SPEC CPU®2017 Floating Point Rate Result

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GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

$SPECrate®2017\_fp\_base = 1410$

$SPECrate®2017\_fp\_peak = 1540$

CPU2017 License: 9082	**Test Date:** Jun-2023
Test Sponsor: Giga Computing Technology Co., Ltd.	**Hardware Availability:** Jun-2023
Tested by: Giga Computing Technology Co., Ltd.	**Software Availability:** Nov-2022

Copies

- 503.bwaves_r 256 — 1760
- 507.cactuBSSN_r 256 — 1610
- 508.namd_r 256 — 1540; **512** — 1640
- 510.parest_r 256 — 994; **128** — 1160
- 511.povray_r 256 — 2040; **512** — 2340
- 519.lbm_r 256 — 599
- 521.wrf_r 256 — 934; **128** — 1130
- 526.blender_r 256 — 1670; **512** — 1970
- 527.cam4_r 256 — 1650; 1680
- 538.imagick_r 256 — 7380; **512** — 8330
- 544.nab_r 256 — 2900; **512** — 3570
- 549.fotonik3d_r 256 — 568
- 554.roms_r 256 — 509; **128** — 552

——— SPECrate®2017_fp_base (1410)   ---- SPECrate®2017_fp_peak (1540)

Hardware

CPU Name: AMD EPYC 9754
Max MHz: 3100
Nominal: 2250
Enabled: 256 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 256 MB I+D on chip per chip, 16 MB shared / 8 cores
Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 1.92TB PCIE NVME SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86_64) 5.14.21-150400.22-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version F07 released Mar-2023
File System: xfs
System State: Run level 3 (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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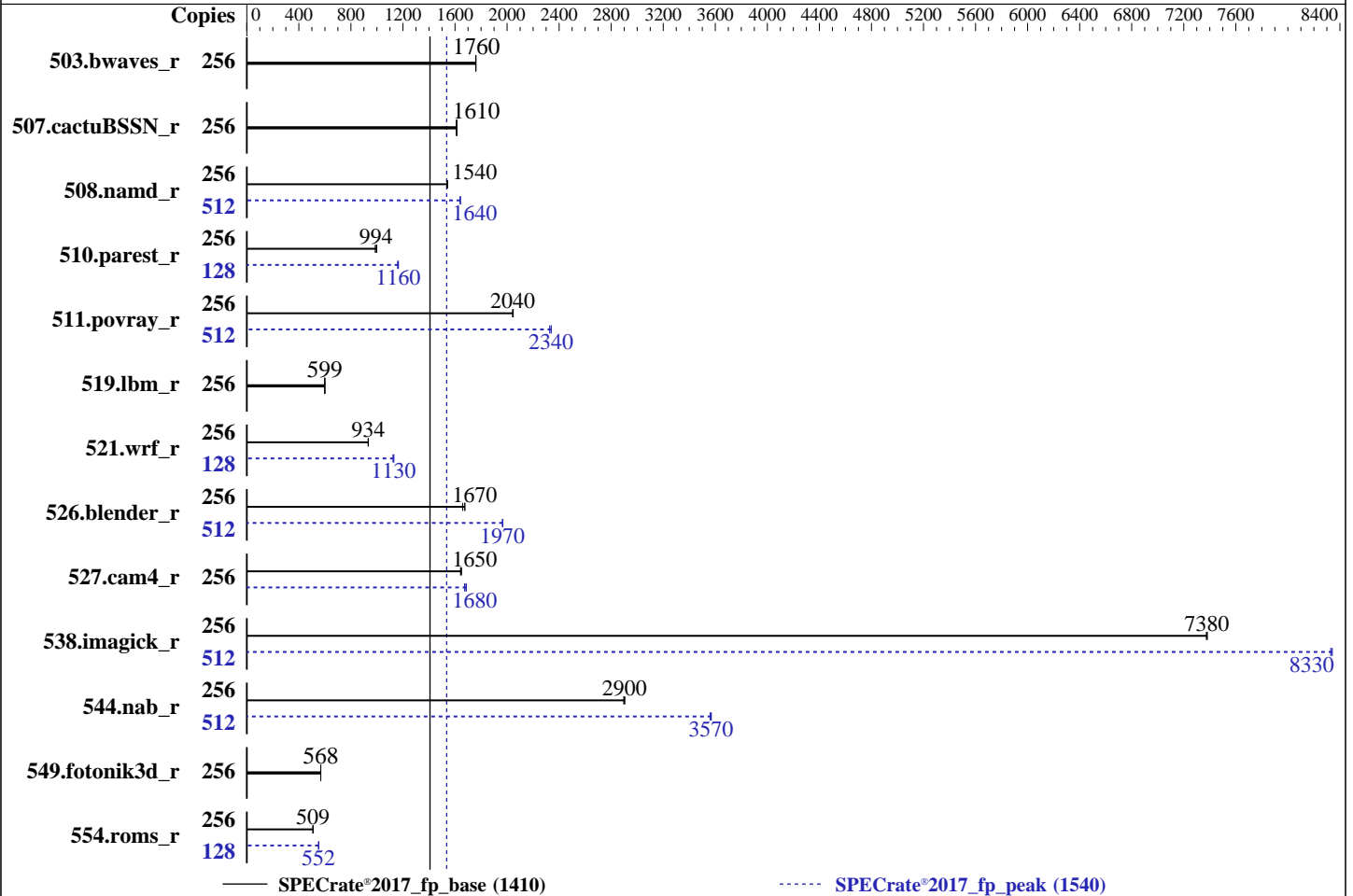SPECrate®2017_fp_base = 1410

