

2025年1月17日

Bringing AI everywhere in HPC

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 in the bottom right corner of the slide. It is set against a solid blue square background.

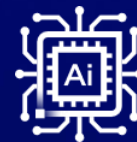
インテルのフォーカス・エリア



グローバル・
サプライチェーン
の強靱化



ムーアの法則の
継続



AI Everywhere

AI Everywhere の実現

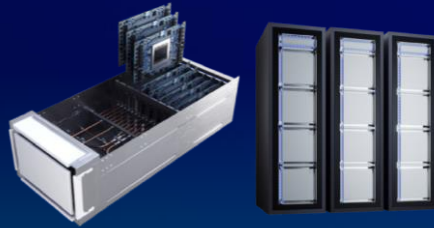


AI PC ノード

軽量の
推論処理

AI PC

最も広範な AI ソフトウェア・
エコシステム



ノード

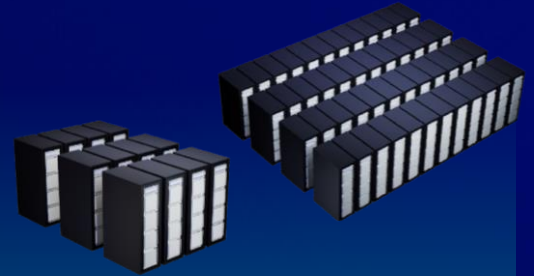
ファイン・チューニング、軽量の学習処理、チューニング、
推論

クラスター

最大レベルの推論処理

エンタープライズ & エッジ

オープン・スタンダード、
「導入後すぐに使用可能」



スーパークラスター

学習処理、チューニング、
最大レベルの推論処理

メガクラスター

大規模な学習処理と
推論処理

データセンター AI

オープンでスケーラブルなシステム &
リファレンス・アーキテクチャー

進化するデータセンターの要件 さまざまな用途によって最適化の方向性が異なる

あらゆる場所にAIを

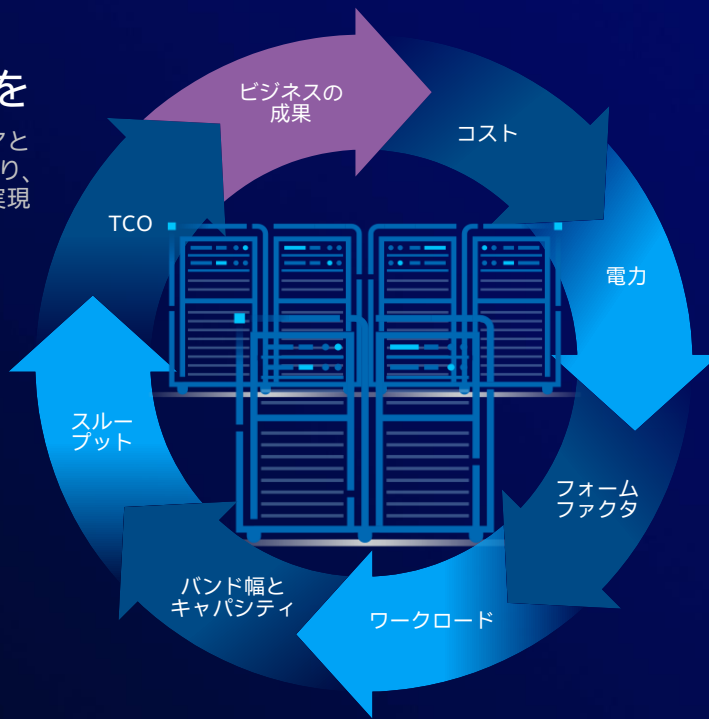
高速化されたハードウェアとオープン・スタンダード・ベースのソフトウェアにより、これまででない規模で動作を実現

スループットとレイテンシー

クラス最高の応答時間でシステムレベルのパフォーマンスを最大化

セキュリティ、品質と信頼性

セキュリティ、品質、信頼性をこれまででない規模で提供



効率性とTCO

電力効率要件を満たしながらラック密度を高め、TCOを改善

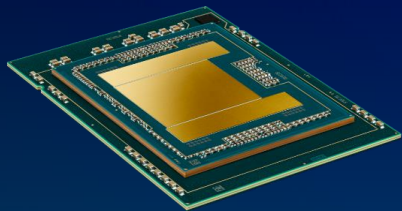
サステナビリティ

エネルギー効率の改善と循環型製品設計により、二酸化炭素排出量を最小限に

ソフトウェアの互換性

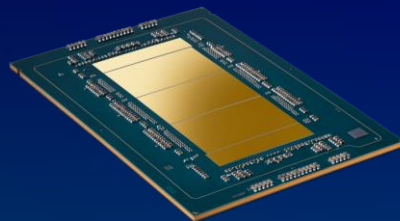
ソフトウェア・エコシステムの互換性のためのISAの一貫性

次世代データセンターソリューション



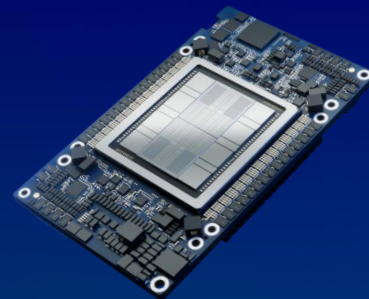
インテル Xeon 6 プロセッサー
(Efficient-Core)

