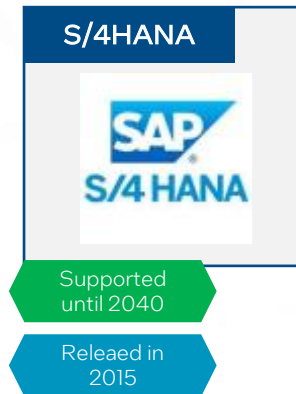


# Intel® Xeon® Scalable Platform - 360° Support for SAP

## Re-Host/Re-Platform/Transform




## Greenfield/ Migrate



- Intel Xeon Platform powers the SAP landscape for the last 2 decades
- Benefit from Intel's partnership with SAP, Microsoft, Oracle and IBM to deliver highest performance, resilience at lower TCO for their database products
- Intel enables an open ecosystem of SAP hardware and software vendors to provide highest flexibility
- Future Proof Investment in case you Re-Host or Re-Platform your existing SAP landscape or start your migration to S4/HANA
- Scale-Up to 32TB SAP HANA and consolidate your SAP landscape with Intel® Xeon® processors to optimize TCO and help meet your sustainability goals





# Edge Platform-as-a-Service (PaaS) from SAP and Intel

Enabled by SAP RISE & SAP BTP

# Introducing Edge Platform-as-a-Service from SAP and Intel

Intel's new commercial software platform enabling enterprises to build, deploy, run, and manage scalable edge and AI solutions on standard hardware with cloud-like simplicity

## A Modular Platform for Network and Edge Transformation

Foundational components that drive network and edge transformation

### Industry Solutions

AI-enabled edge end-solutions optimized for various use-cases

### AI and Applications

Tools to build and deploy edge-native application software and AI

### Infrastructure Software

Secure infrastructure software for edge-to-cloud hybrid implementations

### Foundational HW built for the edge

Platform Hardware built for the edge (CPUs, GPUs, network accelerators)

