



# SPEC CPU®2017 Floating Point Speed Result

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## ASUSTeK Computer Inc.

ASUS RS500A-E10(KRPA-U16) Server System  
2.90 GHz, AMD EPYC 7272

SPECspeed®2017\_fp\_base = 59.2

SPECspeed®2017\_fp\_peak = 59.3

CPU2017 License: 9016

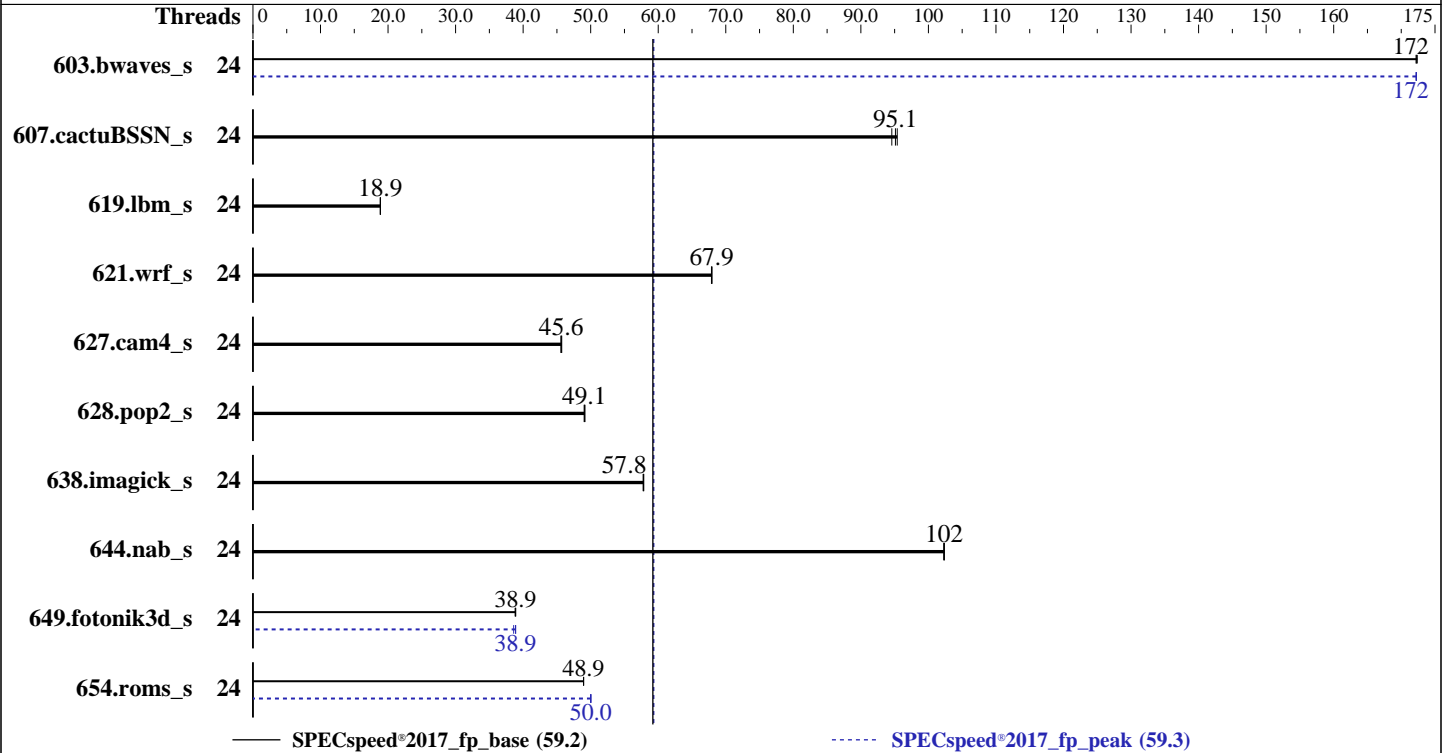
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Mar-2020