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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	256	1460	1760	**1459**	**1760**	1458	1760	256	1460	1760	**1459**	**1760**	1458	1760
507.cactuBSSN_r	256	201	1610	201	1610	**201**	**1610**	256	201	1610	201	1610	**201**	**1610**
508.namd_r	256	158	1540	**158**	**1540**	158	1540	512	**296**	**1640**	296	1640	297	1640
510.parest_r	256	679	987	**673**	**994**	671	998	128	289	1160	**288**	**1160**	287	1170
511.povray_r	256	293	2040	292	2050	**292**	**2040**	512	514	2330	**511**	**2340**	511	2340
519.lbm_r	256	450	600	451	599	**450**	**599**	256	450	600	451	599	**450**	**599**
521.wrf_r	256	**614**	**934**	615	932	614	934	128	254	1130	255	1120	**254**	**1130**
526.blender_r	256	233	1680	**233**	**1670**	235	1660	512	396	1970	397	1960	**397**	**1970**
527.cam4_r	256	273	1640	**272**	**1650**	271	1650	256	265	1690	**266**	**1680**	268	1670
538.imagick_r	256	86.3	7370	86.3	7380	**86.3**	**7380**	512	153	8330	153	8340	**153**	**8330**
544.nab_r	256	148	2900	**148**	**2900**	149	2900	512	241	3570	242	3560	**242**	**3570**
549.fotonik3d_r	256	1756	568	1754	569	**1756**	**568**	256	1756	568	1754	569	**1756**	**568**
554.roms_r	256	801	508	799	509	**799**	**509**	128	**369**	**552**	369	551	368	553

SPECrate®2017_fp_base =	**1410**
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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 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.
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,
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/

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Operating System Notes (Continued)

```
'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 =
     "/home/cpu2017_znver4_A1/amd_rate_aocc400_znver4_A_lib/lib:/home/cpu2017_znver4_A1/amd_rate_aocc400_zn
     ver4_A_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:
SEV Control = Disable
TSME = Disabled
Determinism Control = Manual
Determinism Enable = Power
TDP Control = Manual
TDP = 400
PPT Control = Manual
PPT = 400

 Sysinfo program /home/cpu2017_znver4_A1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Thu Jun  1 18:27:42 2023

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

 -------------------------------------------------------
 Table of contents
 -------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
```