Build

Deploy

Run

Manage

Security

Partner Ecosystem Support

# SAP / Alert Enterprise Solution – Edge PaaS



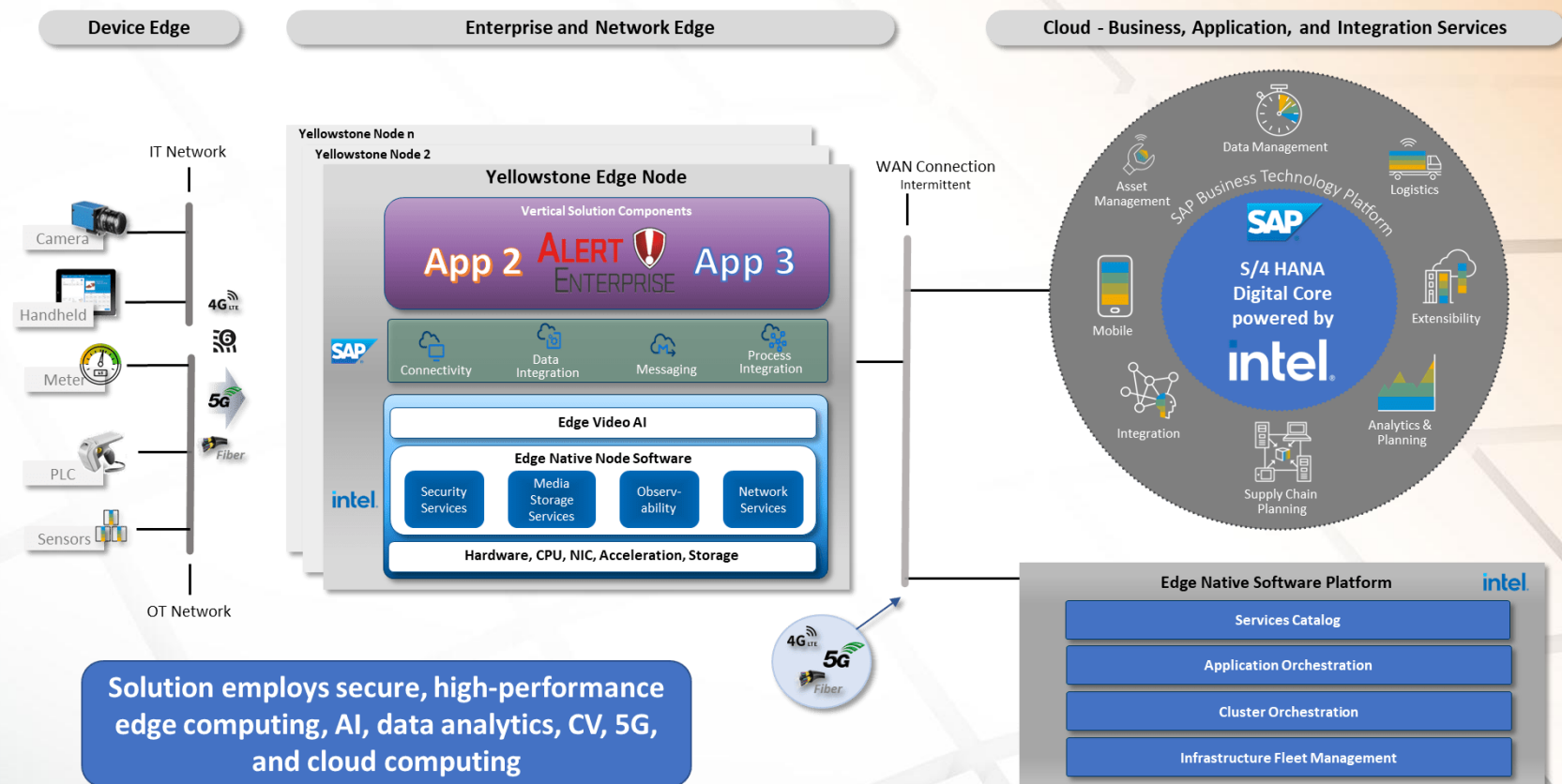
## Solution Overview

Cyber-Physical Security Governance  
Risk and Compliance –  
“Cyber Physical GRC” for Utilities

Based on Intel® Xeon®, Core, Edge  
Platform

Alert Enterprise Prevents, Detects &  
Mitigates Electrical Substation Threats

SAP S/4 Hana Delivers Enterprise to  
Edge Vertical Solutions



Solution employs secure, high-performance edge computing, AI, data analytics, CV, 5G, and cloud computing

# SAP / QuayChain Solution – Edge PaaS



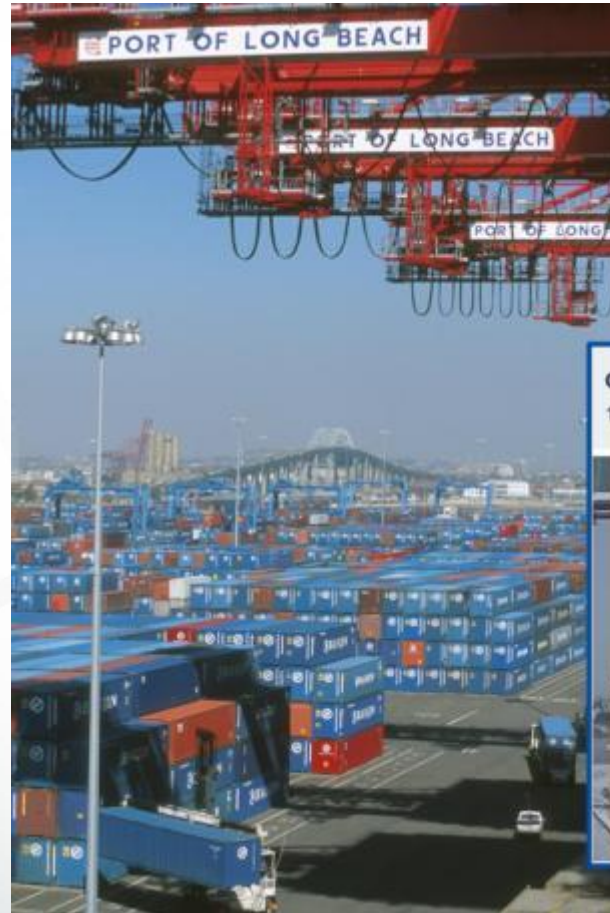
## Solution Overview

Drives Value for Ports, their Supply Chain Stakeholders, Communities and the Environment

