LEADERSHIP PERFORMANCE ON AMD EPYC™ 9754 PROCESSORS
SPECrate® 2017 INTEGER AND FLOATING POINT

Powered by 4th Gen AMD EPYC™ 9754 Processors

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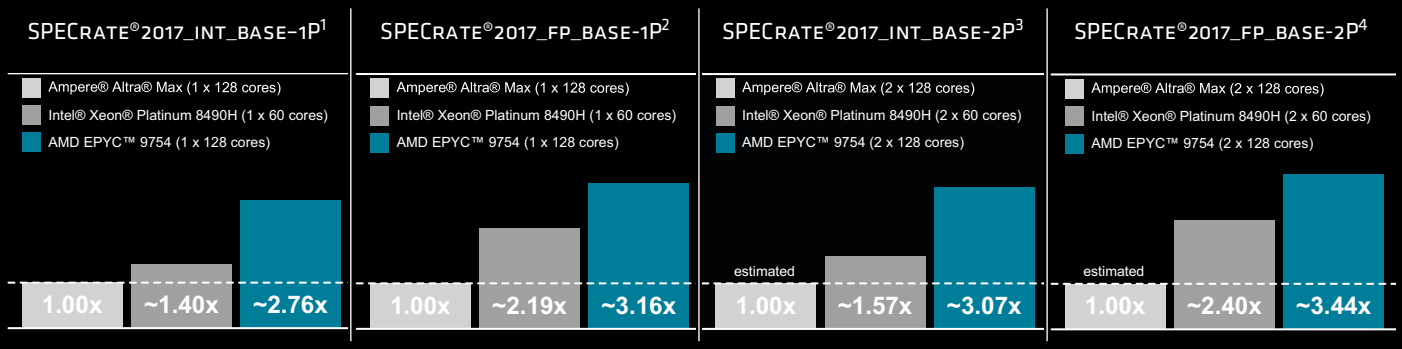
AT A GLANCE

1P and 2P systems powered by 128-core 4th Gen AMD EPYC™ 9754 CPUs show strong performance uplifts on the SPEC® CPU 2017 Integer and Floating-Point throughput workloads vs. comparable Intel® Xeon® Platinum 8490H and Ampere® Altra® Max CPUs.

PERFORMANCE HIGHLIGHTS

A 1P 128-core 4th Gen AMD EPYC 9754 system demonstrates ~2.80x SPECrate®2017_int_base and ~3.20x SPECrate®2017_fp_base uplifts vs. an Ampere® Altra® Max M128-30 system. A 2P 128-core 4th Gen AMD EPYC 9754 system demonstrates ~3.10x SPECrate®2017_int_base and ~3.40x SPECrate®2017_fp_base uplifts vs. comparable Ampere® Altra® Max systems. .



KEY TAKEAWAYS

Cloud Service Providers (CSPs) must fulfill a growing demand for public cloud Infrastructure as a Service (IaaS) and hybrid cloud integrations by providing VMs with varying vCPU, memory, and network options to support diverse workloads that can be quickly reconfigured for Platform as a Service (PaaS) deployments at the software level. 4th Gen AMD EPYC 9754 (128-core) processors demonstrate top of stack competitive performance uplifts compared to the Intel Xeon Platinum 8490H (60-core) and Ampere Altra Max (128-core) processors in both 1P and 2P configurations. The SPEC CPU 2017 benchmark is the best proxy for current and future performance because it comparatively measures compute-intensive performance using workloads developed from real user applications. The outstanding Integer and Floating-Point performance of 4th Gen AMD EPYC 9754 processors makes them an ideal choice for scalable cloud native services and enterprise applications. 4th Gen AMD EPYC 97x4 processors are available in 1P and 2P configurations and feature:

- Up to 128 cores (256 threads) per processor.
- Up to 256MB L3 cache.
- Up to 4 links of Gen 3 Infinity Fabric™ at up to 32 Gbps.
- 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.[5]

IN THIS BRIEF

TEST METHODOLOGY

The SPEC CPU® 2017 benchmark from the Standard Performance Evaluation Corporation (SPEC®) provides a comparative measure of compute-intensive performance using workloads developed from real user applications. SPEC CPU 2017 is the industry-standardized, CPU intensive suite of benchmarks for measuring and comparing compute intensive performance, stressing a system's processor, memory subsystem and compiler. This benchmark is used by hardware vendors, the IT industry, computer manufacturers, and governments. SPECrate 2017 measures the throughput or work per unit of time. 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 8490H and 4th Gen AMD EPYC 9754 systems (*sut*) are normalized against the Ampere Altra Max systems (*ref*). Published results are available at https://www.spec.org/cpu2017/results/. The 2P Ampere results presented in this Performance Brief are compliant benchmark runs tested by AMD.