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Platform Notes (Continued)

```
 11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
 15. cpupower frequency-info
 16. tuned-adm active
 17. sysctl
 18. /sys/kernel/mm/transparent_hugepage
 19. /sys/kernel/mm/transparent_hugepage/khugepaged
 20. OS release
 21. Disk information
 22. /sys/devices/virtual/dmi/id
 23. dmidecode
 24. BIOS
    ------------------------------------------------------------


    ------------------------------------------------------------
 1. uname -a
   Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
   x86_64 x86_64 x86_64 GNU/Linux


    ------------------------------------------------------------
 2. w
    18:27:42 up  8:01,  2 users,  load average: 0.50, 0.36, 42.84
   USER      TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root      tty1     -                10:29   30.00s 1.93s  0.39s /bin/bash ./amd_rate_aocc400_znver4_A1.sh
   root      pts/0    10.1.116.39      14:09    3:49m 0.05s  0.05s -bash


    ------------------------------------------------------------
 3. Username
   From environment variable $USER:  root


    ------------------------------------------------------------
 4. ulimit -a
   core file size          (blocks, -c) unlimited
   data seg size           (kbytes, -d) unlimited
   scheduling priority             (-e) 0
   file size               (blocks, -f) unlimited
   pending signals                 (-i) 6190496
   max locked memory       (kbytes, -l) 2097152
   max memory size         (kbytes, -m) unlimited
   open files                      (-n) 1024000
   pipe size            (512 bytes, -p) 8
   POSIX message queues     (bytes, -q) 819200
   real-time priority              (-r) 0
   stack size              (kbytes, -s) unlimited
   cpu time               (seconds, -t) unlimited
   max user processes              (-u) 6190496
   virtual memory          (kbytes, -v) unlimited
   file locks                      (-x) unlimited


    ------------------------------------------------------------
 5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   login -- root
   -bash
   python3 ./run_amd_rate_aocc400_znver4_A1.py
   /bin/bash ./amd_rate_aocc400_znver4_A1.sh
   runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fprate
   runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
```

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Platform Notes (Continued)

```
    --runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
    $SPEC/tmp/CPU2017.003/templogs/preenv.fprate.003.0.log --lognum 003.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017_znver4_A1


    -----------------------------------------------------------
 6. /proc/cpuinfo
    model name         : AMD EPYC 9754 128-Core Processor
    vendor_id          : AuthenticAMD
    cpu family         : 25
    model              : 160
    stepping           : 1
    microcode          : 0xaa00107
    bugs               : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size           : 3584 4K pages
    cpu cores          : 128
    siblings           : 256
    2 physical ids (chips)
    512 processors (hardware threads)
    physical id 0: core ids 0-127
    physical id 1: core ids 0-127
    physical id 0: apicids 0-255
    physical id 1: apicids 256-511
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.


    -----------------------------------------------------------
 7. lscpu

 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):                  512
   On-line CPU(s) list:     0-511
   Vendor ID:               AuthenticAMD
   Model name:              AMD EPYC 9754 128-Core Processor
   CPU family:              25
   Model:                   160
   Thread(s) per core:      2
   Core(s) per socket:      128
   Socket(s):               2
   Stepping:                1
   Frequency boost:         enabled
   CPU max MHz:             3100.3411
   CPU min MHz:             1500.0000
   BogoMIPS:                4499.87
   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 aperfmperf 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 bpext 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 arat npt lbrv
```