Based on Intel® Xeon®, Core, Edge Platform

QuayChain Edge Devices (QEDs):

- Computer Vision
- Machine Learning/AI
- Local Edge Compute
- Environmental Sensors
- Dynamic Physical Sensors 5G Connectivity
- End to end encryption



### Automate Reporting

For specific location within, or across entire Port automate:

- Air monitoring
- Traffic count, aggregate type, speed
- Weather, wind, seasonality, light etc

Automate reporting to:

- EPA, local and state regulatory authorities

### Adaptable Insights

Easily scale and add new use cases

Granular data to correlate dependencies

Robust machine learning to surface unseen factors on sustainability

Plan infrastructure and sustainability decisions using accurate, not snapshot, data

### Impact Port Community

Real-world, accurate data enables addressing port community concerns:

- Shared baseline data to co-create solutions
- Increased transparency and understanding of decisions and ongoing impact
- Real-time data to reroute traffic, reduce noise, improve air quality
- Communicate traffic count type eg supply chain vs. construction

**Computer Vision:**  
100% Recognition on all Equipment



### Container

Number: FDU 952007  
Size/Type: 40R General  
Hazard Plaque: Yes  
Shipline: Florens  
Owner: Florens  
Container History: 74/last 30 days at this location

### Location

Current location: QuickPick, 1021 E 233rd St, Carson, CA 90746  
Direction: Inbound  
Time and Date: Sept 12, 2021, 1:43pm PST  
Greenhouse (GHG): 22 CO2e MT/last 30 days

### Truck

Truck Owner: ABC Trucks  
SCAC: AACT  
License Plate: T60306  
State: TN  
Make, Model and Year: Freightliner, Cascadia Evolution New Cascadia, 2014

### Chassis

Number: FLT2 419682  
SEP: Chassis Management Services, Southern California  
SCAC: FWAZ  
License plate: T60306  
State: TN  
Plate: 419682

Container	Location	Truck	Chassis
FDU 952007	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952008	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952009	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952010	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952011	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952012	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952013	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952014	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952015	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952016	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952017	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952018	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952019	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682
FDU 952020	QuickPick, 1021 E 233rd St, Carson, CA 90746	ABC Trucks	FLT2 419682



# Call to Action

**Modernize your SAP landscape with 4th Gen Intel® Xeon® Processors\*** leveraging the largest SAP certified ecosystem for improved performance and optimized TCO on Microsoft Azure

\*5<sup>th</sup> Gen Intel Xeon SAP-certified Azure instances COMING SOON

**Migrate to SAP S4 / HANA with support from SAP RISE - powered by Intel® Xeon®.** Support your journey to SAP RISE and benefit from the SAP and Intel partnership delivering better performance, scalability and resiliency for your business-critical processes.

**Connect with an Intel representative to learn more about the Edge Platform-as-a-Service from SAP and Intel,** integrated with SAP RISE and SAP BTP, enables new business cases already integrated into SAP landscapes for faster adoption and improved efficiencies.

# Training

## Competency

### Business Transformation for SAP Software



SAP is one of the leading global providers of business software solutions. These solutions can be found in many enterprise and public sector organizations, including many of your customers.

SAP and Intel have a two-decade-long relationship, with SAP software solutions optimized on Intel® technologies, including server processors, memory, storage, and AI acceleration. Explore SAP software solutions and how they work with Intel® technologies will help you deliver digital transformation services to your customers. This curriculum will help explain the value of SAP on Intel data center technologies. Delve into topics such as Business Transformation, Digital Disruptions, and Key Market Trends. Gain skills and insights about SAP software system requirements, benchmarks and sizing, and deployment options.

