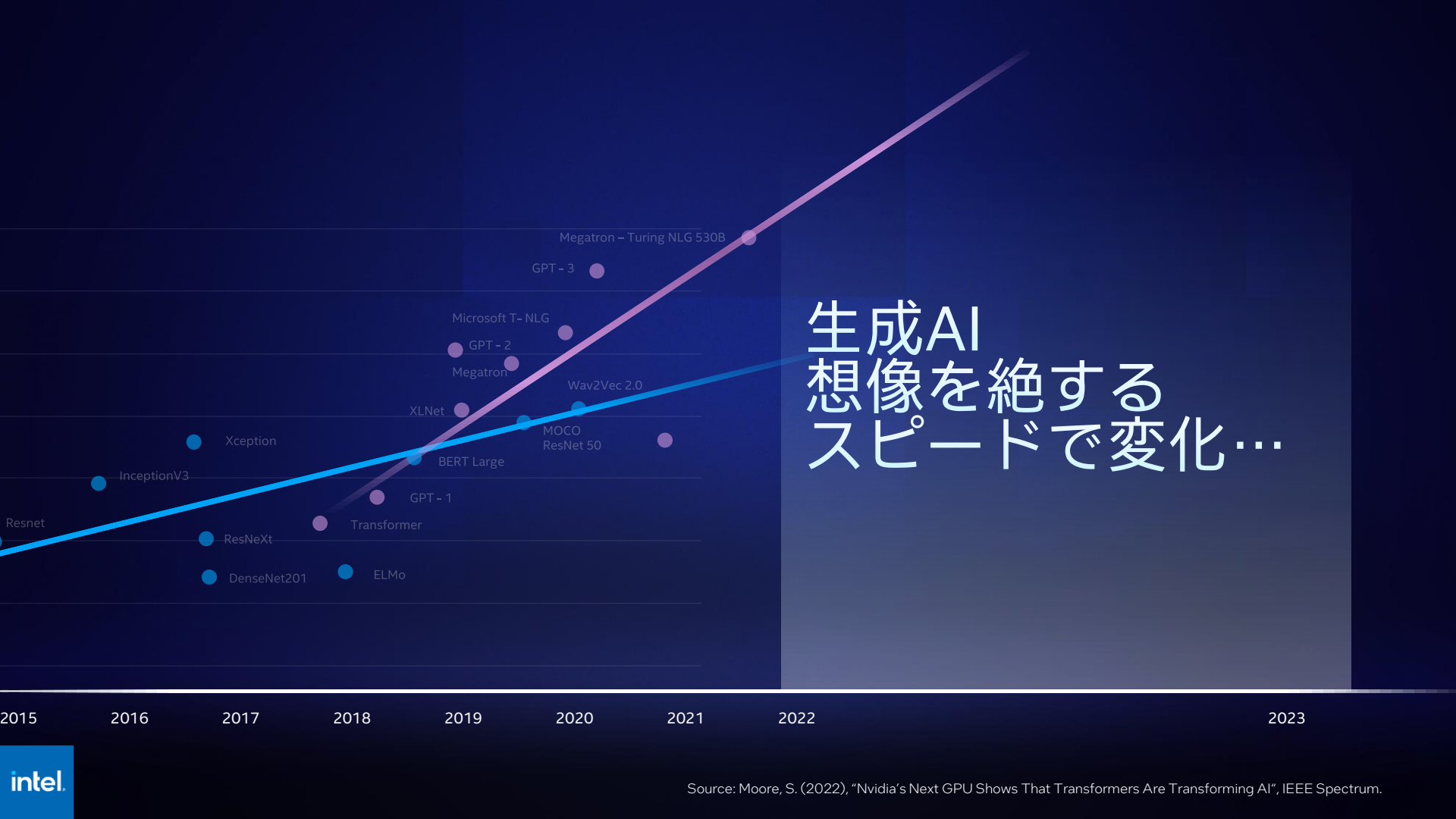


2024年6月27日 PCCC WS Jun.2024

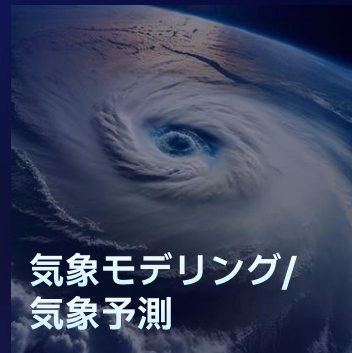
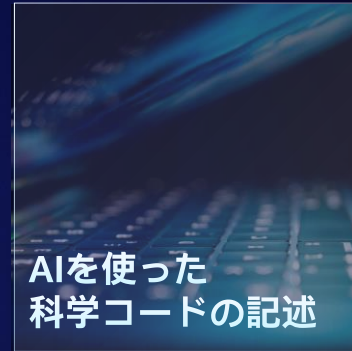
Bringing AI everywhere in HPC (AI を HPC へ)

インテル株式会社 HPC事業開発部長
矢澤 克巳

The Intel logo, consisting of the word "intel" in a white, lowercase, sans-serif font, is positioned on a blue rectangular background.



科学分野に AIブームが到来...



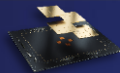
インテル データセンター ロードマップ

Efficient -Core
CPU

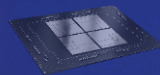
インテル® Xeon® 6 プロセッサー
with E-core
コードネーム Sierra Forest

次世代インテル® Xeon® プロセッサー
with E-core
コードネーム Clearwater Forest

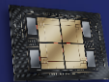
Performance-Core
CPU



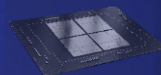
第四世代 インテル® Xeon®
スケーラブル・プロセッサー



第五世代 インテル® Xeon®
プロセッサー
コードネーム Emerald Rapids



インテル® Xeon®
CPU マックス・シリーズ



インテル® Xeon® 6 プロセッサー
with P-core
コードネーム Granite Rapids

AI
専用アクセラレータ

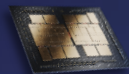


Habana®
Gaudi® 2

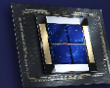


Habana®
Gaudi® 3

HPC & AI
GPU



インテル® Data Center GPU マックス・シリーズ



次世代 GPU
コードネーム Falcon Shores

2023

2025+

Sierra Forest demo

2 processors with 288 cores

intel

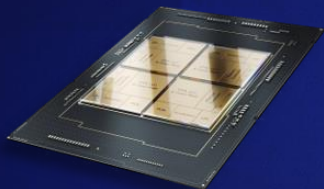
XEON

```
processor      : 567  
processor      : 568  
processor      : 569  
processor      : 570  
processor      : 571  
processor      : 572  
processor      : 573  
processor      : 574  
processor      : 575  
demo@srfubuntu22p4-3405:~$
```

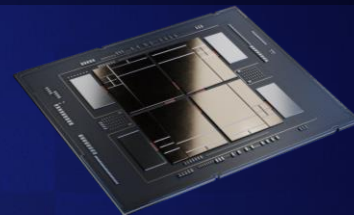
288 cores
Intel® Xeon® with E-core
Launch 2024

HPC とAI アクセラレーションに最適化された特徴的な新機能

第4世代インテル® Xeon® スケーラブル・プロセッサ



インテル® Xeon® CPU マックス



ブレイクスルー・テクノロジー

DDR5

強化されたメモリバンド幅

PCIe 5

高いスループット

CXL 1.1

次世代 IO

内蔵AI アクセラレーション

Advanced Matrix Extensions (AMX)

ディープラーニングの推論および学習処理性能を向上

広帯域メモリ

HBM2e

広帯域を必要とするワークロードの性能を飛躍的に向上

インテル® Advanced Matrix Extensions (AMX)

ディープラーニングの推論および学習処理性能を向上

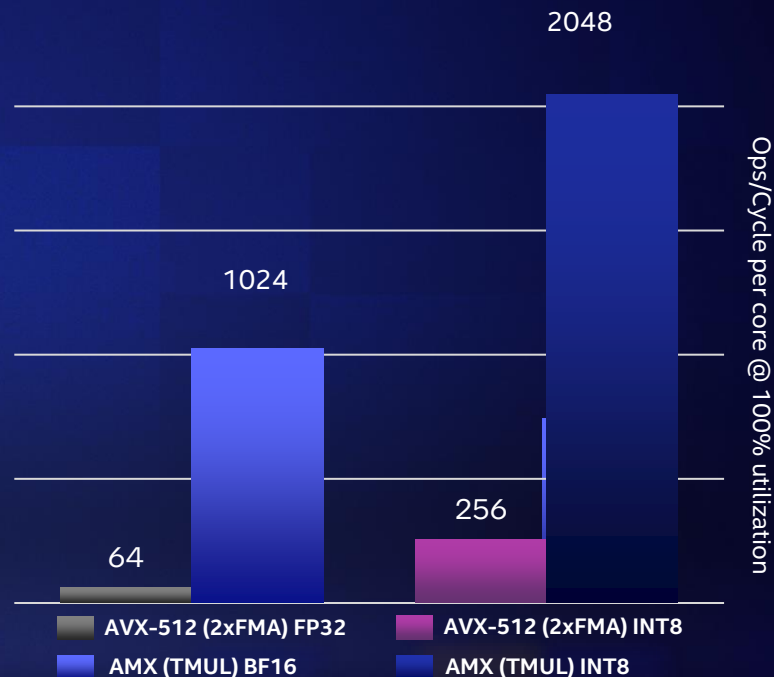
ディープラーニング
データタイプ

- int8
- Bfloat16

ISAレベルでの加速

- 完全なインテルアーキテクチャの
プログラマビリティ
- 低遅延

業界関連のフレームワーク
およびライブラリが利用可能



Results have been simulated. For workloads and configurations visit www.intel.com/ArchDay21claims. Results may vary



