AMD Reference Configuration: Ansys on HPE

AMD® Value Proposition for Ansys

Better Performance vs. Competition

- Up to 33% faster[1] for Ansys® Mechanical™
- Up to 119% faster[2] for Ansys® LS-DYNA®
- Up to 118% faster[3] for Ansys® CFX®
- Up to 68% faster[4] for Ansys® Fluent®

Optimization Boost with AOCL

- Up to 212% gains[1] for Ansys® Mechanical™

Up to 51% TCO Savings Over 3 Years[5]

Sample HPE Configuration for Ansys

Head / Login Node

HPE ProLiant DL365 Gen10 Plus Server

Performance Compute Node

HPE Apollo 2000 Gen10 Plus System

Visualization Node

HPE ProLiant DL385 Gen10 Plus v2 Server

Why run Ansys applications on HPC systems?

To realize the full value from Ansys applications, companies are investing in high-performance computing (HPC) infrastructure to help reduce constraints on the number, size, and complexity of models while delivering faster time to results. It also helps engineers improve design quality and prototype performance and can significantly reduce total cost of ownership (TCO) with fewer servers, reduced power, and lower emissions.[5]

Yet, challenges remain with HPC infrastructure

Even with modern systems, Ansys workloads are challenged by:

- Inadequate processor frequency and/or core density, requiring massive, expensive scale-out solutions for many Ansys tasks
- Insufficient memory capacity and bandwidth, and low ratios of cache per core, hurt compute performance
- Poorly optimized I/O
- Lack of data security during computation

Why AMD for Ansys?

AMD EPYC™ processors help overcome the above challenges and provide an optimized architecture for Ansys applications. Analysis conducted by AMD suggests that manufacturers could achieve up to an estimated 51% TCO savings over three years by upgrading to the latest AMD EPYC processors, while cutting the number of cores in half.[5]

Ansys LS-DYNA, CFX, and Fluent users benefit from AMD EPYC processors with 3D V-Cache™ technology, providing triple the L3 cache compared to previous generation. In addition, optimizing Ansys applications with AMD compilers and libraries can help enhance performance. For example, Ansys Mechanical was optimized with AOCL (AMD Optimizing CPU Libraries) for a geomean performance improvement of up to 26% with estimated gains as much as up to 212% versus the competition.[1]

HPE® compute node systems configurations with AMD EPYC processors for Ansys

Hewlett Packard Enterprise (HPE) systems with high core count EPYC processors can deliver high throughput per node for Ansys applications across a range of use cases.

In general, liquid-cooled options will deliver the highest performance. If liquid cooling is not an option, air-cooled systems are a great choice for price-performance.

Computational Fluid Dynamics (CFD) applications like Fluent and CFX and crash applications like LS-DYNA benefit from multicore parallelism and from the large L3 cache available via AMD 3D V-Cache technology. See configurations in Table 1 below:

Table 1: HPE Apollo Gen10 Plus configurations for CFD (CFX, Fluent) and Crash (LS-DYNA)

	Processor	Memory	Storage/Network
Liquid Cooled	• 2x AMD EPYC 7573X • 64 cores/node • 4 nodes per chassis for a total of 256 cores • 2.80 GHz | 3.60GHz • L3 Cache of 768MB (with AMD 3D V-Cache)	• 256GB (16x) Dual-Rank x8 DDR4-3200 16GB DIMMs, 1DPC	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Air Cooled	• 2x AMD EPYC 7543 • 64 cores/node • 4 nodes per chassis for a total of 256 cores • 2.80 GHz | 3.60GHz • L3 Cache of 256MB	• 256GB (16x) Dual-Rank x8 DDR4-3200 16GB DIMMs, 1DPC	• 1x480GB SATA Read Intensive • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor

For structural analysis using implicit FEA, like Ansys Mechanical, HPE systems (Table 2 below) with low-core count EPYC processors with high frequencies help efficiently utilize per-core software licenses and performs well on 3rd generation EPYC processors without 3D V-Cache technology.