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Platform Notes (Continued)

```
                              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_l1d
     Virtualization:          AMD-V
     L1d cache:               8 MiB (256 instances)
     L1i cache:               8 MiB (256 instances)
     L2 cache:                256 MiB (256 instances)
     L3 cache:                512 MiB (32 instances)
     NUMA node(s):            32
     NUMA node0 CPU(s):       0-7,256-263
     NUMA node1 CPU(s):       8-15,264-271
     NUMA node2 CPU(s):       16-23,272-279
     NUMA node3 CPU(s):       24-31,280-287
     NUMA node4 CPU(s):       32-39,288-295
     NUMA node5 CPU(s):       40-47,296-303
     NUMA node6 CPU(s):       48-55,304-311
     NUMA node7 CPU(s):       56-63,312-319
     NUMA node8 CPU(s):       64-71,320-327
     NUMA node9 CPU(s):       72-79,328-335
     NUMA node10 CPU(s):      80-87,336-343
     NUMA node11 CPU(s):      88-95,344-351
     NUMA node12 CPU(s):      96-103,352-359
     NUMA node13 CPU(s):      104-111,360-367
     NUMA node14 CPU(s):      112-119,368-375
     NUMA node15 CPU(s):      120-127,376-383
     NUMA node16 CPU(s):      128-135,384-391
     NUMA node17 CPU(s):      136-143,392-399
     NUMA node18 CPU(s):      144-151,400-407
     NUMA node19 CPU(s):      152-159,408-415
     NUMA node20 CPU(s):      160-167,416-423
     NUMA node21 CPU(s):      168-175,424-431
     NUMA node22 CPU(s):      176-183,432-439
     NUMA node23 CPU(s):      184-191,440-447
     NUMA node24 CPU(s):      192-199,448-455
     NUMA node25 CPU(s):      200-207,456-463
     NUMA node26 CPU(s):      208-215,464-471
     NUMA node27 CPU(s):      216-223,472-479
     NUMA node28 CPU(s):      224-231,480-487
     NUMA node29 CPU(s):      232-239,488-495
     NUMA node30 CPU(s):      240-247,496-503
     NUMA node31 CPU(s):      248-255,504-511
     Vulnerability Itlb multihit:   Not affected
     Vulnerability L1tf:            Not affected
     Vulnerability Mds:             Not affected
     Vulnerability Meltdown:        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       8M    8 Data           1     64        1             64
       L1i       32K       8M    8 Instruction    1     64        1             64
       L2         1M     256M    8 Unified        2   2048        1             64
       L3        16M     512M   16 Unified        3  16384        1             64
```

(Continued on next page)

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Platform Notes (Continued)

```
   -------------------------------------------------------------
   8. numactl --hardware
   NOTE: a numactl 'node' might or might not correspond to a physical chip.
     available: 32 nodes (0-31)
     node 0 cpus: 0-7,256-263
     node 0 size: 48114 MB
     node 0 free: 46989 MB
     node 1 cpus: 8-15,264-271
     node 1 size: 48379 MB
     node 1 free: 47759 MB
     node 2 cpus: 16-23,272-279
     node 2 size: 48379 MB
     node 2 free: 47759 MB
     node 3 cpus: 24-31,280-287
     node 3 size: 48379 MB
     node 3 free: 47735 MB
     node 4 cpus: 32-39,288-295
     node 4 size: 48379 MB
     node 4 free: 47690 MB
     node 5 cpus: 40-47,296-303
     node 5 size: 48379 MB
     node 5 free: 47741 MB
     node 6 cpus: 48-55,304-311
     node 6 size: 48379 MB
     node 6 free: 47730 MB
     node 7 cpus: 56-63,312-319
     node 7 size: 48379 MB
     node 7 free: 47724 MB
     node 8 cpus: 64-71,320-327
     node 8 size: 48379 MB
     node 8 free: 47718 MB
     node 9 cpus: 72-79,328-335
     node 9 size: 48379 MB
     node 9 free: 47724 MB
     node 10 cpus: 80-87,336-343
     node 10 size: 48379 MB
     node 10 free: 47731 MB
     node 11 cpus: 88-95,344-351
     node 11 size: 48379 MB
     node 11 free: 47735 MB
     node 12 cpus: 96-103,352-359
     node 12 size: 48379 MB
     node 12 free: 47682 MB
     node 13 cpus: 104-111,360-367
     node 13 size: 48379 MB
     node 13 free: 46535 MB
     node 14 cpus: 112-119,368-375
     node 14 size: 48379 MB
     node 14 free: 47731 MB
     node 15 cpus: 120-127,376-383
     node 15 size: 48379 MB
     node 15 free: 47662 MB
     node 16 cpus: 128-135,384-391
     node 16 size: 48379 MB
     node 16 free: 47751 MB
     node 17 cpus: 136-143,392-399
     node 17 size: 48379 MB
     node 17 free: 47747 MB
     node 18 cpus: 144-151,400-407
     node 18 size: 48379 MB
```

(Continued on next page)