X86初 HBMを持つ唯一のCPU

最適なメモリ選択肢となりうる

64GB

HBM2e
4 stacks of 16GB

最大
220GF/s

HPCG

最大
2GB

HBM per Core

Memory Modes

HBM Only

Bootable from
HBM
No code change



HBM Flat

2 Memory Regions
SW Optimization
Needed



HBM Caching

HBM as cache for DDR
No code change

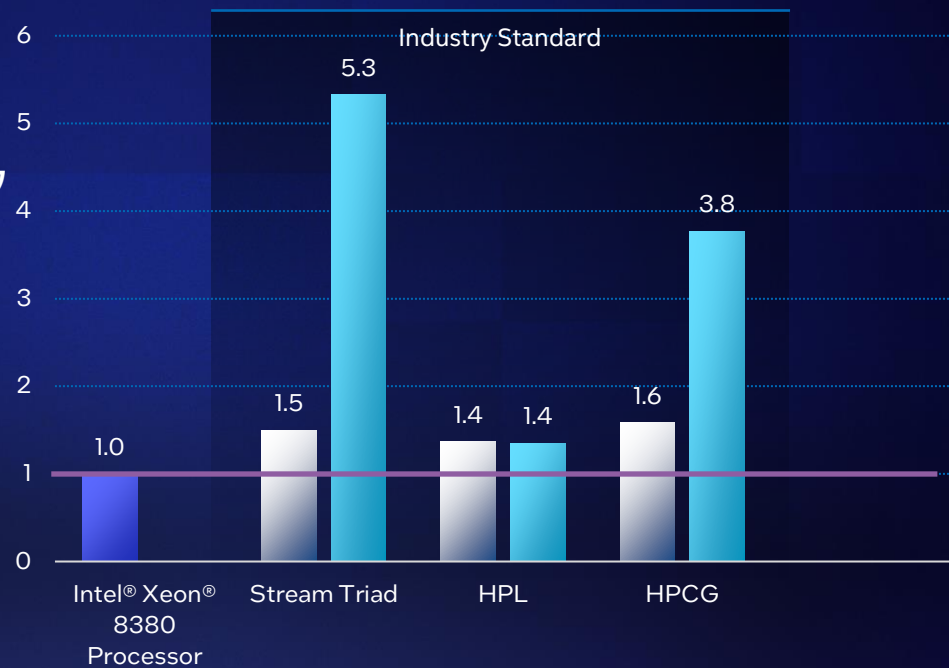




メモリ帯域を要求するベンチマーク CPU MAXでは最大 5倍の性能

2S インテル® Xeon® CPU マックス・シリーズ vs.
2S 第三世代 インテル® Xeon® 8380 プロセッサ

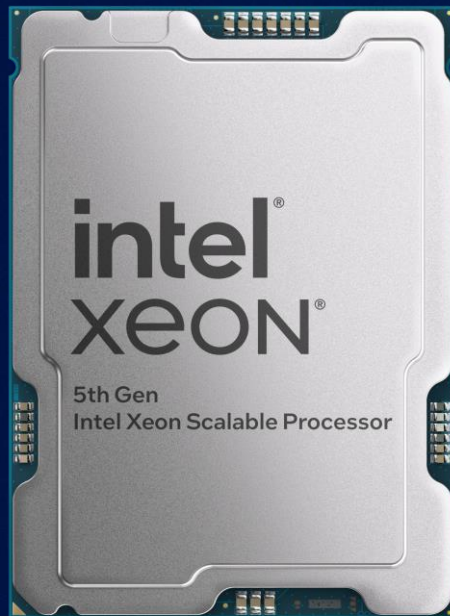
Relative Perf. Higher is better



■ 第四世代 インテル® Xeon® スケーラブル・プロセッサ ■ インテル® Xeon® CPU マックス・シリーズ

See backup for workloads and configurations. Results may vary.

AI向けにデザインされた 第五世代 インテル® Xeon® プロセッサー



プロセッサあたり最大64コア

インテル® Advanced Matrix Extensions (インテル® AMX)
より高い AMX 周波数と最適化されたソフトウェア群

メモリバンド幅の向上
最大5600 MT/s

CXLタイプ3 メモリサポート

大きなラストレベルキャッシュ
(LLC)
前世代から最大3倍

インテル® AI ソフトウェア

300以上の最適化された深層学習モデル
50以上の最適化された機械学習
およびグラフモデル
インテル® AI デベロッパーツール

PyTorch コンテナ

<https://hub.docker.com/r/intel/intel-optimized-pytorch>

TensorFlow コンテナ

<https://hub.docker.com/r/intel/intel-optimized-tensorflow>

パフォーマンスの大幅な飛躍

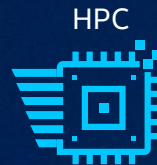
第五世代インテル® Xeon® プロセッサ

CPUアップグレード

第四世代インテル® Xeon® プロセッサ
vs. 第五世代インテル Xeon プロセッサ

最大 **1.42倍**
より高い推論性能

最大 **1.4倍**
より高いHPC性能



サーバープラットフォーム アップグレード

第三世代インテル® Xeon® プロセッサ
vs. 第五世代インテル Xeon プロセッサ

最大 **14倍**
より高い推論
および学習性能

最大 **2.1倍**
平均性能向上

HPC

3倍

より高い
LAMMPS性能

幅広いワークロードの性能向上

第五世代インテル® Xeon® プロセッサ vs. 第三世代インテル Xeon プロセッサ

Web

5th Gen Intel Xeon 8592+(64c) vs
3rd Gen Intel Xeon 8380(40c)

Data Services

5th Gen Intel Xeon 8592+(64c) vs
3rd Gen Intel Xeon 8380(40c)

HPC

5th Gen Intel Xeon 8592+(64c) vs
3rd Gen Intel Xeon 8380(40c)

AI

5th Gen Intel Xeon 8592+(64c) vs
3rd Gen Intel Xeon 8380(40c)

Network

5th Gen Intel Xeon 8592+(64c)
vs
3rd Gen Intel Xeon
6338N(32c)

