# SPEC CPU®2017 Floating Point Rate Result

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## Altos Computing Inc.

BrainSphere R385 F4 (AMD EPYC 7352)

SPECrate®2017_fp_base = 327

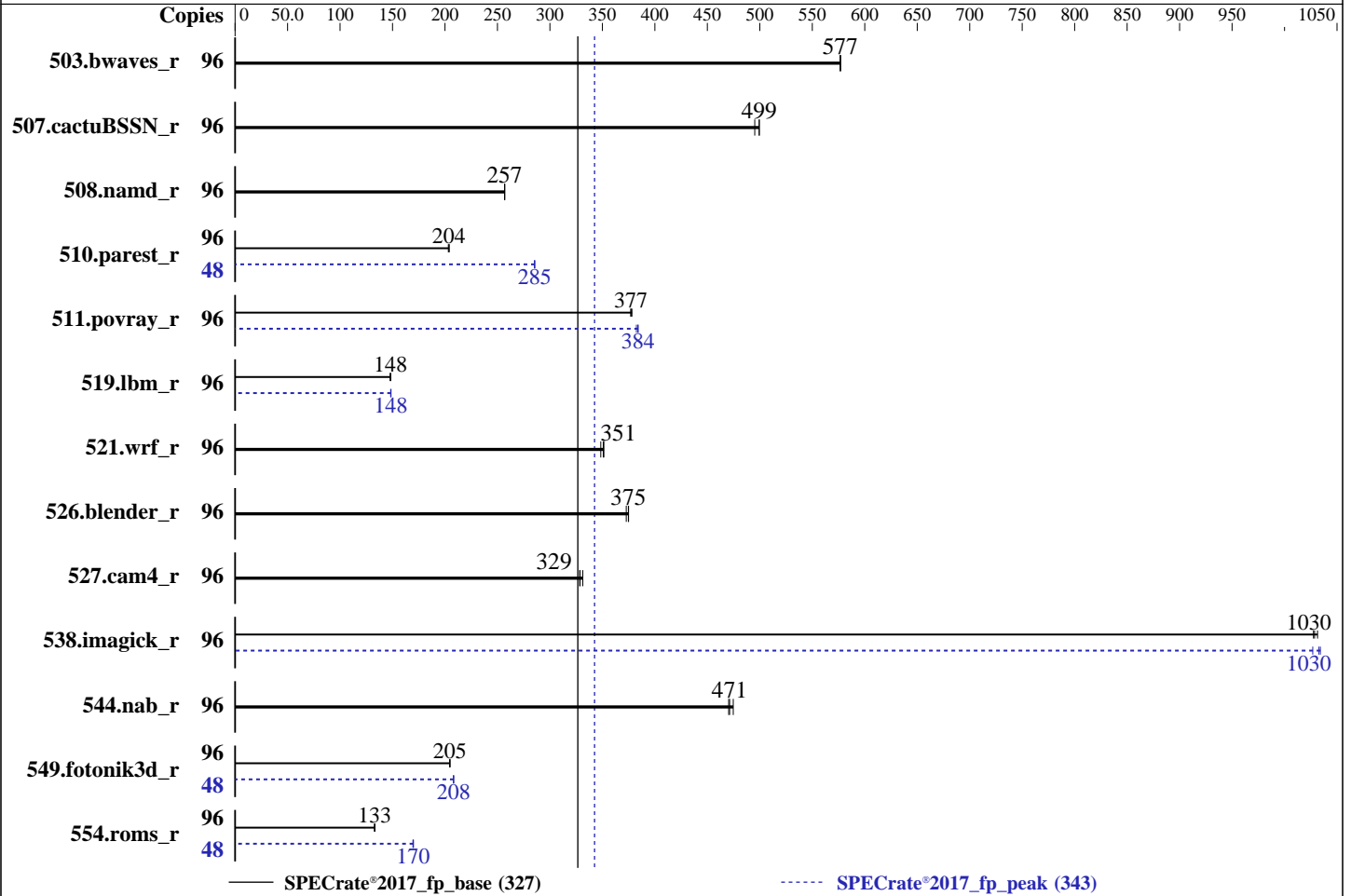SPECrate®2017_fp_peak = 343

**CPU2017 License:** 97

**Test Sponsor:** Altos Computing Inc.

**Tested by:** Altos Computing Inc.

**Test Date:** Apr-2021

**Hardware Availability:** Dec-2019

**Software Availability:** Dec-2019



| Benchmark | Copies | Base | Peak |
|---|---|---|---|
| 503.bwaves_r | 96 | 577 | |
| 507.cactuBSSN_r | 96 | 499 | |
| 508.namd_r | 96 | 257 | |
| 510.parest_r | 96 / 48 | 204 | 285 |
| 511.povray_r | 96 | 377 | 384 |
| 519.lbm_r | 96 | 148 | 148 |
| 521.wrf_r | 96 | 351 | |
| 526.blender_r | 96 | 375 | |
| 527.cam4_r | 96 | 329 | |
| 538.imagick_r | 96 | 1030 | 1030 |
| 544.nab_r | 96 | 471 | |
| 549.fotonik3d_r | 96 / 48 | 205 | 208 |
| 554.roms_r | 96 / 48 | 133 | 170 |