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

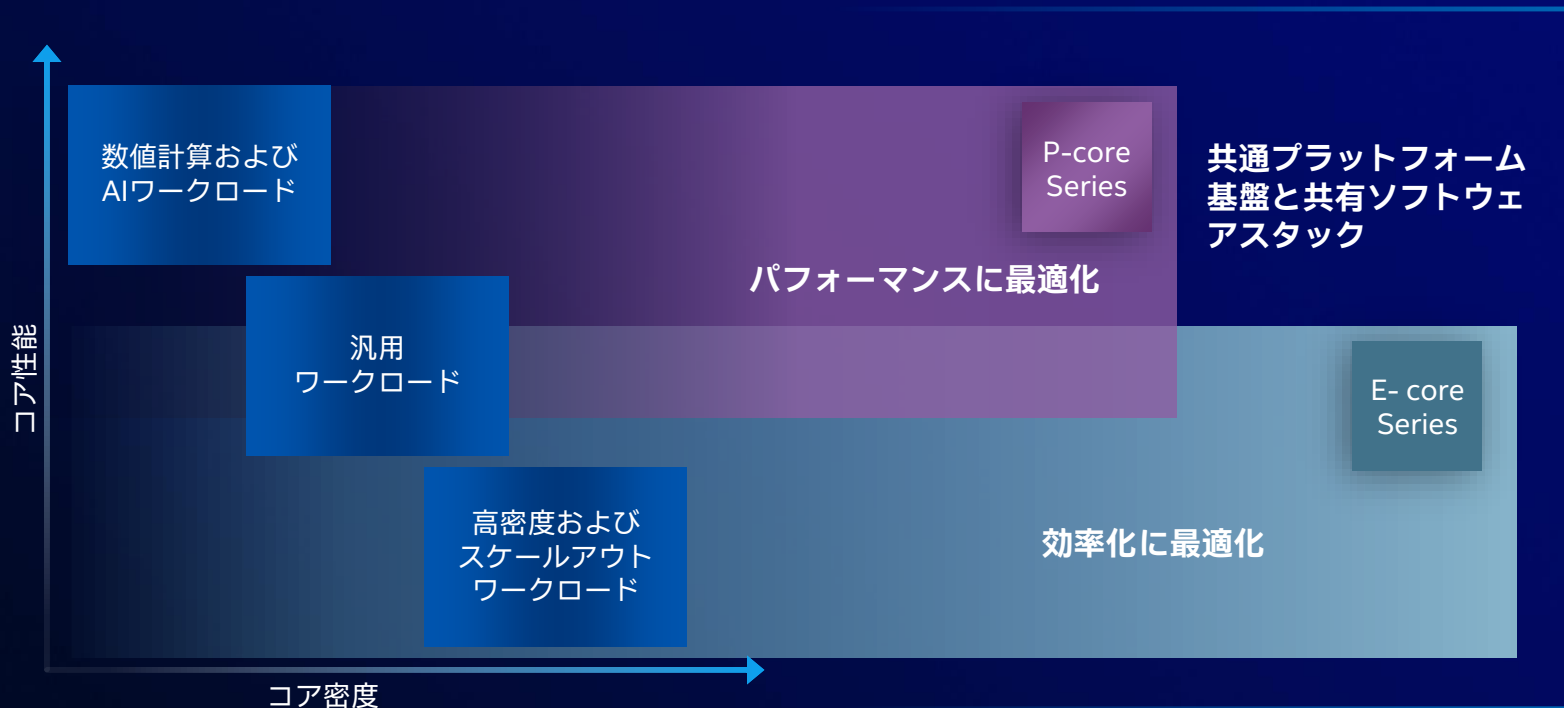


インテル Gaudi 3 AI
アクセラレーター

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

インテル® Xeon® 6 プロセッサ



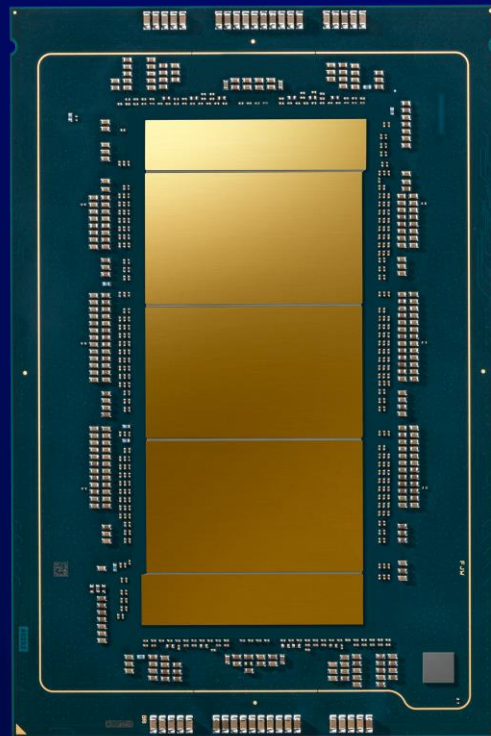
共通のソフトウェア・スタックで 効率性と使いやすさを実現

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

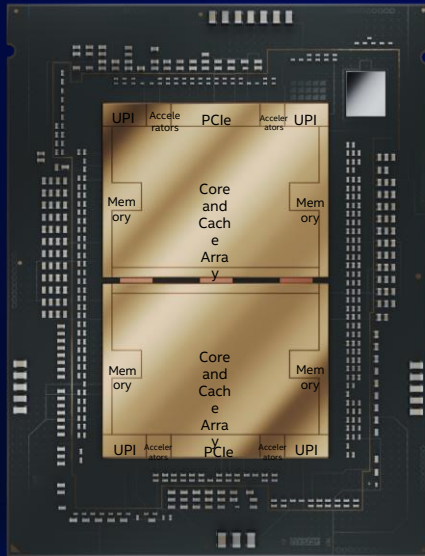
インテル® Xeon® 6プロセッサー Performance Cores (P-cores)

データセンターの多様なワークロードに対応し、優れたパフォーマンスを提供

- Xeon製品最大のコア数、メモリチャネル数を誇る
- MRDIMMをサーバーCPUとして市場初採用



スケーラビリティと柔軟性Intel Xeon 6 ダイパッケージの優位性

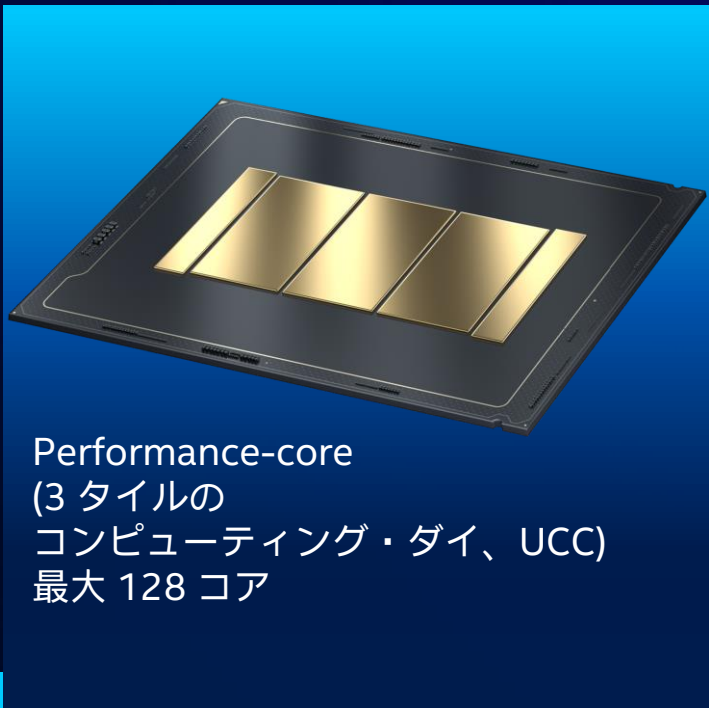


第五世代インテル® Xeon® プロセッサ

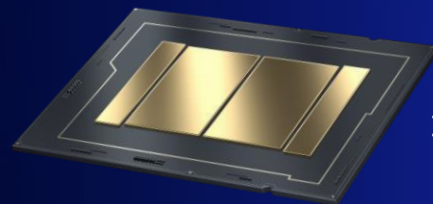


Intel Xeon 6900
Performance Core

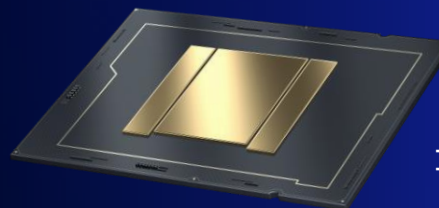
インテル® Xeon® 6 プロセッサー (P-cores 採用) の ダイパッケージ



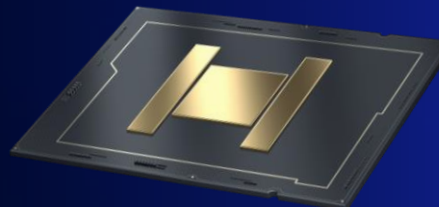
Performance-core
(3 タイルの
コンピューティング・ダイ、UCC)
最大 128 コア



