SPEC CPU®2017 Floating Point Rate Result

New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

$SPECrate®2017\_fp\_base = 1980$

$SPECrate®2017\_fp\_peak = 1990$

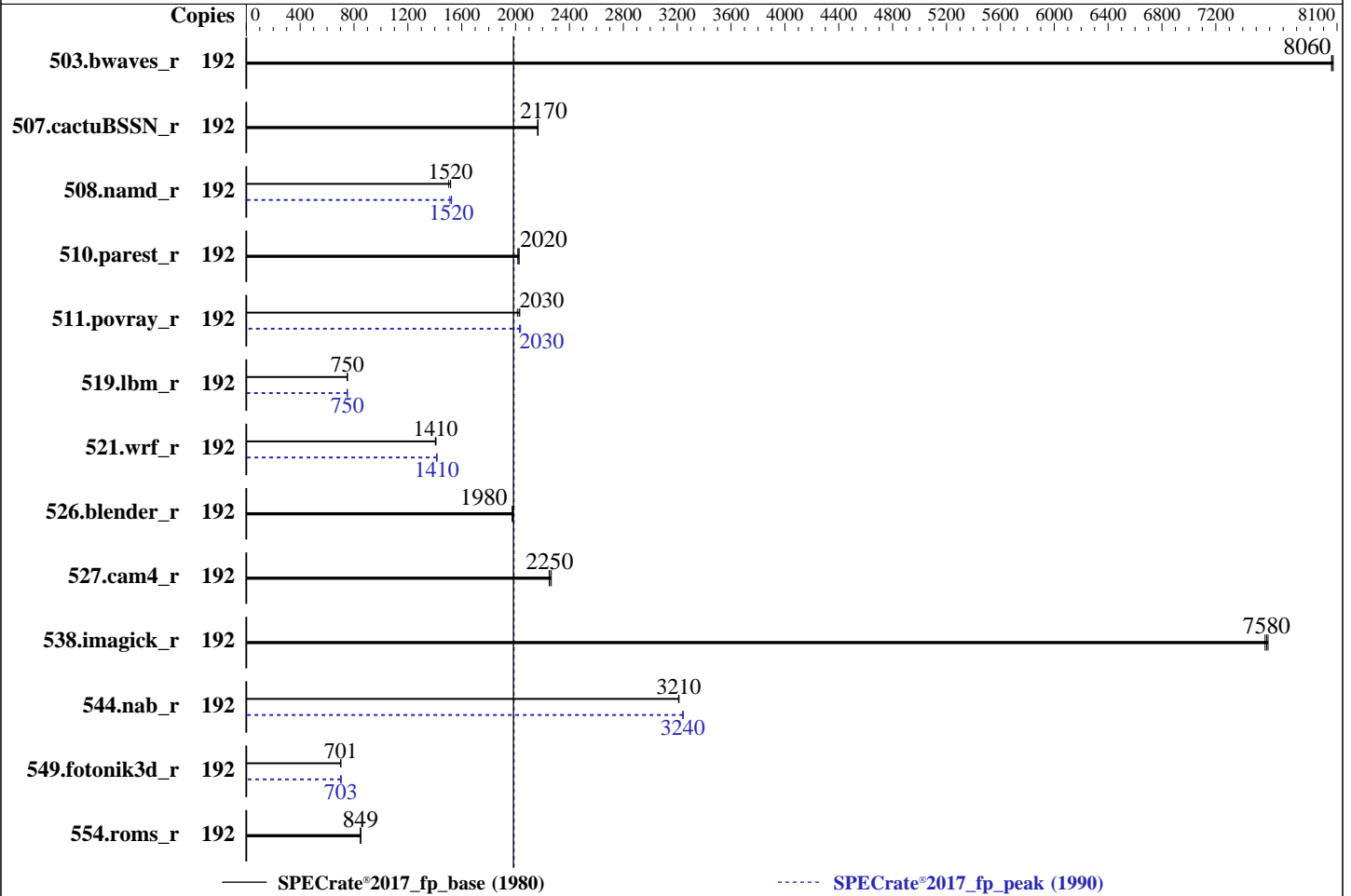|	
CPU2017 License: 9066	**Test Date:** Jan-2025
Test Sponsor: New H3C Technologies Co., Ltd.	**Hardware Availability:** Oct-2024
Tested by: New H3C Technologies Co., Ltd.	**Software Availability:** Dec-2024

