SPEC CPU®2017 Floating Point Rate Result

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GIGA-BYTE TECHNOLOGY CO., LTD.

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

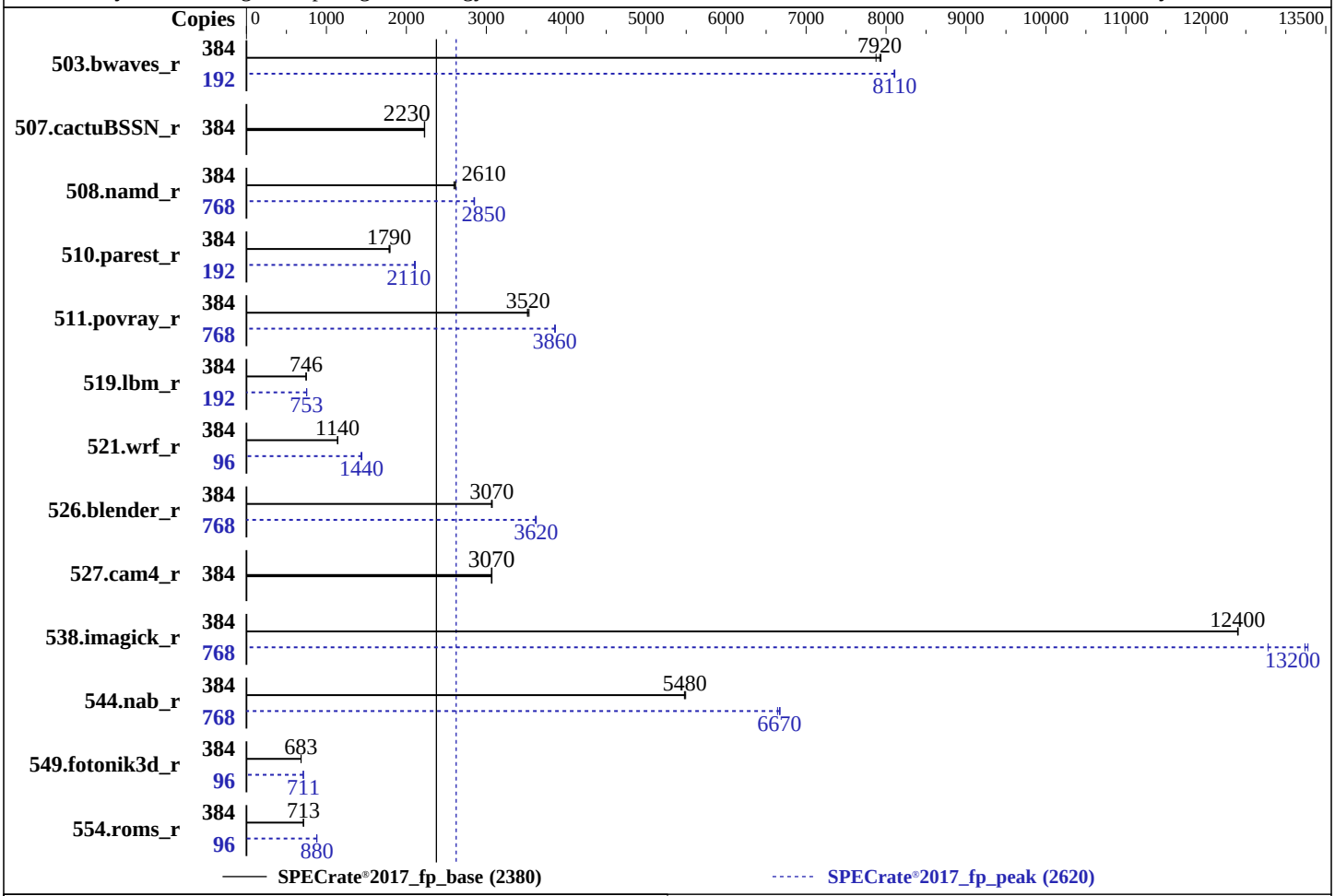
R183-Z93-LAJ1-000
(2.25 GHz, AMD EPYC 9965)

SPECrate®2017_fp_base = 2380

SPECrate®2017_fp_peak = 2620

CPU2017 License: 9082
Test Sponsor: Giga Computing Technology Co., Ltd.
Tested by: Giga Computing Technology Co., Ltd.