## CloudTV

**COMING SOON**  
[Intel.com/cloudtv](https://www.intel.com/cloudtv)  
**CloudTV: SAP Migration on Azure**

# Additional Resources

Asset Type	Title and Link
Data Sheet	<a href="#">Azure Products Available by Region</a>
Website	<a href="#">Certified and Supported SAP HANA® Hardware</a>
Blog	<a href="#">Considering Migrating to SAP S/4HANA? Why Now Is a Great Time to Move to the Cloud</a>

# Notices and Disclaimers

Performance varies by use, configuration and other factors. Learn more on the [Performance Index site](#).

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary.

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# 2.3x OLAP - SAP BW4HANA

## 4th Gen Intel Xeon relative to 2nd Gen Intel Xeon

	SAPBW4H				
	CLX	ICX	SPR	Phase2 SPR/ICX	Phase2 SPR/CLX
Phase1(seconds)	18,997	17,573	14,450		
Phase2 (QpH)	3,376	4,933	7,893	1.60	2.34
Phase3 (seconds)	123.02	129.35	134.49		
logical cores	112	160	240	1.50	2.14
TDP (W)	205	270	350		

### 4th Gen Xeon - SPR System Config

4th Gen Config : Tested by Intel on November 2022, 1-node, 2x Intel® Xeon® 8490H, E3 stepping, 60 cores, 80KB L1 cache and 2MB L2 cache per core, 112MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 4800 MHz [run @ 4400 MHz] ), BKC WW41->BIOS: EGSDCRB1.SYS.8901.P01.2209200243, ucode: 0xAB0000C0, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default, HANA: 2.00.052.00.1599235305, NetWeaver: 7.50, Benchmark kit: 3.17, Score 7893 Queries/Hour

### 2nd Gen Xeon - CLX System Config

2nd Gen Config: Tested by Intel: 1-node, Wolf Pass; Processor: 2x Intel Xeon 8280L 28C, 2.7GHz, 205W; BIOS: SE5C620.86B.02.01.0013.121520200651; Microcode: 0x5003006; Memory: 1.5TB (24x64GB DDR4 2667 MT/s); OS SLE 15 SP2; Linux Kernel: 5.3.18-22-default  
Score 3376 Queries/Hour

4<sup>th</sup> Gen Intel Xeon (SPR) of 7893 QpH divided by 2<sup>nd</sup> Gen Intel Xeon (CLX) score of 3376 QpH = 2.34X

# SAP SD Benchmark

**Config 1:** Tested by Intel on November 2022, 1-node, 2x Intel® Xeon® 8380, 40 cores, 2.3 GHz, 80KB L1 cache and 1280KB L2 cache per core, 60MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 3200 MHz), BIOS: SE5C6200.86B.0022.D64.2105220049, ucode: 0xD000375, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default, SD 2-Tier, Sybase 16.0 SP03, EHP5 for ERP 6.0, Score 37,980 SD users.

**Config 2:** Tested by Intel on November 2022, 1-node, pre-production 2x Intel® Xeon® 8490H, E3 stepping, 60 cores, 80KB L1 cache and 2MB L2 cache per core, 112MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 4800 MHz), BKC WW41->BIOS: EGSDCRB1.SYS.8901.P01.2209200243, ucode: 0xAB0000C0, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default, SD 2-Tier, Sybase 16.0 SP03, EHP5 for ERP 6.0, Score 58,374 SD users

Cert Number	OEM	Sockets	CPU	Memory	SAPS	Users	CVEs
<a href="#">2023004</a>	HPE	2	Intel Xeon Platinum 8490H processor	1024	352725	64576	mitigated
<a href="#">2019036</a>	IBM	2	Intel Xeon Platinum 8280M processor	1536	147220	26940	mitigated
<a href="#">2017027</a>	IBM	2	Intel Xeon E5-2690v4	512	65520	12000	
<a href="#">2017031</a>	Dell	2	Intel Xeon E5-2699v4	512	106370	19411	

## Performance Improvements

8490H over 8280M = 2.4x  
8490H over E5-2690 = 3.3x

2.39590409 2.39703044  
3.31601955 3.32677348

# Intel Sustainability for SAP Workloads

- Intel Performance Test based on SAP BW4HANA scenario and SAP SD scenario
  - At constant Query Rate, 4th Gen Xeon enables up to 27% power savings in the Business Warehouse Scenario
  - In the SAP SD Scenario, 4th Generation Xeon enables up to 22% power savings, at constant user rate.