Copies

Benchmark	Copies	base	peak
503.bwaves_r	192	8060	
507.cactuBSSN_r	192	2170	
508.namd_r	192	1520	1520
510.parest_r	192	2020	
511.povray_r	192	2030	2030
519.lbm_r	192	750	750
521.wrf_r	192	1410	1410
526.blender_r	192	1980	
527.cam4_r	192	2250	
538.imagick_r	192	7580	
544.nab_r	192	3210	3240
549.fotonik3d_r	192	701	703
554.roms_r	192	849	

—— SPECrate®2017_fp_base (1980)   ······ SPECrate®2017_fp_peak (1990)

Hardware

CPU Name: AMD EPYC 9655
 Max MHz: 4500
 Nominal: 2600
Enabled: 192 cores, 2 chips
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 / 8
  cores
 Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-6400B-R, running at
  6000)
Storage: 1 x 3.84TB SSD
Other: CPU Cooling: Air

Software

OS: Ubuntu 24.04.1 LTS
  kernel version
  6.8.0-51-generic
Compiler: C/C++/Fortran: Version 5.0.0 of AOCC
Parallel: No
Firmware: Version 7.30.05 released Dec-2024
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS set to prefer performance at
  the cost of additional power usage.

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Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	239	8070	**239**	**8060**	239	8060	192	239	8070	**239**	**8060**	239	8060
507.cactuBSSN_r	192	112	2170	**112**	**2170**	112	2160	192	112	2170	**112**	**2170**	112	2160
508.namd_r	192	**120**	**1520**	121	1500	120	1520	192	121	1510	**120**	**1520**	120	1520
510.parest_r	192	249	2020	248	2030	**248**	**2020**	192	249	2020	248	2030	**248**	**2020**
511.povray_r	192	223	2010	221	2030	**221**	**2030**	192	221	2030	220	2040	**221**	**2030**
519.lbm_r	192	**270**	**750**	269	751	270	750	192	270	750	**270**	**750**	270	750
521.wrf_r	192	**306**	**1410**	306	1400	305	1410	192	**304**	**1410**	304	1420	304	1410
526.blender_r	192	**148**	**1980**	148	1980	148	1980	192	**148**	**1980**	148	1980	148	1980
527.cam4_r	192	**149**	**2250**	149	2250	148	2270	192	**149**	**2250**	149	2250	148	2270
538.imagick_r	192	62.9	7590	63.1	7570	**63.0**	**7580**	192	62.9	7590	63.1	7570	**63.0**	**7580**
544.nab_r	192	101	3210	101	3210	**101**	**3210**	192	**99.7**	**3240**	99.7	3240	99.6	3240
549.fotonik3d_r	192	**1067**	**701**	1067	701	1067	701	192	1063	704	**1065**	**703**	1065	703
554.roms_r	192	359	850	**360**	**849**	360	848	192	359	850	**360**	**849**	360	848

SPECrate®2017_fp_base =	**1980**
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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)

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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/amd_rate_aocc500_znver5_A_lib/lib:/home/cpu2017/amd_rate_aocc500_znver5_A_lib/lib32:/us
    r/local/mpc-131/lib:/usr/local/gmp-630/lib:/usr/local/mpfr-421/lib:/usr/local/isl-027/lib:/usr/local/g
    cc-1420/lib64:/usr/local/lib:/usr/lib:/usr/local/amd/aocc-compiler-5.0.0/lib:/usr/local/amd/aocc-compi
    ler-5.0.0/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:
SMT Control set to Disabled
SVM Mode set to Disabled
Power Profile Selection set to High Performance Mode
Determinism Slider set to Power
cTDP set to 400
PPT set to 400
NUMA nodes per socket set to NPS 4
ACPI SRAT L3 cache as NUMA domain set to Enabled

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on h3c Wed Jan 22 17:09:25 2025

