SPEC CPU®2017 Floating Point Speed Result
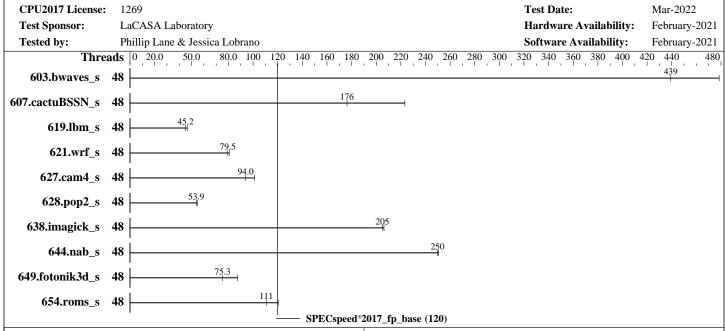Copyright 2017-2022 Standard Performance Evaluation Corporation

LaCASA Laboratory

AMD EPYC 7402 24-Core Processor

SPECspeed®2017_fp_base =   120

SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 1269	**Test Date:** Mar-2022
Test Sponsor: LaCASA Laboratory	**Hardware Availability:** February-2021
Tested by: Phillip Lane & Jessica Lobrano	**Software Availability:** February-2021

Threads — chart (scale 0 to 480)

- 603.bwaves_s 48 — 439
- 607.cactuBSSN_s 48 — 176
- 619.lbm_s 48 — 45.2
- 621.wrf_s 48 — 79.5
- 627.cam4_s 48 — 94.0
- 628.pop2_s 48 — 53.9
- 638.imagick_s 48 — 205
- 644.nab_s 48 — 250
- 649.fotonik3d_s 48 — 75.3
- 654.roms_s 48 — 111

SPECspeed®2017_fp_base (120)

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: Yes
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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	48	123	479	**134**	**439**									
607.cactuBSSN_s	48	74.7	223	**94.6**	**176**									
619.lbm_s	48	113	46.5	**116**	**45.2**									
621.wrf_s	48	**166**	**79.5**	164	80.6									
627.cam4_s	48	87.6	101	**94.3**	**94.0**									
628.pop2_s	48	217	54.7	**220**	**53.9**									
638.imagick_s	48	**70.3**	**205**	69.9	206									
644.nab_s	48	**69.9**	**250**	69.7	251									
649.fotonik3d_s	48	104	87.5	**121**	**75.3**									
654.roms_s	48	131	120	**142**	**111**									

SPECspeed®2017_fp_base =	**120**
SPECspeed®2017_fp_peak =	**Not Run**

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/:"
OMP_STACKSIZE = "196M"
```

Platform Notes

```
 Sysinfo program /apps/arch/cpu2017/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
 running on euler.ece.uah.edu Sat Mar 26 00:38:03 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
    model name : AMD EPYC 7402 24-Core Processor
        2  "physical id"s (chips)
       48 "processors"
```

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LaCASA Laboratory

AMD EPYC 7402 24-Core Processor

SPECspeed®2017_fp_base =   120

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CPU2017 License:	1269	**Test Date:**	Mar-2022
Test Sponsor:	LaCASA Laboratory	**Hardware Availability:**	February-2021
Tested by:	Phillip Lane & Jessica Lobrano	**Software Availability:**	February-2021

Platform Notes (Continued)

```
   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 bpext 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
     rdpid overflow_recov succor smca sme sev sev_es

 /proc/cpuinfo cache data
```

LaCASA Laboratory

AMD EPYC 7402 24-Core Processor

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CPU2017 License:	1269	**Test Date:**	Mar-2022
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Tested by:	Phillip Lane & Jessica Lobrano	**Software Availability:**	February-2021

Platform Notes (Continued)

```
    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/swapgs 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


 SPEC is set to: /apps/arch/cpu2017
    Filesystem                      Type  Size  Used Avail Use% Mounted on
```

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Platform Notes (Continued)

```
    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               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(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, Fortran | 607.cactuBSSN_s(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)
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)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
------------------------------------------------------------------------------

==============================================================================
```

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Compiler Version Notes (Continued)

```
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(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      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(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)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
-------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

Benchmarks using both Fortran and C:
```
flang clang
```

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

Base Portability Flags

603.bwaves_s: `-DSPEC_LP64`
607.cactuBSSN_s: `-DSPEC_LP64`
619.lbm_s: `-DSPEC_LP64`

(Continued on next page)

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Base Portability Flags (Continued)

621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c99 -g -O3 -ffast-math -march=native -flto -fopenmp
-DSPEC_OPENMP

Fortran benchmarks:
-m64 -g -O3 -march=native -flto -Kieee -fno-finite-math-only
-DSPEC_OPENMP -fopenmp -lflang

Benchmarks using both Fortran and C:
-m64 -std=c99 -g -O3 -ffast-math -march=native -flto -Kieee
-fno-finite-math-only -DSPEC_OPENMP -fopenmp -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 -fopenmp -DSPEC_OPENMP -lflang

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

Tested with SPEC CPU®2017 v1.1.0 on 2022-03-26 00:38:02-0500.
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