



# SPEC CPU®2017 Floating Point Rate Result

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## Supermicro

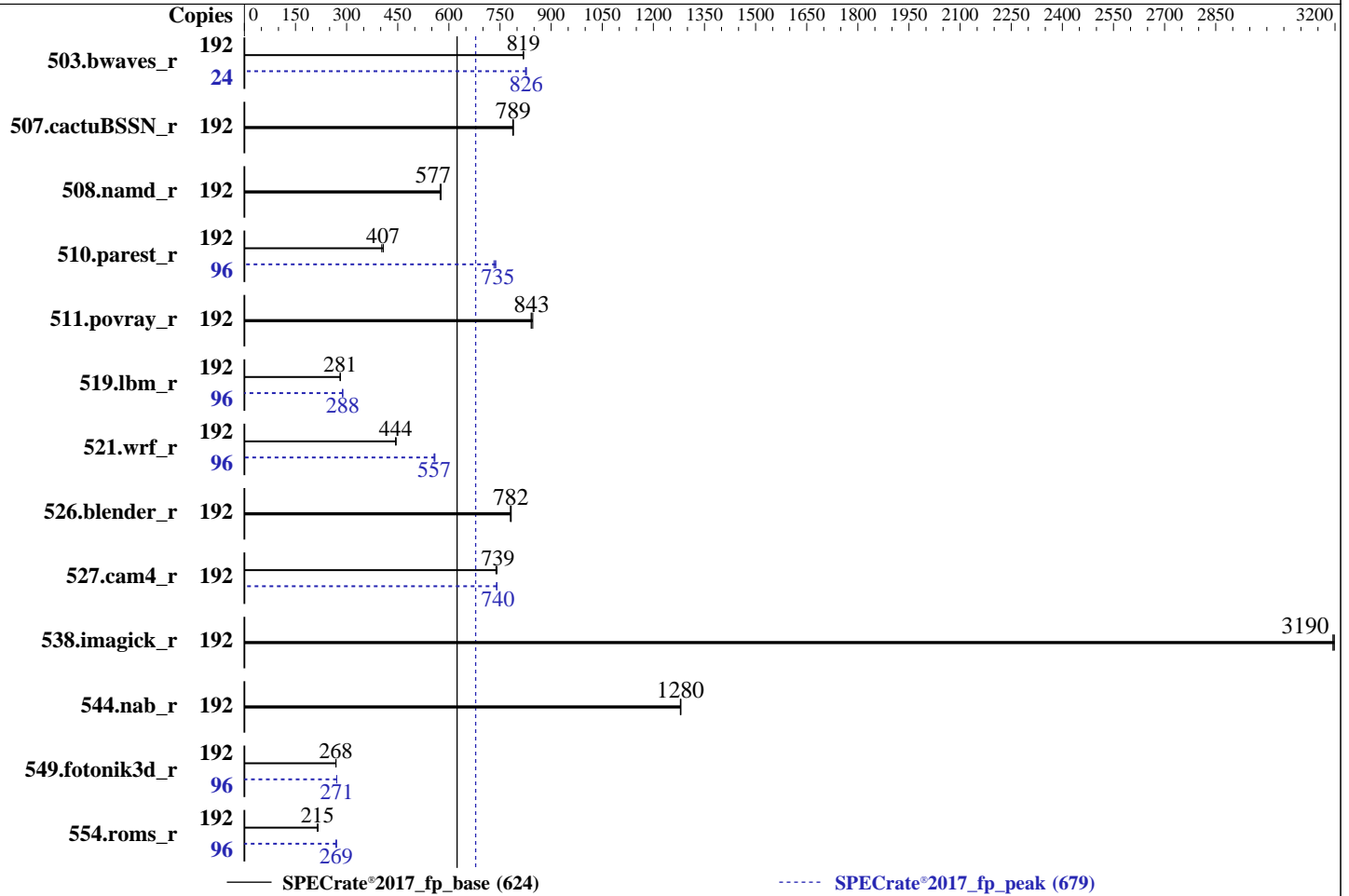
A+ Server 2015CS-TNR  
(H13SSW , AMD EPYC 9654)

SPECrate®2017\_fp\_base = 624

SPECrate®2017\_fp\_peak = 679

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

Test Date: Oct-2022  
Hardware Availability: Nov-2022  
Software Availability: Nov-2022



### Hardware

CPU Name: AMD EPYC 9654  
 Max MHz: 3700  
 Nominal: 2400  
 Enabled: 96 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 384 MB I+D on chip per chip, 32 MB shared / 8 cores  
 Other: None  
 Memory: 1152 GB (12 x 96 GB 2Rx4 PC5-4800B-R)  
 Storage: 1 x 128 GB SATA III SSD  
 Other: None

