



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## ASUSTeK Computer Inc.

ASUS RS500A-E10(KRPA-U16) Server System  
2.00 GHz, AMD EPYC 7662

SPECrate®2017\_fp\_base = 277

SPECrate®2017\_fp\_peak = 299

CPU2017 License: 9016

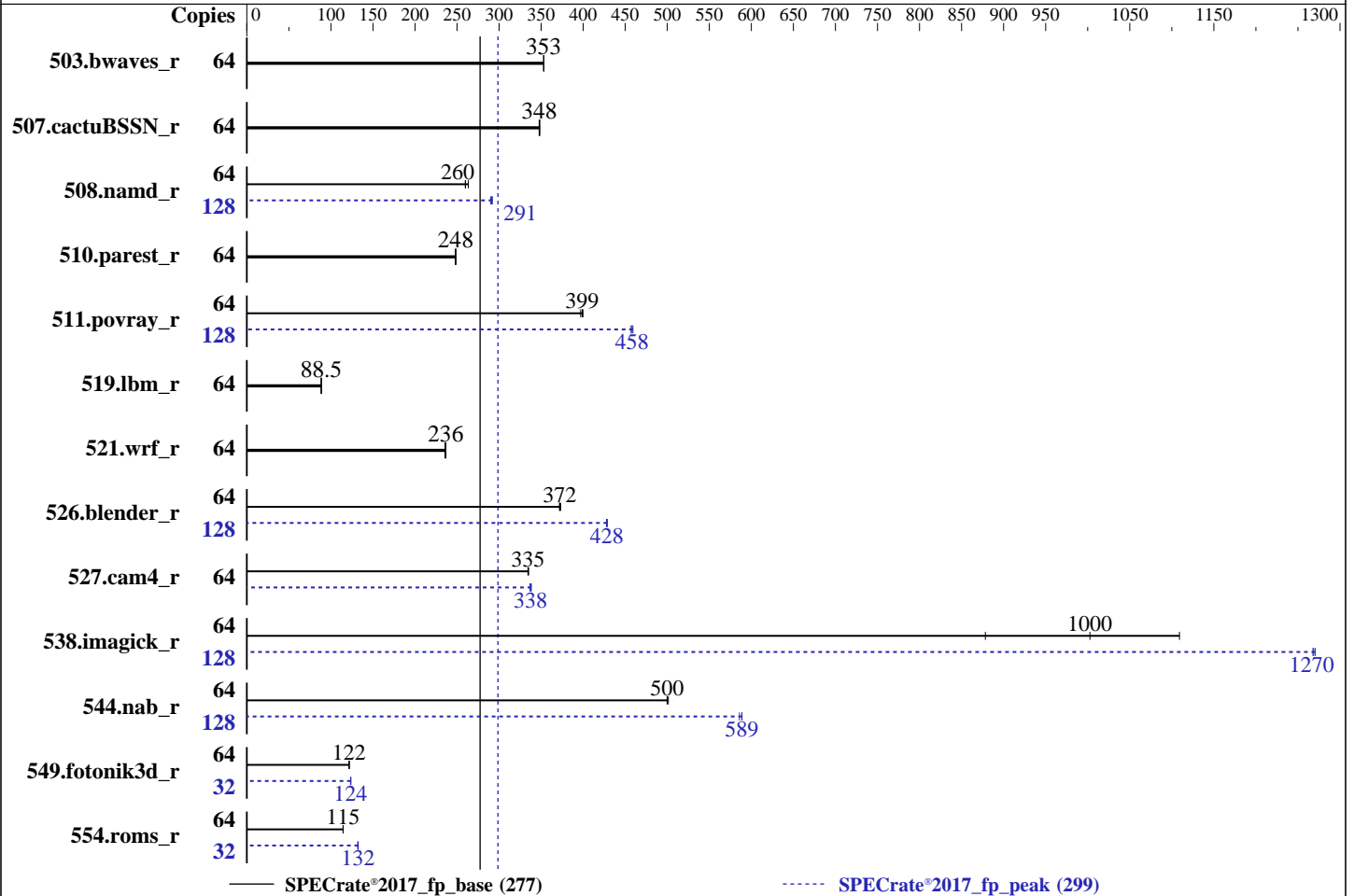
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Jan-2020

