SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECrate®2017\_fp\_base = 679$

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

$SPECrate®2017\_fp\_peak = 680$

CPU2017 License: 3   **Test Date:** Sep-2023
Test Sponsor: HPE   **Hardware Availability:** Sep-2023
Tested by: HPE   **Software Availability:** Apr-2023

Benchmark	Copies	Base	Peak
503.bwaves_r	112	878	879
507.cactuBSSN_r	112	822	
508.namd_r	112	654	655
510.parest_r	112	518	
511.povray_r	112	877	
519.lbm_r	112	301	301
521.wrf_r	112	495	
526.blender_r	112	737	
527.cam4_r	112	769	780
538.imagick_r	112	3190	
544.nab_r	112	1250	
549.fotonik3d_r	112	288	288
554.roms_r	112	312	

SPECrate®2017_fp_base (679)

SPECrate®2017_fp_peak (680)

Hardware

CPU Name: AMD EPYC 9734
Max MHz: 3000
Nominal: 2200
Enabled: 112 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 256 MB I+D on chip per chip,
16 MB shared / 7 cores
Other: None
Memory: 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
Kernel 5.14.0-70.13.1.el9_0.x86_64
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: HPE BIOS Version v1.42 08/16/2023 released
Aug-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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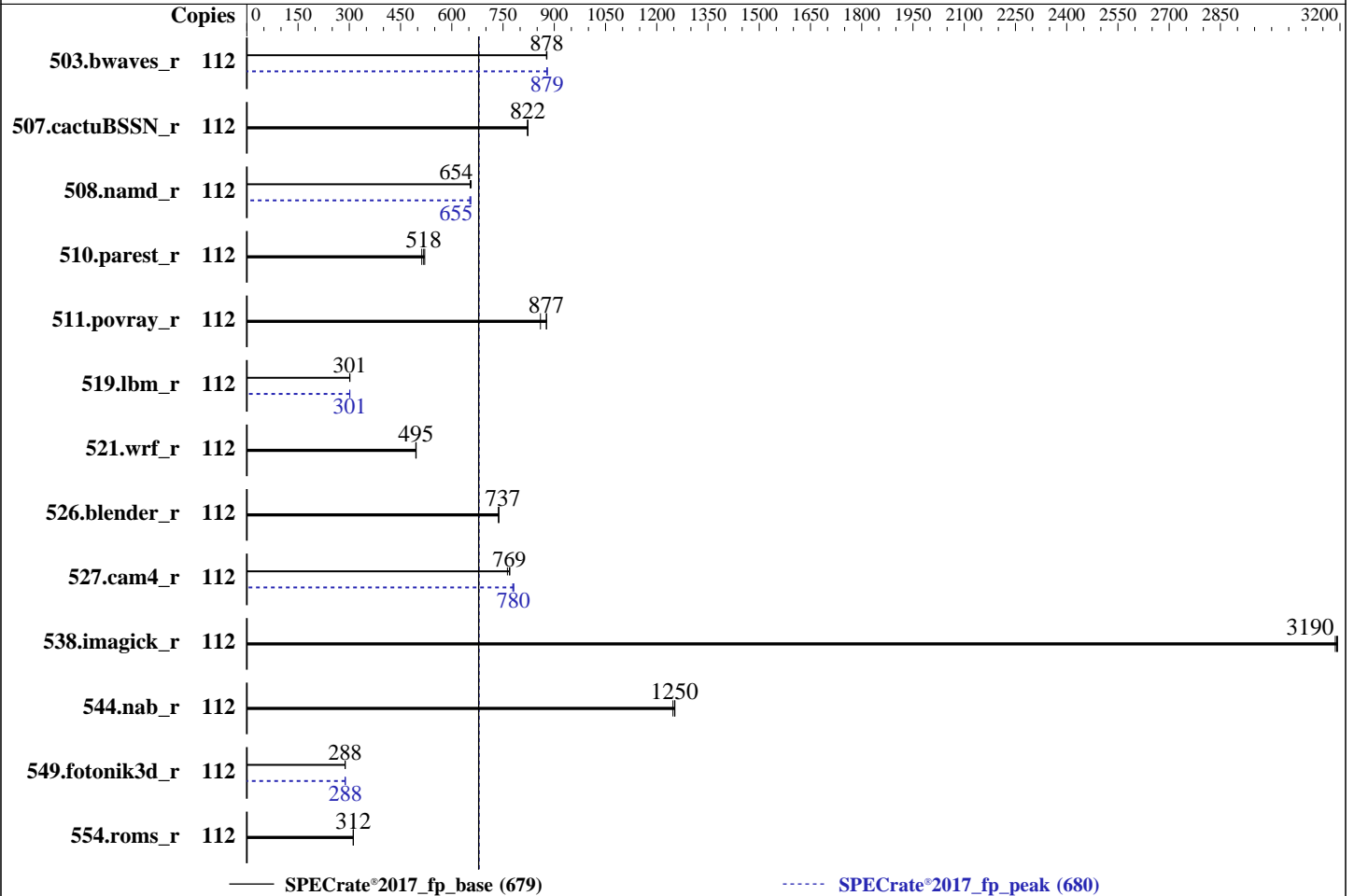## Hewlett Packard Enterprise
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Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	112	**1280**	**878**	1280	877	1279	878	112	1278	879	1277	879	**1278**	**879**
507.cactuBSSN_r	112	**172**	**822**	173	822	172	823	112	**172**	**822**	173	822	172	823
508.namd_r	112	162	657	**163**	**654**	163	654	112	**162**	**655**	163	653	162	655
510.parest_r	112	572	512	563	521	**566**	**518**	112	572	512	563	521	**566**	**518**
511.povray_r	112	298	877	304	860	**298**	**877**	112	298	877	304	860	**298**	**877**