### Software

OS: Ubuntu 22.04.1 LTS  
 Kernel 5.15.0-48-generic  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: No  
 Firmware: Version 1.0 released Oct-2022  
 File System: ext4  
 System State: Run level 5 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None  
 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	192	2351	819	<u>2352</u>	<u>819</u>	2352	819	24	<u>291</u>	<u>826</u>	292	825	291	827
507.cactuBSSN_r	192	308	789	309	787	<b>308</b>	<b>789</b>	192	308	789	309	787	<b>308</b>	<b>789</b>
508.namd_r	192	318	574	<u>316</u>	<u>577</u>	316	577	192	318	574	<u>316</u>	<u>577</u>	316	577
510.parest_r	192	1247	403	1233	407	<u>1233</u>	<u>407</u>	96	340	738	<u>342</u>	<u>735</u>	343	732
511.povray_r	192	<u>532</u>	<u>843</u>	530	846	533	841	192	<u>532</u>	<u>843</u>	530	846	533	841
519.lbm_r	192	719	281	<u>719</u>	<u>281</u>	720	281	96	351	289	352	288	<u>351</u>	<u>288</u>
521.wrf_r	192	966	445	<u>969</u>	<u>444</u>	969	444	96	385	559	386	557	<u>386</u>	<u>557</u>
526.blender_r	192	375	781	373	783	<u>374</u>	<u>782</u>	192	375	781	373	783	<u>374</u>	<u>782</u>
527.cam4_r	192	453	741	<u>454</u>	<u>739</u>	455	738	192	<u>453</u>	<u>740</u>	453	741	454	740
538.imagick_r	192	149	3200	149	3190	<u>149</u>	<u>3190</u>	192	149	3200	149	3190	<u>149</u>	<u>3190</u>
544.nab_r	192	253	1280	<u>253</u>	<u>1280</u>	252	1280	192	253	1280	<u>253</u>	<u>1280</u>	252	1280
549.fotonik3d_r	192	2789	268	<u>2787</u>	<u>268</u>	2782	269	96	1380	271	1380	271	<u>1380</u>	<u>271</u>
554.roms_r	192	<u>1420</u>	<u>215</u>	1412	216	1428	214	96	564	270	567	269	<u>566</u>	<u>269</u>

SPECrate®2017\_fp\_base = **624**

SPECrate®2017\_fp\_peak = **679**

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 limit  
'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>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty\_ratio=8' run as root.  
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.  
To free node-local memory and avoid remote memory usage,  
'sysctl -w vm.zone\_reclaim\_mode=1' run as root.

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### Operating System Notes (Continued)

To clear filesystem caches, 'sync; sysctl -w vm.drop\_caches=3' run as root.  
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize\_va\_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations, 'echo always > /sys/kernel/mm/transparent\_hugepage/enabled' and 'echo always > /sys/kernel/mm/transparent\_hugepage/defrag' run as root.

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH =  
"/root/spec-cpu2017-Genoa-A1/amd\_rate\_aocc400\_genoa\_B\_lib/lib:/root/spec-cpu2017-Genoa-A1/amd\_rate\_aocc400\_genoa\_B\_lib/lib32:"  
MALLOC\_CONF = "retain:true"

### General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6  
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.

### Platform Notes

BIOS Settings:  
Determinism Control = Manual  
Determinism Enable = Disable Performance Determinism  
cTDP Control = Manual  
cTDP = 400  
Package Power Limit Control = Manual  
Package Power Limit = 400  
ACPI SRAT L3 cache As NUMA Domain = Enabled  
  
Sysinfo program /root/spec-cpu2017-Genoa-A1/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
running on sysv Sat Oct 22 07:54:59 2022

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### Platform Notes (Continued)

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 9654 96-Core Processor
 1 "physical id"s (chips)
192 "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 : 96
siblings  : 192
physical 0: cores 0 1 2 3 4 5 6 7 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81
82 83 84 85 86 87 88 89 90 91 92 93 94 95
```

From lscpu from util-linux 2.37.2:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 192
On-line CPU(s) list: 0-191
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9654 96-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 2
Core(s) per socket: 96
Socket(s): 1
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3709.0000
CPU min MHz: 400.0000
BogoMIPS: 4800.04
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 nonstop_tsc cpuid extd_apicid
aperfmpperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid 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
bpxext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc arat
```

