



# SPEC CPU®2017 Floating Point Speed Result

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## Supermicro

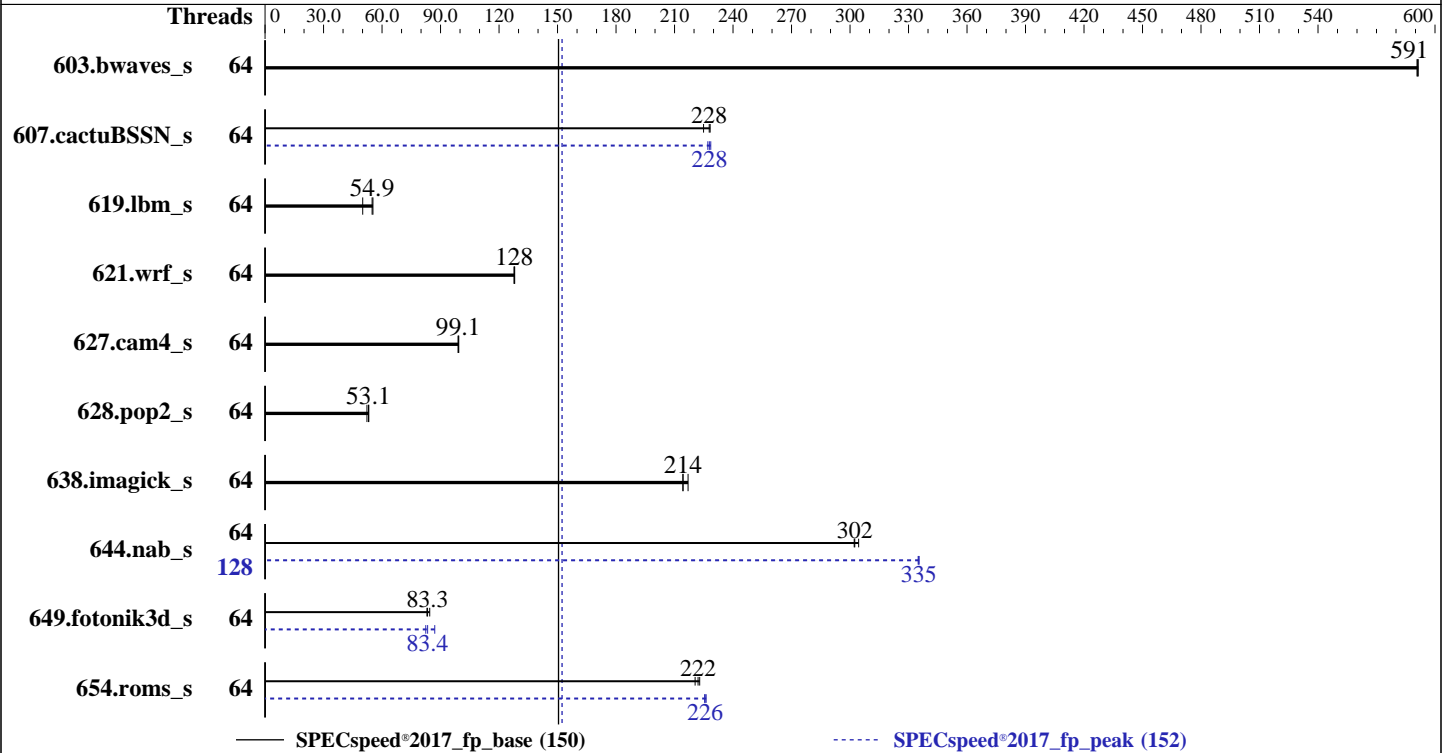
A+ Server 2023US-TR4  
(H11DSU-iN , AMD EPYC 7452)

SPECspeed®2017\_fp\_base = 150

SPECspeed®2017\_fp\_peak = 152

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

Test Date: Jan-2020  
Hardware Availability: Aug-2019  
Software Availability: Aug-2019



### Hardware

CPU Name: AMD EPYC 7452  
Max MHz: 3350  
Nominal: 2350  
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: 128 MB I+D on chip per chip, 16 MB shared / 4 cores  
Other: None  
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)  
Storage: 1 x 200 GB SATA III SSD  
Other: None

