SPEC CPU®2017 Floating Point Rate Result

Supermicro

A+ Server 2024US-TRT
(H12DSU-iN , AMD EPYC 7573X)

$SPECrate^{®}2017\_fp\_base = 555$

$SPECrate^{®}2017\_fp\_peak = 566$

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2022
Hardware Availability: Mar-2021
Software Availability: Feb-2022

Benchmark	Copies	Base	Peak
503.bwaves_r	128 / 32	806	872
507.cactuBSSN_r	128	661	
508.namd_r	128	382	384
510.parest_r	128	738	
511.povray_r	128	589	
519.lbm_r	128	186	186
521.wrf_r	128	679	693
526.blender_r	128	639	639
527.cam4_r	128	579	589
538.imagick_r	128	2060	2110
544.nab_r	128	779	
549.fotonik3d_r	128 / 64	254	254
554.roms_r	128 / 64	280	317

Chart scale: 0 100 200 300 400 500 600 700 800 900 1000 1150 1300 1450 1600 1750 1900 2150

—— SPECrate®2017_fp_base (555)   ----- SPECrate®2017_fp_peak (566)

Hardware

CPU Name: AMD EPYC 7573X
 Max MHz: 3600
 Nominal: 2800
Enabled: 64 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 768 MB I+D on chip per chip, 96 MB shared / 4 cores
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 200 GB SATA III SSD
Other: None

Software

OS: Ubuntu 20.04.3 LTS
 Kernel 5.4.0-99-generic
Compiler: C/C++/Fortran: Version 3.2.0 of AOCC
Parallel: No
Firmware: Version 2.3a released Jan-2022
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc: jemalloc memory allocator library v5.1.0
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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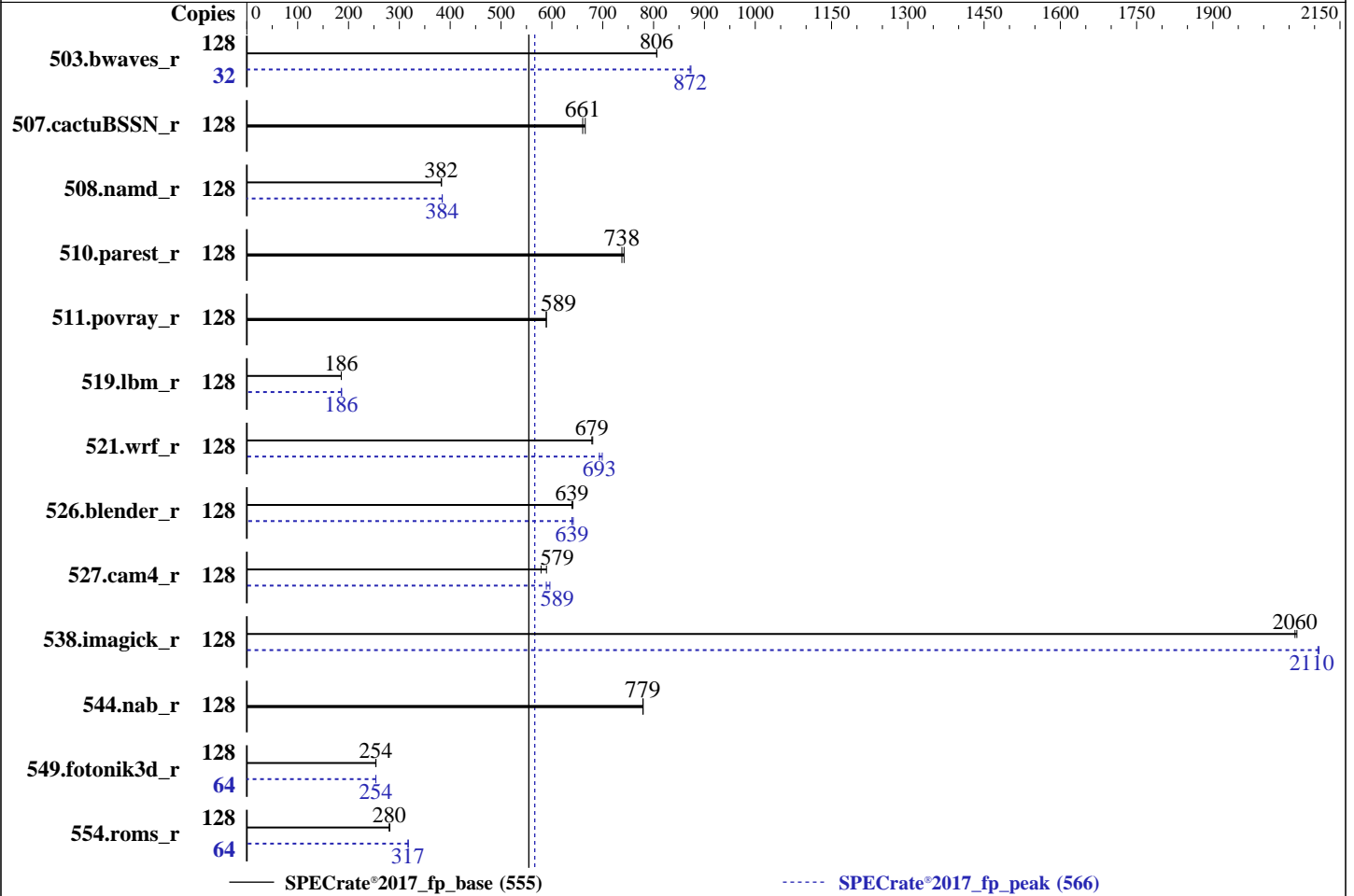Copyright 2017-2022 Standard Performance Evaluation Corporation