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Platform Notes (Continued)

```
    node 18 free: 47745 MB
    node 19 cpus: 152-159,408-415
    node 19 size: 48379 MB
    node 19 free: 47735 MB
    node 20 cpus: 160-167,416-423
    node 20 size: 48377 MB
    node 20 free: 47749 MB
    node 21 cpus: 168-175,424-431
    node 21 size: 48381 MB
    node 21 free: 47751 MB
    node 22 cpus: 176-183,432-439
    node 22 size: 48377 MB
    node 22 free: 47752 MB
    node 23 cpus: 184-191,440-447
    node 23 size: 48347 MB
    node 23 free: 47725 MB
    node 24 cpus: 192-199,448-455
    node 24 size: 48379 MB
    node 24 free: 47756 MB
    node 25 cpus: 200-207,456-463
    node 25 size: 48379 MB
    node 25 free: 47761 MB
    node 26 cpus: 208-215,464-471
    node 26 size: 48379 MB
    node 26 free: 47761 MB
    node 27 cpus: 216-223,472-479
    node 27 size: 48379 MB
    node 27 free: 47748 MB
    node 28 cpus: 224-231,480-487
    node 28 size: 48379 MB
    node 28 free: 47761 MB
    node 29 cpus: 232-239,488-495
    node 29 size: 48379 MB
    node 29 free: 47748 MB
    node 30 cpus: 240-247,496-503
    node 30 size: 48379 MB
    node 30 free: 47724 MB
    node 31 cpus: 248-255,504-511
    node 31 size: 48171 MB
    node 31 free: 47544 MB
    node distances:
    node   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
      0:  10  11  11  11  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      1:  11  10  11  11  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      2:  11  11  10  11  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      3:  11  11  11  10  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      4:  12  12  12  12  10  11  11  11  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      5:  12  12  12  12  11  10  11  11  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      6:  12  12  12  12  11  11  10  11  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      7:  12  12  12  12  11  11  11  10  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
      32  32  32  32  32  32  32
      8:  12  12  12  12  12  12  12  12  10  11  11  11  12  12  12  12  32  32  32  32  32  32  32  32  32
```

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GIGA-BYTE TECHNOLOGY CO., LTD.

SPECrate®2017_fp_base = 1410

(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000

SPECrate®2017_fp_peak = 1540

(AMD EPYC 9754, 2.25GHz)

CPU2017 License: 9082	**Test Date:** Jun-2023
Test Sponsor: Giga Computing Technology Co., Ltd.	**Hardware Availability:** Jun-2023
Tested by: Giga Computing Technology Co., Ltd.	**Software Availability:** Nov-2022

Platform Notes (Continued)

```
    32  32  32   32   32   32   32
 9:  12  12  12   12   12   12  12  12  11  10  11  11  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
10:  12  12  12   12   12   12  12  12  11  11  10  11  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
11:  12  12  12   12   12   12  12  12  11  11  11  10  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
12:  12  12  12   12   12   12  12  12  12  12  12  12  10  11  11  11  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
13:  12  12  12   12   12   12  12  12  12  12  12  12  11  10  11  11  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
14:  12  12  12   12   12   12  12  12  12  12  12  12  11  11  10  11  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
15:  12  12  12   12   12   12  12  12  12  12  12  12  11  11  11  10  32  32  32  32  32  32  32  32  32
    32  32  32   32   32   32   32
16:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  10  11  11  11  12  12  12  12  12
    12  12  12   12   12   12   12
17:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  11  10  11  11  12  12  12  12  12
    12  12  12   12   12   12   12
18:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  11  11  10  11  12  12  12  12  12
    12  12  12   12   12   12   12
19:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  11  11  11  10  12  12  12  12  12
    12  12  12   12   12   12   12
20:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  10  11  11  11  12
    12  12  12   12   12   12   12
21:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  11  10  11  11  12
    12  12  12   12   12   12
22:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  11  11  10  11  12
    12  12  12   12   12   12   12
23:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  11  11  11  10  12
    12  12  12   12   12   12   12
24:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  10
    11  11  11   12   12   12
25:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  11
    10  11  11   12   12   12   12
26:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  11
    11  10  11   12   12   12   12
27:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  11
    11  11  10   12   12   12
28:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12
    12  12  12   10   11   11   11
29:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12
    12  12  12   11   10   11   11
30:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12
    12  12  12   11   11   10   11
31:  32  32  32   32   32   32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12
    12  12  12   11   11   11   10

    -----------------------------------------------------------
 9. /proc/meminfo
      MemTotal:       1584791428 kB


    -----------------------------------------------------------
10. who -r
      run-level 3 Jun 1 10:28


    -----------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
     Default Target  Status
     multi-user      degraded
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1540

CPU2017 License: 9082

Test Sponsor: Giga Computing Technology Co., Ltd.

Tested by: Giga Computing Technology Co., Ltd.

Test Date: Jun-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Platform Notes (Continued)