2.0

1.81

1.85

1.73

2.45

2.49

1.84

1.66

1.98

3.05

2.36

4.05

6.5

4.36

6.2

3.02

3.64

SVT-HEVC-1080p-preset-lavx2
AVC-1080p-fast-avx2
Server Side Java Throughput

Virtualization
SPDK NVMe - 16k random read

Clickhouse Database
MySQL Database

Monte Carlo
WRF

LAMMPS

Ansys LS-DYNA
BERT Large Inference

ResNet34 Inference
Distillbert Inference

AI Training
VPP-FIB

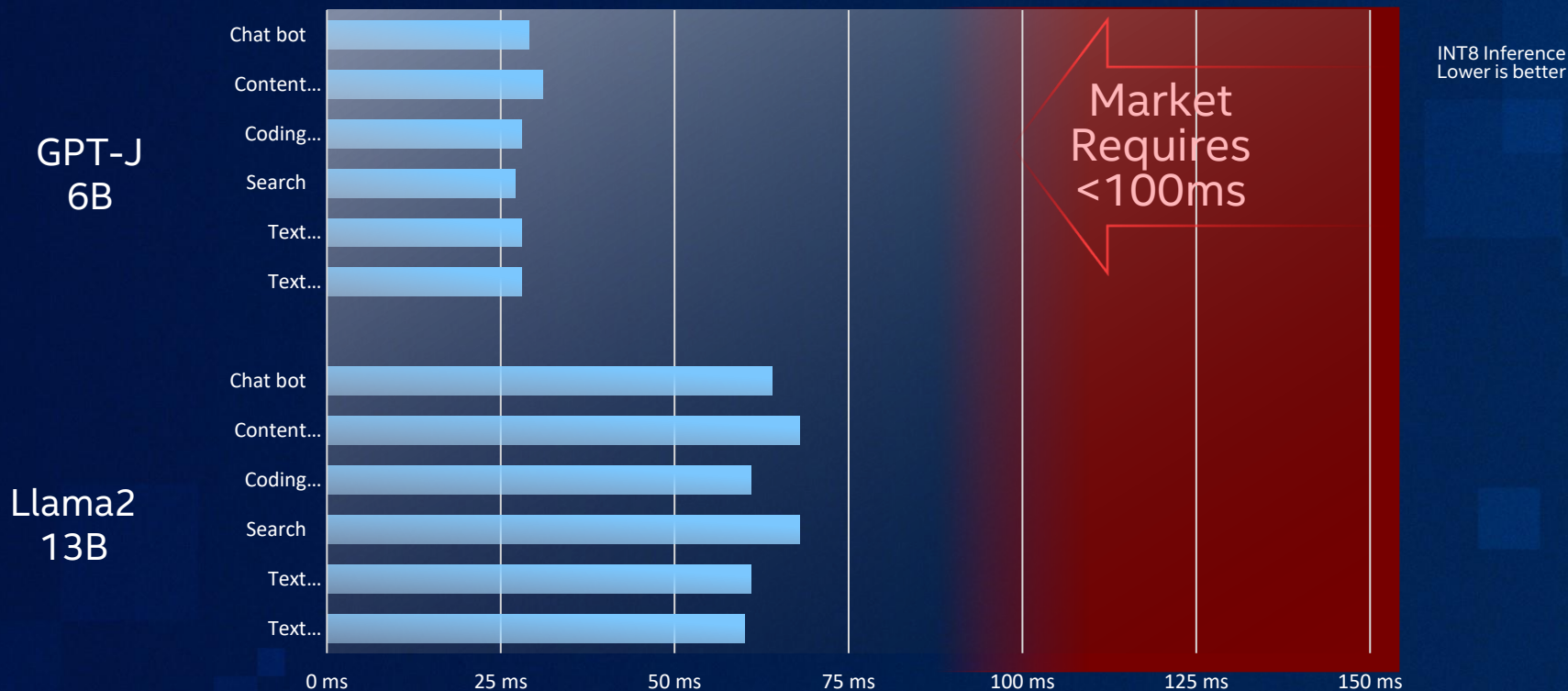
VPP-IPSec

Normalized to 3rd Gen Intel Xeon-SP
Higher is better

市場要求を十分満たすLLMレイテンシ性能

第五世代インテル® Xeon® プロセッサ

Single node 2S 5th Gen Xeon Large Language Model Next Token Latency



第五世代 インテル® Xeon® プロセッサー

2S PERFORMANCE GENERAL PURPOSE

SKU	CORES	BASE (GHz)	ALL-CORE TURBO (GHz)	Max TURBO (GHz)	CACHE (MB)	TDP (Watts)	Maximum Sockability	DORS Memory Speed (TDPC)	UPI Links Enabled	Default DSA Devices	Default IAA Devices	Default QAT Devices	Default DLB Devices	Intel SGX Enclave Capacity (Per Processor)	Long life availability	Recommended Customer Pricing (SCP) in \$ US Dollars	Intel On Demand Capable
8592+	64	1.9	2.9	3.9	320	350	2S	5600	4	1	1	1	1	512GB		\$11,600	✓
8580	60	2.0	2.9	4.0	300	350	2S	5600	4	1	0	0	0	512GB		\$10,710	✓
8570	56	2.1	3.0	4.0	300	350	2S	5600	4	1	0	0	0	512GB		\$9,595	✓
8568Y+	48	2.3	3.2	4.0	300	350	2S	5600	4	1	1	1	1	512GB		\$6,497	✓
8562Y+	32	2.8	3.8	4.1	60	300	2S	5600	3	1	1	1	1	512GB		\$5,945	✓
6548Y+	32	2.5	3.5	4.1	60	250	2S	5200	3	1	1	1	1	128GB	✓	\$3,726	✓
6542Y	24	2.9	3.6	4.1	60	250	2S	5200	3	1	0	0	0	128GB		\$2,878	✓
6544Y	16	3.6	4.1	4.1	45	270	2S	5200	3	1	0	0	0	128GB		\$3,622	✓
6526Y	16	2.8	3.5	3.9	37.5	195	2S	5200	3	1	0	0	0	128GB	✓	\$1,517	✓
6534	8	3.9	4.2	4.2	22.5	195	2S	4800	3	1	0	0	0	128GB		\$2,816	✓
5515+	8	3.2	3.6	4.1	22.5	165	2S	4800	3	1	1	1	1	128GB	✓	\$1,099	✓

2S MAINLINE GENERAL PURPOSE

8558	48	2.1	3.0	4.0	260	330	2S	5200	4	1	0	0	0	512GB		\$4,650	✓
6538Y+	32	2.2	3.3	4.0	60	225	2S	5200	3	1	1	1	1	128GB		\$3,141	✓
6530	32	2.1	2.7	4.0	160	270	2S	4800	3	1	0	0	0	128GB	✓	\$2,128	✓
5520+	28	2.2	3.0	4.0	52.5	205	2S	4800	3	1	1	1	1	128GB	✓	\$1,640	✓
4516Y+	24	2.2	2.9	3.7	45	185	2S	4400	2	1	1	1	1	64GB		\$1,295	✓
4514Y	16	2.0	2.6	3.4	30	150	2S	4400	2	1	0	0	0	64GB	✓	\$780	✓
4510	12	2.4	3.3	4.1	30	150	2S	4400	2	1	0	0	0	64GB	✓	\$563	✓
4509Y	8	2.6	3.6	4.1	22.5	125	2S	4400	2	1	0	0	0	64GB	✓	\$563	✓

LIQUID COOLED GENERAL PURPOSE (-Q)

8593Q	64	2.2	3.0	3.9	320	385	2S	5600	4	1	1	1	1	512GB		\$12,400	✓
6580Q	32	3.2	4.1	4.1	60	350	2S	5200	3	1	0	0	0	128GB		\$6,416	✓

SINGLE SOCKET GENERAL PURPOSE (-U)

SKU	CORES	BASE (GHz)	ALL-CORE TURBO (GHz)	Max TURBO (GHz)	CACHE (MB)	TDP (Watts)	Maximum Sockability	DORS Memory Speed (TDPC)	UPI Links Enabled	Default DSA Devices	Default IAA Devices	Default QAT Devices	Default DLB Devices	Intel SGX Enclave Capacity (Per Processor)	Long life availability	Recommended Customer Pricing (SCP) in \$ US Dollars	Intel On Demand Capable
8558U	48	2.0	2.9	4.0	260	300	1S	4800	0	1	0	0	0	512GB		\$3,720	✓
5512U	28	2.1	3.0	3.7	52.5	185	1S	4800	0	1	0	0	0	128GB		\$1,230	✓
3508U	8	2.1	2.2	2.2	22.5	125	1S	4400	0	1	0	0	0	64GB	✓	\$415	

5G / NETWORKING OPTIMIZED (-N)

8571N	52	2.4	3.0	4.0	300	300	1S	4800	0	4	4	4	4	512GB	✓	\$6,839	✓
6548N	32	2.8	3.5	4.1	60	250	2S	5200	3	1	0	2	2	128GB	✓	\$3,875	✓
6538N	32	2.1	2.9	4.1	60	205	2S	5200	3	1	0	2	2	128GB	✓	\$3,351	✓

CLOUD OPTIMIZED IaaS (-P) / SaaS (-V)

8592V	64	2.0	2.9	3.9	320	330	2S	4800	3	1	1	1	1	512GB		\$10,995	✓
8588P	48	2.7	3.2	4.0	260	350	2S	5600	3	1	1	1	1	512GB		\$6,759	✓
8581V	60	2.0	2.6	3.9	300	270	1S	4800	0	1	1	1	1	512GB		\$7,568	✓

STORAGE & HYPERCONVERGED INFRASTRUCTURE (HCI) OPTIMIZED (-S)

6554S	36	2.2	3.0	4.0	180	270	2S	5200	4	4	0	4	4	128GB		\$3,157	✓
-------	----	-----	-----	-----	-----	-----	----	------	---	---	---	---	---	-------	--	---------	---

LONG-LIFE USE (IOT) GENERAL PURPOSE (-T)

4510T	12	2.0	2.8	3.7	30	115	2S	4400	2	1	0	0	0	64GB	✓	\$624	✓
-------	----	-----	-----	-----	----	-----	----	------	---	---	---	---	---	------	---	-------	---

Intel may make changes to specifications and product descriptions at any time, without notice.

Please visit intel.com/xeon or contact your Intel representative to obtain the latest product specifications. Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. All processors support Intel Virtualization Technology (Intel VT-x).