SPECrate®2017_fp_base (327)

SPECrate®2017_fp_peak (343)

## Hardware

CPU Name: AMD EPYC 7352

Max MHz: 3200

Nominal: 2300

Enabled: 48 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: 128 MB I+D on chip per chip, 16 MB shared / 3 cores

Other: None

Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)

Storage: 1 x 1.6 TB SATA SSD

Other: None

## Software

OS: Ubuntu 19.04
Kernel 5.0.0-38-generic

Compiler: C/C++/Fortran: Version 2.0.0 of AOCC

Parallel: No

Firmware: Version R04 released Aug-2019

File System: ext4

System State: Run level 5 (multi-user)

Base Pointers: 64-bit

Peak Pointers: 64-bit

Other: jemalloc: jemalloc memory allocator library v5.2.0

Power Management: BIOS set to prefer performance at the cost of additional power usage

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| | | |
|---|---|---|
| **CPU2017 License:** 97 | **Test Date:** | Apr-2021 |
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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 | 96 | 1669 | 577 | **1669** | **577** | 1669 | 577 | 96 | 1669 | 577 | **1669** | **577** | 1669 | 577 |
| 507.cactuBSSN_r | 96 | **243** | **499** | 243 | 499 | 245 | 495 | 96 | **243** | **499** | 243 | 499 | 245 | 495 |
| 508.namd_r | 96 | 355 | 257 | 355 | 257 | **355** | **257** | 96 | 355 | 257 | 355 | 257 | **355** | **257** |
| 510.parest_r | 96 | 1236 | 203 | **1232** | **204** | 1232 | 204 | 48 | **440** | **285** | 440 | 286 | 440 | 285 |
| 511.povray_r | 96 | **594** | **377** | 593 | 378 | 595 | 377 | 96 | **584** | **384** | 584 | 384 | 586 | 382 |
| 519.lbm_r | 96 | 683 | 148 | 685 | 148 | **683** | **148** | 96 | 681 | 149 | 682 | 148 | **682** | **148** |
| 521.wrf_r | 96 | **613** | **351** | 612 | 351 | 617 | 348 | 96 | **613** | **351** | 612 | 351 | 617 | 348 |
| 526.blender_r | 96 | **390** | **375** | 390 | 375 | 392 | 373 | 96 | **390** | **375** | 390 | 375 | 392 | 373 |
| 527.cam4_r | 96 | 507 | 331 | 511 | 328 | **511** | **329** | 96 | 507 | 331 | 511 | 328 | **511** | **329** |
| 538.imagick_r | 96 | **232** | **1030** | 231 | 1030 | 232 | 1030 | 96 | **231** | **1030** | 233 | 1030 | 231 | 1030 |
| 544.nab_r | 96 | 340 | 475 | **343** | **471** | 344 | 470 | 96 | 340 | 475 | **343** | **471** | 344 | 470 |
| 549.fotonik3d_r | 96 | 1830 | 204 | 1827 | 205 | **1828** | **205** | 48 | 899 | 208 | 898 | 208 | **899** | **208** |
| 554.roms_r | 96 | 1148 | 133 | 1145 | 133 | **1147** | **133** | 48 | **449** | **170** | 450 | 169 | 449 | 170 |
| **SPECrate®2017_fp_base =** | 327 | | | | | | | | | | | |
| **SPECrate®2017_fp_peak =** | 343 | | | | | | | | | | | |

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
'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>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu
```

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## Operating System Notes (Continued)

```
dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)
```

## Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
      "/home/cpu2017/amd_rate_aocc200_rome_C_lib/64;/home/cpu2017/amd_rate_aoc
      c200_rome_C_lib/32:"
MALLOC_CONF = "retain:true"
```

## General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using Fedora 26

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 v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto
jemalloc 5.2.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2
```

## Platform Notes

```
BIOS settings:
 Power Policy Quick Settings set to Best Performance"
 NUMA Nodes Per Socket set to NPS4