BW4HANA Scenario	4 <sup>th</sup> Gen Xeon	2 <sup>nd</sup> Gen Xeon
QpH	7930	3376
Watt	700	410
QpH/Watt	11.32857143	8.234146
	CLX-SPR	0.273152308

SD Scenario	4 <sup>th</sup> Gen Xeon	2 <sup>nd</sup> Gen Xeon
User	56487	25866
SAPS	305580	142470
Power	700	410
Users/Watt	80.695714	63.08780488
	CLX-SPR	0.218201293

## 4th Gen Xeon - SPR System Config

4th Gen Config : Tested by Intel on November 2022, 1-node, 2x Intel® Xeon® 8490H, E3 stepping, 60 cores, 80KB L1 cache and 2MB L2 cache per core, 112MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 4800 MHz [run @ 4400 MHz] ), BKC WW41->BIOS: EGSDCRBI.SYS.8901.P01.2209200243, ucode: 0xAB0000C0, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default, HANA: 2.00.052.00.1599235305, NetWeaver: 7.50, Benchmark kit: 3.17, Score 7893 Queries/Hour

## 2nd Gen Xeon - CLX System Config

2<sup>nd</sup> Gen Config: Tested by Intel: 1-node, Wolf Pass; Processor: 2x Intel Xeon 8280L 28C, 2.7GHz, 205W; BIOS: SE5C620.86B.02.01.0013.121520200651; Microcode: 0x5003006; Memory: 1.5TB (24x64GB DDR4 2667 MT/s); OS SLE 15 SP2; Linux Kernel: 5.3.18-22-default  
Score 3376 Queries/Hour



# Configuration Details SQL Server 1/3

**Plus Configuration with Microsoft SQL Server 2019** : Tested by Intel as of 11/22/2022. 1 Node pre-production platform, with 2x Intel® Xeon® Gold 8460Y+ (32C, 2.3GHz, 300W) CPU, 1x Quanta SDP QuantaGrid D54Q-2U , Total Memory: 512GB (16 x 32 GB 4800MHz DDR5 DIMM), Intel® Hyper-Threading Technology: Enabled, Turbo: Enabled, Storage (boot): 1 x Solidigm DC S4610 , 960 GB , Storage (Data drive): 6x Solidigm® D7 P5510 Series (3.84TB) (NVMe) , Storage (Log drive): 2 x Intel® SSD DC P5800X 400GB (NVMe), , Network devices: 1 x 25 GbE Intel® Ethernet Network Adapter E810-C-Q2, Network speed: 25 GbE, 1 x 10 GbE Intel(R) Ethernet Converged Network Adapter X550-T2, Network Speed: 1 GbE, OS/Software: Windows 2022 standard Edition with SQL Server 2019 Enterprise Edition with CU18

**Plus Configuration with Microsoft SQL Server 2019 (CLX)** : Tested by Intel as of 3/09/21. Platform S2600WFT, 1 Node, 2 socket, CPU 6258R (2.7GHz). 28 Cores/socket, 56 threads/socket. Microcode 05003003, HT on, Turbo on, performance power management, prefetcher enabled, BIOS version SE5C620.86B.02.01.0010.010620200716, System DDR Mem Configs - DDR4, 2666MHz, total memory/Node (DDR, DCPMM) 384 GB (12X32GB); Storage – boot 1x Intel® SSD D3-S4510 Series (240GB, 2.5in SATA 6Gb/s, 3D2, TLC) (Mirrored) OS Drive, Storage/application drives - **Data Drive:** 4x Intel® SSD DC P4510 Series (2TB) (NVMe) **Log Drive:** 2 x Intel® SSD DC P4800X 375GB (Optane SSD), NIC 10Gb Intel® C260 Series Chipset with integrated Intel® Ethernet Network Connection X722