Test Date: Oct-2024
Hardware Availability: Oct-2024
Software Availability: Oct-2024



Hardware

CPU Name:	AMD EPYC 9965
Max MHz:	3700
Nominal:	2250
Enabled:	384 cores, 2 chips, 2 threads/core
Orderable:	1,2 chips
Cache L1:	32 KB I + 48 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 / 16 cores
Other:	None
Memory:	1536 GB (24 x 64 GB 2Rx4 PC5-6400B-R, running at 6000)
Storage:	1 x 3.5TB SSD
Other:	CPU Cooling: Air

Software

OS:	Ubuntu 22.04.05 LTS 5.15.0-122-generic
Compiler:	C/C++/Fortran: Version 5.0.0 of AOCC
Parallel:	No
Firmware:	Version R02_F19 released Sep-2024
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	384	489	7870	485	7940	**486**	**7920**	192	237	8110	238	8100	**237**	**8110**
507.cactuBSSN_r	384	**218**	**2230**	218	2230	218	2230	384	**218**	**2230**	218	2230	218	2230
508.namd_r	384	141	2590	140	2610	**140**	**2610**	768	**256**	**2850**	256	2850	256	2850
510.parest_r	384	**562**	**1790**	559	1800	563	1790	192	239	2100	**238**	**2110**	238	2110
511.povray_r	384	255	3510	**255**	**3520**	254	3530	768	**465**	**3860**	464	3860	465	3860
519.lbm_r	384	**542**	**746**	543	746	542	747	192	**269**	**753**	268	754	269	751
521.wrf_r	384	754	1140	**754**	**1140**	754	1140	96	149	1440	150	1430	**149**	**1440**
526.blender_r	384	**191**	**3070**	190	3070	191	3070	768	323	3630	324	3610	**323**	**3620**
527.cam4_r	384	219	3070	219	3070	**219**	**3070**	384	219	3070	219	3070	**219**	**3070**
538.imagick_r	384	77.0	12400	77.0	12400	**77.0**	**12400**	768	149	12800	**144**	**13200**	144	13300
544.nab_r	384	118	5490	118	5480	**118**	**5480**	768	195	6640	194	6670	**194**	**6670**
549.fotonik3d_r	384	2192	683	**2192**	**683**	2189	684	96	526	711	526	711	**526**	**711**
554.roms_r	384	855	714	856	712	**856**	**713**	96	174	879	173	880	**173**	**880**

SPECrate®2017_fp_base = 2380

SPECrate®2017_fp_peak = 2620

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,
'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/cpu2017_J/amd_rate_aocc500_znver5_A_lib/lib:/root/cpu2017_J/amd_rate_aocc500_znver5_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:
Power Policy Quick Settings = Best Performance
TDP Control = Manual
TDP = 500
PPT Control = Manual
PPT = 500
SMT Mode = Enabled

 Sysinfo program /root/cpu2017_J/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on mz43-g20 Tue Jan  2 03:19:43 2024

 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
 11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)
 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. sysctl
 17. /sys/kernel/mm/transparent_hugepage
 18. /sys/kernel/mm/transparent_hugepage/khugepaged
 19. OS release
 20. Disk information
```

(Continued on next page)

Platform Notes (Continued)

```
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS
------------------------------------------------------------

------------------------------------------------------------
1. uname -a
  Linux mz43-g20 5.15.0-122-generic #132-Ubuntu SMP Thu Aug 29 13:45:52 UTC 2024 x86_64 x86_64 x86_64
  GNU/Linux

------------------------------------------------------------
2. w
   03:19:43 up  1:11,  3 users,  load average: 0.30, 0.11, 0.04
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                02:10   50:37   0.01s  0.01s -bash
  test     pts/0    10.1.116.144     02:25   54:19   0.06s  0.01s sshd: test [priv]
  test     pts/1    10.1.116.144     02:25   31.00s  1.71s  0.06s sudo -i

------------------------------------------------------------
3. Username
  From environment variable $USER:  root
  From the command 'logname':       test

------------------------------------------------------------
4. ulimit -a
  time(seconds)        unlimited
  file(blocks)         unlimited
  data(kbytes)         unlimited
  stack(kbytes)        unlimited
  coredump(blocks)     0
  memory(kbytes)       unlimited
  locked memory(kbytes) 2097152
  process              6189535
  nofiles              1024
  vmemory(kbytes)      unlimited
  locks                unlimited
  rtprio               0

------------------------------------------------------------
5. sysinfo process ancestry
 /sbin/init
 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
 sshd: test [priv]
 sshd: test@pts/0
 -bash
 sudo -i
 sudo -i
 -bash
 python3 ./run_amd_rate_aocc500_znver5_A1.py
 /bin/bash ./amd_rate_aocc500_znver5_A1.sh
 runcpu --config amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 fprate
 runcpu --configfile amd_rate_aocc500_znver5_A1.cfg --tune all --reportable --iterations 3 --nopower
   --runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.001/templogs/preenv.fprate.001.0.log --lognum 001.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /root/cpu2017_J