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Results Table

	Base							Peak						
Benchmark	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
503.bwaves_r	128	1592	806	**1592**	**806**			32	**368**	**872**	367	873		
507.cactuBSSN_r	128	243	666	**245**	**661**			128	243	666	**245**	**661**		
508.namd_r	128	317	383	**318**	**382**			128	316	384	**316**	**384**		
510.parest_r	128	451	742	**454**	**738**			128	451	742	**454**	**738**		
511.povray_r	128	507	589	**507**	**589**			128	507	589	**507**	**589**		
519.lbm_r	128	**726**	**186**	726	186			128	**725**	**186**	724	186		
521.wrf_r	128	421	680	**423**	**679**			128	410	699	**413**	**693**		
526.blender_r	128	**305**	**639**	304	641			128	304	642	**305**	**639**		
527.cam4_r	128	**387**	**579**	380	589			128	376	596	**380**	**589**		
538.imagick_r	128	154	2070	**154**	**2060**			128	151	2110	**151**	**2110**		
544.nab_r	128	276	780	**277**	**779**			128	276	780	**277**	**779**		
549.fotonik3d_r	128	**1968**	**254**	1963	254			64	**983**	**254**	982	254		
554.roms_r	128	**727**	**280**	723	281			64	320	318	**321**	**317**		
SPECrate®2017_fp_base =		**555**												
SPECrate®2017_fp_peak =		**566**												

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

Compiler Notes

```
The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/
```

Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
```

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Operating System Notes (Continued)

```
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
      "/home/cpu2017/amd_rate_aocc320_milanx_A_lib/lib;/home/cpu2017/amd_rate_
      aocc320_milanx_A_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2
```

Platform Notes

```
BIOS Settings:
Determinism Control = Manual
Determinism Slider = Power
cTDP Control = Manual
cTDP = 280
Package Power Limit Control = Manual
Package Power Limit = 280
APBDIS = 1
NUMA Nodes Per Socket = NPS4
```

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Platform Notes (Continued)

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on h12dsu-7573x Thu Feb 17 11:10:19 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 7573X 32-Core Processor
      2  "physical id"s (chips)
      128 "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 : 32
      siblings  : 64
      physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
      25 26 27 28 29 30 31
      physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
      25 26 27 28 29 30 31

From lscpu from util-linux 2.34:
   Architecture:              x86_64
   CPU op-mode(s):            32-bit, 64-bit
   Byte Order:                Little Endian
   Address sizes:             48 bits physical, 48 bits virtual
   CPU(s):                    128
   On-line CPU(s) list:       0-127
   Thread(s) per core:        2
   Core(s) per socket:        32
   Socket(s):                 2
   NUMA node(s):              16
   Vendor ID:                 AuthenticAMD
   CPU family:                25
   Model:                     1
   Model name:                AMD EPYC 7573X 32-Core Processor
   Stepping:                  2
   Frequency boost:           enabled
   CPU MHz:                   3463.165
   CPU max MHz:               2800.0000
   CPU min MHz:               1500.0000
   BogoMIPS:                  5599.72
   Virtualization:            AMD-V
   L1d cache:                 2 MiB
   L1i cache:                 2 MiB
   L2 cache:                  32 MiB
```