Performance-core
(2 タイルの
コンピューティング・ダイ、XCC)
最大 86 コア



Performance-core
(1 タイルの
コンピューティング・ダイ、HCC)
最大 48 コア

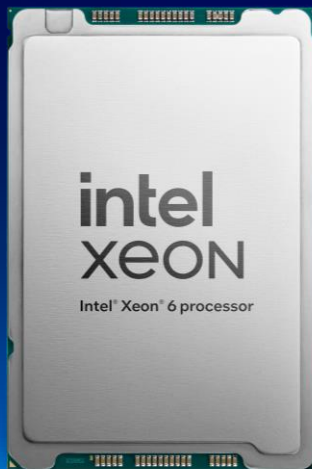


Performance-core
(1 タイルの
コンピューティング・ダイ、LCC)
最大 16 コア

インテル® Xeon® 6 プロセッサ ロードマップ



Intel Xeon 6700E



Intel Xeon 6900P



Intel Xeon 6900E

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

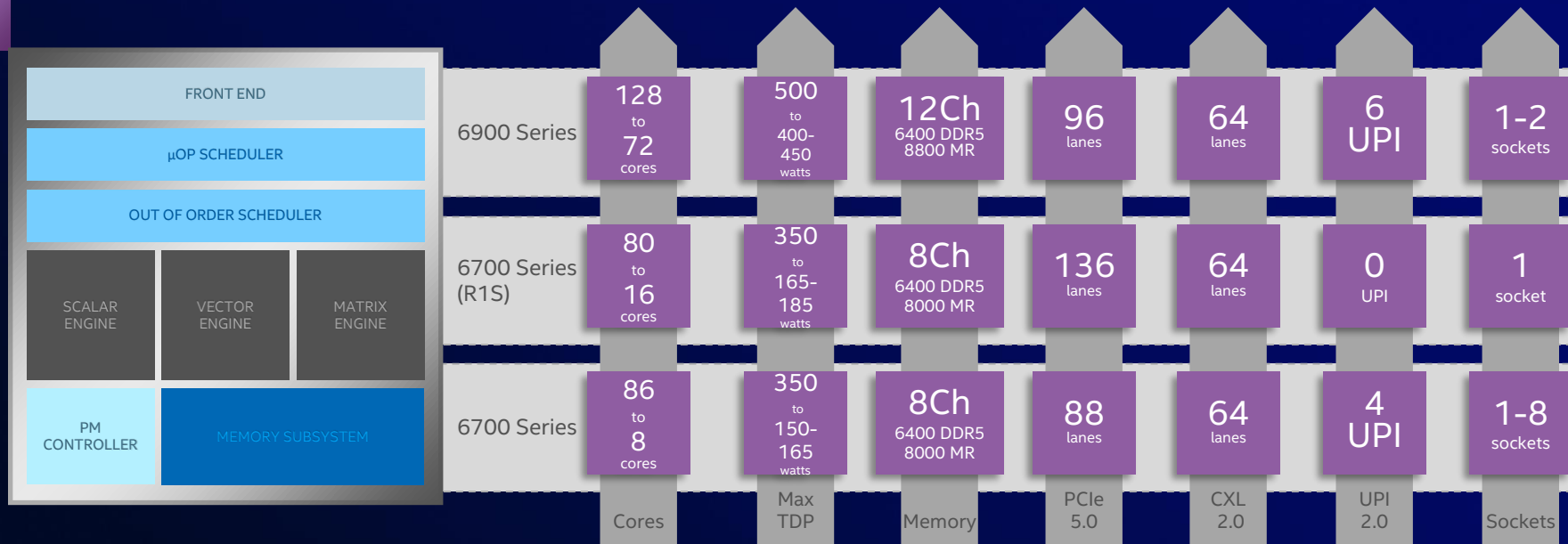
2024年6月発表

2024年9月24日発表

2025年第一四半期

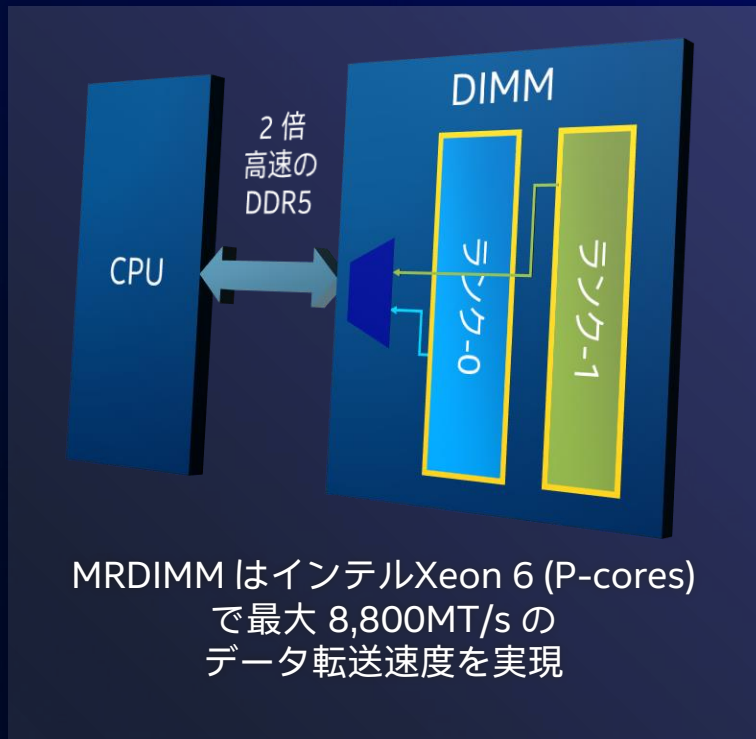
インテル® Xeon® 6 6900 および 6700 プラットフォームシリーズ 性能に最適化したコア

P-core Series



多重化ランク DIMM (MRDIMM)

インテル® Xeon® 6 プロセッサ (P-cores 採用) プラットフォームに市場初搭載



インテル® Xeon® 6 プロセッサ P-cores (128c)

MRDIMM-8800 は DDR5-6400 性能を凌駕



See backup for workload and configurations. Results may vary. * 6972P (96c) used.
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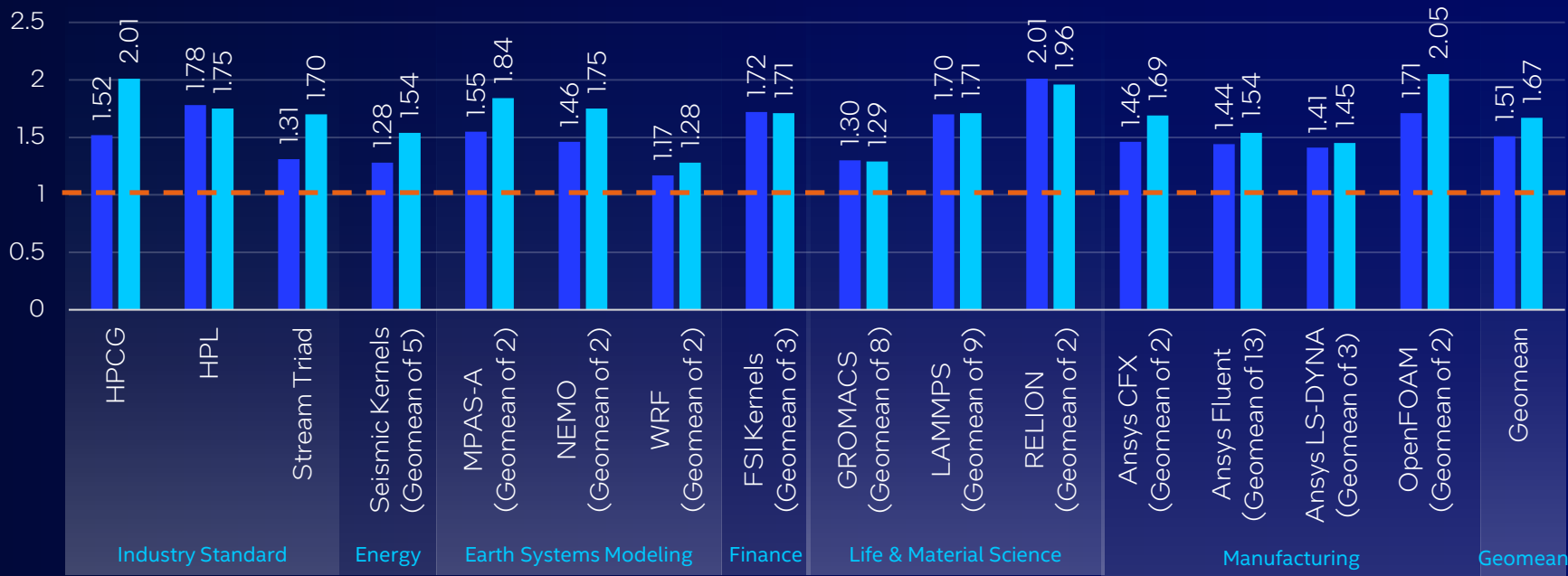
HPC ワークロードでのパフォーマンスリーダーシップ

競合他社製品に対して最大2.1倍高いパフォーマンスを実現
市場初対応のMRDIMMを使うことでメモリ性能に敏感なワークロードでの性能も向上

■ Intel® Xeon® 6980P (128c) with DDR5-6400

■ Intel® Xeon® 6980P (128c) with MRDIMM-8800

EPYC 9654に正規化
数字が大きいまは性能がよい



See backup for workload and configurations. Results may vary.

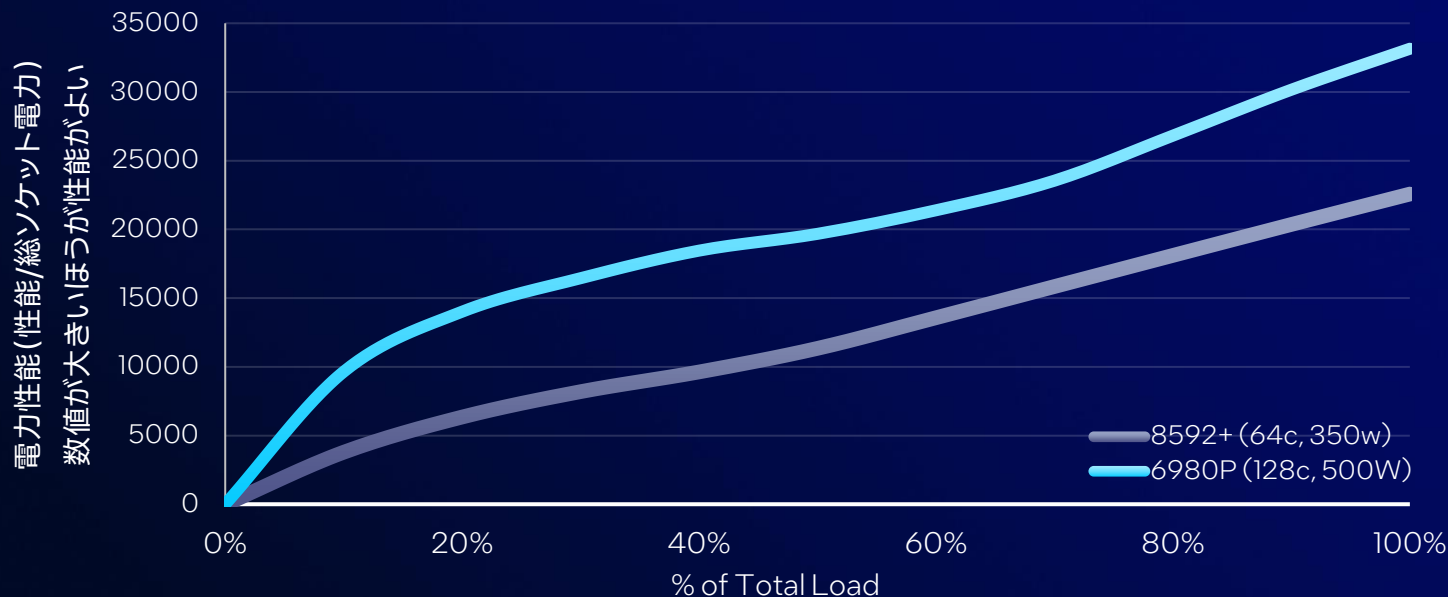
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P-cores 採用 インテル® Xeon® 6 プロセッサは ワット当たりの性能で大きな優位性を発揮