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on ubuntu Sat Apr 17 10:40:13 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
```

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Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

## Altos Computing Inc.

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SPECrate®2017_fp_peak = 343

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## Platform Notes (Continued)

```
     model name : AMD EPYC 7352 24-Core Processor
        2  "physical id"s (chips)
        96 "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  : 48
        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 from util-linux 2.33.1:
        Architecture:        x86_64
        CPU op-mode(s):      32-bit, 64-bit
        Byte Order:          Little Endian
        Address sizes:       43 bits physical, 48 bits virtual
        CPU(s):              96
        On-line CPU(s) list: 0-95
        Thread(s) per core:  2
        Core(s) per socket:  24
        Socket(s):           2
        NUMA node(s):        8
        Vendor ID:           AuthenticAMD
        CPU family:          23
        Model:               49
        Model name:          AMD EPYC 7352 24-Core Processor
        Stepping:            0
        CPU MHz:             3199.593
        CPU max MHz:         2300.0000
        CPU min MHz:         1500.0000
        BogoMIPS:            4600.02
        Virtualization:      AMD-V
        L1d cache:           32K
        L1i cache:           32K
        L2 cache:            512K
        L3 cache:            16384K
        NUMA node0 CPU(s):   0-5,48-53
        NUMA node1 CPU(s):   6-11,54-59
        NUMA node2 CPU(s):   12-17,60-65
        NUMA node3 CPU(s):   18-23,66-71
        NUMA node4 CPU(s):   24-29,72-77
        NUMA node5 CPU(s):   30-35,78-83
        NUMA node6 CPU(s):   36-41,84-89
        NUMA node7 CPU(s):   42-47,90-95
        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 xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni
        pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
```

**(Continued on next page)**

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## Platform Notes (Continued)

```
     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 sme ssbd mba sev 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 arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid
     decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif umip 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: 8 nodes (0-7)
    node 0 cpus: 0 1 2 3 4 5 48 49 50 51 52 53
    node 0 size: 64298 MB
    node 0 free: 63867 MB
    node 1 cpus: 6 7 8 9 10 11 54 55 56 57 58 59
    node 1 size: 64504 MB
    node 1 free: 64194 MB
    node 2 cpus: 12 13 14 15 16 17 60 61 62 63 64 65
    node 2 size: 64504 MB
    node 2 free: 64223 MB
    node 3 cpus: 18 19 20 21 22 23 66 67 68 69 70 71
    node 3 size: 64492 MB
    node 3 free: 64164 MB
    node 4 cpus: 24 25 26 27 28 29 72 73 74 75 76 77
    node 4 size: 64504 MB
    node 4 free: 64172 MB
    node 5 cpus: 30 31 32 33 34 35 78 79 80 81 82 83
    node 5 size: 64504 MB
    node 5 free: 64191 MB
    node 6 cpus: 36 37 38 39 40 41 84 85 86 87 88 89
    node 6 size: 64504 MB
    node 6 free: 64238 MB
    node 7 cpus: 42 43 44 45 46 47 90 91 92 93 94 95
    node 7 size: 64502 MB
    node 7 free: 64182 MB
    node distances:
    node   0   1   2   3   4   5   6   7
      0:  10  12  12  12  32  32  32  32
      1:  12  10  12  12  32  32  32  32
      2:  12  12  10  12  32  32  32  32
      3:  12  12  12  10  32  32  32  32
      4:  32  32  32  32  10  12  12  12
      5:  32  32  32  32  12  10  12  12
```

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## Platform Notes (Continued)

```
      6:  32  32  32  32  12  12  10  12
      7:  32  32  32  32  12  12  12  10

 From /proc/meminfo
    MemTotal:       528198088 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

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

 /usr/bin/lsb_release -d
    Ubuntu 19.04

 From /etc/*release* /etc/*version*
    debian_version: buster/sid
    os-release:
        NAME="Ubuntu"
        VERSION="19.04 (Disco Dingo)"
        ID=ubuntu
        ID_LIKE=debian
        PRETTY_NAME="Ubuntu 19.04"
        VERSION_ID="19.04"
        HOME_URL="https://www.ubuntu.com/"
        SUPPORT_URL="https://help.ubuntu.com/"

 uname -a:
    Linux ubuntu 5.0.0-38-generic #41-Ubuntu SMP Tue Dec 3 00:27:35 UTC 2019 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:
                                                     conditional, RSB filling
 CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
 CVE-2019-11135 (TSX Asynchronous Abort):            Not affected
```

**(Continued on next page)**

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## Platform Notes (Continued)