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Platform Notes (Continued)

```
    L3 cache:                        1.5 GiB
    NUMA node0 CPU(s):               0-3,64-67
    NUMA node1 CPU(s):               4-7,68-71
    NUMA node2 CPU(s):               8-11,72-75
    NUMA node3 CPU(s):               12-15,76-79
    NUMA node4 CPU(s):               16-19,80-83
    NUMA node5 CPU(s):               20-23,84-87
    NUMA node6 CPU(s):               24-27,88-91
    NUMA node7 CPU(s):               28-31,92-95
    NUMA node8 CPU(s):               32-35,96-99
    NUMA node9 CPU(s):               36-39,100-103
    NUMA node10 CPU(s):              40-43,104-107
    NUMA node11 CPU(s):              44-47,108-111
    NUMA node12 CPU(s):              48-51,112-115
    NUMA node13 CPU(s):              52-55,116-119
    NUMA node14 CPU(s):              56-59,120-123
    NUMA node15 CPU(s):              60-63,124-127
    Vulnerability Itlb multihit:     Not affected
    Vulnerability L1tf:              Not affected
    Vulnerability Mds:               Not affected
    Vulnerability Meltdown:          Not affected
    Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
    prctl and seccomp
    Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user
    pointer sanitization
    Vulnerability Spectre v2:        Mitigation; Full AMD retpoline, IBPB conditional,
    IBRS_FW, STIBP always-on, RSB filling
    Vulnerability Srbds:             Not affected
    Vulnerability Tsx async abort:   Not affected
    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 pcid sse4_1 sse4_2 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 invpcid_single hw_pstate ssbd mba ibrs
    ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 invpcid 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 arat npt lbrv svm_lock
    nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
    v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

  From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL
    L1d       32K       2M    8 Data              1
    L1i       32K       2M    8 Instruction       1
    L2       512K      32M    8 Unified           2
```

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Platform Notes (Continued)

```
     L3          96M      1.5G   16 Unified              3

 /proc/cpuinfo cache data
   cache size : 512 KB

 From numactl --hardware
 WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 16 nodes (0-15)
   node 0 cpus: 0 1 2 3 64 65 66 67
   node 0 size: 64380 MB
   node 0 free: 63799 MB
   node 1 cpus: 4 5 6 7 68 69 70 71
   node 1 size: 64507 MB
   node 1 free: 64192 MB
   node 2 cpus: 8 9 10 11 72 73 74 75
   node 2 size: 64509 MB
   node 2 free: 64153 MB
   node 3 cpus: 12 13 14 15 76 77 78 79
   node 3 size: 64508 MB
   node 3 free: 64223 MB
   node 4 cpus: 16 17 18 19 80 81 82 83
   node 4 size: 64509 MB
   node 4 free: 64214 MB
   node 5 cpus: 20 21 22 23 84 85 86 87
   node 5 size: 64508 MB
   node 5 free: 64219 MB
   node 6 cpus: 24 25 26 27 88 89 90 91
   node 6 size: 64509 MB
   node 6 free: 64220 MB
   node 7 cpus: 28 29 30 31 92 93 94 95
   node 7 size: 64496 MB
   node 7 free: 64208 MB
   node 8 cpus: 32 33 34 35 96 97 98 99
   node 8 size: 64509 MB
   node 8 free: 64210 MB
   node 9 cpus: 36 37 38 39 100 101 102 103
   node 9 size: 64508 MB
   node 9 free: 64215 MB
   node 10 cpus: 40 41 42 43 104 105 106 107
   node 10 size: 64509 MB
   node 10 free: 64207 MB
   node 11 cpus: 44 45 46 47 108 109 110 111
   node 11 size: 64480 MB
   node 11 free: 64187 MB
   node 12 cpus: 48 49 50 51 112 113 114 115
   node 12 size: 64509 MB
   node 12 free: 64205 MB
```