With an industry-leading 128 cores per x86 socket, the AMD EPYC 9754 processor is able to exhibit compelling performance uplifts across the benchmarks listed in this Performance Brief in both 1P and 2P configurations. The total amount of variability between individual runs was <1%.

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™ Tuning Guides
- AMD EPYC™ Products

REFERENCES

1. As of 6/13/2023, 1P Ampere Altra Max M128-30 128 cores SPECrate®2017_int_base 356 available at: https://www.spec.org/cpu2017/results/res2022q4/cpu2017-20221205-32963.html; 1P Intel Xeon Platinum 8490H 60 cores SPECrate®2017_int_base 498 is available at: https://www.spec.org/cpu2017/results/res2023q1/cpu2017-20221206-33075.html; 498/356=1.3988=1.4x, 1P AMD EPYC 9754 128 cores SPECrate®2017_int_base 981 is available at: https://www.spec.org/cpu2017/results/res2023q2/cpu2017-20230522-36617.html; 981/356=2.7556=2.8x
2. As of 6/13/2023, 1P Ampere Altra Max M128-30 128 cores SPECrate®2017_fp_base 232 available at: https://www.spec.org/cpu2017/ results/res2022q4/cpu2017-20221205-32964.html; 1P Intel Xeon Platinum 8490H 60 cores SPECrate®2017_fp_base 508 is available at: https://www.spec.org/cpu2017/results/res2023q1/cpu2017-20221206-33076.html; 508/232=2.1896=2.2x; As of 6/13/2023, 1P AMD EPYC 9754 128 cores SPECrate®2017_fp_base 733 is available at: https://www.spec.org/cpu2017/results/res2023q2/cpu2017-20230522-36615.html; 733/232=3.1594=3.2x
3. As of 6/13/2023, 2P Ampere Altra Max M128-30 128 cores Est. SPECrate®2017_int_base 636, Memory 1.0 TB (16x) Dual-Rank DDR4 320 10 64 GB DIMMs 1 DPC, Ubuntu 22.04, GCC 10.3, Jemalloc 5.2.1, BIOS 0ACOD009 (SCP: 2.10.20221028),default settings; 2P Intel Xeon Platinum 8490H 60 cores SPECrate®2017_int_base 1000 is available at: https://www.spec.org/cpu2017/results/res2023q1/cpu2017-20230310-34562.html; 1000/ 636=1.5723=1.6x; 2P AMD EPYC 9754 128 cores SPECrate®2017_int_base 1950 is available at: https://www.spec.org/cpu2017/results/res2023q2/cpu2017-20230522-36617.html; 1950/636=3.0660=3.10x
4. As of 6/13/2023, 2P Ampere Altra Max M128-30 128 cores Est. SPECrate®2017_fp_base 424, Memory 1.0 TB (16x) Dual-Rank DDR4 320 10 64 GB DIMMs 1 DPC, Ubuntu 22.04, GCC 10.3, Jemalloc 5.2.1, BIOS 0ACOD009 (SCP: 2.10.20221028),default settings; 2P Intel Xeon Platinum 8490H 60 cores SPECrate®2017_fp_base 1020 is available at: https://www.spec.org/cpu2017/results/res2023q1/cpu2017-20230310-34571.html; 1020/424=2.4056=2.4x; 2P AMD EPYC 9754 128 cores SPECrate®2017_fp_base 1460 is available at: https://www.spec.org/cpu2017/results/res2023q2/cpu2017-20230522-36615.html; 1460/424=3.4433=3.4x
5. 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
6. 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

AUTHOR

Gnanakumar Rajaram contributed to this Performance Brief.

RELATED LINKS

- SPEC CPU® 2017*
- AMD EPYC Processors
- AMD EPYC Technical Briefs

**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.*

ZEN4C CORE OPTIMIZED FOR SCALE-OUT PERFORMANCE

AMD EPYC 97xx Series Processors are based on the new density optimized "Zen 4c" compute core. The "Zen 4c" core is manufactured using a 5nm process and is designed to provide an Instructions per Cycle (IPC) uplift and frequency improvements over prior generation "Zen" cores.

"ZEN 4" CORE & SECURITY FEATURES

Support for up to:

- 128 physical cores, 256 threads
- 256 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 features[5]

- Secure Boot
- Encrypted memory with SME

DESIGNED FOR CLOUD NATIVE COMPUTING

Platforms powered by 4th Gen AMD EPYC™ 97xx Series processors provide core compute densities (up to 128 cores/socket), memory capacities, bandwidth, and up to either 128 (1P) or 160 (2P) lanes of high-speed PCIe® Gen5 lanes I/O to meet design challenges encountered by Cloud Service Providers (CSPs) fulfilling the growing demands of public cloud infrastructures.

SPEC CPU® 2017

The SPEC CPU® 2017 benchmark from the Standard Performance Evaluation Corporation (SPEC®) provides a comparative measure of compute-intensive performance using workloads developed from real user applications.