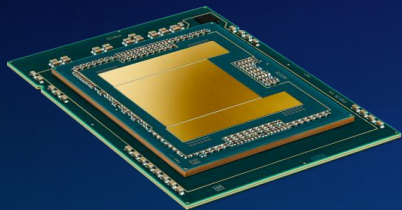
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© Copyright 2022, Intel Corporation
5th Gen Intel® Xeon®
processors

Y Supports Intel Speed Select Technology – Performance Profile 2.0 (Intel SST-PP)

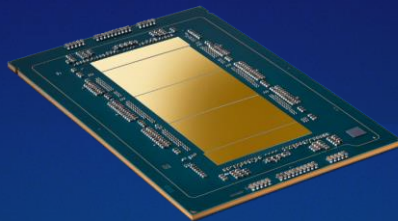
Unless noted, all 8500, 6500 and 5500 processors, include support for Intel Speed Select technology (Intel SST) featuring Intel SST Base Frequency (SST-BF), Intel SST Core Power (SST-CP) and Intel SST Turbo Frequency (SST-TF) capabilities.

次世代データセンターソリューション



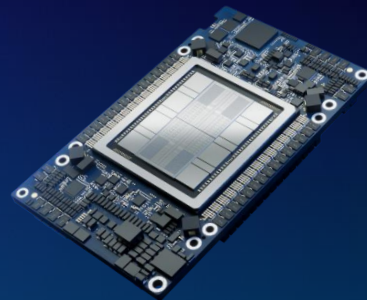
インテル Xeon 6 プロセッサー
(Efficient-Core)

高密度実装を実現する
消費電力あたりの性能に
最適化



インテル Xeon 6 プロセッサー
(Performance-Core)

計算負荷の高い
ワークロードに向け
コア性能を最適化



インテル Gaudi 3 AI
アクセラレーター

性能、スケーラビリティ、
効率性において
生成AIのあらたな選択肢

Open Ecosystems

• Open Software •

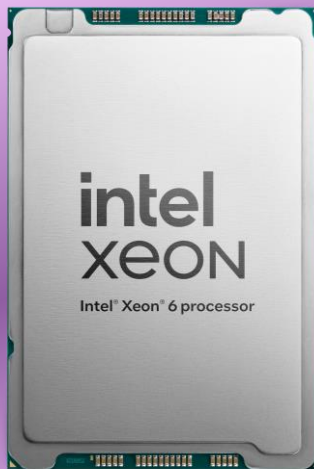
Open Platforms

発売開始
2024年6月



Intel® Xeon® 6700E

Q3'2024



Intel® Xeon® 6900P

Q1'2025



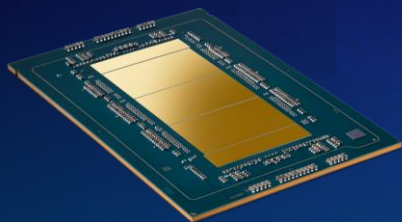
Intel® Xeon® 6900E

Intel® Xeon® 6700P
Intel® Xeon® 6500P
Intel® Xeon® 6 SoC
Intel® Xeon® 6300P

共通のソフトウェア・スタックで 効率性と使いやすさを実現

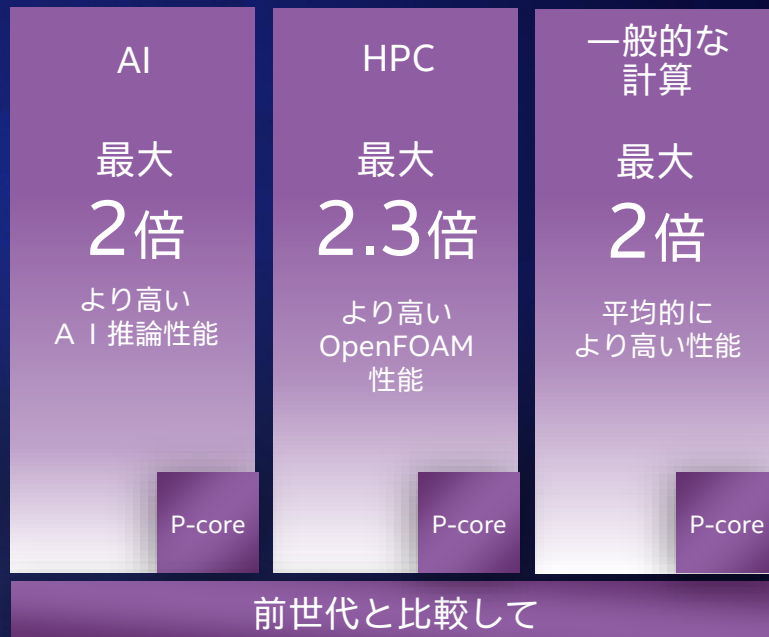
カテゴリ	ソフトウェアスタック構成要素	Efficient-core (E-core)	Performance-core (P-core)
命令セットと 拡張機能	Base x86 ISA	x	x
	Intel® Advanced Vector Extensions 2 (Intel® AVX2)	x	x
	Intel® Advanced Vector Extensions 512 (Intel® AVX-512)		x
	Intel® Advanced Matrix Extensions (Intel® AMX)		x
OSと ハイパーバイザー	Linux kernel and commercial Linux	x	x
	Windows	x	x
	VMware ESXi	x	x
アプリケーションと ライブラリ	Database incl. common libraries (ex. ZStd)	x	x
	Network & media incl. common libraries (ex. DPDK)	x	x
	General compute & storage incl. libraries (ex. SPDK)	x	x

インテル® Xeon® 6 卓越した性能と効率性



インテル Xeon 6 プロセッサー
(Performance-Core)

計算負荷の高い
ワークロードに向け
コア性能を最適化



INTEL® XEON® 6 PROCESSORS Performance Core



INTEL® XEON® 6 PROCESSORS Efficient Core

up to 86 cores (6700) or 128 cores (6900)	Cores	up to 144 cores (6700) or 288 cores (6900)
1S, 2S, 4S, 8S	Sockets	1S, 2S
125 to 500W	Max TDP	205 to 500W
up to 12 channels DDR5 MCR DIMM	Memory	up to 12 channels DDR5
6400 (1 DPC) 5200 (2 DPC) 8800 MCR (1 DPC)	Max Memory Speed	6400 (1 DPC) 5200 (2 DPC)
up to 6 UPI 2.0 up to 24 GT/s per lane	Intel® UPI	up to 4 UPI 2.0 up to 24 GT/s per lane
up to 96 lanes PCIe 5.0 (x16, x8, x4, x2) RIS: up to 136 lanes PCIe 5.0 for single socket designs	PCI Express	up to 96 lanes PCIe 5.0 (x16, x8, x4, x2)
up to 64 lanes CXL 2.0	Compute Express Link	up to 64 lanes CXL 2.0
52/57	Physical/Virtual Address Bits	52/48
Intel Advanced Matrix Extensions (INT8, BF16, FP16) Intel Advanced Vector Extensions 512 (VNNI/INT8)	AI Acceleration Intel® Deep Learning Boost	Intel Advanced Vector Extensions 2 (VNNI/INT8)
Intel Software Guard Extensions, Intel Trusted Domain Extensions	Security	Intel Software Guard Extensions, Intel Trusted Domain Extensions
Vector AES, SHA2-256 extensions, VPMADD52	Crypto	Vector AES, SHA2-256 extensions, VPMADD52
Intel QuickAssist Technology, Intel Dynamic Load Balancer , Intel Data Streaming Accelerator , Intel In-memory Analytics Accelerator	Integrated Accelerators	Intel QuickAssist Technology, Intel Dynamic Load Balancer , Intel Data Streaming Accelerator , Intel In-memory Analytics Accelerator