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : AMD EPYC 9965 192-Core Processor
```

(Continued on next page)

Platform Notes (Continued)

```
     vendor_id       : AuthenticAMD
     cpu family      : 26
     model           : 17
     stepping        : 0
     microcode       : 0xb101021
     bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
     TLB size        : 192 4K pages
     cpu cores       : 192
     siblings        : 384
     2 physical ids (chips)
     768 processors (hardware threads)
     physical id 0: core ids 0-191
     physical id 1: core ids 0-191
     physical id 0: apicids 0-383
     physical id 1: apicids 512-895
   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):                               768
   On-line CPU(s) list:                  0-767
   Vendor ID:                            AuthenticAMD
   Model name:                           AMD EPYC 9965 192-Core Processor
   CPU family:                           26
   Model:                                17
   Thread(s) per core:                   2
   Core(s) per socket:                   192
   Socket(s):                            2
   Stepping:                             0
   Frequency boost:                      enabled
   CPU max MHz:                          3700.1951
   CPU min MHz:                          1500.0000
   BogoMIPS:                             4500.21
   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 ibrs_enhanced vmmcall fsgsbase tsc_adjust 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 avx_vnni avx512_bf16 clzero irperf xsaveerptr rdpru
                                         wbnoinvd amd_ppin cppc arat 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 bus_lock_detect movdiri movdir64b
                                         overflow_recov succor smca fsrm avx512_vp2intersect flush_l1d
   Virtualization:                       AMD-V
```

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Platform Notes (Continued)

```
  L1d cache:                             18 MiB (384 instances)
  L1i cache:                             12 MiB (384 instances)
  L2 cache:                              384 MiB (384 instances)
  L3 cache:                              768 MiB (24 instances)
  NUMA node(s):                          24
  NUMA node0 CPU(s):                     0-15,384-399
  NUMA node1 CPU(s):                     16-31,400-415
  NUMA node2 CPU(s):                     32-47,416-431
  NUMA node3 CPU(s):                     48-63,432-447
  NUMA node4 CPU(s):                     64-79,448-463
  NUMA node5 CPU(s):                     80-95,464-479
  NUMA node6 CPU(s):                     96-111,480-495
  NUMA node7 CPU(s):                     112-127,496-511
  NUMA node8 CPU(s):                     128-143,512-527
  NUMA node9 CPU(s):                     144-159,528-543
  NUMA node10 CPU(s):                    160-175,544-559
  NUMA node11 CPU(s):                    176-191,560-575
  NUMA node12 CPU(s):                    192-207,576-591
  NUMA node13 CPU(s):                    208-223,592-607
  NUMA node14 CPU(s):                    224-239,608-623
  NUMA node15 CPU(s):                    240-255,624-639
  NUMA node16 CPU(s):                    256-271,640-655
  NUMA node17 CPU(s):                    272-287,656-671
  NUMA node18 CPU(s):                    288-303,672-687
  NUMA node19 CPU(s):                    304-319,688-703
  NUMA node20 CPU(s):                    320-335,704-719
  NUMA node21 CPU(s):                    336-351,720-735
  NUMA node22 CPU(s):                    352-367,736-751
  NUMA node23 CPU(s):                    368-383,752-767
  Vulnerability Gather data sampling:    Not affected
  Vulnerability Itlb multihit:           Not affected
  Vulnerability L1tf:                    Not affected
  Vulnerability Mds:                     Not affected
  Vulnerability Meltdown:                Not affected
  Vulnerability Mmio stale data:         Not affected
  Vulnerability Reg file data sampling: Not affected
  Vulnerability Retbleed:                Not affected
  Vulnerability Spec rstack overflow:    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; Enhanced / Automatic IBRS; IBPB conditional; STIBP
                                         always-on; RSB filling; PBRSB-eIBRS Not affected; BHI Not affected
  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       48K      18M   12 Data            1    64        1             64
     L1i       32K      12M    8 Instruction     1    64        1             64
     L2         1M     384M   16 Unified         2  1024        1             64
     L3        32M     768M   16 Unified         3 32768        1             64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 24 nodes (0-23)
  node 0 cpus: 0-15,384-399
  node 0 size: 64064 MB
  node 0 free: 63474 MB
  node 1 cpus: 16-31,400-415
```

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Platform Notes (Continued)