Hardware Availability: Feb-2020

Software Availability: Jun-2019



### Hardware

CPU Name: AMD EPYC 7662  
 Max MHz: 3300  
 Nominal: 2000  
 Enabled: 64 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 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, 16 MB shared / 4 cores  
 Other: None  
 Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)  
 Storage: 1 x 240 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP1 (x86\_64)  
 Kernel 4.12.14-195-default  
 Compiler: C/C++/Fortran: Version 2.0.0 of AOCC  
 Parallel: No  
 Firmware: Version 0501 released Nov-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: jemalloc: jemalloc memory allocator library v5.2.0  
 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	64	1818	353	<b><u>1818</u></b>	<b><u>353</u></b>	1817	353	64	1818	353	<b><u>1818</u></b>	<b><u>353</u></b>	1817	353
507.cactuBSSN_r	64	233	348	233	348	<b><u>233</u></b>	<b><u>348</u></b>	64	233	348	233	348	<b><u>233</u></b>	<b><u>348</u></b>
508.namd_r	64	231	263	234	260	<b><u>234</u></b>	<b><u>260</u></b>	128	416	292	419	290	<b><u>418</u></b>	<b><u>291</u></b>
510.parest_r	64	675	248	673	249	<b><u>674</u></b>	<b><u>248</u></b>	64	675	248	673	249	<b><u>674</u></b>	<b><u>248</u></b>
511.povray_r	64	374	400	<b><u>375</u></b>	<b><u>399</u></b>	376	397	128	654	457	<b><u>652</u></b>	<b><u>458</u></b>	651	459
519.lbm_r	64	762	88.6	762	88.5	<b><u>762</u></b>	<b><u>88.5</u></b>	64	762	88.6	762	88.5	<b><u>762</u></b>	<b><u>88.5</u></b>
521.wrf_r	64	606	237	608	236	<b><u>606</u></b>	<b><u>236</u></b>	64	606	237	608	236	<b><u>606</u></b>	<b><u>236</u></b>
526.blender_r	64	262	372	261	373	<b><u>262</u></b>	<b><u>372</u></b>	128	<b><u>455</u></b>	<b><u>428</u></b>	456	428	455	429
527.cam4_r	64	<b><u>335</u></b>	<b><u>335</u></b>	335	334	334	335	64	331	338	333	337	<b><u>332</u></b>	<b><u>338</u></b>
538.imagick_r	64	<b><u>159</u></b>	<b><u>1000</u></b>	181	878	144	1110	128	251	1270	251	1270	<b><u>251</u></b>	<b><u>1270</u></b>
544.nab_r	64	215	500	215	501	<b><u>215</u></b>	<b><u>500</u></b>	128	368	586	<b><u>366</u></b>	<b><u>589</u></b>	366	589
549.fotonik3d_r	64	<b><u>2049</u></b>	<b><u>122</u></b>	2050	122	2049	122	32	1009	124	<b><u>1009</u></b>	<b><u>124</u></b>	1008	124
554.roms_r	64	<b><u>888</u></b>	<b><u>115</u></b>	889	114	887	115	32	384	132	<b><u>384</u></b>	<b><u>132</u></b>	386	132

SPECrate®2017\_fp\_base = **277**

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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

dirty\_ratio, swappiness, zone\_reclaim\_mode and drop\_caches were

(Continued on next page)



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## Operating System Notes (Continued)

all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)  
OS set to performance mode via cpupower frequency-set -g performance.

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =  
    "/spec2017cl/amd_rate_aocc200_rome_C_lib/64;/spec2017cl/amd_rate_aocc200  
    _rome_C_lib/32:"  
MALLOCONF = "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 Configuration:

Power phase shedding = Disabled

SVM Mode = Disabled

SR-IOV support = Disabled

DRAM Scrub time = Disabled

NUMA nodes per socket = NPS4

Determinism Slider = Power

Sysinfo program /spec2017cl/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on linux-wv9n Fri Jan 10 14:30:12 2020

SUT (System Under Test) info as seen by some common utilities.

