AMD Reference Configuration: Ansys on Lenovo

AMD® Value Proposition for Ansys

Better performance with 4th Gen AMD EPYC™ CPUs* vs. 3rd Gen Intel® Xeon® Platinum CPUs*

- Up to ~1.5x speedup[1] for Ansys® Mechanical™
- Up to ~1.76x speedup [2] for Ansys® LS-DYNA®
- Up to ~2.17x speedup [3] for Ansys® CFX®
- Up to ~1.75x speedup [4] for Ansys® Fluent®

*2P 32-core 4th Gen EPYC 9374F vs. 2P 32-core 3rd Gen Xeon Platinum 8362

Lenovo ThinkSystem™ SR645 V3 for Ansys

Designed for flexibility – Can act as:

- Head Node
- Visualization Node
- Performance Compute Node

Performance without compromise

- 1U Rack Server
- 4th Generation AMD EPYC Processors
- Up to 24x TruDDR5 4800MHz memory
- Optional Lenovo Neptune™ liquid cooling for higher-performance CPUs.

Why run Ansys applications on AMD processors?

Companies are investing in high-performance compute infrastructure with the best-performing processors to maximize the value of game-changing Ansys applications. The 4th Gen AMD EPYC processors deliver the optimal architecture for Ansys and help reduce constraints on the number, size, and complexity of simulation models while helping provide faster time to results. In addition, with AMD CPU-based systems, engineers can improve design quality and prototype performance and significantly reduce total cost of ownership (TCO) using fewer servers to do the same work, helping reduce power and lower related emissions.

How does AMD improve Ansys applications' performance?

Compared to the prior generation, the new AMD EPYC 4th Gen 9004 processors achieve better performance for Ansys applications with up to 50% more cores, higher frequencies, support for AVX-512 instructions, more memory bandwidth, and faster PCIe® and Infinity Fabric™ data transfer rate. In addition, optimizing Ansys applications with AMD compilers and libraries can help enhance performance further.

Lenovo® compute node systems configurations with AMD processors for Ansys

Table 1 shows recommendations for Computational Fluid Dynamics (CFD) applications like Ansys CFD including CFX and Fluent. Lenovo ThinkSystem™ servers with 4th Gen EPYC processors with 12 memory channels and support for AVX-512 instructions can deliver high throughput per node for Ansys CFD applications since they benefit from multicore parallelism and greater memory bandwidth.

Table 1: Sample Lenovo ThinkSystem™ configurations for CFD (CFX, Fluent)

Suitable for	Server/Processor	Memory	Storage/Network
High Performance	• SR645 V3 (1U) • 2x EPYC 9554 CPUs • 64 Cores • 3.10 GHz |3.75 GHz • L3 Cache of 256MB	• 768GB Total RAM • 24x 32GB DDR5 4800MHz 2R DIMMs	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Balanced Performance	• SR645 V3 (1U) • 2x EPYC 9374F CPUs • 32 Cores • 3.85 GHz | 4.30 GHz • L3 Cache of 256MB	• 384GB Total RAM • 24x 16GB DDR5 4800MHz 2R DIMMs	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Performance per Watt per Dollar	• SR645 V3 (1U) • 2x EPYC 9334 CPUs • 32 Cores • 2.70 GHz | 3.90 GHz • L3 Cache of 128MB	• 384GB Total RAM • 24x 16GB DDR5 4800MHz 2R DIMMs	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor

Table 2 shows recommendations for structural analysis using implicit Finite Element Analysis (FEA), like Ansys Mechanical. Lenovo ThinkSystem™ servers with lower-core count EPYC processors with high frequencies with support for AVX-512 instructions help efficiently utilize per-core software licenses and offer very high performance per core.

Table 2: Sample Lenovo ThinkSystem™ configurations for Structural Mechanics: Ansys Mechanical

Suitable for	Server/Processor	Memory	Storage/Network
High Performance	• SR645 V3 (1U) • 2x EPYC 9374F CPUs • 32 Cores each • 4.10 GHz | 4.40 GHz • L3 Cache of 256MB	• 768GB Total RAM • 24x 32GB DDR5 4800MHz 2R DIMMs	• 1x 2.5" 1.6TB SAS SSD (internal) • 2x 2.5" 1.6TB NVMe PCIe (upgraded internal) • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Balanced Performance	• SR645 V3 (1U) • 2x EPYC 9474F CPUs • 48 Cores each • 4.05 GHz | 4.30 GHz • L3 Cache of 256MB	• 768GB Total RAM • 24x 32GB DDR5 4800MHz 2R DIMMs	• 1x 2.5" 1.6TB SAS SSD (internal) • 3x 2.5" 1.6TB NVMe PCIe (upgraded internal) • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor

Table 3 shows recommendations for crash applications using explicit FEA like Ansys LS-DYNA. Lenovo systems with medium-core count EPYC processors with high frequencies and high cache-per-core and support for AVX-512 instructions offer very high performance per core to help efficiently utilize per-core software licenses.