```
node 1 size: 64504 MB
node 1 free: 63846 MB
node 2 cpus: 32-47,416-431
node 2 size: 64504 MB
node 2 free: 64103 MB
node 3 cpus: 48-63,432-447
node 3 size: 64504 MB
node 3 free: 63988 MB
node 4 cpus: 64-79,448-463
node 4 size: 64504 MB
node 4 free: 63847 MB
node 5 cpus: 80-95,464-479
node 5 size: 64504 MB
node 5 free: 63959 MB
node 6 cpus: 96-111,480-495
node 6 size: 64504 MB
node 6 free: 64155 MB
node 7 cpus: 112-127,496-511
node 7 size: 64504 MB
node 7 free: 64137 MB
node 8 cpus: 128-143,512-527
node 8 size: 64504 MB
node 8 free: 64097 MB
node 9 cpus: 144-159,528-543
node 9 size: 64504 MB
node 9 free: 64113 MB
node 10 cpus: 160-175,544-559
node 10 size: 64504 MB
node 10 free: 64086 MB
node 11 cpus: 176-191,560-575
node 11 size: 64504 MB
node 11 free: 64141 MB
node 12 cpus: 192-207,576-591
node 12 size: 64504 MB
node 12 free: 64218 MB
node 13 cpus: 208-223,592-607
node 13 size: 64504 MB
node 13 free: 64233 MB
node 14 cpus: 224-239,608-623
node 14 size: 64504 MB
node 14 free: 64233 MB
node 15 cpus: 240-255,624-639
node 15 size: 64504 MB
node 15 free: 64232 MB
node 16 cpus: 256-271,640-655
node 16 size: 64504 MB
node 16 free: 64228 MB
node 17 cpus: 272-287,656-671
node 17 size: 64504 MB
node 17 free: 64235 MB
node 18 cpus: 288-303,672-687
node 18 size: 64504 MB
node 18 free: 64235 MB
node 19 cpus: 304-319,688-703
node 19 size: 64504 MB
node 19 free: 64234 MB
node 20 cpus: 320-335,704-719
node 20 size: 64504 MB
node 20 free: 64235 MB
node 21 cpus: 336-351,720-735
```

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Platform Notes (Continued)

```
  node 21 size: 64504 MB
  node 21 free: 64207 MB
  node 22 cpus: 352-367,736-751
  node 22 size: 64456 MB
  node 22 free: 64171 MB
  node 23 cpus: 368-383,752-767
  node 23 size: 64386 MB
  node 23 free: 64114 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
    0:  10  11  11  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    1:  11  10  11  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    2:  11  11  10  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    3:  12  12  12  10  11  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    4:  12  12  12  11  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    5:  12  12  12  11  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    6:  12  12  12  12  12  12  10  11  11  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    7:  12  12  12  12  12  12  11  10  11  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    8:  12  12  12  12  12  12  11  11  10  12  12  12  32  32  32  32  32  32  32  32  32  32  32  32
    9:  12  12  12  12  12  12  12  12  12  10  11  11  32  32  32  32  32  32  32  32  32  32  32  32
   10:  12  12  12  12  12  12  12  12  12  11  10  11  32  32  32  32  32  32  32  32  32  32  32  32
   11:  12  12  12  12  12  12  12  12  12  11  11  10  32  32  32  32  32  32  32  32  32  32  32  32
   12:  32  32  32  32  32  32  32  32  32  32  32  32  10  11  11  12  12  12  12  12  12  12  12  12
   13:  32  32  32  32  32  32  32  32  32  32  32  32  11  10  11  12  12  12  12  12  12  12  12  12
   14:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  10  12  12  12  12  12  12  12  12  12
   15:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  10  11  11  12  12  12  12  12  12
   16:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  10  11  12  12  12  12  12  12
   17:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  11  11  10  12  12  12  12  12  12
   18:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11  11  12  12  12
   19:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10  11  12  12  12
   20:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11  10  12  12  12
   21:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12  10  11  11
   22:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12  11  10  11
   23:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12  12  11  11  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1584632156 kB

------------------------------------------------------------
10. who -r
  run-level 5 Jan 2 02:10

------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)
  Default Target  Status
  graphical       degraded

------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
    UNIT                                LOAD   ACTIVE SUB    DESCRIPTION
  * systemd-networkd-wait-online.service loaded failed failed Wait for Network to be Configured