MCR DIMM

Memory

Granite Rapids向け2-Rank RDIMMによる
同容量でより高いメモリバンド幅を持つ

最大

8800
MT/s

最大

83%
ピークB/W
向上

2 socket

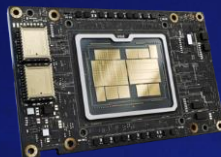
>1.5
TB/s

DRAM

Buffer

アクセラレータと GPU ロードマップ

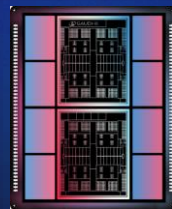
HPC/AI



AI

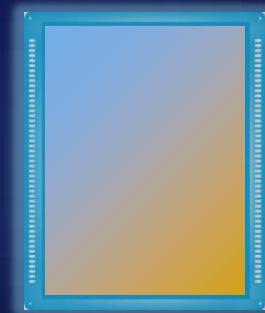


Intel® Data Center
GPU Max Series



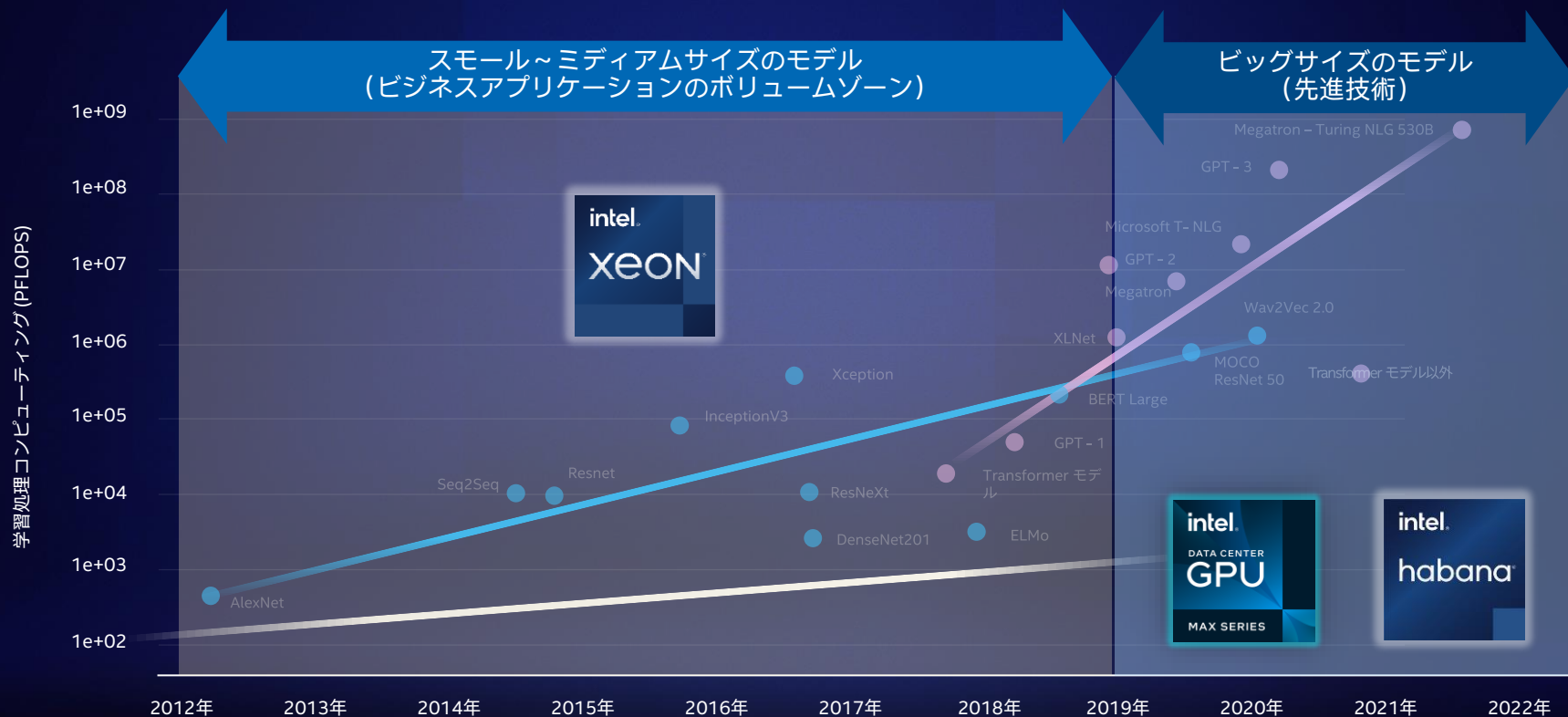
Intel® Gaudi® 2
Accelerator

Intel® Gaudi® 3 Accelerator



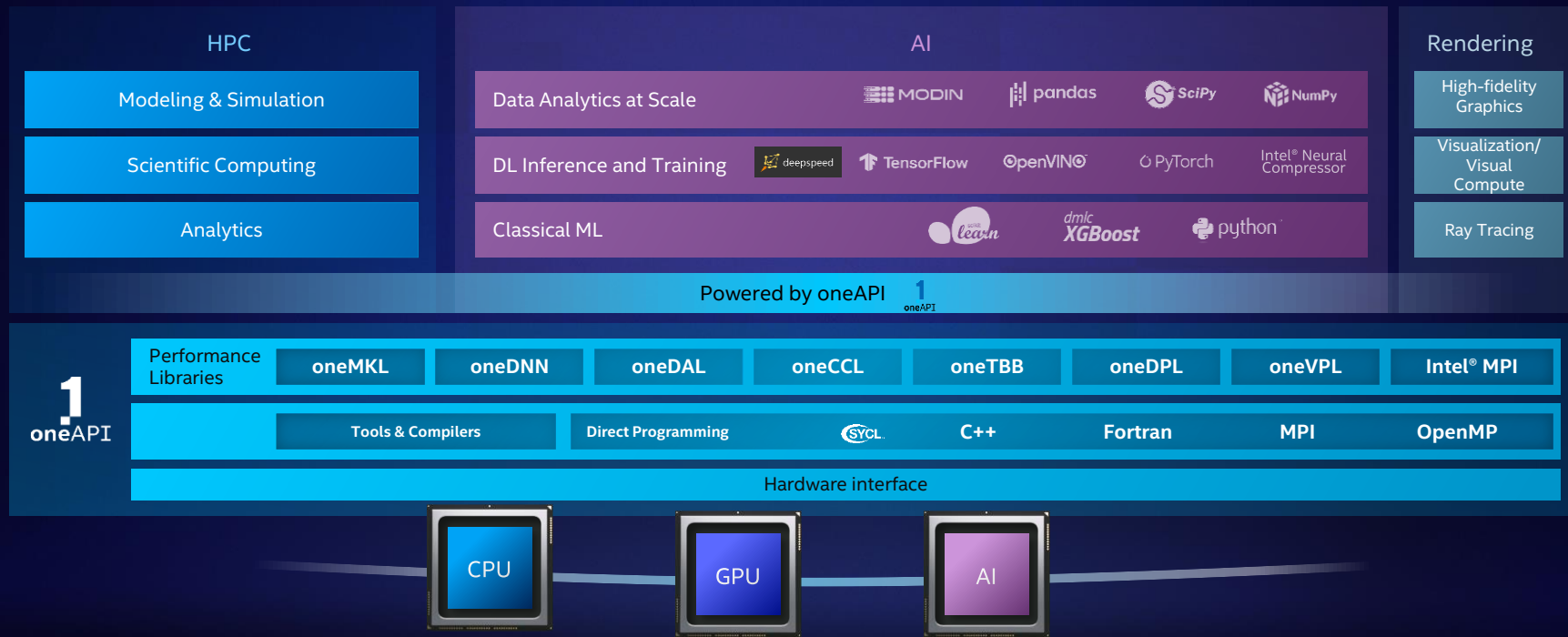
Next Generation
GPU Codenamed
Falcon Shores

こういったモデルに適している？



柔軟で包括的なオープンソフトウェアスタック

インテルハードウェアの価値、アプリケーションのパフォーマンス、開発の生産性を最大化



Bringing AI Everywhere in HPCの実現

エッジからデータセンター、クラウドまで、あらゆるプラットフォームで AIを



イノベーション
の促進



価値の最大化



あらゆる環境
に対応



セキュアで、
責任のあるAI

The Intel logo is centered on a dark blue background. It features the word "intel" in a white, lowercase, sans-serif font. A small, bright blue square is positioned above the letter "i". To the right of the word "intel" is a registered trademark symbol (®).

intel®

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Configurations

Performance varies by use, configuration and other factors. Results may vary.

SVT-HEVC-1080p-preset1-avx2 and AVC-1080p-fast-avx2:

8592+: 1-node, 2x Intel® Xeon® Platinum 8592+, 64 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS EGSDCRB1.SYS.0105.D74.2308261931, microcode 0x21000161, 1x Ethernet Controller I225-LM, 1x 3.5T INTEL SSDPF2KX038TZ, Ubuntu 22.04.3 LTS, 5.15.0-84-generic, x264 Version-0.164.x, x265 Version-Release_3.5, SVT-HEVC Version-v1.3.0, SVT-AV1 Version-v0.8.7, Test by Intel as of 09/25/23

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380, 40 cores, HT On, Turbo On, Total Memory 512GB (16x32GB DDR4 3200 MT/s [3200 MT/s]), BIOS SE5C620.86B.01.01.0008.2305172341, microcode 0xd0003a5, 2x Ethernet Controller X710 for 10GBASE-T, 1x 57.3G Ultra USB 3.0, 1x 7T INTEL SSDPF2KX076TZ, Ubuntu 22.04.3 LTS, 5.15.0-84-generic, x264 Version-0.164.x, x265 Version-Release_3.5, SVT-HEVC Version-v1.3.0, SVT-AV1 Version-v0.8.7, Test by Intel as of 09/25/23

Server-Side Java Throughput:

8592+: 1-node, 2x INTEL(R) XEON(R) PLATINUM 8592+, 64 cores, HT On, Turbo On, NUMA 4, Integrated Accelerators Available [used]: DLB 2 [0], DSA 2 [0], IAA 2 [0], QAT 2 [0], Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 3B05.TEL4P1, microcode 0x21000161, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.1 LTS, 5.15.0-78-generic, Server Side Java, JDK21, Test by Intel as of 10/05/23.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, NUMA 4, Integrated Accelerators Available [used]: DLB 0 [0], DSA 0 [0], IAA 0 [0], QAT 0 [0], Total Memory 1024GB (16x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS 1.5, microcode 0xd0003a5, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, Server Side Java, JDK21, Test by Intel as of 10/13/23.