前世代からの電力効率の更なる向上



インテル® Xeon® 6 P-core SKU

PERFORMANCE SKUs

SKU	CORES	BASE (GHz)	ALL CORE TURBO (GHz)	Max TURBO (GHz)	L3 CACHE (MB)	TDP (Watts)	Max. Scala.	Memory Channels	DDR5 Memory Speed	MRDIMM Speed	Default Accel. Devices	Intel TDX Keys (Per CPU)	UPI Links Enab.	PCIe Lanes
6980P	128	2.0	3.2	3.9	504	500	2S	12	6400	8800	4/4/4/4	1024	6	96
6979P	120	2.1	3.2	3.9	504	500								
6972P	96	2.4	3.5	3.9	480	500								
6952P	96	2.1	3.2	3.9	480	400								
6960P	72	2.7	3.8	3.9	432	500								

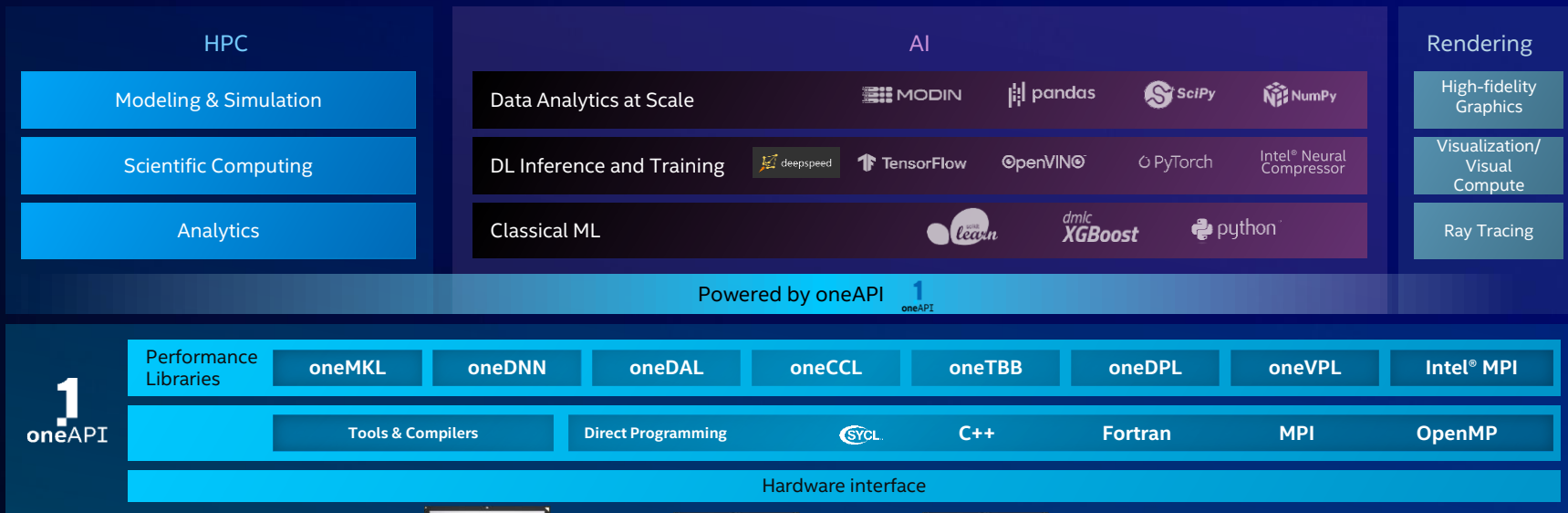
Intel may make changes to specifications and product descriptions at any time, without notice.

Please visit [intel.com/xeon](https://www.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).

*Accelerators List Order:
DSA, IAA, QAT, DLB
Intel® AMX featured in each core

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



インテル® ソフトウェア開発ツール 2025.0

AI とオープン・アクセラレーテッド・コンピューティング向けの生産性に優れた開発スタック

最新のインテルのプラットフォームを最大限に活用

[インテル® Core™ Ultra プロセッサ \(シリーズ 2\)](#) (開発コード名 Lunar Lake) のサポートにより PC を AI 開発に最大限に活用

[P-cores 搭載インテル® Xeon® 6 プロセッサ](#) (開発コード名 Granite Rapids) のサポートにより計算集約型の HPC および AI ワークロードのパフォーマンスを最大化

クラウドベースのサポートと[インテル® Tiber™ AI クラウド](#)のリソースを拡張

業界標準のツールに簡単にアクセス

業界をリードする AI フレームワークと、多くの[インテルの最適化を含む](#)ライブラリーを使用して、既存の開発ワークフローを活用

最新バージョンのインテルの AI ツールを使用してさまざまなハードウェアで[人気の高い LLM](#) を簡単に活用し、生成 AI 基礎モデルの新しいリリースがインテルの CPU、GPU、AI アクセラレーターで最適に動作することを保証

オンラインの[ツールキット・セレクター](#) (英語) によりソフトウェアのセットアップを合理化。時間を節約し、手間をかけることなく、プロジェクトに最適なツールを簡単に入手可能

幅広いハードウェアに対応

インテル® DPC++ 互換性ツールの 100 以上の API の自動移行により、[CUDA* から SYCL* への移行](#) がより速く容易に

新しいインテルのパフォーマンス・ライブラリーとコンパイラの最適化、Codeplay の[oneAPI Construction Kit](#) (英語) 4.0 の RISC-V* ネイティブ・ホスト・サポートにより、複数のアーキテクチャーでパフォーマンスと新機能が向上

[Triton](#) (英語)、[JAX](#) (英語)、[OpenXLA](#) (英語) などのクロスハードウェア AI アクセラレーション・ライブラリーにより、将来のシステムの柔軟性を獲得し、ロックインを防止

oneAPI 対応 5 年目を迎え、さらに進化するインテル® ソフトウェア開発ツール

430 万以上のインストール、680 万人の開発者をサポート

oneAPI の取り組みから 5 周年を迎えました。異なるハードウェアでアプリケーションを実行できるようにするエコシステムの技術的な奥深さだけでなく、HPC、AI、API 標準、移植性の高いアプリケーションを中心としたコミュニティの形成に成功した方法を再認識する良い機会と言えるでしょう。

Hartwig Anzt 博士

ミュンヘン工科大学計算数学学部長、テネシー大学ノックスビル校教授

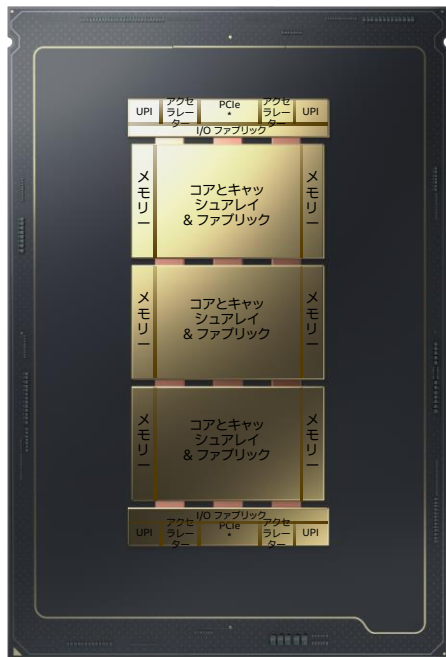
oneAPI ソフトウェア・スタックに対するインテルの取り組みは、オープン・スタンダードを使用してプログラムを作成する開発者をサポートするという取り組みの証です。oneAPI は 5 周年を迎え、CPU と GPU 向けに、インテルのプロセッサを最大限に活用するためのライブラリーとツールのエコシステムにより強化された OpenMP* と SYCL* の包括的で高性能な実装を提供しています。

Tom Deakin 博士

プリストル大学、コンピューターサイエンス学部、高度コンピューター・システム担当上級講師、ハイパフォーマンス・コンピューティング研究グループ長

インテル® Xeon® 6 プロセッサ対応の開発ツール

P-cores 搭載インテル® Xeon® 6 プロセッサのサポートにより計算集約型の HPC および AI ワークロードのパフォーマンスを最大化



AI を高速化

インテル® [oneAPI ベース・ツールキット](#)とインテルの [AI ツール](#) (英語) を使用して、マシンラーニングとデータサイエンスのパイプラインを高速化します。