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Platform Notes (Continued)

```
   node 13 cpus: 52 53 54 55 116 117 118 119
   node 13 size: 64508 MB
   node 13 free: 64220 MB
   node 14 cpus: 56 57 58 59 120 121 122 123
   node 14 size: 64509 MB
   node 14 free: 64147 MB
   node 15 cpus: 60 61 62 63 124 125 126 127
   node 15 size: 64507 MB
   node 15 free: 64138 MB
   node distances:
   node   0    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
     0:  10   11   12   12   12   12   12   12   32   32   32   32   32   32   32   32
     1:  11   10   12   12   12   12   12   12   32   32   32   32   32   32   32   32
     2:  12   12   10   11   12   12   12   12   32   32   32   32   32   32   32   32
     3:  12   12   11   10   12   12   12   12   32   32   32   32   32   32   32   32
     4:  12   12   12   12   10   11   12   12   32   32   32   32   32   32   32   32
     5:  12   12   12   12   11   10   12   12   32   32   32   32   32   32   32   32
     6:  12   12   12   12   12   12   10   11   32   32   32   32   32   32   32   32
     7:  12   12   12   12   12   12   11   10   32   32   32   32   32   32   32   32
     8:  32   32   32   32   32   32   32   32   10   11   12   12   12   12   12   12
     9:  32   32   32   32   32   32   32   32   11   10   12   12   12   12   12   12
    10:  32   32   32   32   32   32   32   32   12   12   10   11   12   12   12   12
    11:  32   32   32   32   32   32   32   32   12   12   11   10   12   12   12   12
    12:  32   32   32   32   32   32   32   32   12   12   12   12   10   11   12   12
    13:  32   32   32   32   32   32   32   32   12   12   12   12   11   10   12   12
    14:  32   32   32   32   32   32   32   32   12   12   12   12   12   12   10   11
    15:  32   32   32   32   32   32   32   32   12   12   12   12   12   12   11   10

  From /proc/meminfo
    MemTotal:       1056746436 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

  /sbin/tuned-adm active
     Current active profile: throughput-performance

  /sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
    performance

  /usr/bin/lsb_release -d
    Ubuntu 20.04.3 LTS

  From /etc/*release* /etc/*version*
    debian_version: bullseye/sid
    os-release:
       NAME="Ubuntu"
       VERSION="20.04.3 LTS (Focal Fossa)"
```

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Platform Notes (Continued)

```
        ID=ubuntu
        ID_LIKE=debian
        PRETTY_NAME="Ubuntu 20.04.3 LTS"
        VERSION_ID="20.04"
        HOME_URL="https://www.ubuntu.com/"
        SUPPORT_URL="https://help.ubuntu.com/"

  uname -a:
     Linux h12dsu-7573x 5.4.0-99-generic #112-Ubuntu SMP Thu Feb 3 13:50:55 UTC 2022 x86_64
     x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:

  CVE-2018-12207 (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:
                                                       always-on, RSB filling
  CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
  CVE-2019-11135 (TSX Asynchronous Abort):              Not affected

  run-level 3 Feb 17 07:05

  SPEC is set to: /home/cpu2017
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda3       ext4  178G   22G  148G  13% /

  From /sys/devices/virtual/dmi/id
      Vendor:         Supermicro
      Product:        AS-2024US-TRT
      Serial:         0123456789

  Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you
  interpret this section. The 'dmidecode' program reads system data which is "intended to
  allow hardware to be accurately determined", but the intent may not be met, as there are
  frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
    Memory:
      16x NO DIMM Unknown
      16x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200
```

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Platform Notes (Continued)

```
  BIOS:
     BIOS Vendor:        American Megatrends Inc.
     BIOS Version:       2.3a
     BIOS Date:          01/25/2022
     BIOS Revision:      5.22

  (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C                  | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                   | 544.nab_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
C++                | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C             | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
```