Virtualization:

8592+: 1-node, 2x Intel® Xeon® Platinum 8592+, 64 cores, HT On, Turbo On, NUMA 2, Integrated Accelerators Available [used]: DLB 2 [0], DSA 2 [0], IAA 2 [0], QAT 2 [0], Total Memory 4096GB (32x128GB DDR5 4800 MT/s [4400 MT/s]), BIOS EGSDCRB1.SYS.0105.D74.2308261931, microcode 0x21000161, 1x Ethernet Controller I225-LM, 4x Ethernet Controller E810-C for QSFP, 25x Ethernet Adaptive Virtual Function, 1x 3.5T INTEL SSDPF2KX038TZ, 9x 2.9T INTEL SSDPF21Q032TB, Red Hat Enterprise Linux 8.6 (Ootpa), 4.18.0-372.9.1.el8.x86_64, qemu-kvm-6.2.0-11, Test by Intel as of 09/24/23.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, NUMA 2, Integrated Accelerators Available [used]: DLB 0 [0], DSA 0 [0], IAA 0 [0], QAT 0 [0], Total Memory 2048GB (32x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS SE5C620.86B.01.01.0008.2305172341, microcode 0xd0003a5, 73x Ethernet Adaptive Virtual Function, 2x Ethernet Controller 10G X550T, 4x Ethernet Controller E810-C for QSFP, 4x 3.5T INTEL SSDPF2KX038TZ, 1x 5.8T INTEL SSDPE2KE064T8, 1x 894.3G INTEL SSDSC2KG96, 2x 447.1G INTEL SSDSC2KG48, 1x 7.3G Transcend 8GB, Red Hat Enterprise Linux 8.6 (Ootpa), 4.18.0-372.9.1.el8.x86_64, qemu-kvm-6.2.0-11, Test by Intel as of 09/20/23.

SPDK NVME:

8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor (64 core) with integrated Intel Data Streaming Accelerator (Intel DSA), DSA device utilized=1(1 active socket), HT On, Turbo On, SNC Off, with 1024GB DDR5 memory (16x64 GB 5600), microcode 0x21000161, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, 1x 894.3G Micron 7450, 4x 3.84TB Samsung PM1733, 1x Intel® Ethernet Network Adapter E810-2CQDA2, 2x100GbE, FIO v3.34, SPDK 22.05, tested by Intel October 2023.

8380: 1-node, Intel platform with 2x 3rd Gen Intel Xeon Scalable processor (40 cores), HT On, Turbo On, SNC Off, Total Memory 1024GB (16x64GB DDR4 3200), microcode 0xd0003a5, HT On, Turbo On, SNC Off, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, 1x 1.7T Samsung PM9A3, 4x 3.84TB Samsung PM1733, 1x Intel® Ethernet Network Adapter E810-2CQDA2, 2x100GbE, 1x Ethernet Controller 10-Gigabit X540-AT2, FIO v3.34, SPDK 22.05, tested by Intel October 2023.

Clickhouse DB with IAA:

8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor 8592+ (64 cores) with integrated Intel In-Memory Analytics Accelerator (Intel IAA), Number of IAA device utilized=4(1 sockets active), HT On, Turbo On, SNC off, Total Memory 1024GB (16x64GB DDR5 5600), microcode 0x21000161, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 6.5.0-060500-generic, ZSTD v1.5.0, QPL v1.3dev, accel-config-v4.1.1, clang13, Clickhouse 21dev, Star Schema Benchmark, Query 4.1, tested by Intel October 2023.

8380: 1-node, Intel platform with 2x 3rd Gen Intel Xeon Scalable processor (40 cores) with HT On, Turbo On, SNC off, Total Memory 1024GB (16x64GB DDR5 3200), microcode 0xd0003a5, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 6.5.0-060500-generic, ZSTD v1.5.0, clang13, Clickhouse 21dev, Star Schema Benchmark, Query 4.1, tested by Intel October 2023.



Configurations

Performance varies by use, configuration and other factors. Results may vary.

MySQL Database:

8592+: 1-node, 2x Intel(R) Xeon(R) Platinum 8592+, 64 cores, HT On, Turbo On, NUMA 2, Integrated Accelerators Available [used]: DLB 8 [0], DSA 8 [0], IAX 8 [0], QAT 8 [0], Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000161, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 2x 1.7T SAMSUNG MZWLJT9HBJR-00007, Ubuntu 22.04.3 LTS, 5.15.0-84-generic, HammerDB Multi Instance, MySQL 8.0.33. Test by Intel as of 10/04/23.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, NUMA 2, Integrated Accelerators Available [used]: DLB 0 [0], DSA 0 [0], IAX 0 [0], QAT 0 [0], Total Memory 1024GB (16x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS 1.4, microcode 0xd0003a5, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller X710 for 10GBASE-T, 1x 894.3G INTEL SSDSC2KG96, Ubuntu 22.04.3 LTS, 5.15.0-84-generic, HammerDB Multi Instance, MySQL 8.0.33, Test by Intel as of 10/05/23.

Monte Carlo:

Intel Xeon 8380: 1-node, 2x 3rd Gen Intel Xeon 8380, HT On, Turbo On, SNC2, 1024 GB DDR4-3200, ucode=0xd0003a5, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Monte Carlo v1.2, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of October 2023.

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Monte Carlo v1.2, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of October 2023.

WRF (Geomean of CONUS 2.5KM, CONUS 12KM):

Intel Xeon 8380: 1-node, 2x 3rd Gen Intel Xeon 8380, HT On, Turbo On, SNC2, 1024 GB DDR4-3200, ucode=0xd0003a5, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, WRF v4.2.2, icc:2023.2.0 ifort:2021.10.0, impi:2021.10.0. Test by Intel as of October 2023.

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, WRF v4.2.2, icc:2023.2.0 ifort:2021.10.0, impi:2021.10.0. Test by Intel as of October 2023.

LAMMPS (Geomean of Polyethylene,DPD,Copper,Liquid Crystal,Atomic Fluid,Protein,Stillinger-Weber,Tersoff,Water):

Intel Xeon 8380: 1-node, 2x 3rd Gen Intel Xeon 8380, HT On, Turbo On, SNC2, 1024 GB DDR4-3200, ucode=0xd0003a5, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, LAMMPS v2021-09-29, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0, impi:2021.10.0. Test by Intel as of October 2023.

Intel Xeon 8490H: 1-node, 2x 4th Gen Intel Xeon 8490H, HT On, Turbo On, SNC4, 1024 GB DDR4-4800, ucode=0x2b0004d0, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, LAMMPS v2021-09-29, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0, impi:2021.10.0. Test by Intel as of March 2023.

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, LAMMPS v2021-09-29, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0, impi:2021.10.0. Test by Intel as of October 2023.

Ansys LS-DYNA (Geomean of 3cars-150ms, ODB-10M, car2car/120ms)

Intel Xeon 8380: 1-node, 2x 3rd Gen Intel Xeon 8380, HT On, Turbo On, SNC2, 1024 GB DDR4-3200, ucode=0xd0003a5, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Ansys LS-DYNA R11, impi:2021.10.0. Test by Intel as of October 2023.

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Ansys LS-DYNA R11, impi:2021.10.0. Test by Intel as of October 2023.



Configurations

Performance varies by use, configuration and other factors. Results may vary.

BERT-large Inference:

8592+: 1-node, 2x Intel(R) Xeon(R) Platinum 8592+, 64 cores, HT On, Turbo On, NUMA 4, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS EGSDCRB1.SYS.0105.D74.2308261933, microcode 0x21000161, 1x Ethernet Controller I225-LM, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL, CentOS Stream 9, 6.2.0-emr.bkc.6.2.3.6.31.x86_64, PyTorch: torch:2.1.0.dev20230825+cpu, oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1, Test by INTEL as of 09/07/2023.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS SE5C620.86B.01.01.0008.2305172341, microcode 0xd0003a5, 2x Ethernet Controller 10G X550T, 3x 894.3G INTEL SSDSC2KG96, 1x 0B vmDisk, 1x 60G Flash Disk, 1x 1024M vmDisk-CD, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL SSDPE2KX010T8, Ubuntu 22.04 LTS, 5.15.0-78-generic, PyTorch: torch:2.1.0.dev20230825+cpu oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1. Test by INTEL as of 09/14/23.