- インテル® [oneAPI ディープ・ニューラル・ネットワーク・ライブラリー](#) (インテル® [oneDNN](#)) (英語) の汎用行列乗算 (matmul) とグラフ API でスケールされたドット積サブグラフの最適化により、幅広い AI ワークロード全体のパフォーマンスが向上します。
- 最新のインテル® [oneAPI ディープ・ニューラル・ネットワーク・ライブラリー](#) (インテル® [oneDNN](#))、インテルにより最適化された AI フレームワーク、インテル® [アドバンスド・マトリクス・エクステンション](#) (インテル® [AMX](#)) により、前の世代と比較して [Llama2 のパフォーマンスが最大 3 倍向上](#)¹しました。
- [TensorFlow*](#) (英語) と [PyTorch*](#) (英語) ディープラーニング [AI フレームワーク](#) (英語) のトレーニングと推論を大幅に最適化します。

HPC を高速化

インテル® [HPC ツールキット](#)のベクトル化、マルチスレッド化、マルチノードの並列処理、およびメモリー最適化の最新の手法を使用して、HPC アプリケーションを開発、解析、最適化、およびスケールアップします。

- インテル® [oneAPI マス・カーネル・ライブラリー](#) (インテル® [oneMKL](#)) のパフォーマンス最適化により、BLAS、LAPACK、FFT などさまざまな分野の数学関数を高速化します。
- MRDIMM² およびインテル® [oneAPI マス・カーネル・ライブラリー](#) (インテル® [oneMKL](#)) により、前の世代と比較して [HPC のパフォーマンスが最大 2.5 倍向上](#)します。
- インテル® [MPI ライブラリー](#)は、インテル® Xeon® 6 プロセッサのスケールアウトとスケールアップのチューニングと最適化をサポートします。
- インテル® [Fortran コンパイラー](#)は、OpenMP* を使用した GPU オフロードを含む、高速な CPU および GPU アプリケーションのパフォーマンスを実現します。

マルチアーキテクチャーで高速化

インテル® [oneAPI ベース・ツールキット](#)を使用して、ハイパフォーマンスなマルチアーキテクチャー・アプリケーションを開発。

- インテル® Xeon® 6 プロセッサに合わせてカスタマイズされた [インテル® oneAPI DPC++/C++ コンパイラー](#)のパフォーマンス最適化機能を利用して、アプリケーションの効率を最大化し、ピーク・パフォーマンスと最先端のコンピューティング・エクスペリエンスを実現します。
- インテル® [VTune™ プロファイラー](#)とインテル® [Advisor](#) でインテル® Xeon® 6 プロセッサをサポート。最新のインテルのプラットフォームでのパフォーマンス解析を最適化できます。
- インテル® [DPC++](#) 互換性ツールまたはオープンソースの SYCLomatsc により [CUDA* コードを SYCL* に移行](#)して、マルチベンダーの CPU と GPU に容易に移植できるように単一のソースコード・ベースを作成します。

セキュリティの向上

- 新しい [インテル® クリプトグラフィック・プリミティブ・ライブラリー](#) (英語) は、マルチバッファ機能により RSA 暗号化 (2K、3K、4K) を高速化します。

1) [インテル® Xeon® 6 プロセッサのパフォーマンス・インデックス](#) (英語) の [9A2] を参照。結果は異なることがあります。
2) [インテル® Xeon® 6 プロセッサのパフォーマンス・インデックス](#) (英語) の [9H10] を参照。結果は異なることがあります。



intel
XEON

インテル Xeon 6 プロセッサ

1.9倍

前世代のサーバーと比較して、
一般的なワークロードにおける40%の
サーバー使用率で、
ワット当たりの性能が向上

電力効率に優れた設計

2.5倍

前世代のサーバーと比較して、
より高いHPC性能

HPC性能の大幅な飛躍

5.5倍

AMD EPYCと比較して、
より高いAI推論性能

比類なきAI性能

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



セキュアで責任あるAI

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

intel®

注意事項および免責条項

性能は、使用状況、構成、その他の要因によって異なります。詳細については、

<https://www.Intel.com/PerformanceIndex/> (英語) を参照してください。

性能の測定結果は、構成に示されている日付時点のテストに基づいています。また、現在公開中のすべてのアップデートが適用されているとは限りません。構成の詳細については、補足資料を参照してください。絶対的なセキュリティーを提供できる製品またはコンポーネントはありません。

インテルのテクノロジーを使用するには、対応したハードウェア、ソフトウェア、またはサービスの有効化が必要となる場合があります。

各アクセラレーターの利用可否は SKU ごとに異なります。詳細については、担当のインテル販売代理店までお問い合わせください。

実際のコストや結果は異なる場合があります。

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Configuration: 10

P-core

[10] Performance Leadership

a) ResNet50: 5.5x higher AI performance vs. AMD EPYC

Intel Xeon 6980P: 1-node, pre-production platform, 2x Intel(R) 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800MT/s [8800 MT/s]), BIOS BHSDCRBI.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller X550, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 08/20/24.

AMD EPYC 9654: 1-node, 2x AMD EPYC 9654, 96 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa101144, 1x 3.5T SAMSUNG MZWLJ3T8HBL5-00007, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 07/09/24

Software: ResNet50 v1.5, Inference: int8, bs=x, Dataset: ImageNet, Framework: PyTorch:2.4.0, IPEX:2.4.0, OneDNN:v3.4.2, Modelzoo: https://github.com/intel/ai-reference-models

b) OpenFOAM (motorbike-20m, motorbike-42m): 2.1x higher HPC performance vs. AMD EPYC

Intel Xeon 6980P with MRDIMM : Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312

AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312



Configuration: 11

[11] Significant Gains Across Broad Workloads, Advantages of Intel® Xeon® 6 in the Cloud - 1.2x higher average performance/core, 1.6x higher average performance per watt

a) General Compute: Integer Throughput, FP Throughput, Memory Bandwidth, Linpack

6980P: 1-node pre-production platform, 2x Intel Xeon 6 with P cores, 128 cores, 500W, HT On [Off Linpack, Stream], Turbo On, Total Memory 1536GB [Linpack (24x 64GB DDR5 6400), Others (24x64GB MRDIMM 8800)], microcode 0x81000290, 1x 1.5T INTEL SSDPF21Q016TB, Ubuntu 24.04 LTS, 6.8.0-39-generic. Test by Intel as of 08/15/24.

8592+1-node, 2x Intel Xeon Platinum 8592+, 64 cores, HT On [Off Linpack, Stream], Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), microcode 0x21000200, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.5T INTEL SSDPF21Q016TB, Ubuntu 22.04.1 LTS, 6.5.0-27-generic. Test by Intel as of 04/17/24.

Software: est. SPECcpu2017 int/fp rate: gcc13.1; Stream Triad: STREAM 5.10, OneAPI2024.2, LINPACK: HPLinpack 2.3, OneAPI 2023.2.

b) MongoDB (1S):

6980P: 1-node pre-production platform, 2x (1x used) Intel(r) Xeon(r) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS

BHSDCRBI.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 4x 3.5T KIOXIA KCD8XPUG3T84, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.1 LTS, 6.5.0-21-generic. Test by Intel as of 07/17/24.

8592+1-node, 2x (1x used) Intel Xeon Platinum 8592+, 64 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000230, 1x Ethernet Controller E810-C for QSFP, 1x Ethernet interface, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T SAMSUNG MZL21T9HCLS-00A07, 4x 3.5T KIOXIA KCD8XPUG3T84, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/16/24.

Software: MongoDB 6.0.4, YCSB, multi-instance, read/update 90/10.