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### Platform Notes (Continued)

For more information on this section, see  
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : AMD EPYC 7662 64-Core Processor

1 "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 : 64

siblings : 128

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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52  
53 54 55 56 57 58 59 60 61 62 63

From lscpu:

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): 128

On-line CPU(s) list: 0-127

Thread(s) per core: 2

Core(s) per socket: 64

Socket(s): 1

NUMA node(s): 4

Vendor ID: AuthenticAMD

CPU family: 23

Model: 49

Model name: AMD EPYC 7662 64-Core Processor

Stepping: 0

CPU MHz: 2000.000

CPU max MHz: 2000.0000

CPU min MHz: 1500.0000

BogoMIPS: 4039.89

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 32K

L2 cache: 512K

L3 cache: 16384K

NUMA node0 CPU(s): 0-15,64-79

NUMA node1 CPU(s): 16-31,80-95

NUMA node2 CPU(s): 32-47,96-111

NUMA node3 CPU(s): 48-63,112-127

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 xtopology nonstop\_tsc cpuid extd\_apicid aperfmperf pni

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### Platform Notes (Continued)

pclmulqdq monitor ssse3 fma cx16 sse4\_1 sse4\_2 movbe popcnt aes xsave avx fl6c  
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\_l2 mwaitx cpb  
cat\_l3 cdp\_l3 hw\_pstate sme ssbd 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 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: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 64 65 66 67 68 69 70 71 72 73 74 75
76 77 78 79
node 0 size: 128795 MB
node 0 free: 128397 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95
node 1 size: 129011 MB
node 1 free: 128707 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 96 97 98 99 100 101 102
103 104 105 106 107 108 109 110 111
node 2 size: 129011 MB
node 2 free: 128737 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 112 113 114 115 116 117
118 119 120 121 122 123 124 125 126 127
node 3 size: 128996 MB
node 3 free: 128721 MB
node distances:
node  0  1  2  3
0:  10  12  12  12
1:  12  10  12  12
2:  12  12  10  12
3:  12  12  12  10
```

```
From /proc/meminfo
MemTotal:      528194032 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP1"
```

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### Platform Notes (Continued)

```

VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

```

uname -a:

```

Linux linux-wv9n 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

```

Kernel self-reported vulnerability status:

```

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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):        Mitigation: Full AMD retpoline, IBPB:
                                              conditional, IBRS_FW, STIBP: conditional, RSB
                                              filling

```

run-level 3 Jan 10 14:29

SPEC is set to: /spec2017c1

```

Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdd4       xfs   199G   14G  186G   7% /

```

From /sys/devices/virtual/dmi/id

```

BIOS:      American Megatrends Inc. 0501 11/07/2019
Vendor:    ASUSTeK COMPUTER INC.
Product:   KRPA-U16 Series
Product Family: Server
Serial:    System Serial Number

```

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:

```

8x Samsung M393A8G40AB2-CWE 64 kB 2 rank 3200
8x Unknown Unknown

```

(End of data from sysinfo program)



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### 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
  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
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### Compiler Version Notes (Continued)

```

Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
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

```

```

=====
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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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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InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

```

### Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

(Continued on next page)





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## Base Compiler Invocation (Continued)

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:

```
-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
-freemap-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
```

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**Test Sponsor:** ASUSTeK Computer Inc.

**Tested by:** ASUSTeK Computer Inc.

**Test Date:** Jan-2020

**Hardware Availability:** Feb-2020

**Software Availability:** Jun-2019

## Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-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
```

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
-freemap-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 -freemap-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 -freemap-arrays
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
```

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# SPEC CPU®2017 Floating Point Rate Result

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**ASUSTeK Computer Inc.**

ASUS RS500A-E10(KRPA-U16) Server System  
2.00 GHz, AMD EPYC 7662

SPECrate®2017\_fp\_base = 277

SPECrate®2017\_fp\_peak = 299

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## Base Optimization Flags (Continued)

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

```
-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

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: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
```

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## Peak Optimization Flags (Continued)

538.imagick\_r (continued):

```
-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
```

544.nab\_r: Same as 538.imagick\_r

C++ benchmarks:

508.namd\_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 -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
```

510.parest\_r: basepeak = yes

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
```

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## Peak Optimization Flags (Continued)

554.roms\_r (continued):

```
-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: -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 -O3 -funroll-loops
-Mrecursive -Kieee -fno-finite-math-only -lmvec
-lamdlibm -ljemalloc -lflang
```

Benchmarks using both C and C++:

```
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
```

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## Peak Optimization Flags (Continued)

```

526.blender_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 -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

```

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/ASUSTekPlatform-Settings-AMD-Rome-V1.0-revG.html>  
<http://www.spec.org/cpu2017/flags/aocc200-flags-A1.2019-09-17.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-AMD-Rome-V1.0-revG.xml>  
<http://www.spec.org/cpu2017/flags/aocc200-flags-A1.2019-09-17.xml>

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