Bert-Large, BS=x (batch): 1 instance/ numa node; Bert Large: SQuAD1.1 (seq len=384)

SSD-ResNet34 Inference:

8592+: 1-node, 2x Intel(R) Xeon(R) Platinum 8592+, 64 cores, HT On, Turbo On, NUMA 4, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS EGSDCRB1.SYS.0105.D74.2308261933, microcode 0x21000161, 1x Ethernet Controller I225-LM, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL, CentOS Stream 9, 6.2.0-emr.bkc.6.2.3.6.31.x86_64, PyTorch: torch:2.1.0.dev20230825+cpu, oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1, Test by INTEL as of 09/07/2023.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS SE5C620.86B.01.01.0008.2305172341, microcode 0xd0003a5, 2x Ethernet Controller 10G X550T, 3x 894.3G INTEL SSDSC2KG96, 1x 0B vmDisk, 1x 60G Flash Disk, 1x 1024M vmDisk-CD, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL SSDPE2KX010T8, Ubuntu 22.04 LTS, 5.15.0-78-generic, PyTorch: torch:2.1.0.dev20230825+cpu oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1. Test by INTEL as of 09/14/23.

SSD-ResNet34, BS=x: 1 instance/ numa node; SSD-Resnet34 coco 2017 (1200 x1200)

Distilbert Inference:

8592+: 1-node, 2x Intel(R) Xeon(R) Platinum 8592+, 64 cores, HT On, Turbo On, NUMA 4, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS EGSDCRB1.SYS.0105.D74.2308261933, microcode 0x21000161, 1x Ethernet Controller I225-LM, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL, CentOS Stream 9, 6.2.0-emr.bkc.6.2.3.6.31.x86_64, PyTorch: torch:2.1.0.dev20230825+cpu, oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1, Test by INTEL as of 09/07/2023.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS SE5C620.86B.01.01.0008.2305172341, microcode 0xd0003a5, 2x Ethernet Controller 10G X550T, 3x 894.3G INTEL SSDSC2KG96, 1x 0B vmDisk, 1x 60G Flash Disk, 1x 1024M vmDisk-CD, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL SSDPE2KX010T8, Ubuntu 22.04 LTS, 5.15.0-78-generic, PyTorch: torch:2.1.0.dev20230825+cpu oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1. Test by INTEL as of 09/14/23.

DistilBERT, BS=x: 1 instance/ numa node

AI Training:

8592+: 1-node, 2x Intel(R) Xeon(R) Platinum 8592+, 64 cores, HT On, Turbo On, NUMA 4, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS EGSDCRB1.SYS.0105.D74.2308261933, microcode 0x21000161, 1x Ethernet Controller I225-LM, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL, CentOS Stream 9, 6.2.0-emr.bkc.6.2.3.6.31.x86_64, PyTorch: torch:2.1.0.dev20230825+cpu, oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1, Test by INTEL as of 09/07/2023.

8380: 1-node, 2x Intel(R) Xeon(R) Platinum 8380 CPU @ 2.30GHz, 40 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR4 3200 MT/s [3200 MT/s]), BIOS SE5C620.86B.01.01.0008.2305172341, microcode 0xd0003a5, 2x Ethernet Controller 10G X550T, 3x 894.3G INTEL SSDSC2KG96, 1x 0B vmDisk, 1x 60G Flash Disk, 1x 1024M vmDisk-CD, 1x 3.6T INTEL SSDPE2KX040T8, 1x 931.5G INTEL SSDPE2KX010T8, Ubuntu 22.04 LTS, 5.15.0-78-generic, PyTorch: torch:2.1.0.dev20230825+cpu oneDNN:v3.2.1 IPEX:2.1.0+git31b5ee1. Test by INTEL as of 09/14/23.

BS=x, 1 instance/ numa node [Using only one socket]. Resnet50 v1.5: ImageNet (224 x224), SSD Resnet34: COCO 2017, BERT-large: Wikipedia 2020/01/01 (seq len =512), DLRM: Criteo Terabyte Dataset, RNN: LibriSpeech, Mask RCNN: COCO 2017



[illegible]

VPP Ipv4 FIB:

6338N: 1-node, 2x Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz, 32 cores, HT On, Turbo Off, NUMA 2, Integrated Accelerators Available [used]: DLB 0 [0], DSA 0 [0], IAA 0 [0], QAT 0 [0], Total Memory 256GB (16x16GB DDR4 2933 MT/s [2666 MT/s]), BIOS WLYDCRB1.KSM.0030.P26.2303301709, microcode 0xd0003a5, 1x I210 Gigabit Network Connection, 1x 240MDisk, 1x 223.6G KINGSTON SUV400S37240G, Ubuntu 22.04 LTS, 5.15.0-27-generic, Workload: VPP ipv4-fib-1M flows 64B packets, VPP version 23.10-rc0~0-ga7dd04d73. score=167Gb/s, Test by Intel as of 10/02/23.

VPP IPSec:

6338N: 1-node, 2x Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz, 32 cores, HT On, Turbo Off, NUMA 2, Integrated Accelerators Available [used]: DLB 0 [0], DSA 0 [0], IAA 0 [0], QAT 0 [0], Total Memory 256GB (16x16GB DDR4 2933 MT/s [2666 MT/s]), BIOS WLYDCRB1.KSM.0030.P26.2303301709, microcode 0xd0003a5, 1x I210 Gigabit Network Connection, 1x 240MDisk, 1x 223.6G KINGSTON SUV400S37240G, Ubuntu 22.04 LTS, 5.15.0-27-generic, Workload: VPP IPsec 56K tunnels 512B packets, VPP version 23.10-rc0~0-ga7dd04d73. Test by Intel as of 10/02/23.

Configurations

5th Gen Xeon Large Language Model Latency



Llama2-13B

8592+: 1-node, 2x INTEL(R) XEON(R) PLATINUM 8592+, 64 cores, HT On, Turbo On, NUMA 2, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000161, 2x Ethernet Controller X710 for 10GBASE-T, 1x Ethernet interface, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.2 LTS, 5.15.0-78-generic, Test by Intel as of 10/10/23. Llama2, gcc=12.3 gxx=12.3, python 3.9, intel-extension-for-pytorch 2.2.0+, git305fc52, torch 2.2.0.dev20230914+cpu, transformers 4.31.0, protobuf 3.20.3, neural-compressor 2.2, test on 1 socket, Batch Size(BS)=1, Corest per instance (CPI)=#cores/socket, search algorithm: BEAM4.

GPT-J 6B

8592+: 1-node, 2x INTEL(R) XEON(R) PLATINUM 8592+, 64 cores, HT On, Turbo On, NUMA 2, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000161, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 5.15.0-83-generic, GPT-J 6B, gcc=12.3, python 3.9 intel-extension-for-pytorch 2.2.0+git305fc52torch 2.2.0.dev20230914+cpuputransformers 4.31.0protobuf 3.20.3neural-compressor 2.2, Test on 1 socket, BS1 CPI 64. Test by Intel as of 09/21/23.

Configurations



5th Gen Xeon Mainstream Workload Performance

Server Side Java SLA

Intel Xeon 8592+: 1-node, 2x INTEL(R) XEON(R) PLATINUM 8592+, 64 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 3B05.TEL4P1, microcode 0x21000161, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.1 LTS, 5.15.0-78-generic, Server-side Java* SLA throughput. Test by Intel as of 10/06/23.

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554 64-Core Processor, 64 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.5, microcode 0xa10113e, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZ1L21T9HCLS-00A07, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, Server-side Java*SLA throughput. Test by Intel as of 10/24/23.

NGINXTLS

Intel Xeon 8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor (64 core) with integrated Intel Quick Assist Technology (Intel QAT), QAT device utilized=4 (1 active socket), HT On, Turbo Off, SNC On, with 1024GB DDR5 memory (16x64 GB 5600), microcode 0x21000161, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, 1x 1.7T SAMSUNG MZWLJIT9HBJR-000007, 1x Intel® Ethernet Network Adapter E810-2CQDA2, 1x100GbE, NGINX Async v0.5.1, OpenSSL 3.1.3, IPP Crypto 2021.8, IPsec MB v 1.4, QAT_Engine v 1.4.0, QAT Driver 20.1.1.20-00030, TLS 1.3 Webserver: ECDHE-X25519-RSA2K, tested by Intel October 2023.

AMD EPYC 9554: 1-node, AMD platform with 2x 4th Gen AMD EPYC processor (64 cores), SMT On, Core Performance Boost Off, NPS1, Total Memory 1536GB (24x64GB DDR5 4800), microcode 0xa10113e, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, 1x 1.7T SAMSUNG MZWLJIT9HBJR-000007, 1x Intel® Ethernet Network Adapter E810-2CQDA2, 1x100GbE, NGINX Async v0.5.1, OpenSSL 3.1.3, TLS 1.3 Webserver: ECDHE-X25519-RSA2K, tested by Intel October 2023.

ClickHouse

Intel Xeon 8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor 8592+ (64 cores) with integrated Intel In-Memory Analytics Accelerator (Intel IAA), Number of IAA device utilized=4 (1 sockets active), HT On, Turbo On, SNC off, Total Memory 1024GB (16x64GB DDR5 5600), microcode 0x21000161, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 6.5.0-060500-generic, ZSTD v1.5.0, QPL v1.3dev, accel-config-v4.1.1, clang13, Clickhouse 21dev, Star Schema Benchmark, Query 4.1, tested by Intel October 2023.