 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
```

(Continued on next page)

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Platform Notes (Continued)

```
    10. who -r
    11. Systemd service manager version: systemd 255 (255.4-1ubuntu8.4)
    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
    21. /sys/devices/virtual/dmi/id
    22. dmidecode
    23. BIOS
    -----------------------------------------------------------


    -----------------------------------------------------------
    1. uname -a
      Linux h3c 6.8.0-51-generic #52-Ubuntu SMP PREEMPT_DYNAMIC Thu Dec  5 13:09:44 UTC 2024 x86_64 x86_64 x86_64
      GNU/Linux


    -----------------------------------------------------------
    2. w
       17:09:25 up  5:53,  1 user,  load average: 0.16, 0.05, 0.01
       USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU  WHAT
       root     tty1     -                11:17   18.00s  0.97s  0.12s /bin/bash ./amd_rate_aocc500_znver5_A1.sh


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


    -----------------------------------------------------------
    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              6190254
      nofiles              1024
      vmemory(kbytes)      unlimited
      locks                unlimited
      rtprio               0


    -----------------------------------------------------------
    5. sysinfo process ancestry
     /sbin/init
     /bin/login -p --
     -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/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
     specperl $SPEC/bin/sysinfo
     $SPEC = /home/cpu2017
```

(Continued on next page)

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Platform Notes (Continued)

```
   ----------------------------------------------------------
   6. /proc/cpuinfo
      model name        : AMD EPYC 9655 96-Core Processor
      vendor_id         : AuthenticAMD
      cpu family        : 26
      model             : 2
      stepping          : 1
      microcode         : 0xb00211a
      bugs              : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
      TLB size          : 192 4K pages
      cpu cores         : 96
      siblings          : 96
      2 physical ids (chips)
      192 processors (hardware threads)
      physical id 0: core ids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183
      physical id 1: core ids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183
      physical id 0: apicids 0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183
      physical id 1: apicids
      256-263,272-279,288-295,304-311,320-327,336-343,352-359,368-375,384-391,400-407,416-423,432-439
    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 2.39.3:
     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
     BIOS Vendor ID:          Advanced Micro Devices, Inc.
     Model name:              AMD EPYC 9655 96-Core Processor
     BIOS Model name:         AMD EPYC 9655 96-Core Processor               Unknown CPU @ 2.6GHz
     BIOS CPU family:         107
     CPU family:              26
     Model:                   2
     Thread(s) per core:      1
     Core(s) per socket:      96
     Socket(s):               2
     Stepping:                1
     Frequency boost:         enabled
     CPU(s) scaling MHz:      59%
     CPU max MHz:             4509.3750
     CPU min MHz:             1500.0000
     BogoMIPS:                5187.93
     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 amd_lbr_v2 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 extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
                              osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
                              perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd mba perfmon_v2
                              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
```

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Platform Notes (Continued)

```
                          cqm_mbm_local user_shstk 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 x2avic v_spec_ctrl vnmi
                          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 debug_swap
  L1d cache:              9 MiB (192 instances)
  L1i cache:              6 MiB (192 instances)
  L2 cache:               192 MiB (192 instances)
  L3 cache:               768 MiB (24 instances)
  NUMA node(s):           24
  NUMA node0 CPU(s):      0-7
  NUMA node1 CPU(s):      8-15
  NUMA node2 CPU(s):      16-23
  NUMA node3 CPU(s):      24-31
  NUMA node4 CPU(s):      32-39
  NUMA node5 CPU(s):      40-47
  NUMA node6 CPU(s):      48-55
  NUMA node7 CPU(s):      56-63
  NUMA node8 CPU(s):      64-71
  NUMA node9 CPU(s):      72-79
  NUMA node10 CPU(s):     80-87
  NUMA node11 CPU(s):     88-95
  NUMA node12 CPU(s):     96-103
  NUMA node13 CPU(s):     104-111
  NUMA node14 CPU(s):     112-119
  NUMA node15 CPU(s):     120-127
  NUMA node16 CPU(s):     128-135
  NUMA node17 CPU(s):     136-143
  NUMA node18 CPU(s):     144-151
  NUMA node19 CPU(s):     152-159
  NUMA node20 CPU(s):     160-167
  NUMA node21 CPU(s):     168-175
  NUMA node22 CPU(s):     176-183
  NUMA node23 CPU(s):     184-191
  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:     Vulnerable
  Vulnerability Spectre v1:            Vulnerable: __user pointer sanitization and usercopy barriers only;
                                       no swapgs barriers
  Vulnerability Spectre v2:            Vulnerable; IBPB: disabled; STIBP: disabled; 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       9M   12 Data            1    64     1           64
      L1i      32K       6M    8 Instruction     1    64     1           64
      L2        1M     192M   16 Unified         2  1024     1           64
      L3       32M     768M   16 Unified         3 32768     1           64
```

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Platform Notes (Continued)

