SPEC CPU®2017 Floating Point Rate Result

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ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

$SPECrate®2017\_fp\_base = 531$

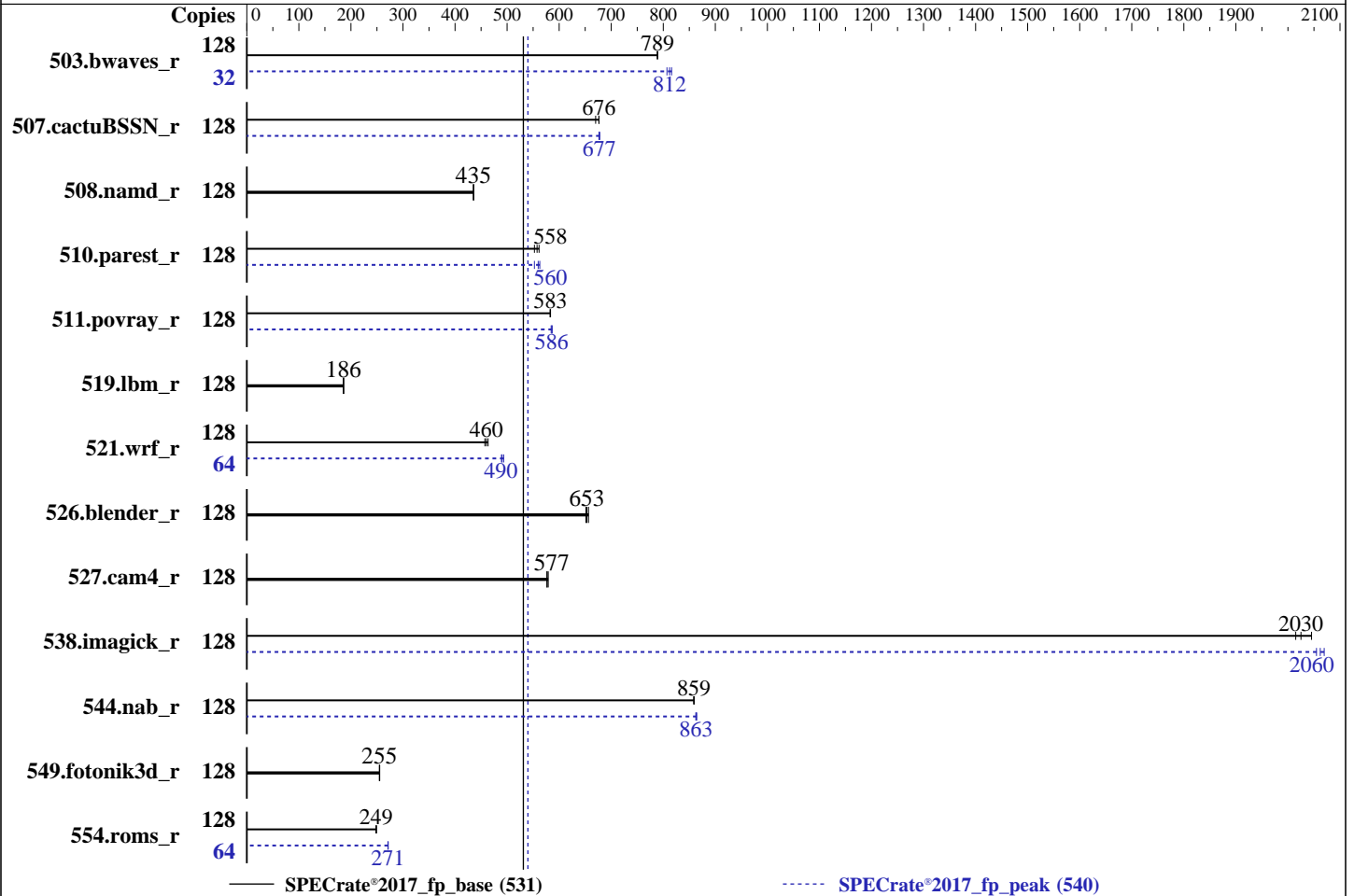$SPECrate®2017\_fp\_peak = 540$

CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021

Copies	Benchmark	base	peak
128 / 32	503.bwaves_r	789	812
128	507.cactuBSSN_r	676	677
128	508.namd_r	435	
128	510.parest_r	558	560
128	511.povray_r	583	586
128	519.lbm_r	186	
128 / 64	521.wrf_r	460	490
128	526.blender_r	653	
128	527.cam4_r	577	
128	538.imagick_r	2030	2060
128	544.nab_r	859	863
128	549.fotonik3d_r	255	
128 / 64	554.roms_r	249	271

——— SPECrate®2017_fp_base (531)   - - - - SPECrate®2017_fp_peak (540)

Hardware

CPU Name: AMD EPYC 7543
  Max MHz: 3700
  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: 256 MB I+D on chip per chip, 32 MB shared / 4 cores
  Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 240 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP2 (x86_64)
    Kernel 5.3.18-22-default
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
Firmware: Version 0404 released Feb-2021
File System: xfs
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.