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### Platform Notes (Continued)

```

npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq
la57 rdpid overflow_recov succor smca fsrm flush_lld
Virtualization: AMD-V
L1d cache: 3 MiB (96 instances)
L1i cache: 3 MiB (96 instances)
L2 cache: 96 MiB (96 instances)
L3 cache: 384 MiB (12 instances)
NUMA node(s): 12
NUMA node0 CPU(s): 0-7,96-103
NUMA node1 CPU(s): 8-15,104-111
NUMA node2 CPU(s): 16-23,112-119
NUMA node3 CPU(s): 24-31,120-127
NUMA node4 CPU(s): 32-39,128-135
NUMA node5 CPU(s): 40-47,136-143
NUMA node6 CPU(s): 48-55,144-151
NUMA node7 CPU(s): 56-63,152-159
NUMA node8 CPU(s): 64-71,160-167
NUMA node9 CPU(s): 72-79,168-175
NUMA node10 CPU(s): 80-87,176-183
NUMA node11 CPU(s): 88-95,184-191
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user
pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW,
STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	3M	8	Data	1	64	1	64
L1i	32K	3M	8	Instruction	1	64	1	64
L2	1M	96M	8	Unified	2	2048	1	64
L3	32M	384M	16	Unified	3	32768	1	64

/proc/cpuinfo cache data  
cache size : 1024 KB

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### Platform Notes (Continued)

```

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 12 nodes (0-11)
node 0 cpus: 0 1 2 3 4 5 6 7 96 97 98 99 100 101 102 103
node 0 size: 96513 MB
node 0 free: 95612 MB
node 1 cpus: 8 9 10 11 12 13 14 15 104 105 106 107 108 109 110 111
node 1 size: 96762 MB
node 1 free: 95981 MB
node 2 cpus: 16 17 18 19 20 21 22 23 112 113 114 115 116 117 118 119
node 2 size: 96762 MB
node 2 free: 95957 MB
node 3 cpus: 24 25 26 27 28 29 30 31 120 121 122 123 124 125 126 127
node 3 size: 96762 MB
node 3 free: 95933 MB
node 4 cpus: 32 33 34 35 36 37 38 39 128 129 130 131 132 133 134 135
node 4 size: 96762 MB
node 4 free: 95939 MB
node 5 cpus: 40 41 42 43 44 45 46 47 136 137 138 139 140 141 142 143
node 5 size: 96727 MB
node 5 free: 95894 MB
node 6 cpus: 48 49 50 51 52 53 54 55 144 145 146 147 148 149 150 151
node 6 size: 96762 MB
node 6 free: 95871 MB
node 7 cpus: 56 57 58 59 60 61 62 63 152 153 154 155 156 157 158 159
node 7 size: 96762 MB
node 7 free: 95984 MB
node 8 cpus: 64 65 66 67 68 69 70 71 160 161 162 163 164 165 166 167
node 8 size: 96711 MB
node 8 free: 95885 MB
node 9 cpus: 72 73 74 75 76 77 78 79 168 169 170 171 172 173 174 175
node 9 size: 96762 MB
node 9 free: 95934 MB
node 10 cpus: 80 81 82 83 84 85 86 87 176 177 178 179 180 181 182 183
node 10 size: 96762 MB
node 10 free: 95938 MB
node 11 cpus: 88 89 90 91 92 93 94 95 184 185 186 187 188 189 190 191
node 11 size: 96762 MB
node 11 free: 95960 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11
  0: 10 11 11 11 11 11 11 11 11 11 11 11
  1: 11 10 11 11 11 11 11 11 11 11 11 11
  2: 11 11 10 11 11 11 11 11 11 11 11 11
  3: 11 11 11 10 11 11 11 11 11 11 11 11
  4: 11 11 11 11 10 11 11 11 11 11 11 11
  5: 11 11 11 11 11 10 11 11 11 11 11 11

```

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### Platform Notes (Continued)

6:	11	11	11	11	11	11	10	11	11	11	11	11
7:	11	11	11	11	11	11	11	10	11	11	11	11
8:	11	11	11	11	11	11	11	11	10	11	11	11
9:	11	11	11	11	11	11	11	11	11	10	11	11
10:	11	11	11	11	11	11	11	11	11	11	10	11
11:	11	11	11	11	11	11	11	11	11	11	11	10

From /proc/meminfo

MemTotal: 1188677460 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has performance

/usr/bin/lsb\_release -d  
Ubuntu 22.04.1 LTS

From /etc/\*release\* /etc/\*version\*

debian\_version: bookworm/sid  
os-release:  
PRETTY\_NAME="Ubuntu 22.04.1 LTS"  
NAME="Ubuntu"  
VERSION\_ID="22.04"  
VERSION="22.04.1 LTS (Jammy Jellyfish)"  
VERSION\_CODENAME=jammy  
ID=ubuntu  
ID\_LIKE=debian  
HOME\_URL="https://www.ubuntu.com/"

uname -a:

Linux sysv 5.15.0-48-generic #54-Ubuntu SMP Fri Aug 26 13:26:29 UTC 2022 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
mmio_stale_data:	Not affected
retbleed:	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

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```

CVE-2017-5715 (Spectre variant 2): sanitization
Mitigation: Retpolines, IBPB:
conditional, IBRS_FW, STIBP:
always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Oct 22 00:50

SPEC is set to: /root/spec-cpu2017-Genoa-A1
Filesystem                Type      Size  Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4      98G   21G   73G   23% /

From /sys/devices/virtual/dmi/id
Vendor:          Supermicro
Product:         Super Server
Product Family: SMC H13
Serial:         123456789

Additional information from dmidecode 3.3 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:
  12x Micron Technology MTC40F204WS1RC48BBZ 96 GB 2 rank 4800

BIOS:
  BIOS Vendor:    American Megatrends International, LLC.
  BIOS Version:   1.0
  BIOS Date:     10/14/2022
  BIOS Revision: 5.27

(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)
-----
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