------------------------------------------------------------
13. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          ModemManager apparmor blk-availability cloud-config cloud-final cloud-init
                   cloud-init-local console-setup cron dmesg e2scrub_reap finalrd getty@ gpu-manager
                   grub-common grub-initrd-fallback irqbalance keyboard-setup lvm2-monitor lxd-agent
                   multipathd networkd-dispatcher open-iscsi open-vm-tools pollinate rsyslog secureboot-db
```

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Platform Notes (Continued)

```
                  setvtrgb snapd ssh systemd-networkd systemd-networkd-wait-online systemd-pstore
                  systemd-resolved systemd-timesyncd thermald ua-reboot-cmds ubuntu-advantage udisks2 ufw
                  unattended-upgrades vgauth
  enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
  disabled        console-getty debug-shell ipmievd iscsid nftables rsync serial-getty@
                  systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                  systemd-time-wait-sync upower
  generated       apport openipmi
  indirect        uuidd
  masked          cryptdisks cryptdisks-early hwclock lvm2 multipath-tools-boot rc rcS screen-cleanup sudo
                  x11-common

------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-5.15.0-122-generic
  root=UUID=47834d90-08a4-46b4-873c-9fa419c95684
  ro

------------------------------------------------------------
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
      Boost States: 0
      Total States: 3
      Pstate-P0:  38800MHz

------------------------------------------------------------
16. 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
  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

------------------------------------------------------------
17. /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
```

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Platform Notes (Continued)

```
------------------------------------------------------------
18. /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

------------------------------------------------------------
19. OS release
  From /etc/*-release /etc/*-version
  os-release Ubuntu 22.04.5 LTS

------------------------------------------------------------
20. Disk information
SPEC is set to: /root/cpu2017_J
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/nvme0n1p3 ext4  3.5T   67G  3.2T   2% /

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Giga Computing
    Product:        R183-Z93-LAJ1-000
    Product Family: Server
    Serial:         0123456789012345678 9AB

------------------------------------------------------------
22. dmidecode
  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:
    9x Samsung M321R8GA0PB2-CCPKC 64 GB 2 rank 6400, configured at 6000
    3x Samsung M321R8GA0PB2-CCPPC 64 GB 2 rank 6400, configured at 6000
    12x Samsung M321R8GA0PB2-CCPWC 64 GB 2 rank 6400, configured at 6000


------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       GIGABYTE
   BIOS Version:      R02_F19
   BIOS Date:         09/18/2024
   BIOS Revision:     5.35
```

Compiler Version Notes

```
==============================================================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
--------------------------------------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
==============================================================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
--------------------------------------------------------------------------------------------------------------
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/bin
AMD clang version 17.0.6 (CLANG: AOCC_5.0.0-Build#1316 2024_09_09)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-5.0.0-4925-1316/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
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 -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=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50

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Base Optimization Flags (Continued)

C benchmarks (continued):
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang -ldl

C++ benchmarks:
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang -ldl

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-aggressive-gather=true
-Wl,-mllvm -Wl,-enable-masked-gather-sequence=false -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang -ldl

Benchmarks using both Fortran and C:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-aggressive-gather=true
-Wl,-mllvm -Wl,-enable-masked-gather-sequence=false -O3 -march=znver5
-fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining
-mllvm -reduce-array-computations=3 -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang -ldl

Benchmarks using both C and C++:
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie
-flto -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

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Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
-ldl

Benchmarks using Fortran, C, and C++:
-m64 -std=c++14 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-extra-inliner
-O3 -march=znver5 -fveclib=AMDLIBM -ffast-math -fno-PIE -no-pie
-flto -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
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang -ldl

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

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:

519.lbm_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl

538.imagick_r: Same as 519.lbm_r

544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Ofast -march=znver5
-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 -ldl

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Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl

510.parest_r: -m64 -std=c++14 -flto -Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc -ldl

Fortran benchmarks:

503.bwaves_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
-lamdalloc -ldl -lflang

549.fotonik3d_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -ldl -lflang

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop

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Peak Optimization Flags (Continued)

521.wrf_r (continued):
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-ldl -lflang

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-extra-inliner -Ofast -march=znver5
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100
-mllvm -loop-unswitch-threshold=200000 -lamdlibm
-lamdalloc -ldl

526.blender_r: -m64 -std=c++14
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100 -lamdlibm -lamdalloc -ldl

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

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Peak Other Flags (Continued)

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/aocc500-flags.2024-10-10.00.html`
`http://www.spec.org/cpu2017/flags/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.0-Turin.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/aocc500-flags.2024-10-10.00.xml`
`http://www.spec.org/cpu2017/flags/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.0-Turin.xml`

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