

SPEC CPU®2017 Floating Point Rate Result

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LaCASA Laboratory

SPECrate®2017_fp_base = 8.36

AMD EPYC 7402 24-Core Processor

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 1269

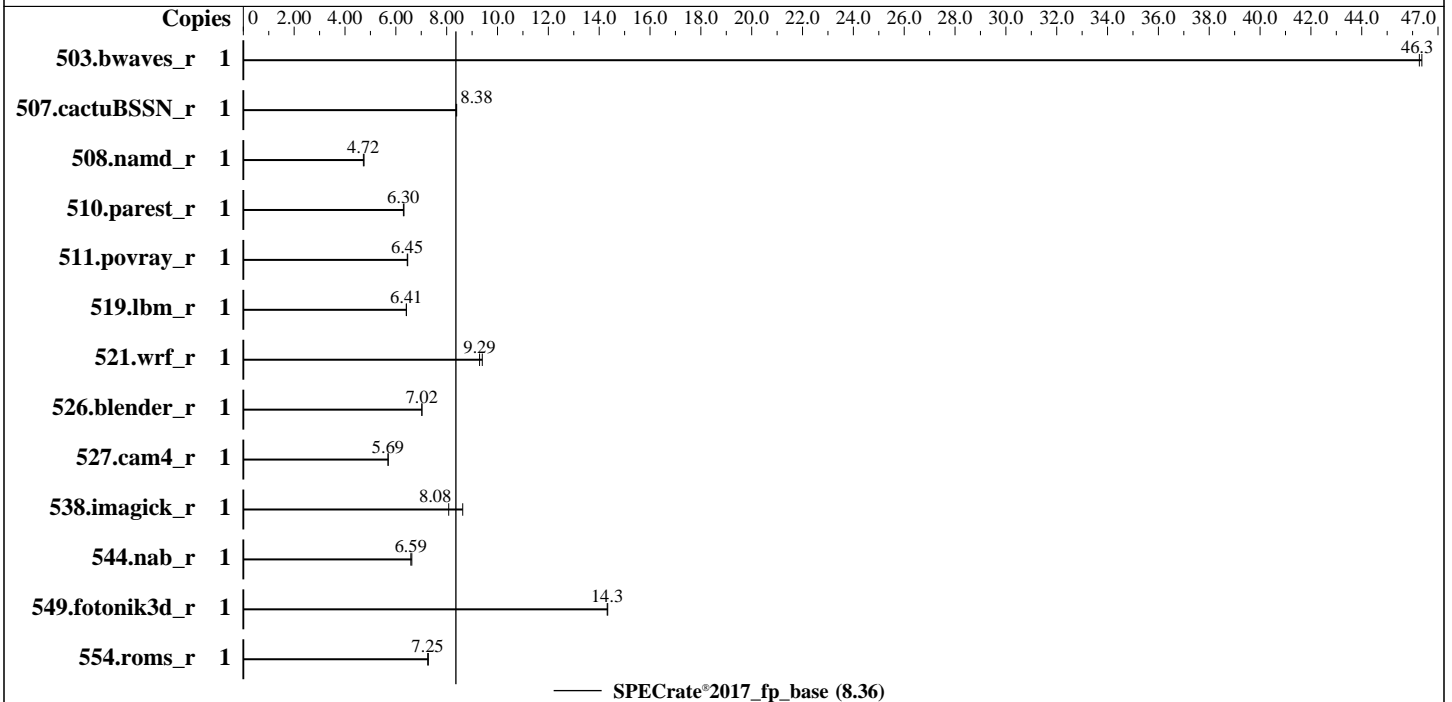
Test Sponsor: LaCASA Laboratory

Tested by: Phillip Lane & Jessica Lobrano

Test Date: Mar-2022

Hardware Availability: February-2021

Software Availability: February-2021



Hardware

CPU Name: AMD EPYC 7402
Max MHz: 3350
Nominal: 2800
Enabled: 48 cores, 2 chips
Orderable: 0-47 chips
Cache L1: 64K
L2: 512K
L3: 128M
Other: --
Memory: 256 GB
running at 3200 MHz
Storage: 2TB
Other: --

Software

OS: Linux
Red Hat Enterprise Linux 8.4
Compiler: C/C++/Fortran: Version 3.1.0 of AOCC, the AMD Optimizing C/C++ Compiler
Parallel: No
Firmware: --
File System: nfs
System State: Run level N (add definition here)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: --
Power Management: --

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	1	<u>217</u>	<u>46.3</u>	216	46.4									
507.cactuBSSN_r	1	151	8.39	<u>151</u>	<u>8.38</u>									
508.namd_r	1	200	4.75	<u>201</u>	<u>4.72</u>									
510.parest_r	1	414	6.32	<u>415</u>	<u>6.30</u>									
511.povray_r	1	<u>362</u>	<u>6.45</u>	361	6.47									
519.lbm_r	1	164	6.41	<u>164</u>	<u>6.41</u>									
521.wrf_r	1	<u>241</u>	<u>9.29</u>	238	9.40									
526.blender_r	1	217	7.03	<u>217</u>	<u>7.02</u>									
527.cam4_r	1	307	5.70	<u>307</u>	<u>5.69</u>									
538.imagick_r	1	288	8.63	<u>308</u>	<u>8.08</u>									
544.nab_r	1	<u>255</u>	<u>6.59</u>	254	6.63									
549.fotonik3d_r	1	272	14.3	<u>272</u>	<u>14.3</u>									
554.roms_r	1	218	7.28	<u>219</u>	<u>7.25</u>									