```

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### Compiler Version Notes (Continued)

=====  
C++ | 508.namd\_r(base, peak) 510.parest\_r(base, peak)  
=====

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin  
=====

=====  
C++, C | 511.povray\_r(base, peak) 526.blender\_r(base, peak)  
=====

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin  
=====

=====  
C++, C, Fortran | 507.cactuBSSN\_r(base, peak)  
=====

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
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Thread model: posix  
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### Compiler Version Notes (Continued)

Fortran | 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak)  
| 554.roms\_r(base, peak)

-----  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin  
-----

=====  
Fortran, C | 521.wrf\_r(base, peak) 527.cam4\_r(base, peak)

-----  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin  
AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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



# SPEC CPU®2017 Floating Point Rate Result

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## Supermicro

A+ Server 2015CS-TNR  
(H13SSW , AMD EPYC 9654)

SPECrate®2017\_fp\_base = 624

SPECrate®2017\_fp\_peak = 679

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

**Test Date:** Oct-2022  
**Hardware Availability:** Nov-2022  
**Software Availability:** Nov-2022

## 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 -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:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -lamdlibm -lamdalloc -lflang
```

### C++ benchmarks:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang
```

### Fortran benchmarks:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang
```

(Continued on next page)



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## Supermicro

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**Tested by:** Supermicro

**Test Date:** Oct-2022  
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**Software Availability:** Nov-2022

## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

Benchmarks using both C and C++:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

## Base Other Flags

C benchmarks:

-Wno-unused-command-line-argument

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

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## Supermicro

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## Base Other Flags (Continued)

Benchmarks using both Fortran and C:  
-Wno-unused-command-line-argument

Benchmarks using both C and C++:  
-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:  
-Wno-unused-command-line-argument

## 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: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver4 -fveclib=AMDLIBM -ffast-math
```

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## Peak Optimization Flags (Continued)

519.lbm\_r (continued):

```
-fstruct-layout=7 -mllvm -unroll-threshold=50  
-fremap-arrays -fstrip-mining  
-mllvm -inline-threshold=1000  
-mllvm -reduce-array-computations=3 -zopt -lamdlibm  
-lamdalloc
```

538.imagick\_r: basepeak = yes

544.nab\_r: basepeak = yes

C++ benchmarks:

508.namd\_r: basepeak = yes

```
510.parest_r: -m64 -flto -Wl,-mllvm -Wl,-suppress-fmas  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast  
-march=znver4 -fveclib=AMDLIBM -ffast-math  
-finline-aggressive -mllvm -unroll-threshold=100  
-mllvm -reduce-array-computations=3 -zopt -lamdlibm  
-lamdalloc
```

Fortran benchmarks:

```
503.bwaves_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast  
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive  
-mllvm -reduce-array-computations=3  
-fepilog-vectorization-of-inductions -zopt -lamdlibm  
-lamdalloc -lflang
```

```
549.fotonik3d_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast  
-march=znver4 -fveclib=AMDLIBM -ffast-math -Kieee  
-Mrecursive -mllvm -reduce-array-computations=3  
-fepilog-vectorization-of-inductions -fvector-transform  
-fscalar-transform -lamdlibm -lamdalloc -lflang
```

554.roms\_r: Same as 503.bwaves\_r

Benchmarks using both Fortran and C:

```
521.wrf_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3
```

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## Peak Optimization Flags (Continued)

521.wrf\_r (continued):

```
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

527.cam4\_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-Kieeee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

Benchmarks using both C and C++:

511.povray\_r: basepeak = yes

526.blender\_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN\_r: basepeak = yes

## Peak Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

Benchmarks using both Fortran and C:

```
-Wno-unused-command-line-argument
```

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## Peak Other Flags (Continued)

Benchmarks using both C and C++:  
-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:  
-Wno-unused-command-line-argument

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

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>  
<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Genoa-revB.html>

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

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>  
<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-Genoa-revB.xml>

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