SPEC CPU®2017 Floating Point Rate Result

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Supermicro

A+ Server 2024US-TRT
(H12DSU-iN , AMD EPYC 7573X)

SPECrate®2017_fp_base = 555

SPECrate®2017_fp_peak = 566

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2022
Hardware Availability: Mar-2021
Software Availability: Feb-2022

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 -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`

Base Optimization Flags

C benchmarks:
`-m64 -flto -Wl,-mllvm -Wl,-region-vectorize`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM`

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Supermicro

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(H12DSU-iN , AMD EPYC 7573X)

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Base Optimization Flags (Continued)

C benchmarks (continued):
```
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang
```

C++ benchmarks:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -Hz,1,0x1 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-loop-fusion
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

Benchmarks using both Fortran and C:
```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
```

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -Hz,1,0x1 -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

Benchmarks using both C and C++:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -z muldefs -lamdlibm -ljemalloc
-lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
```

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-mllvm -convert-pow-exp-to-int=false -Hz,1,0x1 -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

Base Other Flags

C benchmarks:
```
-Wno-unused-command-line-argument
```

C++ benchmarks:
```
-Wno-unused-command-line-argument
```

Fortran benchmarks:
```
-Wno-unused-command-line-argument
```

Benchmarks using both Fortran and C:
```
-Wno-unused-command-line-argument
```

Benchmarks using both C and C++:
```
-Wno-unused-command-line-argument
```

Benchmarks using Fortran, C, and C++:
```
-Wno-unused-command-line-argument
```

Peak 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
```

(Continued on next page)

Supermicro

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(H12DSU-iN , AMD EPYC 7573X)

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Peak Compiler Invocation (Continued)

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -m64 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

```
538.imagick_r: Same as 519.lbm_r
```

```
544.nab_r: basepeak = yes
```

C++ benchmarks:

```
508.namd_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-flv-function-specialization -mllvm -enable-licm-vrp
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

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Supermicro

A+ Server 2024US-TRT
(H12DSU-iN , AMD EPYC 7573X)

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Tested by: Supermicro

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Software Availability: Feb-2022

Peak Optimization Flags (Continued)

510.parest_r: `basepeak = yes`

Fortran benchmarks:

503.bwaves_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive`
`-mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp`
`-lamdlibm -ljemalloc -lflang`

549.fotonik3d_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -ffast-math -Kieee`
`-Mrecursive -mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp`
`-lamdlibm -ljemalloc -lflang`

554.roms_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive`
`-mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp`
`-Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm`
`-ljemalloc -lflang`

Benchmarks using both Fortran and C:

521.wrf_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
`-Wl,-mllvm -Wl,-enable-licm-vrp -flto`
`-Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver3 -fveclib=AMDLIBM -ffast-math`
`-fstruct-layout=7 -mllvm -unroll-threshold=50`

(Continued on next page)

Supermicro

A+ Server 2024US-TRT
(H12DSU-iN , AMD EPYC 7573X)

SPECrate®2017_fp_base = 555

SPECrate®2017_fp_peak = 566

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Peak Optimization Flags (Continued)

521.wrf_r (continued):
```
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -Mrecursive -lamdlibm
-ljemalloc -lflang
```

527.cam4_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching`
```
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -O3 -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-Mrecursive -Hz,1,0x1 -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -lamdlibm -ljemalloc
-lflang
```

Benchmarks using both C and C++:

511.povray_r: `basepeak = yes`

526.blender_r: `-m64 -std=c++98 -mno-adx -mno-sse4a`
```
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -finline-aggressive
-mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -lamdlibm -ljemalloc
```

Benchmarks using Fortran, C, and C++:

(Continued on next page)

Supermicro

A+ Server 2024US-TRT
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Peak Optimization Flags (Continued)

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

C benchmarks:
-Wno-unused-command-line-argument

C++ benchmarks:
-Wno-unused-command-line-argument

Fortran benchmarks:
-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument

Benchmarks using both C and C++:
-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at
  http://www.spec.org/cpu2017/flags/aocc320-flags-A1.html
  http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Milan-revD.html

You can also download the XML flags sources by saving the following links:
  http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml
  http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Milan-revD.xml

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

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