**Plus Configuration with Microsoft SQL Server 2019 (ICX)** : Tested by Intel as of 3/12/21. Platform M50CYP (Coyote Pass), 1 Node, 2 socket, CPU 6348 (2.6GHz). 28 Cores/socket, 56 threads/socket. Microcode 8D05A260, HT on, Turbo on, performance power management, prefetcher enabled, BIOS version SE5C6200.86B.0021.D40.2101090208, System DDR Mem Configs - DDR4, 3200MHz, total memory/Node (DDR, DCPMM) 512 GB (16X32GB); Storage – boot 1 x Intel® SSD D3-S4510 Series (240GB, 2.5in SATA 6Gb/s, 3D2, TLC), Storage/application drives - **Data Drive:** 6x Intel® SSD DC P5510 Series (3.8TB) (NVMe) **Log Drive:** 2 x Intel® SSD DC P5800X 400GB (Optane SSD), NIC 10Gb Intel® Ethernet Network Connection X550

**QAT Feature testing with Microsoft SQL Server 2022** : Tested by Intel as of 11/22/2022. 1 Node, 2x Intel® Xeon® Gold 8460Y+ (32C, 2.3GHz, 300W) CPU, 1x Quanta SDP QuantaGrid D54Q-2U , Total Memory: 512GB (16 x 32 GB 4800MHz DDR5 DIMM), Intel® Hyper-Threading Technology: Enabled, Turbo: Enabled, Storage (boot): 1 x Solidigm DC S4610 , 960 GB , Storage (Data drive): 6x Solidigm® D7 P5510 Series (3.84TB) (NVMe) , Storage (Log drive): 2 x Intel® SSD DC P5800X 400GB (NVMe), , Network devices: 1 x 25 GbE Intel(R) Ethernet Network Adapter E810-C-Q2, Network speed: 25 GbE, 1 x 10 GbE Intel® Ethernet Converged Network Adapter X550-T2, Network Speed: 1 GbE, OS/Software: Windows 2022 standard Edition with SQL Server 2022 Enterprise Edition (16.0.1000.6), QAT1.7.W.1.9.0-0008

# Configuration Details SQL Server 2/3

## Raw Performance Results: Gen-to-Gen Comparison

Workload	Metrics	2 <sup>nd</sup> Gen Intel® Xeon® Scalable processor	3 <sup>rd</sup> Gen Intel® Xeon® Scalable processor	4 <sup>th</sup> Gen Intel® Xeon® Scalable processor
OLTP – HammerDB TPROC-C	Average New Orders Per Minute (NOPM) (Higher the better)	1.87 Million	2.07 Million	2.53 Million
DSS – HammerDB TPROC-H	Average Query Response Time (mins) (Lower the better)	16.34 mins	6.92 mins	5.80 mins

- 36% higher NOPM (4th Gen Intel® Xeon® Scalable processor over 2nd Gen Intel Xeon Scalable processor)
- 65% lower Query Response Times

# Configuration Details SQL Server 3/3

## Microsoft SQL Server 2022 – QAT Accelerator Feature Testing

**QAT feature on SQL 2022** has been tested for below test cases with QAT & without QAT enabled :

- a) Time taken for 1TB DB backup is faster with QAT feature by **47.16%** with only backup running on server (idle state)  
**367.7 sec** without QAT vs **249.86 sec** with QAT (Average of 3 runs)
- b) Time taken for 1TB DB backup is faster with QAT feature by **53.36%** when server is under peak load (100% CPU utilization)  
**1098.44 sec** without QAT vs **512.24 sec** with QAT (Average of 3 runs)

Testing of Quick Assist Technology on Microsoft SQL Server 2022		
Test cases for 1TB TPC-H DB (Avg. of 3 runs)	Time taken for DB Backup (in idle state)	Time taken for DB Backup (under peak load)
Without QAT Enabled (in sec)	367.7	1098.44
With QAT Enabled (in sec)	249.86	512.24
<b>Performance Gains</b>	<b>47.16%</b>	<b>53.36%</b>