Configuration: 11

P-core

c) HammerDB MySQL (1S):

6980P: 1-node pre-production platform, 2x (1x used) Intel(r) Xeon(r) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.PC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 4x 3.5T KIOXIA KCD8XPUG3T84, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.1 LTS, 6.5.0-21-generic. Test by Intel as of 07/17/24.
8592+: 1-node, 2x (1x used) Intel Xeon Platinum 8592+, 64 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000230, 2x Ethernet Controller X710 for 10GBASE-T, 2x Ethernet Controller E810-C for QSFP, 1x Ethernet interface, 1x 1.7T SAMSUNG MZL121T9HCLS-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/29/24.
Software: TPROC-C on MySQL 8033, HammerDB 4.7, multi-instance.

d) Redis Vector Similarity Search

6980P w/MRDIMM: 1-node pre-production platform, 2x Intel(r) Xeon(r) 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800 MT/s [8800 MT/s]), BIOS BHSDCRB1.PC.0033.D57.2406240014, microcode 0x81000290, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T KIOXIA KCD8XPUGIT92, 1x 1.7T SAMSUNG MZWLJIT9HBJR-00007, 3x 1.7T KIOXIA KCD81PUGIT92, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/15/24.
8592+: 1-node, 2x Intel Xeon Platinum 8592+, 64 cores, 350W TDP, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 2.0, microcode 0x21000230, 2x Ethernet Controller X710 for 10GBASE-T, 2x Ethernet Controller E810-C for QSFP, 1x Ethernet interface, 1x 1.7T SAMSUNG MZL121T9HCLS-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/30/24.
Software: Redis: 7.2 Redisearch=v2.8.11 vector-db-benchmark GCC 12.3.0, multi-instance

e) ClickHouse OLAP

6972P: 1-node pre-production platform, 2x Intel(R) Xeon(R) 6972P, 96 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.PC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 1x 1.7T Micron_7400_MTFDKCCIT9TDZ, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/15/24.
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 3B08.TEL3P1, microcode 0x21000240, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 1x Ethernet interface, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/15/24.
Software : Star Schema Benchmark, ClickHouse, Clang 18, v24.7.3.42-stable, lz4. Geomean of Q1.1, Q2.1, Q2.2, Q2.3, Q3.1, Q3.2, Q3.3, Q4.1, Q4.2, Q4.3, multi-instance

f) NEMO (BENCH ORCA-1, GYRE_PISCES_25)

6980P w/MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, NEMO v4.2
8592+: Test by Intel as of April 2024, 1 node, 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 1024GB DDR5-5600, BIOS EGSDCRB1.SYS.0105.D74.2308261931, ucode 0x21000161, Ubuntu 22.04.1 LTS, Kernel 5.15.0, NEMO v4.2

g) OpenFOAM (motorbike-20m, motorbike-42m)

6980P w/MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312
8592+: Test by Intel as of March 2024, 1 node, 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 512GB DDR5-5600, BIOS 3B07.TEL2P1, ucode 0x21000200, Ubuntu 23.10, Kernel 6.5.0, OpenFOAM v2312

h) HPCG

6980P w/MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPCG from Intel_Optimized_MKL_v2024.1
8592+: Test by Intel as of March 2024, 1 node, 2x Intel Xeon 8592+, HT On, Turbo On, SNC2, 512GB DDR5-5600, BIOS 3B07.TEL2P1, ucode 0x21000200, Ubuntu 23.10, Kernel 6.5.0, App Version: HPCG from Intel_Optimized_MKL_v2022.10

i) LLM:

6972P w/MRDIMM: 1-node pre-production platform, 2x Intel(R) Xeon(R) 6972P, 96 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800MT/s [8800 MT/s]), BIOS BHSDCRB1.PC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 07/10/24.
8592+: 1-node, 2x Intel Xeon Platinum 8592+, 64 cores, 350W TDP, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 3B07.TEL2P1, microcode 0x21000200, 1x Ethernet interface, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 3.5T Micron_7450_MTFDKCB3T8TFR, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 07/11/24.
Llama2 7B: bf16, P90<=100ms, bs=x (1024/128), PyTorch:2.4.0, IPEX:2.4.0, OneDNN:v3.4.2, Modelzoo:https://github.com/intel/ai-reference-models
Llama3 8B: int8, P90<=100ms, bs=x (1024/128), PyTorch:2.3.0, IPEX:2.3.0, OneDNN:v3.4.2, Modelzoo:https://github.com/intel/ai-reference-models

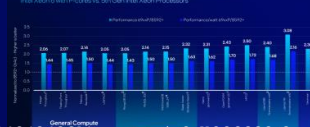
Advantages of Intel Xeon 6 in the Cloud

Reducing the cost of cloud computing



Significant Gains Across Broad Workloads

Measured with Process 16 on Gen 6 Intel Xeon Processors



Configuration: 12

P-core

[12] Higher Performance Efficiency Across Server Utilization

6980P: 1-node pre-production platform, 2x Intel(R) Xeon(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x81000290, 1x I210 Gigabit Network Connection, 1x 894.3G Micron_7450_MTFDKBG960TFR, CentOS Stream 9, 6.6.0-gnr.bkc.6.6.26.5.40.x86_64, Test by Intel as of 08/07/24

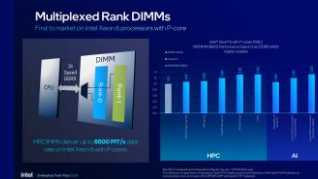
8592+: 1-node, 2x Intel Xeon Platinum 8592+, 64 cores, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS EGSDCRB1.SYS.0111.D23.2405061937, microcode 0x21000283, 2x Ethernet Controller I225-LM, 1x 447.1G SAMSUNG MZ7LH480HAHQ-00005, CentOS Stream 9, 6.2.0-emr.bkc.6.2.19.2.52.x86_64, Test by Intel as of 08/07/24

Package power = measured 2 socket power during workload execution
Software Config: PowerEfficiency workload, OpenJDK11.28



Configuration: 13

P-core



[13] MRDIMMs Excel for Bandwidth Intensive Workloads

- a) Ansys Fluent (aircraft_wing_14m, aircraft_wing_2m, combustor_12m, combustor_16m, combustor_71m, exhaust_system_33m, fluidized_bed_2m, ice_2m, landing_gear_15m, oil_rig_7m, pump_2m, rotor_3m, sedan_4m)
6980P, MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys Fluent 2024R1
6980P, DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys Fluent 2024R1
- b) WRF (CONUS-12km, CONUS-2.5km)
6980P, MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, WRF v4.5.2,
6980P, DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, WRF v4.5.2,
- c) OpenFOAM (motorbike-20m, motorbike-42m)
6980P, MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312
6980P, DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312
- d) Stream Triad
6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, App Version: v5.10
6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, App Version: v5.10
- e) HPCG:
6980P, MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPCG from Intel_Optimized_MKL_v2024.1
6980P, DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPCG from Intel_Optimized_MKL_v2024.1
- f) ResNet50:
6972P, MRDIMM, 1-node, 2x Intel(R) Xeon(R) 6972P, 96 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800 MT/s [8800 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic, Test by Intel as of 07/10/24.
6972P, DDR5: 1-node, 2x Intel(R) Xeon(R) 6972P, 96 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, Dual-Media 10G RDMA Ethernet Controller, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic, Test by Intel as of 08/13/24.
Software: ResNet50 v1.5, Inference: int8, bs=1 (sla=15ms), Dataset: ImageNet, Framework: PyTorch:2.4.0, IPEX: 2.4.0, OneDNN: v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>
- g) Gen AI - LLM:
6980P, MRDIMM: 1-node, 2x Intel Xeon 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800 MT/s [8800 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller X710 for 10GBASE-T, 1x 1.7T Micron_7400_MTFDKCCIT9TDZ, Ubuntu 24.04 LTS, 6.8.0-31-generic, Test by Intel as of 07/11/24.
6980P, DDR: 1-node, 2x Intel Xeon 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 3.5T Micron_7450_MTFDKCB3T8TFR, Ubuntu 24.04 LTS, 6.8.0-31-generic, Test by Intel as of 07/23/24.
Software: Llama3 8B: int8, P90<=100ms, bs=1, x(1024/128), PyTorch:2.3.0, IPEX: 2.3.0, OneDNN: v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>

Configuration: 18

P-core

[18] World's Best CPU for AI Inference

a) LLM: GPT-J 6B, Llama2 7B, Llama3 8B

6972P w/MRDIMM:1-node, pre-production platform, 2x Intel(R) Xeon(R) 6972P, 96 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800MT/s [8800 MT/s]), BIOS BHSDCRB1IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 07/10/24.

8592+: 1-node, 2x Intel Xeon Platinum 8592+, 64 cores, 350W TDP, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 3B07.TEL2P1, microcode 0x21000200, 1x Ethernet interface, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 3.5T Micron_7450_MTFDKCB3T8TFR, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 07/11/24.

AMD EPYC 9654: 1-node, 2x AMD EPYC 9654, 96 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa01144, 2x Ethernet Controller X550, 1x 3.5T SAMSUNG MZWLJ3T8HBL5-00007, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 07/09/24.

GPT-J 6B: int8, P90<=100ms, bs=x (128/128), bs=x (1024/128), PyTorch:2.4.0, IPEX: 2.4.0, OneDNN:v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>

Llama2 7B: int8, P90<=100ms, bs=x (128/128), bs=x (1024/128), PyTorch:2.4.0, IPEX: 2.4.0, OneDNN:v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>

Llama3 8B: int8, P90<=100ms, bs=x (128/128), bs=x (1024/128), PyTorch:2.3.0, IPEX: 2.3.0, OneDNN:v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>

b) Inference: BertLarge, ResNet-50, DLRM

6980P w/MRDIMM:1-node, pre-production, 2x Intel(R) 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800MT/s [8800 MT/s]), BIOS BHSDCRB1IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller X550, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 08/20/24.