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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	128	1627	789	1627	789	**1627**	**789**	32	393	816	**395**	**812**	398	807
507.cactuBSSN_r	128	**240**	**676**	242	670	240	676	128	239	678	240	676	**239**	**677**
508.namd_r	128	279	436	279	435	**279**	**435**	128	279	436	279	435	**279**	**435**
510.parest_r	128	606	552	596	561	**601**	**558**	128	**598**	**560**	606	552	595	563
511.povray_r	128	**513**	**583**	512	583	513	583	128	510	586	511	585	**510**	**586**
519.lbm_r	128	727	186	725	186	**726**	**186**	128	727	186	725	186	**726**	**186**
521.wrf_r	128	**623**	**460**	619	464	627	457	64	291	493	293	489	**292**	**490**
526.blender_r	128	299	651	**298**	**653**	297	656	128	299	651	**298**	**653**	297	656
527.cam4_r	128	387	579	**388**	**577**	388	576	128	387	579	**388**	**577**	388	576
538.imagick_r	128	156	2050	**157**	**2030**	158	2010	128	155	2050	154	2070	**154**	**2060**
544.nab_r	128	251	859	**251**	**859**	251	858	128	249	864	**250**	**863**	250	863
549.fotonik3d_r	128	**1957**	**255**	1959	255	1954	255	128	**1957**	**255**	1959	255	1954	255
554.roms_r	128	**818**	**249**	819	248	817	249	64	375	271	375	271	**375**	**271**
	SPECrate®2017_fp_base =		**531**											
	SPECrate®2017_fp_peak =		**540**											

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
 OS set to performance mode via cpupower frequency-set -g performance
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of
memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum
necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory
and avoid remote memory usage.
```

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Operating System Notes (Continued)

```
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout
randomization (ASLR) to reduce run-to-run variability.
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root for peak
integer runs and all FP runs to enable Transparent Hugepages (THP).
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for base
integer runs to enable THP only on request.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/spec2017A1/amd_rate_aocc300_milan_A_lib/64;/spec2017A1/amd_rate_aocc30
     0_milan_A_lib/32:"
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 Configuration:
DLWM Support = Disabled
SVM Mode = Disabled
NUMA nodes per socket = NPS4
APBDIS = 1
Fix SOC P-state = P0
Engine Boost = Enabled
ACPI SRAT L3 Cache as NUMA Domain = Enabled
```

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Platform Notes (Continued)

```
Sysinfo program /spec2017A1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost Tue Apr 20 09:15:33 2021

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 7543 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:
    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 7543 32-Core Processor
    Stepping:            1
    CPU MHz:             2695.021
    CPU max MHz:         2800.0000
    CPU min MHz:         1500.0000
    BogoMIPS:            5589.37
    Virtualization:      AMD-V
    L1d cache:           32K
    L1i cache:           32K
    L2 cache:            512K
    L3 cache:            32768K
    NUMA node0 CPU(s):   0-3,64-67
```

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Platform Notes (Continued)

```
       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
       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 erms 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

  /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: 64306 MB
     node 0 free: 64099 MB
     node 1 cpus: 4 5 6 7 68 69 70 71
     node 1 size: 64507 MB
     node 1 free: 64365 MB
     node 2 cpus: 8 9 10 11 72 73 74 75
     node 2 size: 64509 MB
     node 2 free: 64427 MB
     node 3 cpus: 12 13 14 15 76 77 78 79
     node 3 size: 64507 MB
     node 3 free: 64396 MB
     node 4 cpus: 16 17 18 19 80 81 82 83
```

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Platform Notes (Continued)

```
    node 4 size: 64509 MB
    node 4 free: 64427 MB
    node 5 cpus: 20 21 22 23 84 85 86 87
    node 5 size: 64507 MB
    node 5 free: 64433 MB
    node 6 cpus: 24 25 26 27 88 89 90 91
    node 6 size: 64509 MB
    node 6 free: 64418 MB
    node 7 cpus: 28 29 30 31 92 93 94 95
    node 7 size: 64495 MB
    node 7 free: 64417 MB
    node 8 cpus: 32 33 34 35 96 97 98 99
    node 8 size: 64509 MB
    node 8 free: 64397 MB
    node 9 cpus: 36 37 38 39 100 101 102 103
    node 9 size: 64507 MB
    node 9 free: 64338 MB
    node 10 cpus: 40 41 42 43 104 105 106 107
    node 10 size: 64509 MB
    node 10 free: 64413 MB
    node 11 cpus: 44 45 46 47 108 109 110 111
    node 11 size: 64507 MB
    node 11 free: 64432 MB
    node 12 cpus: 48 49 50 51 112 113 114 115
    node 12 size: 64509 MB
    node 12 free: 64428 MB
    node 13 cpus: 52 53 54 55 116 117 118 119
    node 13 size: 64507 MB
    node 13 free: 64424 MB
    node 14 cpus: 56 57 58 59 120 121 122 123
    node 14 size: 64476 MB
    node 14 free: 64360 MB
    node 15 cpus: 60 61 62 63 124 125 126 127
    node 15 size: 64507 MB
    node 15 free: 64378 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
```

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Platform Notes (Continued)