# Reference to slide - Helping You Reach Your Sustainability Goals

- Intel Performance Test based on SAP BW4HANA scenario and SAP SD scenario
  - At constant Query Rate, 4th Gen Xeon enables up to 27% CPU power savings in the Business Warehouse Scenario
  - In the SAP SD Scenario, 4th Generation Xeon enables up to 22% power savings, at constant user rate.
  - 4th Gen Xeon delivers 31% improved DataLoad times

SAP Business Warehouse Scenario	2 <sup>nd</sup> Gen Xeon - 2S	4 <sup>th</sup> Gen Xeon - 2S	4 <sup>th</sup> Gen vs. 2 <sup>nd</sup> Gen
Phase 1 - DataLoad	18997	14450	-31%
Phase 2 - QpH	3376	7893	134%
Phase 3 - Complex Query	123.02	134.49	
CPU TDP	205	350	
Query / Watt	8.234146	11.275714	27%

**4th Gen Xeon - SPR System Config**  
 4th Gen Config : Tested by Intel on November 2022, 1-node, 2x Intel® Xeon® 8490H, E3 stepping, 60 cores, 80KB L1 cache and 2MB L2 cache per core, 112MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 4800 MHz [run @ 4400 MHz]), BKC WW41->BIOS: EGSDCRB1.SYS.8901.P01.2209200243, ucode: 0xAB0000C0, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default

Test Suite: HANA: 2.00.052.00.1599235305, NetWeaver: 7.50, Benchmark kit: 3.17

**2nd Gen Xeon - CLX System Config**  
 2<sup>nd</sup> Gen Config: Tested by Intel on November 2022: 1-node, Wolf Pass; Processor: 2x Intel Xeon 8280L 28C, 2.7GHz, 205W; BIOS: SE5C620.86B.02.01.0013.121520200651; Microcode: 0x5003006; Memory: 1.5TB (24x64GB DDR4 2667 MT/s); OS SLE 15 SP2; Linux Kernel: 5.3.18-22-default

Test Suite: HANA: 2.00.052.00.1599235305, NetWeaver: 7.50, Benchmark kit: 3.17

SD Scenario	2 <sup>nd</sup> Gen Xeon - 2S	4 <sup>th</sup> Gen Xeon - 2S	4 <sup>th</sup> Gen vs. 2 <sup>nd</sup> Gen
User	25866	56497	
CPU TDP	205	350	
Users/Watt	63.0878	80.7100	22%

**4th Gen Xeon - SPR System Config**  
 4th Gen Config : Tested by Intel on November 2022, 1-node, 2x Intel® Xeon® 8490H, E3 stepping, 60 cores, 80KB L1 cache and 2MB L2 cache per core, 112MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 4800 MHz [run @ 4400 MHz]), BKC WW41->BIOS: EGSDCRB1.SYS.8901.P01.2209200243, ucode: 0xAB0000C0, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default

Test Suite: SAP Sales and Distribution – 2-Tier, Sybase 16.0 SP03, EHP5 for SAP ERP on the same host.

**2nd Gen Xeon - CLX System Config**  
 2<sup>nd</sup> Gen Config: Tested by Intel on November 2022: 1-node, Wolf Pass; Processor: 2x Intel Xeon 8280L 28C, 2.7GHz, 205W; BIOS: SE5C620.86B.02.01.0013.121520200651; Microcode: 0x5003006; Memory: 1.5TB (24x64GB DDR4 2667 MT/s); OS SLE 15 SP2; Linux Kernel: 5.3.18-22-default

Test Suite: SAP Sales and Distribution – 2-Tier, Sybase 16.0 SP03, EHP5 for SAP ERP on the same host.