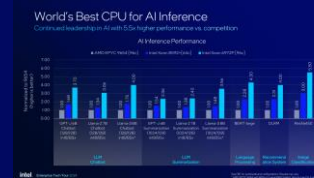
8592+: 1-node, 2x Intel Xeon Platinum 8592+, 64 cores, 350W TDP, HT On, Turbo On, Total Memory 1024GB (16x64GB DDR5 5600 MT/s [5600 MT/s]), BIOS 3B07.TEL2P1, microcode 0x21000230, 2x Ethernet Controller X710 for 10GBASE-T, 1x Ethernet interface, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 08/05/24.

AMD EPYC 9654: 1-node, 2x AMD EPYC 9654, 96 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa01144, 2x Ethernet Controller X550, 1x 3.5T Micron_7450_MTFDKCB3T8TFR, Ubuntu 24.04 LTS, 6.8.0-31-generic. Test by Intel as of 08/07/24.

Bert-large: BERT-large, Inference: int8, bs=x, Dataset: SQuAD1.1, Framework: PyTorch:2.4.0, IPEX: 2.4.0, OneDNN:v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>

ResNet50: ResNet50 v1.5, Inference: int8, bs=x, Dataset: ImageNet, Framework: PyTorch:2.4.0, IPEX: 2.4.0, OneDNN:v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>

DLRM: DLRMv2, Inference: int8, bs=x, Dataset: Criteo Terabyte, Framework: PyTorch:2.4.0, IPEX: 2.4.0, OneDNN:v3.4.2, Modelzoo: <https://github.com/intel/ai-reference-models>



Configuration: 20

P-core

j) General Compute: Integer Throughput, FP Throughput, Memory Bandwidth, Linpack

6980P: 1-node pre-production platform, 2x Intel Xeon 6 with P cores, 128 cores, 500W, HT On [Off Linpack, Stream], Turbo On, Total Memory 1536GB [Linpack (24x 64GB DDR5 6400), Others (24x64GB MRDIMM 8800)], microcode 0x81000290, 1x I210 Gigabit Network Connection, 1x 1.5T INTEL SSDPF21Q016TB, Ubuntu 22.04 LTS, 6.8.0-39-generic, Test by Intel as of 08/15/24.

AMD EPYC 9654: 1-node, 2x AMD EPYC 9654, 96 cores, SMT On [Off Linpack, Stream], Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa10113e, 1x I210 Gigabit Network Connection, 1x 1.5T INTEL SSDPF21Q016TB, 1x 1.5T INTEL SSDPF21Q016TB, Ubuntu 22.04.4 LTS, 6.5.0-21-generic, Test by Intel as of 08/15/24.

AMD EPYC 9754: 1-node, 2x AMD EPYC 9754, 128 cores, SMT On [Off Linpack, Stream], Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 1x I210 Gigabit Network Connection, 1x 1.5T INTEL SSDPF21Q016TB, 1x 1.5T INTEL SSDPF21Q016TB, Ubuntu 22.04.4 LTS, 6.5.0-21-generic, Test by Intel as of 08/15/24.

Software: est. SPECcpu 2017 int/fp rate: gcc13.1; Stream Triad: STREAM 5.10, OneAPI2024.2, LINPACK: HPLinpack 2.3, OneAPI 2023.2.



Configuration: 21



[21] Performance Leadership Across Broad Workloads – Data & Web Services

a) Apache Cassandra

6980P: 1-node, pre-production platform, 2x(1 used) Genuine Intel(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRBI.IPC.0034.D82.2408060239, microcode 0x10002d0, 1x I210 Gigabit Network Connection, 1x 894.3G Micron_7450_MTFDKBG960TFR, 8x 3.5T SAMSUNG MZQL23T8HCLS-00A07, Ubuntu 24.04 LTS, 6.8.0-41-generic. Test by Intel as of 08/26/24..

AMD EPYC 9654: 1-node, 2x(1 used) AMD EPYC 9654 96-Core Processor, 96 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa0101144, 2x Ethernet Controller X550, 6x 3.5T SAMSUNG MZQL23T8HCLS-00A07, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 24.04.1 LTS, 6.8.0-41-generic. Test by Intel as of 09/09/24.

AMD EPYC 9754: 1-node, 2x(1 used) AMD EPYC 9754 128-Core Processor, 128 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00213, 2x Ethernet Controller X550, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 6x 3.5T SAMSUNG MZQL23T8HCLS-00A07, Ubuntu 24.04.1 LTS, 6.8.0-41-generic. Test by Intel as of 07/16/24.

Software: Multi instance, Mix (80:20 Read:Write) at 10ms 99th SLA Apache Cassandra, Cassandra-Stress, Middleware, Framework and Runtimes: "openjdk version "Framework: "11.0.24"" 2024-07-16 OpenJDK Runtime Environment (build 11.0.24+8-post-Ubuntu-lubuntu324.04.1) OpenJDK 64-Bit Server VM (build 11.0.24+8-post-Ubuntu-lubuntu324.04.1, mixed mode, sharin".

b) HammerDB MySQL (IS)

6980P: 1-node, pre-production platform, 2x (1x used) Intel(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRBI.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 4x 3.5T KIOXIA KCD8XPUG3T84, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.1 LTS, 6.5.0-21-generic. Test by Intel as of 07/17/24.

AMD EPYC 9654: 1-node, 2x (1x used) AMD EPYC 9654 96-Core Processor, 96 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa010113e, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/29/24.

AMD EPYC 9754: 1-node, 2x (1x used) AMD EPYC 9754 128-Core Processor, 128 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 1x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 4x 3.5T KIOXIA KCD8XPUG3T84, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/16/24.

Software: TPROC-C on MySQL_8033, HammerDB 4.7, multi-instance.

c) MongoDB (IS)

6980P: 1-node, pre-production platform, 2x (1x used) Intel(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRBI.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 4x 3.5T KIOXIA KCD8XPUG3T84, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.1 LTS, 6.5.0-21-generic. Test by Intel as of 07/17/24.

AMD EPYC 9654: 1-node, 2x (1x used) AMD EPYC 9654 96-Core Processor, 96 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa010113e, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/29/24.

AMD EPYC 9754: 1-node, 2x (1x used) AMD EPYC 9754 128-Core Processor, 128 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 1x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 4x 3.5T KIOXIA KCD8XPUG3T84, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/16/24.

Software: MongoDB 6.0.4, YCSB, multi-instance, read/update 90/10.

d) Redis-Memtier (IS)

6980P: 1-node, pre-production platform, 2x (1x used) Intel(R) 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRBI.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10-Gigabit X540-AT2, 1x 1.7T SAMSUNG MZWLJIT9HBJR-00007, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/14/24.

AMD EPYC 9654: 1-node, 2x (1x used) AMD EPYC 9654 96-Core Processor, 96 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa010113e, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/13/24.

AMD EPYC 9754: 1-node, 2x (1x used) AMD EPYC 9754 128-Core Processor, 128 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller 10G X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/13/24.

Software: Redis memtier: Redis: 7.0.5 Memtier: 1.4.0, multi-instance.

Configuration: 21

e) Redis Vector Similarity Search:

6980P w/ MRDIMM: 1-node, pre-production platform, 2x Intel(R) 6980P, 128 cores, 500W TDP, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800 MT/s [8800 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller E810-C for QSFP, 2x Dual-Media IOG RDMA Ethernet Controller, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/29/24.
 AMD EPYC 9654: 1-node, 2x AMD EPYC 9654 96-Core Processor, 96 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa10113e, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller IOG X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/22/24.
 AMD EPYC 9754: 1-node, 2x AMD EPYC 9754 128-Core Processor, 128 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller IOG X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/22/24.
 Software: Redis: 7.2 Redisearch=v2.8.11 vector-db-benchmark GCC 12.3.0, multi-instance

f) Server-Side Java throughput and throughput w/SLA:

6980P w/ MRDIMM: 1-node, pre-production platform, 2x Intel(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB MRDIMM 8800 MT/s [8800 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x81000290, 2x Ethernet Controller X550, 3x 1.7T KIOXIA KCD81PUGIT92, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, 1x 1.7T KIOXIA KCD8XPUGIT92, CentOS Stream 9, 5.14.0-467.el9.x86_64. Test by Intel as of 07/09/24.
 AMD EPYC 9654: 1-node, 2x AMD EPYC 9654 96-Core Processor, 96 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa101144, 2x Ethernet Controller X550, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, CentOS Stream 9, 5.14.0-467.el9.x86_64. Test by Intel as of 07/07/24.
 AMD EPYC 9754: 1-node, 2x AMD EPYC 9754 128-Core Processor, 128 cores, 360W TDP, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00213, 2x Ethernet Controller X550, 1x 1.7T SAMSUNG MZWLJIT9HBJR-00007, CentOS Stream 9, 5.14.0-467.el9.x86_64. Test by Intel as of 07/07/24.
 Software: Server-side-java workload, JDK 21

g) Wordpress (1S HTTPS):