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
CPLUS_INCLUDE_PATH = "/opt/aocc-compiler-3.1.0/include"
C_INCLUDE_PATH = "/opt/aocc-compiler-3.1.0/include"
LD_LIBRARY_PATH =
"/opt/aocc-compiler-3.1.0/lib:/opt/aocc-compiler-3.1.0/lib32:/usr/lib64:
/usr/local/cuda/lib64:/opt/aocc-compiler-3.1.0/lib/:"
LIBRARY_PATH =
"/opt/aocc-compiler-3.1.0/lib:/opt/aocc-compiler-3.1.0/lib32:/usr/lib64:
/usr/local/cuda/lib64:/opt/aocc-compiler-3.1.0/lib/:"

Platform Notes

Sysinfo program /apps/arch/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on euler.ece.uah.edu Fri Mar 25 21:06:37 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

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Platform Notes (Continued)

model name : AMD EPYC 7402 24-Core Processor

2 "physical id"s (chips)

48 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 24

siblings : 24

physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30

physical 1: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30

From lscpu:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 48

On-line CPU(s) list: 0-47

Thread(s) per core: 1

Core(s) per socket: 24

Socket(s): 2

NUMA node(s): 2

Vendor ID: AuthenticAMD

CPU family: 23

Model: 49

Model name: AMD EPYC 7402 24-Core Processor

Stepping: 0

CPU MHz: 2800.000

CPU max MHz: 2800.0000

CPU min MHz: 1500.0000

BogoMIPS: 5589.35

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 32K

L2 cache: 512K

L3 cache: 16384K

NUMA node0 CPU(s): 0-23

NUMA node1 CPU(s): 24-47

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm

constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq

monitor ssse3 fma cx16 sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand

lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw

ibs skinit wdt tce topoext perfctr_core perfctr_nb bpeext perfctr_llc mwaitx cpb

cat_l3 cdp_l3 hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep

bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves

cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd

amd_ppin arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid

decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl umip

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Platform Notes (Continued)

rdpid overflow_recov succor smca sme sev sev_es

/proc/cpuinfo cache data
cache size : 512 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

From /proc/meminfo
MemTotal: 263581252 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.5 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.5"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.5 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8::baseos

uname -a:
Linux euler.ece.uah.edu 4.18.0-348.20.1.el8_5.x86_64 #1 SMP Tue Mar 8 12:56:54 EST 2022 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit:	Not affected
CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	Not affected
CVE-2017-5754 (Meltdown):	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
srbds:	Not affected
tsx_async_abort:	Not affected

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Platform Notes (Continued)

SPEC is set to: /apps/arch/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
blackhawk.priv:/export/apps/arch	nfs	2.0T	1.4T	580G	70%	/apps/arch

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.1.6 03/09/2021
Vendor: Dell Inc.
Product: PowerEdge R7525
Product Family: PowerEdge

Cannot run dmidecode; consider saying (as root)
chmod +s /usr/sbin/dmidecode

(End of data from sysinfo program)

Compiler Version Notes

=====
C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
=====

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
=====

=====
C++ | 508.namd_r(base) 510.parest_r(base)
=====

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
=====

=====
C++, C | 511.povray_r(base) 526.blender_r(base)
=====

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin

=====
C++, C, Fortran | 507.cactuBSSN_r(base)

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin

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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin

=====
Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin

=====
Fortran, C | 521.wrf_r(base) 527.cam4_r(base)

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin

AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on LLVM Mirror.Version.12.0.0)

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Compiler Version Notes (Continued)

Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using both C and C++:
clang++ clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -DSPEC_LINUX -D__BOOL_DEFINED -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

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Base Optimization Flags

C benchmarks:

-m64 -std=c99 -g -O3 -ffast-math -march=native -flto

C++ benchmarks:

-m64 -std=c++03 -g -O3 -ffast-math -march=native -flto -lflang

Fortran benchmarks:

-m64 -g -O3 -march=native -flto -Kieee -fno-finite-math-only
-lflang

Benchmarks using both Fortran and C:

-m64 -std=c99 -g -O3 -ffast-math -march=native -flto -Kieee
-fno-finite-math-only -lflang

Benchmarks using both C and C++:

-m64 -std=c++03 -std=c99 -g -O3 -ffast-math -march=native -flto
-lflang

Benchmarks using Fortran, C, and C++:

-m64 -std=c++03 -std=c99 -g -O3 -ffast-math -march=native -flto
-Kieee -fno-finite-math-only -lflang

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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