```
      ------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 24 nodes (0-23)
  node 0 cpus: 0-7
  node 0 size: 64043 MB
  node 0 free: 63843 MB
  node 1 cpus: 8-15
  node 1 size: 64509 MB
  node 1 free: 64329 MB
  node 2 cpus: 16-23
  node 2 size: 64465 MB
  node 2 free: 64273 MB
  node 3 cpus: 24-31
  node 3 size: 64509 MB
  node 3 free: 64281 MB
  node 4 cpus: 32-39
  node 4 size: 64509 MB
  node 4 free: 64343 MB
  node 5 cpus: 40-47
  node 5 size: 64509 MB
  node 5 free: 64366 MB
  node 6 cpus: 48-55
  node 6 size: 64509 MB
  node 6 free: 64246 MB
  node 7 cpus: 56-63
  node 7 size: 64509 MB
  node 7 free: 64341 MB
  node 8 cpus: 64-71
  node 8 size: 64509 MB
  node 8 free: 64330 MB
  node 9 cpus: 72-79
  node 9 size: 64509 MB
  node 9 free: 64349 MB
  node 10 cpus: 80-87
  node 10 size: 64509 MB
  node 10 free: 64296 MB
  node 11 cpus: 88-95
  node 11 size: 64509 MB
  node 11 free: 64331 MB
  node 12 cpus: 96-103
  node 12 size: 64509 MB
  node 12 free: 64338 MB
  node 13 cpus: 104-111
  node 13 size: 64509 MB
  node 13 free: 64351 MB
  node 14 cpus: 112-119
  node 14 size: 64509 MB
  node 14 free: 64322 MB
  node 15 cpus: 120-127
  node 15 size: 64509 MB
  node 15 free: 64329 MB
  node 16 cpus: 128-135
  node 16 size: 64509 MB
  node 16 free: 64340 MB
  node 17 cpus: 136-143
  node 17 size: 64509 MB
  node 17 free: 64338 MB
  node 18 cpus: 144-151
```

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Platform Notes (Continued)