6980P: 1-node, pre-production platform, 2x (1x used) Intel(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/22/24.
 AMD EPYC 9654: 1-node, 2x (1x used) AMD EPYC 9654 96-Core Processor, 96 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa10113e, 2x Ethernet Controller E810-C for QSFP, 2x Ethernet Controller IOG X550T, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/21/24.
 AMD EPYC 9754: 1-node, 2x (1x used) AMD EPYC 9754 128-Core Processor, 128 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 2x Ethernet Controller IOG X550T, 2x Ethernet Controller E810-C for QSFP, 1x 1.7T SAMSUNG MZWLJIT9HBJR-00007, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 08/21/24.
 Software: WordPress 6.5, Siege 4.1.5, PHP 8.1, MariaDB 11.4.2, NGINX 1.22, OpenSSL 3.1.4, Workload Pinned to Socket 0, 8 vCPU per Instance, Instances: 32x on 6980P, 9754, 24x 9654.

h) NGINX 1S (Intel w/ QAT SW vs AMD OOB (cps/core)):

6980P: 1-node, pre-production platform, 2x (1x used) Intel(R) 6980P, 128 cores, HT On, Turbo Off, Integrated Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x11000290, 2x Ethernet Controller 10-Gigabit X540-AT2, 2x Ethernet Controller E810-C for QSFP, 1x 1.7T SAMSUNG MZQL21T9HCJR-00A07, Ubuntu 22.04.4 LTS, 6.5.0-21-generic. Test by Intel as of 07/25/24.
 AMD EPYC 9654: 1-node, 2x (1x used) AMD EPYC 9654, 96 cores, SMT On, Boost Off, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa10113e, 2x Ethernet Controller IOG X550T, 2x Ethernet Controller E810-C for QSFP, 1x 3.5T SAMSUNG MZWLJ3T8HBL5-00007, Ubuntu 22.04.4 LTS, 6.5.0-26-generic. Test by Intel as of July 2024.
 AMD EPYC 9754: 1-node, 2x (1x used) AMD EPYC 9754, 128 cores, SMT On, Boost Off, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xaa00212, 2x Ethernet Controller IOG X550T, 2x Ethernet Controller E810-C for QSFP, 1x 3.5T SAMSUNG MZWLJ3T8HBL5-00007, Ubuntu 22.04.4 LTS, 6.5.0-26-generic. Test by Intel as of July 2024.
 Software: NGINX, NGINX Async v0.5.1, OpenSSL 3.1.3, Intel=QAT driver: QAT_Engine v 1.6.1, QAT20.L.12.30-00020, AMD=OOB, IPP Crypto 2021.8, IPsec MB v 1.4,

i) Media SVT-HEVC

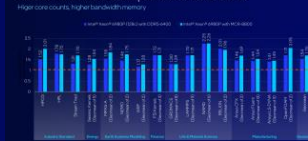
6980P: 1-node, 2x Intel(R) 6980P, 128 cores, HT On, Turbo On, Total Memory 1536GB (24x64GB DDR5 6400 MT/s [6400 MT/s]), BIOS BHSDCRB1.IPC.0033.D57.2406240014, microcode 0x81000290, 1x I210 Gigabit Network Connection, 1x 894.3G Micron_7450_MTFDKBG960TFR, Ubuntu 24.04 LTS, 6.8.0-39-generic. Test by Intel as of 07/29/24.
 AMD EPYC 9754: 1-node, 2x AMD EPYC 9754 128-Core Processor, 128 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.4, microcode 0xaa00212, 2x Ethernet Controller IOG X550T, 1x 3.5T INTEL SSDPF2KX038T2, Ubuntu 22.04.4 LTS, 6.5.0-25-generic. Test by Intel as of 04/24/24.
 AMD EPYC 9654: 1-node, 2x AMD EPYC 9654 96-Core Processor, 96 cores, SMT On, Boost On, Total Memory 1536GB (24x64GB DDR5 4800 MT/s [4800 MT/s]), BIOS 1.6, microcode 0xa10113e, 2x Ethernet Controller IOG X550T, 1x 1.7T SAMSUNG MZWLJIT9HBJR-00007, Ubuntu 22.04.4 LTS, 6.5.0-26-generic. Test by Intel as of 04/22/24
 Software Config: Version:release/6.0, SSVT_HEVC_VER:6cca5b932623d3a1953b165ae6b093ca1325ac44



Configuration: 22

P-core

Performance Leadership on HPC Workloads



[22] HPC

a) HPCG

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPCG from Intel_Optimized_MKL_v2024.1

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPCG from Intel_Optimized_MKL_v2024.1

AMD EPYC 9654: Test by Intel as of August 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, App Version: AMD_Prebuilt

b) HPL

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPL from Intel_Optimized_MKL_v2022.1.0

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, HPL from Intel_Optimized_MKL_v2022.1.0

AMD EPYC 9654: Test by Intel as of August 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, App Version: AMD_Prebuilt

c) Stream Triad

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, App Version: v5.10

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, App Version: v5.10

AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, App Version: v5.10

d) Seismic Kernels run via YASK (AWP; 640^3 grid, Iso3DFD; 1280^3 grid, SSG; 768^3 grid, wave-eq 2D; 32768^2 grid)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, YASK 4.05.01

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, YASK 4.05.01

AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, YASK 4.05.01

e) MPAS-A (60-km dycore, 60-km dycore+Physics)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, MPAS-A v7.3

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, MPAS-A v7.3

AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, MPAS-A v7.3

f) NEMO (BENCH ORCA-1, GYRE_PISCES_25)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, NEMO v4.2

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, NEMO v4.2

AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, NEMO v4.2

g) WRF (CONUS-12km, CONUS-2.5km)

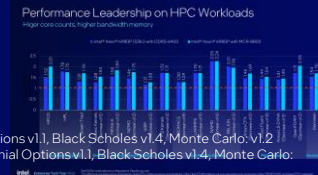
Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, WRF v4.5.2,

Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOS BHS DREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, WRF v4.5.2,

AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS 1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, App Version: v4.5.2

Configuration: 22

P-core



h) FSI Kernels (Binomial Options, Black Scholes, Monte Carlo)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Binomial Options v1.1, Black Scholes v1.4, Monte Carlo: v1.2
Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Binomial Options v1.1, Black Scholes v1.4, Monte Carlo: v1.2
AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, Binomial Options v1.1, Black Scholes v1.4, Monte Carlo: v1.2

i) GROMACS (benchPEP, benchPEP-h, benchRIB, ion_channel_pme_large, lignocellulose_rf_large, stmv, water1.5M_pme_large, water1.5M_rf_large)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, GROMACS v2024.1
Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, GROMACS v2024.1
AMD EPYC 9654: Test by Intel as of August 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, GROMACS v2024.1

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

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, LAMMPS v2024-03-07_dev
Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, LAMMPS v2024-03-07_dev
AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, LAMMPS v2024-03-07_dev

l) RELION (Plasmodium Ribosome 2D classification, Plasmodium Ribosome 3D classification)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, RELION 5.0-beta-2
Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, RELION 5.0-beta-2
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m) Ansys CFX (CFX-Airfoil_IQM, CFX-Airfoil_I00M)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys CFX 2022 R1
Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys CFX 2022 R1
AMD EPYC 9654: Test by Intel as of August 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, Ansys Fluent CFX 2022 R1

n) Ansys Fluent (aircraft_wing_14m, aircraft_wing_2m, combustor_12m, combustor_16m, combustor_71m, exhaust_system_33m, fluidized_bed_2m, ice_2m, landing_gear_15m, oil_rig_7m, pump_2m, rotor_3m, sedan_4m)

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Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys Fluent 2024R1
AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, Ansys Fluent 2024R1

o) Ansys LS-DYNA (3cars-150ms, car2car-120ms, ODB_I0M-30ms)

Intel Xeon 6980P with DDR5: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB DDR5-6400, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys LS-DYNA R11
Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, Ansys LS-DYNA R11
AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, Ansys LS-DYNA R11

p) OpenFOAM (motorbike-20m, motorbike-42m)

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Intel Xeon 6980P with MRDIMM: Test by Intel as of July 2024, 1 node, 2x Intel Xeon 6980P, HT On, Turbo On, SNC3, 1536 GB MRDIMM-8800, BIOSBHSDREL1.86B.0033.D40.2406180419, ucode=0x11000280, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312
AMD EPYC 9654: Test by Intel as of April 2024, 1 node, 2x AMD EPYC 9654, SMT On, Boost On, NPS4, 1536 GB DDR5-4800, BIOS1.9, ucode 0xa101148, Ubuntu 24.04, Kernel 6.8.0, OpenFOAM v2312