AMD EPYC 9554: 1-node, AMD platform with 2x 4th Gen AMD EPYC processor (64 cores), SMT On, Core Performance Boost On, NPS1, Total Memory 1024GB (16x64GB DDR5 4800), microcode 0xa10113e, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 6.5.0-060500-generic, ZSTD v1.5.0, clang13, Clickhouse 21dev, Star Schema Benchmark, Query 4.1, tested by Intel October 2023.

Configurations



5th Gen Xeon Mainstream Workload Performance

RocksDB

Intel Xeon 8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor 8592+ (64 cores) with integrated Intel In-Memory Analytics Accelerator (Intel IAA), Number of IAA device utilized=8(2 sockets active), HT On, Turbo On, SNC off, Total Memory 1024GB (16x64GB DDR5 5600), microcode 0x21000161, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 6.5.0-060500-generic, QPL v1.2.0, accel-config-v4.0, iaa_compressor plugin v0.3.0, ZSTD v1.5.5, gcc 10.4.0, RocksDB v8.3.0 trunk (commit 62fc15f) (db_bench), 4 threads per instance, 64 RocksDB instances, tested by Intel October 2023.

AMD EPYC 9554: 1-node, AMD platform with 2x 4th Gen AMD EPYC processor (64 cores), SMT On, Core Performance Boost On, NPS1, Total Memory 1024GB (16x64GB DDR5 4800), microcode 0xa10113e, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.3 LTS, 6.5.0-060500-generic, ZSTD v1.5.5, gcc 10.4.0, RocksDB v8.3.0 trunk (commit 62fc15f) (db_bench), 4 threads per instance, 28 RocksDB instances, tested by Intel October 2023.

HammerDB MySQL

Intel Xeon 8592+: 1-node, 2x INTEL(R) XEON(R) PLATINUM 8592+, 64 cores, HT On, Turbo On, NUMA 2, Integrated Accelerators Available [used]: DLB 8 [0], DSA 8 [0], IAX 8 [0], QAT 8 [0], Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000161, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 2x 1.7T SAMSUNG MZWLJ1T9HBJR-00007, Ubuntu 22.04.3 LTS, 5.15.0-84-generic, HammerDB Mv4.4, MySQL 8.0.33. Test by Intel as of 10/04/23.

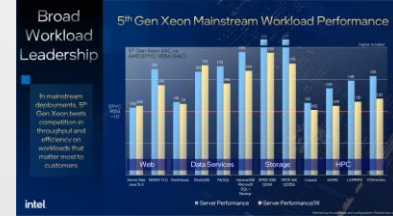
AMD EPYC 9554: 1-node, 2x AMD EPYC 9554 64-Core Processor, 64 cores, HT On, Turbo On, NUMA 2, Integrated Accelerators Available [used]: DLB 0 [0], DSA 0 [0], IAX 0 [0], QAT 0 [0], Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.5, microcode 0xa10113e, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 2x 1.7T SAMSUNG MZWLJ1T9HBJR-00007, Ubuntu 22.04.3 LTS, 5.15.125-0515125-generic, HammerDB v4.4, MySQL 8.0.33. Test by Intel as of 10/05/23.

HammerDB Microsoft SQL Server+ Backup

Intel Xeon 8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor 8592+ (64 cores) with integrated Intel Quick Assist Technology (Intel QAT), Number of IAA device utilized=8(2 sockets active), HT On, Turbo On, SNC off, Total Memory 1024GB (16x64GB DDR5 5600), microcode 0x21000161, 2x Ethernet Controller 10-Gigabit X540-AT2, 7x 3.5T INTEL SSDPE2KE032T807, QAT Zip 2.0.W.1.9.0-0008, Microsoft Windows Server Datacenter 2022, Microsoft SQL Server 2022, SQL Server Management Studio 19.0.1, HammerDB 4.5, tested by Intel October 2023.

AMD EPYC 9554: 1-node, AMD platform with 2x 4th Gen AMD EPYC processor (64 cores), SMT On, Core Performance Boost On, NPS1, Total Memory 1536GB (24x64GB DDR5 4800), microcode 0xa10113e, 2x Ethernet Controller 10G X550T, 7x 3.5T INTEL SSDPE2KE032T807, Microsoft Windows Server Datacenter 2022, Microsoft SQL Server 2022, SQL Server Management Studio 19.0.1, HammerDB 4.5, tested by Intel October 2023.

Configurations



5th Gen Xeon Mainstream Workload Performance

SPDK 128K QD64 (large media files) / SPDK 16K QD256 (database requests)

Intel Xeon 8592+: 1-node, 2x 5th Gen Intel Xeon Scalable processor (64 core) with integrated Intel Data Streaming Accelerator (Intel DSA), DSA device utilized=1(1 active socket), HT On, Turbo On, SNC Off, with 1024GB DDR5 memory (16x64 GB 5600), microcode 0x21000161, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, 1x 894.3G Micron 7450, 4x 3.84TB Samsung PM1733, 1x Intel® Ethernet Network Adapter E810-2CQDA2, 2x100GbE, FIO v3.34, SPDK 22.05, tested by Intel October 2023.

AMD EPYC 9554: 1-node, AMD platform with 2x 4th Gen AMD EPYC processor (64 cores), SMT On, Core Performance Boost On, NPS2, Total Memory 1536GB (24x64GB DDR5 4800), microcode 0xa10113e, Ubuntu 22.04.3 LTS, 5.15.0-78-generic, 1x 1.7T Samsung PM9A3, 4x 3.84TB Samsung PM1733, 1x Intel® Ethernet Network Adapter E810-2CQDA2, 2x100GbE, 1x Ethernet Connection X550T for 10GBASE-T, FIO v3.34, SPDK 22.05, tested by Intel October 2023.

Linpack

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, HPL from MKL_v2022.1.0, cmkl:2023.2.0, icc:2023.2.0, impi:2021.10.0.. Test by Intel as of October 2023

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554, SMT On, Turbo On, CTDPA=360W, NPS=4, 1536GB DDR5-4800, ucode= 0xa101111, Red Hat Enterprise Linux 8.7, Kernel 4.18, AMD official binary. Test by Intel as of March 2023

NAMD (Geomean of apoa1_npt_2fs, stmv_npt_2fs)

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, NAMD v2.15alpha, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of October 2023.

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554, SMT On, Turbo On, CTDPA=360W, NPS=4, 1536GB DDR5-4800, ucode= 0xa101111, Red Hat Enterprise Linux 8.7, Kernel 4.18, NAMD v2.15alpha, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of March 2023.

Configurations



5th Gen Xeon Mainstream Workload Performance

LAMMPS (Geomean of Polyethylene, DPD, Copper, Liquid Crystal, Atomic Fluid, Protein, Stillinger-Weber, Tersoff, Water)

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, LAMMPS v2021-09-29, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0, impi:2021.10.0. Test by Intel as of October 2023.

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554, SMT On, Turbo On, CTDp=360W, NPS=4, 1536GB DDR5-4800, ucode= 0xa101111, Red Hat Enterprise Linux 8.7, Kernel 4.18, LAMMPS v2021-09-29, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0, impi:2021.10.0. Test by Intel as of March 2023.

FSI Kernels (Geomean of Binomial Options, Monte Carlo, BlackScholes)

Binomial Options

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Binomial Options v1.1, icc:2023.2.0 tbb:2021.10.0. Test by Intel as of October 2023.

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554, SMT On, Turbo On, CTDp=360W, NPS=4, 1536GB DDR5-4800, ucode= 0xa101111, Red Hat Enterprise Linux 8.7, Kernel 4.18, Binomial Options v1.1, icc:2023.2.0 tbb:2021.10.0. Test by Intel as of March 2023

Monte Carlo

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Monte Carlo v1.2, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of October 2023.

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554, SMT On, Turbo On, CTDp=360W, NPS=4, 1536GB DDR5-4800, ucode= 0xa101111, Red Hat Enterprise Linux 8.7, Kernel 4.18, Monte Carlo v1.2, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of March 2023

BlackScholes

Intel Xeon 8592+: 1-node 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024 GB DDR5-5600, ucode 0x21000161, Red Hat Enterprise Linux 8.7, 4.18.0-425.10.1.el8_7.x86_64, Black Scholes v1.4, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of October 2023.

AMD EPYC 9554: 1-node, 2x AMD EPYC 9554, SMT On, Turbo On, CTDp=360W, NPS=4, 1536GB DDR5-4800, ucode= 0xa101111, Red Hat Enterprise Linux 8.7, Kernel 4.18, Black Scholes v1.4, cmkl:2023.2.0 icc:2023.2.0 tbb:2021.10.0. Test by Intel as of March 2023