Table 3: Sample Lenovo ThinkSystem™ configurations for Explicit Finite Element Analysis (FEA): Ansys LS-DYNA

Suitable for	Server/Processor	Memory	Storage/Network
High Performance	• SR645 V3 (1U) • 2x EPYC 9554 CPUs • 64 Cores each • 3.10 GHz |3.75 GHz • L3 Cache of 256MB	• 768GB Total RAM • 24x 32GB DDR5 4800MHz 2R DIMMs	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Balanced Performance	• SR645 V3 (1U) • 2x EPYC 9374F CPUs • 32 Cores each • 3.85 GHz | 4.30 GHz • L3 Cache of 256MB	• 384GB Total RAM • 24x 16GB DDR5 4800MHz 2R DIMMs	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Performance per Dollar and Watt	• SR645 V3 (1U) • 2x EPYC 9334 CPUs • 32 Cores each • 2.70 GHz | 3.90 GHz • L3 Cache of 128MB	• 384GB Total RAM • 24x 16GB DDR5 4800MHz 2R DIMMs	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor

Benefits: AMD CPU-based Lenovo ThinkSystem™ servers with Ansys

- **Validated and optimized** solution with compute, storage, software, services, and financial options
- **On-site install, start-up, and integration services** delivered by Lenovo or a certified Lenovo business partner
- **Remote management** is available with proactive monitoring and remediation of any Ansys operational issues.

Key Contacts

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[1] SP5-130: Mechanical® Release 2022 R2 test cases benchmark comparison based on AMD measurements as of 10/19/2022. Configurations: 2x 32-core Intel Xeon Platinum 8362 vs. vs. 2x 32-core EPYC 9374F for ~1.5x the rating performance. System Configurations:
2P AMD EPYC 9374F (32 cores/socket, 64 cores/node); 1.5 TB (24x) Dual-Rank DDR5-4800 64GB DIMMs, 1DIMM per channel; 1 x 256 GB SATA (OS) | 1 x 1 TB NVMe (data); BIOS Version 1002, SMT=off, Determinism=performance, NPS=4, TDP/ PPT=400; RHEL 8.6; OS settings:
Clear caches before every run, NUMA balancing 0, randomize_va_space 0 vs. 2P Intel Xeon Platinum 8362 (32 cores/socket, 64 cores/node); 1 TB (16x) Dual-Rank DDR4-3200 64GB DIMMs, 1DIMM per channel; 1 x 256 GB SATA (OS) | 1 x 1 TB NVMe (data); BIOS Version
1.6.5, SMT=off, HPC Profile; OS settings: Clear caches before every run, NUMA balancing 0, randomize_va_space 0. Results may vary based on factors such as software version, hardware configurations and BIOS version and settings.

[2] SP5-112: LS-DYNA® Version 2021 R1 Nonlinear FEA benchmark comparison based on AMD measurements as of 09/18/2022. Tests run: obd10m, car2car, obd10m-short, ls-3cars and ls-neon. System Configurations: 2P AMD EPYC 9374F (32 cores/socket, 64 cores/node); 1.5 TB (24x) Dual-Rank DDR5-4800 64GB DIMMs, 1DIMM per channel; 1 x 256 GB SATA (OS) | 1 x 1 TB NVMe (data); BIOS Version 1002C, SMT=off, Determinism=performance, NPS=4, TDP/ PPT=400 versus 2P Intel Xeon Platinum 8362 (32 cores/socket, 64 cores/node); 1 TB (16x) Dual-Rank DDR4-3200 64GB DIMMs, 1DIMM per channel; 1 x 256 GB SATA (OS) | 1 x 1 TB NVMe (data); BIOS Version 1.6.5, SMT=off, HPC Profile. Common: RHEL 8.6 OS settings: Clear caches before every run, NUMA balancing 0, randomize_va_space 0. Results may vary due to factors including system configurations, software versions and BIOS settings.

[3] SP5-116: CFX 2022 R2 Solver, Nonlinear CFD benchmark comparison based on AMD measurements as of 9/16/22. Tests used: cfx_100, cfx_50, cfx_10, cfx_lmans, cfx_pump. Configurations: 2P AMD EPYC 9374F (32 cores/socket, 64 cores/node); 1.5 TB (24x) Dual-Rank DDR5-4800 64GB DIMMs, 1DIMM per channel; 1 x 256 GB SATA (OS) | 1 x 1 TB NVMe (data); BIOS Version 1002C, SMT=off, Determinism=performance, NPS=4, TDP/ PPT=400 versus 2P Intel Xeon Platinum 8362 (32 cores/socket, 64 cores/node); 1 TB (16x) Dual-Rank DDR4-3200 64GB DIMMs, 1DIMM per channel; 1 x 256 GB SATA (OS) | 1 x 1 TB NVMe (data); BIOS Version 1.6.5, SMT=off, HPC Profile. Common: RHEL 8.6 OS settings: Clear caches before every run, NUMA balancing 0, randomize_va_space 0. Results may vary due to factors including system configurations, software versions and BIOS settings.

[4] SP5-035A: Fluent® Release 2022 R2 test cases benchmark comparison based on AMD measurements as of 10/19/2022. Configurations: 2x 32-core Intel Xeon Platinum 8362 vs. vs. 2x 32-core EPYC 9374F for ~1.75x the rating performance. Results may vary.