

SHEARWATER® REVEAL® PERFORMANCE LEADERSHIP SEISMIC PROCESSING

Powered by 4th Gen AMD EPYC™ Processors

June 2023

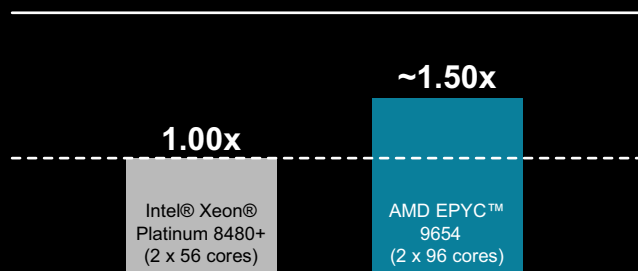
AT A GLANCE

2P systems powered by 96-core 4th Gen AMD EPYC™ processors technology demonstrate outstanding competitive performance uplifts on Shearwater® Reveal®.

PERFORMANCE HIGHLIGHTS

A single 2P 96-core 4th Gen AMD EPYC 9654 system demonstrates a ~1.50x uplift vs. a single 2P Intel® Xeon® Platinum 8480+ system on the 20 shot RTM workload.

2P AMD EPYC™ 9654 VS. 2P INTEL XEON PLATINUM 8480+
(COMPARABLE² - NORMALIZED TO 8480+)



KEY TAKEAWAYS

A 2P server powered by 4th Gen AMD EPYC 9654 (96-core) processors delivered a high core count competitive performance uplift of ~1.50x compared to a 2P server powered by Intel Xeon Platinum 8480+ (56-core) processors².

4th Gen AMD EPYC 9004 are available in 1P and 2P configurations and feature:

- Up to 384MB in standard 4th Gen AMD EPYC processors.
- Up to 4 links of Gen 3 Infinity Fabric™ at up to 32 Gbps.³
- 12 memory channels that support up to 6TB of DDR5-4800 memory.
- Support for PCIe® Gen 5 at up to 32 Gbps.
- AVX-512 instruction support for enhanced HPC and ML performance.
- AMD Infinity Guard technology to defend your data.³

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SYSTEM CONFIGURATION

AMD SYSTEM CONFIGURATION	
CPUs	2x AMD EPYC 9654
Frequency: Base Boost ⁴	2.40 GHz 3.55 GHz (up to)
Cores	96 cores/socket (192 threads)
L3 Cache	384 MB per CPU
Memory	1.5 TB (24x) Dual-Rank DDR5 4800 64 GB DIMMs 1 DPC
NIC	25 Gb Ethernet CCX512-A ConnectX-5 (fw 16.35.2000)
InfiniBand	200 Gb HDR ConnectX-6 VPI (fw 20.35.2000)
Storage: OS Data	Samsung MZQL21T9HCJR-00A07 1.92 TB
BIOS Version	1007D
BIOS Settings	SMT=OFF; NPS=4; Determinism=Power
OS	RHEL 8.7 (kernel 4.18.0-425.3.1.el8.x86_64)
OS Settings	amd_iommu=ON; iommu=pt; mitigations=off; clear caches; NUMA balancing=0; THP=on; CPU governor=Performance; C2 states=disabled

Table 1: AMD system configuration

INTEL SYSTEM CONFIGURATION	
CPUs	2x Intel Xeon Platinum 8480+
Frequency: Base Boost	2.00 GHz 3.80 GHz (up to)
Cores	56 cores per socket (112 threads)
L3 Cache	105 MB per CPU
Memory	1.0 TB (16x) Dual-Rank DDR5 4800 64 GB DIMMs 2 DPC
NIC	25 Gb Ethernet CCX512-A ConnectX-5 (fw 16.35.2000)
InfiniBand	200 Gb HDR ConnectX-6 VPI (fw 20.35.2000)
Storage: OS Data	Samsung MZQL21T9HCJR-00A07 1.92 TB
BIOS Version	ESE110Q-1.10
BIOS Settings	Hyperthreading=Off, Profile = Maximum Performance
OS	RHEL 8.7 (kernel 4.18.0-425.3.1.el8.x86_64)
OS Settings	processor.max_cstate=1; intel_idle.max_cstate=0; iommu=pt mitigations=off; clear caches; NUMA Balancing=0; randomize_va_space 0; THP=ON; CPU Governor=Performance

Table 2: Intel system configuration

TEST METHODOLOGY

Shearwater provides benchmarks to evaluate the performance of different platforms running Shearwater applications. These benchmark cases represent typical usage and cover a range of sizes. The uplift is calculated as the ratio of the systems under test (*sut*) to the reference systems (*ref*). In this Performance Brief, the Intel Xeon Platinum 8480+ is the *ref* system, and high core count 4th Gen AMD EPYC 9654 is the *sut*. The total amount of variability between individual runs was <1%. The results presented in this Performance Brief is a 20 shot RTM workload. The systems tested were configured as shown in Tables 1 and 2, above.

FOR ADDITIONAL INFORMATION

Please see the following additional resources for more information about 4th Gen AMD EPYC features, architecture, and available models:

- [AMD EPYC™ 9004 Series Processors](#)
- [AMD EPYC™ Products](#)
- [AMD EPYC™ Tuning Guides](#)

REFERENCES

1. “Technical Computing” or “Technical Computing Workloads” as defined by AMD can include: electronic design automation, computational fluid dynamics, finite element analysis, seismic tomography, weather forecasting, quantum mechanics, climate research, molecular modeling, or similar workloads. GD-204
2. The Intel Xeon Platinum 8480+ is the highest-performing processor listed in the Performance General-Purpose category for 4th Gen Intel Xeon CPU models at https://download.intel.com/newsroom/2023/data-center-hpc/Intel-4th-Gen-Xeon_product_SKUs.jpg.
3. AMD Infinity Guard features vary by EPYC™ Processor generations. Infinity Guard security features must be enabled by server OEMs and/or Cloud Service Providers to operate. Check with your OEM or provider to confirm support of these features. Learn more about Infinity Guard at <https://www.amd.com/en/technologies/infinity-guard>. GD-183
4. Maximum boost for AMD EPYC processors is the maximum frequency achievable by any single core on the processor under normal operating conditions for server systems. EPYC-18

AUTHORS

Alvaro Fernandez and Ashok Manikonda contributed to this Performance Brief.

RELATED LINKS

- [Shearwater Reveal*](#)
- [AMD EPYC™ Processors](#)
- [AMD EPYC Technical Briefs and Tuning Guides](#)

**Links to third party sites are provided for convenience and unless explicitly stated, AMD is not responsible for the contents of such linked sites and no endorsement is implied.*

BOOST PERFORMANCE WITH AMD EPYC

AMD EPYC™ processors are built to handle large scientific and engineering datasets - ideal for compute-intensive modeling and advanced analysis techniques. Leveraged by many of the world's largest, most scalable data centers and supercomputers, AMD EPYC™ enables fast time-to-results for HPC.

“ZEN 4” CORE & SECURITY FEATURES

Support for up to:

- 96 physical cores, 192 threads
- 384 MB of L3 cache per CPU
- 96 MB of L3 cache per CCD
- 6 TB of DDR5-4800 memory
- Up to 128 1P, up to 160 2P PCIe® Gen 5 lanes

Infinity Guard security features³

- Secure Boot
- Encrypted memory with SME

SHEARWATER REVEAL

Shearwater software provides time and depth processing and imaging for both land and marine environments from within a single user interface.

Reveal stands alone in the industry as the only software product designed and built entirely in the 21st century. Shearwater uses Reveal internally for all land and marine processing projects, ensuring continuous development.

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