```
 run-level 5 Apr 17 02:33

 SPEC is set to: /home/cpu2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda2       ext4  1.5T  110G  1.3T   8% /

 From /sys/devices/virtual/dmi/id
     Vendor:         Acer
     Product:        Altos R385 F4
     Product Family: Server
     Serial:         GJG4P8612A0017

 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 Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200
     16x Unknown Unknown

 BIOS:
    BIOS Vendor:       GIGABYTE
    BIOS Version:      R04
    BIOS Date:         08/23/2019
    BIOS Revision:     5.14

 (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)
------------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++                 | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
```

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```
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C           | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                 | 554.roms_r(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
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**(Continued on next page)**

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## Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
------------------------------------------------------------------------


========================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
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  AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/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)**

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# 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:
```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -z muldefs -lmvec -lamdlibm -ljemalloc
-lflang
```

C++ benchmarks:
```
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
-mllvm -loop-unswitch-threshold=200000 -mllvm -vector-library=LIBMVEC
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-partial-unswitch -z muldefs -lmvec -lamdlibm
-ljemalloc -lflang
```

Fortran benchmarks:
```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
-Kieee -fno-finite-math-only -lmvec -lamdlibm -ljemalloc -lflang
```

## Altos Computing Inc.

BrainSphere R385 F4 (AMD EPYC 7352)

SPECrate®2017_fp_base = 327

SPECrate®2017_fp_peak = 343

**CPU2017 License:** 97　　　　　　　　　　　　　　　　　　**Test Date:**　　　　　　Apr-2021
**Test Sponsor:**　　Altos Computing Inc.　　　　　　　　**Hardware Availability:** Dec-2019
**Tested by:**　　　　Altos Computing Inc.　　　　　　　　**Software Availability:**　Dec-2019

# Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -funroll-loops -Mrecursive -z muldefs
-Kieee -fno-finite-math-only -lmvec -lamdlibm -ljemalloc -lflang
```

Benchmarks using both C and C++:
```
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
-fstruct-layout=3 -mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch -z muldefs
-lmvec -lamdlibm -ljemalloc -lflang
```

Benchmarks using Fortran, C, and C++:
```
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
-fstruct-layout=3 -mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch
-funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only
-lmvec -lamdlibm -ljemalloc -lflang
```

# Peak Compiler Invocation

C benchmarks:
```
clang
```

**(Continued on next page)**

## Altos Computing Inc.

SPECrate®2017_fp_base = 327

BrainSphere R385 F4 (AMD EPYC 7352)

SPECrate®2017_fp_peak = 343

**CPU2017 License:** 97
**Test Sponsor:** Altos Computing Inc.
**Tested by:** Altos Computing Inc.

**Test Date:** Apr-2021
**Hardware Availability:** Dec-2019
**Software Availability:** Dec-2019

# 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: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -lmvec -lamdlibm -ljemalloc
-lflang
```

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

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

**(Continued on next page)**

## Altos Computing Inc.

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SPECrate®2017_fp_peak = 343

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# Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -Ofast -march=znver2
-flv-function-specialization -mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000
-mllvm -vector-library=LIBMVEC
-mllvm -inline-threshold=1000 -lmvec -lamdlibm -ljemalloc
-lflang

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3
-march=znver2 -funroll-loops -Mrecursive
-mllvm -vector-library=LIBMVEC -Kieee
-fno-finite-math-only -lmvec -lamdlibm -ljemalloc
-lflang

554.roms_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC
-Kieee -fno-finite-math-only -lmvec -lamdlibm -ljemalloc
-lflang

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

**(Continued on next page)**

# SPEC CPU®2017 Floating Point Rate Result

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**Hardware Availability:** Dec-2019
**Software Availability:** Dec-2019

# Peak Optimization Flags (Continued)

511.povray_r: `-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-region-vectorize`
`-Wl,-mllvm -Wl,-vector-library=LIBMVEC`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast`
`-march=znver2 -mno-sse4a -fstruct-layout=5`
`-mllvm -vectorize-memory-aggressively`
`-mllvm -function-specialize -mllvm -enable-gvn-hoist`
`-mllvm -unroll-threshold=50 -fremap-arrays`
`-mllvm -vector-library=LIBMVEC`
`-mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000`
`-flv-function-specialization -mllvm -unroll-threshold=100`
`-mllvm -enable-partial-unswitch`
`-mllvm -loop-unswitch-threshold=200000 -lmvec -lamdlibm`
`-ljemalloc -lflang`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

---

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/aocc200-flags-C4.html
http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revE.html

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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/aocc200-flags-C4.xml
http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revE.xml

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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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