```
     node 18 size: 64509 MB
     node 18 free: 64334 MB
     node 19 cpus: 152-159
     node 19 size: 64509 MB
     node 19 free: 64323 MB
     node 20 cpus: 160-167
     node 20 size: 64509 MB
     node 20 free: 64366 MB
     node 21 cpus: 168-175
     node 21 size: 64509 MB
     node 21 free: 64332 MB
     node 22 cpus: 176-183
     node 22 size: 64509 MB
     node 22 free: 64343 MB
     node 23 cpus: 184-191
     node 23 size: 64434 MB
     node 23 free: 64285 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  22  22  22  22  22  22  22  22  22  22  22  22
       1:  11  10  11  12  12  12  12  12  12  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       2:  11  11  10  12  12  12  12  12  12  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       3:  12  12  12  10  11  11  12  12  12  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       4:  12  12  12  11  10  11  12  12  12  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       5:  12  12  12  11  11  10  12  12  12  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       6:  12  12  12  12  12  12  10  11  11  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       7:  12  12  12  12  12  12  11  10  11  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       8:  12  12  12  12  12  12  11  11  10  12  12  12  22  22  22  22  22  22  22  22  22  22  22  22
       9:  12  12  12  12  12  12  12  12  12  10  11  11  22  22  22  22  22  22  22  22  22  22  22  22
      10:  12  12  12  12  12  12  12  12  12  11  10  11  22  22  22  22  22  22  22  22  22  22  22  22
      11:  12  12  12  12  12  12  12  12  12  11  11  10  22  22  22  22  22  22  22  22  22  22  22  22
      12:  22  22  22  22  22  22  22  22  22  22  22  22  10  11  11  12  12  12  12  12  12  12  12  12
      13:  22  22  22  22  22  22  22  22  22  22  22  22  11  10  11  12  12  12  12  12  12  12  12  12
      14:  22  22  22  22  22  22  22  22  22  22  22  22  11  11  10  12  12  12  12  12  12  12  12  12
      15:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  10  11  11  12  12  12  12  12  12
      16:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  11  10  11  12  12  12  12  12  12
      17:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  11  11  10  12  12  12  12  12  12
      18:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  12  12  12  10  11  11  12  12  12
      19:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  12  12  12  11  10  11  12  12  12
      20:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  12  12  12  11  11  10  12  12  12
      21:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  12  12  12  12  12  12  10  11  11
      22:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  12  12  12  12  12  12  11  10  11
      23:  22  22  22  22  22  22  22  22  22  22  22  22  12  12  12  12  12  12  12  12  12  11  11  10

     ----------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       1584777888 kB


     ----------------------------------------------------------
 10. who -r
       run-level 3 Jan 22 11:16


     ----------------------------------------------------------
 11. Systemd service manager version: systemd 255 (255.4-1ubuntu8.4)
      Default Target  Status
      multi-user      degraded


     ----------------------------------------------------------
 12. Failed units, from systemctl list-units --state=failed
        UNIT                  LOAD   ACTIVE SUB     DESCRIPTION
```

(Continued on next page)

New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

SPECrate®2017_fp_base = 1980
SPECrate®2017_fp_peak = 1990

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Dec-2024

Platform Notes (Continued)

```
    * fwupd-refresh.service loaded failed failed Refresh fwupd metadata and update motd
   Legend: LOAD   -> Reflects whether the unit definition was properly loaded.
           ACTIVE -> The high-level unit activation state, i.e. generalization of SUB.
           SUB    -> The low-level unit activation state, values depend on unit type.
   1 loaded units listed.

   ----------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online apparmor
                   apport 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
                   keyboard-setup lm-sensors lvm2-monitor multipathd networkd-dispatcher open-iscsi
                   open-vm-tools pollinate rsyslog secureboot-db setvtrgb snapd sysstat systemd-networkd
                   systemd-networkd-wait-online systemd-pstore systemd-resolved systemd-timesyncd thermald
                   ua-reboot-cmds ubuntu-advantage udisks2 ufw unattended-upgrades vgauth wpa_supplicant
   enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
   disabled        console-getty debug-shell iscsid nftables rsync serial-getty@ ssh
                   systemd-boot-check-no-failures systemd-confext systemd-network-generator
                   systemd-networkd-wait-online@ systemd-pcrlock-file-system systemd-pcrlock-firmware-code
                   systemd-pcrlock-firmware-config systemd-pcrlock-machine-id systemd-pcrlock-make-policy
                   systemd-pcrlock-secureboot-authority systemd-pcrlock-secureboot-policy systemd-sysext
                   systemd-time-wait-sync upower wpa_supplicant-nl80211@ wpa_supplicant-wired@
                   wpa_supplicant@
   indirect        systemd-sysupdate systemd-sysupdate-reboot uuidd
   masked          cryptdisks cryptdisks-early hwclock multipath-tools-boot screen-cleanup sudo x11-common

   ----------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/vmlinuz-6.8.0-51-generic
   root=UUID=5079c432-fd48-464d-92df-94ceb7591bc8
   ro
   iommu=pt
   mitigations=off
   security=none

   ----------------------------------------------------------
15. cpupower frequency-info
   analyzing CPU 31:
     current policy: frequency should be within 1.50 GHz and 2.60 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:  2600MHz