```
      ----------------------------------------------------------
      12. Failed units, from systemctl list-units --state=failed
         UNIT                      LOAD   ACTIVE SUB    DESCRIPTION
       * systemd-udev-settle.service loaded failed failed Wait for udev To Complete Device Initialization

      ----------------------------------------------------------
      13. Services, from systemctl list-unit-files
         STATE            UNIT FILES
         enabled          YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager getty@ haveged
                          irqbalance issue-generator kbdsettings klog lvm2-monitor nscd nvmefc-boot-connections
                          postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4
                          wickedd-dhcp6 wickedd-nanny
         enabled-runtime  systemd-remount-fs
         disabled         accounts-daemon autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates
                          chrony-wait chronyd console-getty cups cups-browsed debug-shell ebtables
                          exchange-bmc-os-info fancontrol firewalld gpm grub2-once haveged-switch-root ipmi ipmievd
                          issue-add-ssh-keys kdump kdump-early kexec-load lm_sensors lunmask man-db-create
                          multipathd nfs nfs-blkmap nvmf-autoconnect rdisc rpcbind rpmconfigcheck rsyncd runssj
                          serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
                          systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
                          udisks2
         indirect         wickedd

      ----------------------------------------------------------
      14. Linux kernel boot-time arguments, from /proc/cmdline
         BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
         root=UUID=d7640ab6-1cf7-45d7-8b8e-5805bbb10001
         splash=silent
         resume=/dev/disk/by-uuid/5c9fc2ce-054f-420c-8d23-68348791fb2a
         mitigations=auto
         quiet
         security=apparmor

      ----------------------------------------------------------
      15. cpupower frequency-info
         analyzing CPU 0:
           current policy: frequency should be within 1.50 GHz and 2.25 GHz.
                           The governor "performance" may decide which speed to use
                           within this range.
           boost state support:
             Supported: yes
             Active: yes

      ----------------------------------------------------------
      16. tuned-adm active
         It seems that tuned daemon is not running, preset profile is not activated.
         Preset profile: throughput-performance

      ----------------------------------------------------------
      17. sysctl
         kernel.numa_balancing           1
         kernel.randomize_va_space       0
         vm.compaction_proactiveness     20
         vm.dirty_background_bytes       0
         vm.dirty_background_ratio       10
         vm.dirty_bytes                  0
         vm.dirty_expire_centisecs       3000
         vm.dirty_ratio                  8
         vm.dirty_writeback_centisecs    500
```

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GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

$SPECrate^{®}2017\_fp\_base = 1410$

$SPECrate^{®}2017\_fp\_peak = 1540$

CPU2017 License: 9082

Test Sponsor: Giga Computing Technology Co., Ltd.

Tested by: Giga Computing Technology Co., Ltd.

Test Date: Jun-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Platform Notes (Continued)

```
   vm.dirtytime_expire_seconds    43200
   vm.extfrag_threshold             500
   vm.min_unmapped_ratio              1
   vm.nr_hugepages                    0
   vm.nr_hugepages_mempolicy          0
   vm.nr_overcommit_hugepages         0
   vm.swappiness                      1
   vm.watermark_boost_factor      15000
   vm.watermark_scale_factor         10
   vm.zone_reclaim_mode               1