# Reference to slide - Improve Resiliency & Performance to optimize ROI

- 39% Higher SAPS/vCPU (Mv3 vs. Mv1)
  - M176s\_3\_v3 – 176vCPU / 257120 SAPS = 1461 SAPS / vCPU
    - Intel 4th Gen Xeon (<https://learn.microsoft.com/en-us/azure/virtual-machines/msv3-mdsv3-medium-series>)
  - M128s – 128 vCPU / 134630 SAPS = 1052 SAPS / vCPU
    - Intel E7-8890v3 (<https://learn.microsoft.com/en-us/azure/virtual-machines/m-series>)
  - Mv3 provides 39% higher SAPS / vCPU than Mv1
  - SAP Note 1928533 – SAPS <https://launchpad.support.sap.com/#/notes/1928533>
- 9% Higher SAPS/vCPU (Mv3 vs. Mv2)
  - M176s\_3\_v3 – 176vCPU / 257120 SAPS = 1461 SAPS / vCPU
    - Intel 4th Gen Xeon (<https://learn.microsoft.com/en-us/azure/virtual-machines/msv3-mdsv3-medium-series>)
  - M128s\_v2 – 128 vCPU / 170846 SAPS = 1335 SAPS / vCPU
    - Intel 2nd Gen Xeon Processor – 8280 (<https://learn.microsoft.com/en-us/azure/virtual-machines/msv2-mdsv2-series>)
  - Mv3 provides 9% higher SAPS / vCPU than Mv2
  - SAP Note 1928533 – SAPS <https://launchpad.support.sap.com/#/notes/1928533>

# Performance Business Warehouse Benchmark

Nb.	SAP-Benchmark	Processor	Memory	Datasets	Phase 2 Query per Hour	Perf Gain
1	<a href="#">2020046</a>	8280L (2nd Gen)	1536 GB	1.3	10106	
2	<a href="#">2023017</a>	8480+ (4th Gen)	1024 GB	1.3	15198	1.17x

	SAP-Benchmark	Processor	Memory	Datasets	Phase 2 Query per Hour	Perf Gain
3	<a href="#">2020046</a>	8280L (2nd Gen)	1536 GB	1.3	10106	
4	<a href="#">2023075</a>	8592+ (5th Gen)	1536 GB	1.3	17846	1.77x

	SAP-Benchmark	Processor	Memory	Datasets	Phase 2 Query per Hour	Perf Gain
5	<a href="#">2018043</a>	8176	6144 GB	2.6	4383	
6	<a href="#">2023076</a>	8592+ (5th Gen)	1536 GB	2.6	13410	3.06x

# 2.3x OLAP - SAP BW4HANA

## 4th Gen Intel Xeon relative to 2nd Gen Intel Xeon

	SAPBW4H				
	CLX	ICX	SPR	Phase2 SPR/ICX	Phase2 SPR/CLX
Phase1(seconds)	18,997	17,573	14,450		
Phase2 (QpH)	3,376	4,933	7,893	1.60	2.34
Phase3 (seconds)	123.02	129.35	134.49		
logical cores	112	160	240	1.50	2.14
TDP (W)	205	270	350		

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4th Gen Config : Tested by Intel on November 2022, 1-node, 2x Intel® Xeon® 8490H, E3 stepping, 60 cores, 80KB L1 cache and 2MB L2 cache per core, 112MB L3 cache per processor, HT On, Turbo On, SNC disabled, Total Memory 2048 GB (32 x 64GB 4800 MHz [run @ 4400 MHz] ), BKC WW41->BIOS: EGSDCRB1.SYS.8901.P01.2209200243, ucode: 0xAB0000C0, OS: SLES15 SP4, kernel: 5.14.21-150400.22-default, HANA: 2.00.052.00.1599235305, NetWeaver: 7.50, Benchmark kit: 3.17, Score 7893 Queries/Hour

### 2nd Gen Xeon - CLX System Config

2nd Gen Config: Tested by Intel: 1-node, Wolf Pass; Processor: 2x Intel Xeon 8280L 28C, 2.7GHz, 205W; BIOS: SE5C620.86B.02.01.0013.121520200651; Microcode: 0x5003006; Memory: 1.5TB (24x64GB DDR4 2667 MT/s); OS SLE 15 SP2; Linux Kernel: 5.3.18-22-default  
Score 3376 Queries/Hour

4<sup>th</sup> Gen Intel Xeon (SPR) of 7893 QpH divided by 2<sup>nd</sup> Gen Intel Xeon (CLX) score of 3376 QpH = 2.34X