



# SPEC CPU®2017 Floating Point Rate Result

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## Supermicro

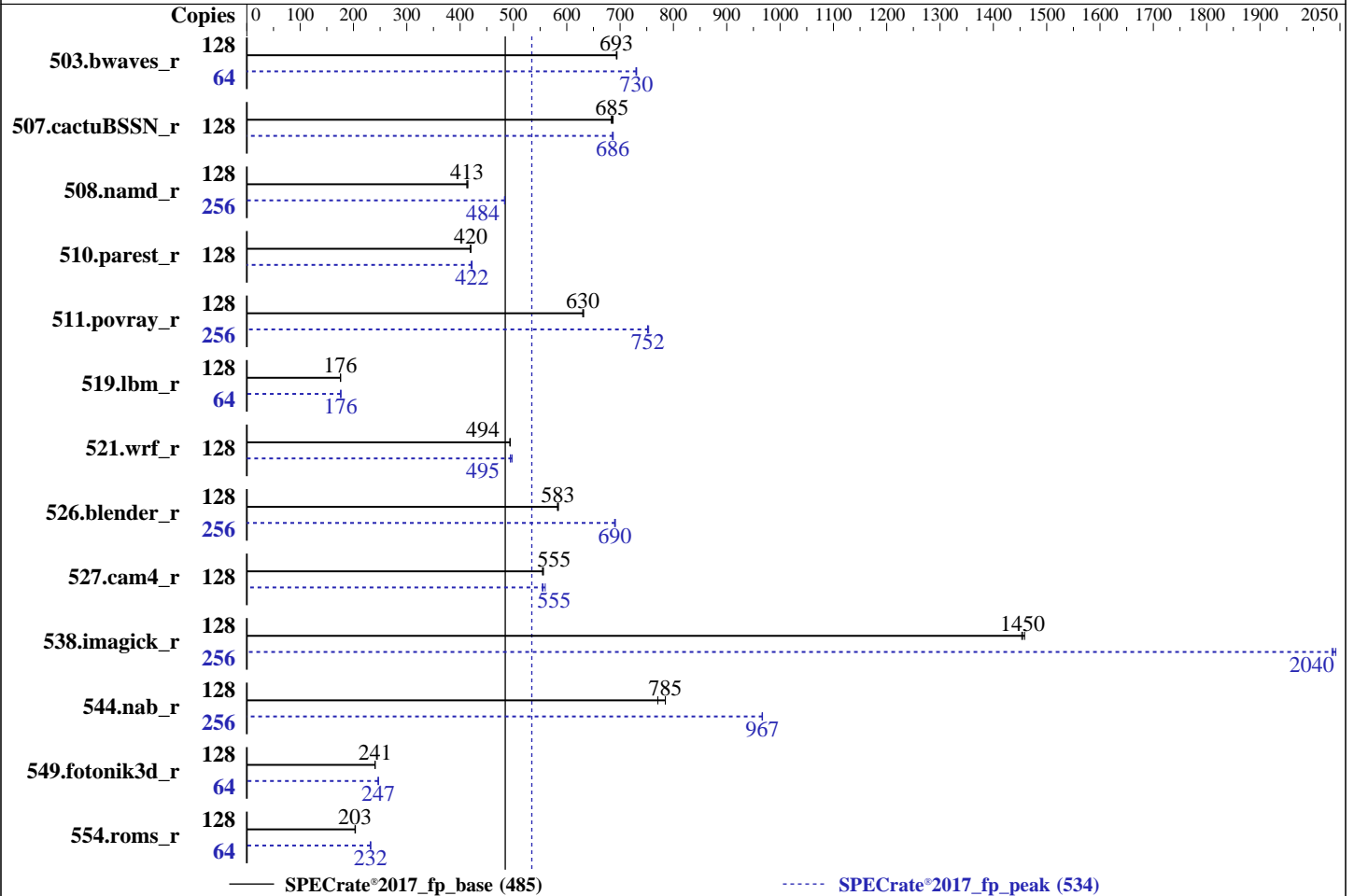
A+ Server 2023US-TR4  
(H11DSU-iN , AMD EPYC 7702)

SPECrate®2017\_fp\_base = 485

SPECrate®2017\_fp\_peak = 534

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 7702  
 Max MHz: 3350  
 Nominal: 2000  
 Enabled: 128 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 256 MB I+D on chip per chip, 16 MB shared / 4 cores  
 Other: None  
 Memory: 1 TB (16 x 64 GB 4DRx4 PC4-3200AA-L)  
 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: No  
 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 v5.2.0  
 Power Management: BIOS set to prefer performance at the cost of additional power usage.