### Software

OS: Ubuntu 19.04  
Kernel 5.0.0-25-generic  
Compiler: C/C++/Fortran: Version 2.0.0 of AOCC  
Parallel: Yes  
Firmware: Version 2.0b released Nov-2019  
File System: ext4  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 64-bit  
Other: jemalloc: jemalloc memory allocator library v5.1.0  
Power Management: BIOS 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	64	99.8	591	<b>99.8</b>	<b>591</b>	99.9	591	64	99.8	591	<b>99.8</b>	<b>591</b>	99.9	591
607.cactuBSSN_s	64	74.1	225	<b>73.2</b>	<b>228</b>	73.0	228	64	<b>73.2</b>	<b>228</b>	73.4	227	72.9	229
619.lbm_s	64	<b>95.4</b>	<b>54.9</b>	105	50.1	94.7	55.3	64	<b>95.4</b>	<b>54.9</b>	105	50.1	94.7	55.3
621.wrf_s	64	<b>103</b>	<b>128</b>	103	128	104	128	64	<b>103</b>	<b>128</b>	103	128	104	128
627.cam4_s	64	89.2	99.3	89.5	99.0	<b>89.4</b>	<b>99.1</b>	64	89.2	99.3	89.5	99.0	<b>89.4</b>	<b>99.1</b>
628.pop2_s	64	223	53.2	227	52.3	<b>224</b>	<b>53.1</b>	64	223	53.2	227	52.3	<b>224</b>	<b>53.1</b>
638.imagick_s	64	66.5	217	<b>67.3</b>	<b>214</b>	67.3	214	64	66.5	217	<b>67.3</b>	<b>214</b>	67.3	214
644.nab_s	64	57.8	302	<b>57.8</b>	<b>302</b>	57.4	304	128	52.2	335	52.1	335	<b>52.1</b>	<b>335</b>
649.fotonik3d_s	64	108	84.5	110	83.0	<b>109</b>	<b>83.3</b>	64	<b>109</b>	<b>83.4</b>	111	82.4	105	87.0
654.roms_s	64	71.4	221	70.6	223	<b>70.9</b>	<b>222</b>	64	<b>69.8</b>	<b>226</b>	69.8	225	69.6	226

SPECSpeed®2017\_fp\_base = **150**

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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  
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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### Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
GOMP\_CPU\_AFFINITY = "0-127"  
LD\_LIBRARY\_PATH =  
"/home/cpu2017/amd\_speed\_aocc200\_rome\_C\_lib/64;/home/cpu2017/amd\_speed\_aocc200\_rome\_C\_lib/32:"  
MALLOCONF = "retain:true"  
OMP\_DYNAMIC = "false"  
OMP\_SCHEDULE = "static"  
OMP\_STACKSIZE = "128M"  
OMP\_THREAD\_LIMIT = "128"

Environment variables set by runcpu during the 607.cactuBSSN\_s peak run:  
GOMP\_CPU\_AFFINITY = "0-63"

Environment variables set by runcpu during the 644.nab\_s peak run:  
GOMP\_CPU\_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74  
11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86  
23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98  
35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45  
109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55  
119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"

Environment variables set by runcpu during the 649.fotonik3d\_s peak run:  
GOMP\_CPU\_AFFINITY = "0-63"

Environment variables set by runcpu during the 654.roms\_s peak run:  
GOMP\_CPU\_AFFINITY = "0-63"

### 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 -fltto  
jemalloc 5.1.0 is available here:  
<https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2>



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### Platform Notes

#### BIOS Settings:

Determinism Control = Manual  
Determinism Slider = Power  
cTDP Control = Manual  
cTDP = 180  
Package Power Limit Control = Manual  
Package Power Limit = 180  
IOMMU = Enabled  
APBDIS = 1  
NUMA Nodes Per Socket = NPS4

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
running on h11dsu-01 Tue Jan 14 23:20:17 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 7452 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:         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:   32
Socket(s):             2
NUMA node(s):         8
Vendor ID:             AuthenticAMD
CPU family:            23
Model:                49
Model name:            AMD EPYC 7452 32-Core Processor
```

(Continued on next page)



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### Platform Notes (Continued)