   ----------------------------------------------------------
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
```

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

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Software Availability: Dec-2024

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


   ----------------------------------------------------------------
   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


   ----------------------------------------------------------------
   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 24.04.1 LTS


   ----------------------------------------------------------------
   20. Disk information
   SPEC is set to: /home/cpu2017
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/sda4      ext4  3.4T   20G  3.2T   1% /


   ----------------------------------------------------------------
   21. /sys/devices/virtual/dmi/id
       Vendor:        AMD Corporation
       Product:       Quartz
       Product Family: Rack


   ----------------------------------------------------------------
   22. dmidecode
     Additional information from dmidecode 3.5 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 Samsung M321R8GA0EB2-CCPPC 64 GB 2 rank 6400, configured at 6000



   ----------------------------------------------------------------
   23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       American Megatrends International, LLC.
     BIOS Version:      7.30.05
```

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

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Test Date: Jan-2025

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Software Availability: Dec-2024

Platform Notes (Continued)

```
        BIOS Date:        12/20/2024
        BIOS Revision:    5.35
        Firmware Revision: 2.1
```

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
------------------------------------------------------------------------------


==============================================================================
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
```

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SPEC CPU®2017 Floating Point Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

SPECrate®2017_fp_base = 1980

SPECrate®2017_fp_peak = 1990

Compiler Version Notes (Continued)

```
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`

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

SPECrate®2017_fp_base = 1980

SPECrate®2017_fp_peak = 1990

CPU2017 License: 9066		**Test Date:**	Jan-2025
Test Sponsor:	New H3C Technologies Co., Ltd.	**Hardware Availability:**	Oct-2024
Tested by:	New H3C Technologies Co., Ltd.	**Software Availability:**	Dec-2024

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 -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`
`-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`

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

SPECrate®2017_fp_base = 1980

SPECrate®2017_fp_peak = 1990

CPU2017 License: 9066   **Test Date:**   Jan-2025
Test Sponsor: New H3C Technologies Co., Ltd.   **Hardware Availability:** Oct-2024
Tested by: New H3C Technologies Co., Ltd.   **Software Availability:** Dec-2024

Base Optimization Flags (Continued)

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

SPEC CPU®2017 Floating Point Rate Result

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

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SPECrate®2017_fp_peak = 1990

CPU2017 License: 9066		**Test Date:**	Jan-2025
Test Sponsor:	New H3C Technologies Co., Ltd.	**Hardware Availability:**	Oct-2024
Tested by:	New H3C Technologies Co., Ltd.	**Software Availability:**	Dec-2024

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 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver5 -fveclib=AMDLIBM -ffast-math -flto
```

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

New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

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Test Sponsor: New H3C Technologies Co., Ltd.
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Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Dec-2024

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 -ldl
```

538.imagick_r: basepeak = yes

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
```

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: basepeak = yes

Fortran benchmarks:

503.bwaves_r: basepeak = yes

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: basepeak = yes

Benchmarks using both Fortran and C:

(Continued on next page)

New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

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CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

Test Date: Jan-2025
Hardware Availability: Oct-2024
Software Availability: Dec-2024

Peak Optimization Flags (Continued)

```
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
-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: `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
```

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New H3C Technologies Co., Ltd.

H3C UniServer R4950 G7 (AMD EPYC 9655)
AMD EPYC 9655

SPECrate®2017_fp_base = 1980

SPECrate®2017_fp_peak = 1990

CPU2017 License: 9066	**Test Date:**	Jan-2025
Test Sponsor: New H3C Technologies Co., Ltd.	**Hardware Availability:**	Oct-2024
Tested by: New H3C Technologies Co., Ltd.	**Software Availability:**	Dec-2024

Peak 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`

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.html`
`http://www.spec.org/cpu2017/flags/New_H3C-Platform-AMD-Settings-V1.5-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.xml`
`http://www.spec.org/cpu2017/flags/New_H3C-Platform-AMD-Settings-V1.5-Turin.xml`

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

Tested with SPEC CPU®2017 v1.1.9 on 2025-01-22 12:09:25-0500.
Report generated on 2025-02-25 19:04:34 by CPU2017 PDF formatter v6716.
Originally published on 2025-02-25.