Hardware Availability: Nov-2019

Software Availability: Jun-2019



### Hardware

CPU Name: AMD EPYC 7272  
 Max MHz: 3200  
 Nominal: 2900  
 Enabled: 12 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: 64 MB I+D on chip per chip, 16 MB shared / 3 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: Yes  
 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 v5.1.0  
 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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	24	342	172	<b>343</b>	<b>172</b>	343	172	24	343	172	343	172	<b>343</b>	<b>172</b>
607.cactuBSSN_s	24	<b>175</b>	<b>95.1</b>	176	94.6	175	95.4	24	<b>175</b>	<b>95.1</b>	176	94.6	175	95.4
619.lbm_s	24	278	18.9	<b>278</b>	<b>18.9</b>	278	18.9	24	278	18.9	<b>278</b>	<b>18.9</b>	278	18.9
621.wrf_s	24	195	68.0	<b>195</b>	<b>67.9</b>	195	67.9	24	195	68.0	<b>195</b>	<b>67.9</b>	195	67.9
627.cam4_s	24	194	45.7	<b>194</b>	<b>45.6</b>	194	45.6	24	194	45.7	<b>194</b>	<b>45.6</b>	194	45.6
628.pop2_s	24	242	49.2	242	49.1	<b>242</b>	<b>49.1</b>	24	242	49.2	242	49.1	<b>242</b>	<b>49.1</b>
638.imagick_s	24	250	57.8	249	57.8	<b>249</b>	<b>57.8</b>	24	250	57.8	249	57.8	<b>249</b>	<b>57.8</b>
644.nab_s	24	171	102	<b>171</b>	<b>102</b>	171	102	24	171	102	<b>171</b>	<b>102</b>	171	102
649.fotonik3d_s	24	235	38.8	<b>235</b>	<b>38.9</b>	234	38.9	24	236	38.6	<b>234</b>	<b>38.9</b>	234	38.9
654.roms_s	24	<b>322</b>	<b>48.9</b>	322	48.9	322	49.0	24	<b>315</b>	<b>50.0</b>	315	50.0	315	50.0

SPECSpeed®2017\_fp\_base = **59.2**

SPECSpeed®2017\_fp\_peak = **59.3**

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

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

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## Operating System Notes (Continued)

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:

GOMP\_CPU\_AFFINITY = "0-23"

LD\_LIBRARY\_PATH =

"/spec2017c3/amd\_speed\_aocc200\_rome\_C\_lib/64;/spec2017c3/amd\_speed\_aocc200\_rome\_C\_lib/32:"

MALLOC\_CONF = "retain:true"

OMP\_DYNAMIC = "false"

OMP\_SCHEDULE = "static"

OMP\_STACKSIZE = "128M"

OMP\_THREAD\_LIMIT = "24"

Environment variables set by runcpu during the 603.bwaves\_s peak run:

GOMP\_CPU\_AFFINITY = "0-23"

Environment variables set by runcpu during the 649.fotonik3d\_s peak run:

GOMP\_CPU\_AFFINITY = "0-23"

Environment variables set by runcpu during the 654.roms\_s peak run:

GOMP\_CPU\_AFFINITY = "0-23"

## 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 5.1.0 is available here:

<https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2>

## Platform Notes

BIOS Configuration:

Power phase shedding = Disabled

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### Platform Notes (Continued)

SVM Mode = Disabled  
SR-IOV support = Disabled  
DRAM Scrub time = Disabled  
Determinism Slider = Power  
APBDIS = 1

Sysinfo program /spec2017c3/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
running on linux-wv9n Wed Mar 25 21:04:25 2020

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 7272 12-Core Processor  
1 "physical id"s (chips)  
24 "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 : 12  
siblings : 24  
physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14

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): 24  
On-line CPU(s) list: 0-23  
Thread(s) per core: 2  
Core(s) per socket: 12  
Socket(s): 1  
NUMA node(s): 1  
Vendor ID: AuthenticAMD  
CPU family: 23  
Model: 49  
Model name: AMD EPYC 7272 12-Core Processor  
Stepping: 0  
CPU MHz: 2900.000  
CPU max MHz: 2900.0000  
CPU min MHz: 1500.0000  
BogoMIPS: 5857.98  
Virtualization: AMD-V  
L1d cache: 32K  
L1i cache: 32K

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### Platform Notes (Continued)

```

L2 cache:          512K
L3 cache:          16384K
NUMA node0 CPU(s): 0-23
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
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: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
node 0 size: 515818 MB
node 0 free: 515059 MB
node distances:
node    0
0:     10

```

```

From /proc/meminfo
MemTotal:      528197632 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

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