```
Stepping: 0
CPU MHz: 2597.489
CPU max MHz: 2350.0000
CPU min MHz: 1500.0000
BogoMIPS: 4700.07
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-7,64-71
NUMA node1 CPU(s): 8-15,72-79
NUMA node2 CPU(s): 16-23,80-87
NUMA node3 CPU(s): 24-31,88-95
NUMA node4 CPU(s): 32-39,96-103
NUMA node5 CPU(s): 40-47,104-111
NUMA node6 CPU(s): 48-55,112-119
NUMA node7 CPU(s): 56-63,120-127
```

```
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
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_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 unip 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 6 7 64 65 66 67 68 69 70 71
node 0 size: 64368 MB
node 0 free: 63893 MB
node 1 cpus: 8 9 10 11 12 13 14 15 72 73 74 75 76 77 78 79
node 1 size: 64504 MB
node 1 free: 64146 MB
node 2 cpus: 16 17 18 19 20 21 22 23 80 81 82 83 84 85 86 87
node 2 size: 64504 MB
node 2 free: 63819 MB
node 3 cpus: 24 25 26 27 28 29 30 31 88 89 90 91 92 93 94 95
```

(Continued on next page)



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### Platform Notes (Continued)

```

node 3 size: 64492 MB
node 3 free: 64141 MB
node 4 cpus: 32 33 34 35 36 37 38 39 96 97 98 99 100 101 102 103
node 4 size: 64481 MB
node 4 free: 64146 MB
node 5 cpus: 40 41 42 43 44 45 46 47 104 105 106 107 108 109 110 111
node 5 size: 64504 MB
node 5 free: 64153 MB
node 6 cpus: 48 49 50 51 52 53 54 55 112 113 114 115 116 117 118 119
node 6 size: 64504 MB
node 6 free: 64154 MB
node 7 cpus: 56 57 58 59 60 61 62 63 120 121 122 123 124 125 126 127
node 7 size: 64503 MB
node 7 free: 64152 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
  6: 32 32 32 32 12 12 10 12
  7: 32 32 32 32 12 12 12 10

```

```

From /proc/meminfo
MemTotal:      528246132 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

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 h11dsu-01 5.0.0-25-generic #26-Ubuntu SMP Thu Aug 1 12:04:58 UTC 2019 x86_64
x86_64 x86_64 GNU/Linux

```

Kernel self-reported vulnerability status:

(Continued on next page)



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### Platform Notes (Continued)

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/swaps barriers and __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 13 16:48

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	ext4	183G	29G	145G	17%	/

From /sys/devices/virtual/dmi/id

**BIOS:** American Megatrends Inc. 2.0b 11/15/2019  
**Vendor:** Supermicro  
**Product:** Super Server  
**Serial:** 0123456789

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 NO DIMM Unknown  
 16x SK Hynix HMA84GR7CJR4N-XN 32 kB 2 rank 3200

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

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### Compiler Version Notes (Continued)

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

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

=====  
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  
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## 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.ibm\_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  
-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

(Continued on next page)



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## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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
-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 -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 -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
-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 -DUSE_OPENMP
```

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

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

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# SPEC CPU®2017 Floating Point Speed Result

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## Supermicro

A+ Server 2023US-TR4  
(H11DSU-iN , AMD EPYC 7452)

SPECspeed®2017\_fp\_base = 150

SPECspeed®2017\_fp\_peak = 152

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

**Test Date:** Jan-2020  
**Hardware Availability:** Aug-2019  
**Software Availability:** Aug-2019

## Base Other Flags (Continued)

Benchmarks using Fortran, C, and C++:  
-Wno-return-type -DUSE\_OPENMP

## 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: -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

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## Peak Optimization Flags (Continued)

644.nab\_s (continued):

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

Fortran benchmarks:

603.bwaves\_s: basepeak = yes

```
649.fotonik3d_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
```

```
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++:

```
-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
```

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**Software Availability:** Aug-2019

## Peak Optimization Flags (Continued)

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

```
-flv-function-specialization -mllvm -unroll-threshold=100  
-mllvm -enable-partial-unswitch -mllvm -loop-unswitch-threshold=200000  
-O3 -funroll-loops -Mrecursive -Kieee -fno-finite-math-only  
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec  
-lamdlibm -ljemalloc -lflang
```

## Peak Other Flags

C benchmarks:

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

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

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

Benchmarks using Fortran, C, and C++:

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

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/aocc200-flags-B1.html>

<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Rome-revB.html>

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

<http://www.spec.org/cpu2017/flags/aocc200-flags-B1.xml>

<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Rome-revB.xml>

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