AMD EPYC DELIVERS EXCELLENT PERFORMANCE FOR HPC WORKLOADS

AMD EPYC, with industry-leading core count and memory bandwidth enables HPC performance enhancements.

ACCELERATION IS EVERYTHING
Once the domain of scientists, high-performance computing (HPC) workloads are used by many organizations, from oil and gas companies and financial institutions to weather and climate modeling services, genome sequencing companies, and universities. These innovative applications require the capability to process very large data sets and quickly run compute-intensive models and analysis techniques.

IT INFRASTRUCTURE CHALLENGES FOR HPC
Although processor and system technology improved incrementally over the last decade, there haven’t been core architectural advancements to efficiently support HPC workloads. Even with modern systems, HPC workloads continue to be challenged by:
- Insufficient memory bandwidth to keep CPU compute engines occupied
- Inadequate core density, requiring massive scale-out solutions to complete HPC tasks
- Growing need for GPU acceleration for highly parallel workloads
- Poorly optimized I/O
- Lack of data security during computation

WHY AMD EPYC FOR HPC?
The AMD EPYC™ processor family balances the ratios of cores, memory, I/O bandwidth, and deploys security features embedded in silicon to achieve optimized performance for today’s HPC applications.

ENHANCED CORE DENSITY
- Supports 8-32 cores per socket to deliver massively parallel performance
- Offers more cores in the same server rack space as other 1RU and 2RU servers

UP TO 33% MORE MEMORY BANDWIDTH
- Uses 8 memory channels to speed the flow of data into and out of the CPU
- Virtually eliminates memory bottlenecks and unlocks application performance

HIGHLY SCALABLE I/O
- Offers up to 128 lanes of PCIe® bandwidth without the need for a switch
- Supports high-bandwidth network interfaces, giving HPC workloads quick access to data
- Directly attaches up to 32 NVMe or SATA devices to optimize I/O and efficiently handle storage needs

EMBEDDED SECURITY PROCESSOR
- Full memory encryption with no changes needed to your applications
- Secure root-of-trust technology to help securely boot software
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OUTSTANDING PERFORMANCE

- DRAMATIC IMPROVEMENT FOR MEMORY-BOUND HPC APPLICATIONS.
- WORLD-RECORD FLOATING-POINT PERFORMANCE.
- EXCEPTIONAL BANDWIDTH AS MEASURED BY THE STREAM BENCHMARK.

FOOTNOTES

1. AMD EPYC 7601 processor supports up to 8 channels of DDR4-2667, versus the Xeon Platinum 8180 processor at 6 channels of DDR4-2667. NAP-42
2. In AMD internal testing on STREAM Triad on an AMD “Ethanol” reference system, with 2 x EPYC 7551 CPU in, 256 GB (16 x 16GB) DDR2666 memory, the gcc v7.2 compiler, Ubuntu 16.04, 1002E BIOS, which achieved 293,081 MB/s. NAP-94
3. Based on AMD internal testing of ANSYS FLUENT v19.1 as of January 20, 2019 and Intel results on ANSYS FLUENT v19.0 published by ANSYS as of January 20, 2019. 206.8 Core Solver Rating on combustor_71m benchmark using 16 x AMD EPYC Processor 7451 (24-core 2.3GHz) in 8 servers (2 processors per server), 256GB DDR4-2666 memory per server, Mellanox ConnectX-5 EDR 100Gb InfiniBand x16 PCIe per server, 1 x 256GB NVMe (DS storage) per server, 1 x 1TB NVMe (Data storage) per server, Red Hat® Enterprise Linux 7.5, MLNX_OFED_LINUX-4.3-3.0.1 OFED Driver, Mellanox EDR 100Gb/s Managed Switch (MSB7800-ES2F), ANSYS FLUENT v19.1, SMT=OFF, Boost=ON, Determinism Slider = Power, Transparent Huge Pages=ON, Swappiness=0, Governor = Performance 139.2650 Core Solver Rating on combustor_71m benchmark using 16 x Intel Xeon Gold Processor model 6148 (20-core 2.4 GHz) in 8 Cray XC50 servers (2 processors per server), Cray Linux Enterprise 6.0 update 07 based on SUSE 12 SP3, Cray Aries network, FLUENT AVX2 binary https://www.ansys.com/solutions/solutions-by-role/it-professionals/platform-support/benchmarks-overview/ansys-fluent-benchmarks/ansys-fluent-benchmarks-release-19/flow-through-combustor-71m. Testing with other EPYC or Intel parts may result in different performance results NAP-138

CONSISTENT FEATURE SET

- Simultaneous multithreading (SMT), 8 memory channels, and 128 PCIe® lanes across SKUs
- Balance of compute capabilities and economics without sacrificing features.

SCALABILITY FOR HPC WORKLOADS

<table>
<thead>
<tr>
<th>PART</th>
<th>CORES / THREADS</th>
<th>BASE FREQ. (GHz)</th>
<th>MAX BOOST (GHz)</th>
<th>MAX DDR FREQ. (1DPC)</th>
<th>PCIe GEN3 Lanes</th>
<th>TDP (W)</th>
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FOR MORE INFORMATION

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