   ----------------------------------------------------------------
18. /sys/kernel/mm/transparent_hugepage
   defrag         [always] defer defer+madvise madvise never
   enabled        [always] madvise never
   hpage_pmd_size 2097152
   shmem_enabled  always within_size advise [never] deny force


   ----------------------------------------------------------------
19. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs  60000
   defrag                     1
   max_ptes_none            511
   max_ptes_shared          256
   max_ptes_swap             64
   pages_to_scan           4096
   scan_sleep_millisecs   10000


   ----------------------------------------------------------------
20. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP4


   ----------------------------------------------------------------
21. Disk information
SPEC is set to: /home/cpu2017_znver4_A1
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/nvme0n1p3 xfs   237G  6.7G  230G   3% /home


   ----------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
     Vendor:         GIGABYTE
     Product:        R283-Z90-AAD1-000
     Product Family: Server
     Serial:         GMG6D1212A0002


   ----------------------------------------------------------------
23. dmidecode
   Additional information from dmidecode 3.2 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:
     24x Micron Technology MTC40F2046S1RC48BA1 64 GB 2 rank 4800


   ----------------------------------------------------------------
24. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       GIGABYTE
```

(Continued on next page)

GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1540

CPU2017 License: 9082   **Test Date:** Jun-2023
Test Sponsor: Giga Computing Technology Co., Ltd.   **Hardware Availability:** Jun-2023
Tested by: Giga Computing Technology Co., Ltd.   **Software Availability:** Nov-2022

Platform Notes (Continued)

```
     BIOS Version:      F07
     BIOS Date:         03/17/2023
     BIOS Revision:     5.27
```

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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++              | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran  | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
```

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GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1540

CPU2017 License: 9082

Test Sponsor: Giga Computing Technology Co., Ltd.

Tested by: Giga Computing Technology Co., Ltd.

Test Date: Jun-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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`

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`

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

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GIGA-BYTE TECHNOLOGY CO., LTD.
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R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1540

CPU2017 License: 9082   **Test Date:**   Jun-2023
Test Sponsor: Giga Computing Technology Co., Ltd.   **Hardware Availability:** Jun-2023
Tested by: Giga Computing Technology Co., Ltd.   **Software Availability:**   Nov-2022

Base Portability Flags (Continued)

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
```

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
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
```

(Continued on next page)

       Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

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GIGA-BYTE TECHNOLOGY CO., LTD.
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R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1540

CPU2017 License: 9082		**Test Date:**	Jun-2023
Test Sponsor:	Giga Computing Technology Co., Ltd.	**Hardware Availability:**	Jun-2023
Tested by:	Giga Computing Technology Co., Ltd.	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-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
-fremap-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
-fremap-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
```

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
```

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SPEC CPU®2017 Floating Point Rate Result

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GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9754, 2.25GHz)

SPECrate®2017_fp_base = 1410

SPECrate®2017_fp_peak = 1540

CPU2017 License: 9082

Test Sponsor: Giga Computing Technology Co., Ltd.

Tested by: Giga Computing Technology Co., Ltd.

Test Date: Jun-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
flang
```

Benchmarks using both Fortran and C:
```
flang clang
```

Benchmarks using both C and C++:
```
clang++ clang
```

Benchmarks using Fortran, C, and C++:
```
clang++ clang flang
```

Peak Portability Flags

```
  Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mllvm -Wl,-reduce-array-computations=3 -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 -lamdlibm -lamdalloc`

544.nab_r: `-m64 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather -Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining -mllvm -inline-threshold=1000`

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Peak Optimization Flags (Continued)

544.nab_r (continued):
```
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

C++ benchmarks:

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

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: `basepeak = yes`

549.fotonik3d_r: `basepeak = yes`

554.roms_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
```

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
-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
```

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Peak Optimization Flags (Continued)

521.wrf_r (continued):
```
-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
-Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

Benchmarks using both C and C++:

511.povray_r: `-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
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm
-lamdalloc
```

526.blender_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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
-finline-aggressive -mllvm -unroll-threshold=100 -lamdlibm
-lamdalloc
```

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

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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
```

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/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.1-Bergamo.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/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.1-Bergamo.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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