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	128	1849	694	<u>1851</u>	<u>693</u>	1852	693	64	878	731	<u>879</u>	<u>730</u>	880	730
507.cactuBSSN_r	128	236	687	<u>237</u>	<u>685</u>	237	684	128	236	687	<u>236</u>	<u>686</u>	236	686
508.namd_r	128	295	413	293	415	<u>294</u>	<u>413</u>	256	<u>503</u>	<u>484</u>	503	483	503	484
510.parest_r	128	<u>797</u>	<u>420</u>	799	419	797	420	128	796	421	792	423	<u>793</u>	<u>422</u>
511.povray_r	128	474	630	<u>474</u>	<u>630</u>	473	632	256	793	754	<u>795</u>	<u>752</u>	795	752
519.lbm_r	128	<u>768</u>	<u>176</u>	768	176	768	176	64	382	176	383	176	<u>383</u>	<u>176</u>
521.wrf_r	128	581	494	581	494	<u>581</u>	<u>494</u>	128	576	497	580	494	<u>579</u>	<u>495</u>
526.blender_r	128	<u>334</u>	<u>583</u>	334	584	335	583	256	<u>565</u>	<u>690</u>	564	691	565	690
527.cam4_r	128	402	556	404	555	<u>403</u>	<u>555</u>	128	400	560	404	554	<u>403</u>	<u>555</u>
538.imagick_r	128	218	1460	<u>219</u>	<u>1450</u>	219	1450	256	313	2040	<u>312</u>	<u>2040</u>	312	2040
544.nab_r	128	274	785	<u>275</u>	<u>785</u>	279	771	256	446	966	<u>446</u>	<u>967</u>	446	967
549.fotonik3d_r	128	2075	240	2074	241	<u>2074</u>	<u>241</u>	64	1012	246	1011	247	<u>1012</u>	<u>247</u>
554.roms_r	128	<u>1001</u>	<u>203</u>	1001	203	998	204	64	439	232	<u>438</u>	<u>232</u>	438	232

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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

(Continued on next page)



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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:  
Determinism Control = Manual  
Determinism Slider = Power  
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 Fri Jan 10 22:23:17 2020

SUT (System Under Test) info as seen by some common utilities.  
For more information on this section, see

(Continued on next page)



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### Platform Notes (Continued)

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

```

model name : AMD EPYC 7702 64-Core Processor
 2 "physical id"s (chips)
256 "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
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 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):                256
On-line CPU(s) list:   0-255
Thread(s) per core:    2
Core(s) per socket:    64
Socket(s):              2
NUMA node(s):          8
Vendor ID:              AuthenticAMD
CPU family:             23
Model:                  49
Model name:             AMD EPYC 7702 64-Core Processor
Stepping:               0
CPU MHz:                2229.645
CPU max MHz:            2000.0000
CPU min MHz:            1500.0000
BogoMIPS:               4000.07
Virtualization:        AMD-V
L1d cache:              32K
L1i cache:              32K
L2 cache:               512K
L3 cache:               16384K
NUMA node0 CPU(s):     0-15,128-143
NUMA node1 CPU(s):     16-31,144-159
NUMA node2 CPU(s):     32-47,160-175
NUMA node3 CPU(s):     48-63,176-191
NUMA node4 CPU(s):     64-79,192-207

```

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### Platform Notes (Continued)

```

NUMA node5 CPU(s): 80-95,208-223
NUMA node6 CPU(s): 96-111,224-239
NUMA node7 CPU(s): 112-127,240-255
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 pri
pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 x2apic 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 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 6 7 8 9 10 11 12 13 14 15 128 129 130 131 132 133 134 135 136
137 138 139 140 141 142 143
node 0 size: 128879 MB
node 0 free: 127999 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 144 145 146 147 148 149
150 151 152 153 154 155 156 157 158 159
node 1 size: 129015 MB
node 1 free: 128231 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 160 161 162 163 164 165
166 167 168 169 170 171 172 173 174 175
node 2 size: 129015 MB
node 2 free: 128247 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 176 177 178 179 180 181
182 183 184 185 186 187 188 189 190 191
node 3 size: 129003 MB
node 3 free: 128227 MB
node 4 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 192 193 194 195 196 197
198 199 200 201 202 203 204 205 206 207
node 4 size: 129015 MB
node 4 free: 128199 MB
node 5 cpus: 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 208 209 210 211 212 213
214 215 216 217 218 219 220 221 222 223
node 5 size: 128992 MB
node 5 free: 128164 MB
node 6 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 224 225 226

```

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### Platform Notes (Continued)

```

227 228 229 230 231 232 233 234 235 236 237 238 239
node 6 size: 129015 MB
node 6 free: 128042 MB
node 7 cpus: 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 240 241
242 243 244 245 246 247 248 249 250 251 252 253 254 255
node 7 size: 129014 MB
node 7 free: 128194 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:      1056720360 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/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 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:

```

CVE-2018-3620 (L1 Terminal Fault):      Not affected
Microarchitectural Data Sampling:      Not affected
CVE-2017-5754 (Meltdown):              Not affected

```

(Continued on next page)



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### Platform Notes (Continued)

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 10 10:43

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 Samsung M386A8K40DM2-CWE 64 kB 4 rank 3200

(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)  
=====

(Continued on next page)



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=====  
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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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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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



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## 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
-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
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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## Supermicro

A+ Server 2023US-TR4  
(H11DSU-iN , AMD EPYC 7702)

SPECrate®2017\_fp\_base = 485

SPECrate®2017\_fp\_peak = 534

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

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

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## 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:

```
-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
```

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
```

(Continued on next page)



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## Peak Optimization Flags (Continued)

508.namd\_r (continued):

```
-mllvm -vector-library=LIBMVEC  
-mllvm -inline-threshold=1000 -lmvec -lamdlibm -ljemalloc  
-lflang
```

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: -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
```

549.fotonik3d\_r: Same as 503.bwaves\_r

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:

```
-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
```

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## Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-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
```

```
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++:

```
-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
```

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## Peak Optimization Flags (Continued)

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

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

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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