```
    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:       1056657348 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

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

 From /etc/*release* /etc/*version*
    os-release:
        NAME="SLES"
        VERSION="15-SP2"
        VERSION_ID="15.2"
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp2"

 uname -a:
    Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) 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
```

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Platform Notes (Continued)

```
run-level 3 Apr 20 09:14

SPEC is set to: /spec2017A1
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   199G   22G  178G  11% /

From /sys/devices/virtual/dmi/id
    Vendor:          ASUSTeK COMPUTER INC.
    Product:         RS720A-E11-RS12E
    Product Family:  Server
    Serial:          123456789012

Additional information from dmidecode 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 Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200
    16x Unknown Unknown

BIOS:
   BIOS Vendor:      American Megatrends Inc.
   BIOS Version:     0404
   BIOS Date:        02/02/2021
   BIOS Revision:    4.4

(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 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
--------------------------------------------------------------------------------


================================================================================
C++                   | 508.namd_r(base, peak) 510.parest_r(base, peak)
--------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
```

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

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Compiler Version Notes (Continued)

```
   LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------


==============================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
   LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
   LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
   LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
   LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
   LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------


==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(base, peak)
------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
   LLVM Mirror.Version.12.0.0)
```

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CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021

Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
--------------------------------------------------------------------------


==========================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
--------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/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`

(Continued on next page)

ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

SPECrate®2017_fp_base = 531

SPECrate®2017_fp_peak = 540

CPU2017 License: 9016		**Test Date:**	Apr-2021
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2021

Base Portability Flags (Continued)

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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti

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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize

(Continued on next page)

ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

SPECrate®2017_fp_base = 531

SPECrate®2017_fp_peak = 540

CPU2017 License:	9016	**Test Date:**	Apr-2021
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2021

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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 -z muldefs -lamdlibm -ljemalloc
-lflang -lflangrti
```

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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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 -Hz,1,0x1
-Kieee -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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-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 -lflangrti
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
```

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SPEC CPU®2017 Floating Point Rate Result

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ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

SPECrate®2017_fp_base = 531

SPECrate®2017_fp_peak = 540

CPU2017 License: 9016		**Test Date:**	Apr-2021
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2021

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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-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
-Hz,1,0x1 -Kieee -Mrecursive -mllvm -fuse-tile-inner-loop
-funroll-loops -mllvm -lsr-in-nested-loop -z muldefs -lamdlibm
-ljemalloc -lflang -lflangrti
```

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
```

(Continued on next page)

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ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

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CPU2017 License: 9016		**Test Date:**	Apr-2021
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2021

Peak Compiler Invocation (Continued)

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
```

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_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 -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`

544.nab_r: `-m64 -flto -Wl,-mllvm -Wl,-region-vectorize`
`-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3`
`-fveclib=AMDLIBM -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`

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ASUS RS720A-E11(KMPP-D32) Server System
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SPECrate®2017_fp_base = 531

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Test Date: Apr-2021
Hardware Availability: Mar-2021
Software Availability: Mar-2021

Peak Optimization Flags (Continued)

544.nab_r (continued):
`-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc`

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_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,-suppress-fmas`
`-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3`
`-fveclib=AMDLIBM -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`

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 -Kieee -Mrecursive`
`-mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp`
`-lamdlibm -ljemalloc -lflang -lflangrti`

549.fotonik3d_r: basepeak = yes

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 -Kieee -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 -lflangrti`

Benchmarks using both Fortran and C:

(Continued on next page)

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ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

SPECrate®2017_fp_base = 531

SPECrate®2017_fp_peak = 540

CPU2017 License: 9016		**Test Date:**	Apr-2021
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2021

Peak Optimization Flags (Continued)

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 -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 -Kieee -Mrecursive
-lamdlibm -ljemalloc -lflang -lflangrti

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_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 -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

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:
-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 -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
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000

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SPEC CPU®2017 Floating Point Rate Result

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ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.80 GHz, AMD EPYC 7543

SPECrate®2017_fp_base = 531

SPECrate®2017_fp_peak = 540

CPU2017 License: 9016		**Test Date:**	Apr-2021
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2021
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2021

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

```
-finline-aggressive -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Kieee -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti
```

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/ASUSTekPlatform-Settings-AMD-Milan-V1.2.html
http://www.spec.org/cpu2017/flags/aocc300-flags-A1.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-AMD-Milan-V1.2.xml
http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml

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

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