```

(Continued on next page)



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### Platform Notes (Continued)

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 Mar 25 13:58

SPEC is set to: /spec2017c3

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sdd4	xfs	199G	18G	182G	9%	/

```
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)

### Compiler Version Notes

```
=====
C          | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
          | 644.nab_s(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
```

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### Compiler Version Notes (Continued)

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

=====  
C++, C, Fortran | 607.cactuBSSN\_s(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

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Target: x86\_64-unknown-linux-gnu

Thread model: posix

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

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Target: x86\_64-unknown-linux-gnu

Thread model: posix

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

=====  
Fortran | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak)  
| 654.roms\_s(base, peak)

-----  
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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

=====  
Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak)  
| 628.pop2\_s(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

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## Compiler Version Notes (Continued)

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

## Base Compiler Invocation

C benchmarks:

clang

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Base Portability Flags

603.bwaves\_s: -DSPEC\_LP64  
607.cactuBSSN\_s: -DSPEC\_LP64  
619.lbm\_s: -DSPEC\_LP64  
621.wrf\_s: -DSPEC\_CASE\_FLAG -Mbyteswapio -DSPEC\_LP64  
627.cam4\_s: -DSPEC\_CASE\_FLAG -DSPEC\_LP64  
628.pop2\_s: -DSPEC\_CASE\_FLAG -Mbyteswapio -DSPEC\_LP64  
638.imagick\_s: -DSPEC\_LP64  
644.nab\_s: -DSPEC\_LP64  
649.fotonik3d\_s: -DSPEC\_LP64  
654.roms\_s: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-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 -DSPEC\_OPENMP -fopenmp

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## Base Optimization Flags (Continued)

C benchmarks (continued):

```
-fopenmp=libomp -lomp -lpthread -ldl -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 -DSPEC_OPENMP -fopenmp -fopenmp=libomp  
-lomp -lpthread -ldl -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  
-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 -DSPEC_OPENMP -fopenmp -fopenmp=libomp  
-lomp -lpthread -ldl -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  
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec  
-lamdlibm -ljemalloc -lflang
```

## Base Other Flags

C benchmarks:

```
-Wno-return-type
```

(Continued on next page)



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## Base Other Flags (Continued)

Fortran benchmarks:

-Wno-return-type

Benchmarks using both Fortran and C:

-Wno-return-type

Benchmarks using Fortran, C, and C++:

-Wno-return-type

## Peak Compiler Invocation

C benchmarks:

clang

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

619.lbm\_s: basepeak = yes

638.imagick\_s: basepeak = yes

644.nab\_s: basepeak = yes

Fortran benchmarks:

(Continued on next page)



# SPEC CPU®2017 Floating Point Speed Result

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## ASUSTeK Computer Inc.

ASUS RS500A-E10(KRPA-U16) Server System  
2.90 GHz, AMD EPYC 7272

SPECSpeed®2017\_fp\_base = 59.2

SPECSpeed®2017\_fp\_peak = 59.3

CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Mar-2020

Hardware Availability: Nov-2019

Software Availability: Jun-2019

## Peak Optimization Flags (Continued)

```
603.bwaves_s: -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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang
```

649.fotonik3d\_s: Same as 603.bwaves\_s

```
654.roms_s: -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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang
```

Benchmarks using both Fortran and C:

621.wrf\_s: basepeak = yes

627.cam4\_s: basepeak = yes

628.pop2\_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_s: basepeak = yes

## Peak Other Flags

C benchmarks:

-Wno-return-type

Fortran benchmarks:

-Wno-return-type

Benchmarks using both Fortran and C:

-Wno-return-type

(Continued on next page)



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

**ASUSTeK Computer Inc.**

ASUS RS500A-E10(KRPA-U16) Server System  
2.90 GHz, AMD EPYC 7272

SPECspeed®2017\_fp\_base = 59.2

SPECspeed®2017\_fp\_peak = 59.3

**CPU2017 License:** 9016

**Test Sponsor:** ASUSTeK Computer Inc.

**Tested by:** ASUSTeK Computer Inc.

**Test Date:** Mar-2020

**Hardware Availability:** Nov-2019

**Software Availability:** Jun-2019

## Peak Other Flags (Continued)

Benchmarks using Fortran, C, and C++:

-Wno-return-type

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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