Table 2: Sample HPE Apollo Gen10 Plus configurations for Structural Mechanics: Ansys Mechanical

	Processor	Memory	Storage/Network
Liquid Cooled	• 2x AMD EPYC 7373X • 32 cores/node • 4 nodes per chassis for a total of 128 cores • 3.05 GHz | 3.80GHz • L3 Cache of 768MB (with AMD 3D-V Cache)	• 1TB (16x) Dual-Rank x4 DDR4-3200 64GB DIMMs, 1DPC	• 2 RAID0 1TB NVME write intensive SSD drives for local scratch • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor
Air Cooled	• 2x AMD EPYC 7543 • 64 cores/node • 4 nodes per chassis for a total of 256 cores • 2.80 GHz | 3.60GHz L3 Cache of 256MB	• 1TB (16x) Dual-Rank x4 DDR4-3200 64GB DIMMs, 1DPC	• 2 RAID0 1TB NVME write intensive SSD drives for local scratch • 1 InfiniBand HDR100/Ethernet 100Gb 1-port adaptor

Get started with Ansys on AMD-based HPE systems:

- **Broad range of unique choices** of compute, networking, storage, software, services, and financial options
- **On-site install, start-up, and integration services** delivered by HPE or a certified HPE business partner
- **Remote management** available with proactive monitoring and remediation of any Ansys operational issues.

Key Contacts

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[1]MLN-130A (https://www.amd.com/en/claims/epyc#faq-MLN-130A): ANSYS® Mechanical® 2021 R2 comparison based on AMD internal testing as of 09/27/2021 measuring the average of all Release 2019 R2 test case simulations using a server with 2x AMD EPYC 75F3 versus 2x Intel Xeon Platinum 8362. Steady state thermal analysis of a power supply module 5.3M (cg1) is max result. Results may vary.

[2]MLNX-009A (https://www.amd.com/en/claims/epyc3x#faq-MLNX-009A): ANSYS® LS-DYNA® 2022.1 comparison based on AMD internal testing as of 09/27/2021 measuring the time to run the 3Cars, Car2Car, odb10m-short, and Neon test case simulations. Configurations: 2x 64C AMD EPYC 7773X with AMD 3D V-Cache Technology ("Milan-X") versus 2x 40C Intel Xeon Platinum 8380. 3cars is the max result. Results may vary based on factors including silicon version, hardware and software configuration and driver versions.

[3]MLNX-010A (https://www.amd.com/en/claims/epyc3x#faq-MLNX-010A): ANSYS® CFX® 2022.1 comparison based on AMD internal testing as of 02/14/2022 measuring the average time to run the cfx_10, cfx_50, cfx_100, cfx_lmans, and cfx_pump test case simulations. Configurations: 2x 32C AMD EPYC™ 7573X with AMD 3D V-Cache technology™ versus 2x 32C Intel Xeon Platinum 8362. Cfx_10 is the max result. Results may vary based on factors including silicon version, hardware and software configuration and driver versions.

[4]MLNX-014 (https://www.amd.com/en/claims/epyc3x#faq-MLNX-014): ANSYS® FLUENT® 2022.1 comparison based on AMD internal testing as of 02/14/2022 measuring the rating of the Release 19 R1 test case test case simulations. Configurations: 2x 32C AMD EPYC™ 7573X with AMD 3D V-Cache™ versus 2x 32C Intel Xeon Platinum 8362. Pump2 is the max result. Results may vary based on factors including silicon version, hardware and software configuration and driver versions.

[5] Based on a comparison of a 2P AMD EPYC 7573X-powered server running Ansys cfx-50 vs. a similarly configured 2P Intel Xeon Platinum 8362-based server to deliver 4,600 jobs per day. Detailed results and TCO calculations are provided in MLNXTCO-001 in the AMD EPYC family claim information endnotes.
See *AMD EPYC claim MLNXTCO-001 at www.amd.com/en/claims/epyc3x*.