519.lbm_r	112	392	301	**392**	**301**	391	302	112	**392**	**301**	392	301	392	301
521.wrf_r	112	507	495	**507**	**495**	506	496	112	507	495	**507**	**495**	506	496
526.blender_r	112	231	737	**231**	**737**	231	737	112	231	737	**231**	**737**	231	737
527.cam4_r	112	257	763	254	770	**255**	**769**	112	251	781	252	778	**251**	**780**
538.imagick_r	112	**87.3**	**3190**	87.4	3190	87.2	3190	112	**87.3**	**3190**	87.4	3190	87.2	3190
544.nab_r	112	150	1250	**151**	**1250**	151	1250	112	150	1250	**151**	**1250**	151	1250
549.fotonik3d_r	112	1515	288	1517	288	**1517**	**288**	112	1515	288	1516	288	**1515**	**288**
554.roms_r	112	571	312	571	312	**571**	**312**	112	571	312	571	312	**571**	**312**
SPECrate®2017_fp_base =		**679**												
SPECrate®2017_fp_peak =		**680**												

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_aocc400_znver4_A_lib/lib:/home/cpu2017/amd_rate_aocc400_znver4_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 Configuration
 Workload Profile set to General Throughput Compute
  AMD SMT Option set to Disabled
 Determinism Control set to Manual
 Performance Determinism set to Power Deterministic
 Last-Level Cache (LLC) as NUMA Node set to Enabled
 NUMA memory domains per socket set to Four memory domains per socket
 Memory Patrol Scrubbing set to Disabled
 ACPI CST C2 Latency set to 18 microseconds
 Thermal Configuration set to Maximum Cooling
 Data Fabric C-State Enable set to Force Enabled
 Workload Profile set to Custom
   Power Regulator set to OS Control Mode
   L2 HW Prefetcher set to Disabled
 The system ROM used for this result contains microcode version 0xaa00212 for the
 AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this
 ROM is version Genoa-XPI 1.0.0.8

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Thu Sep 21 10:33:17 2023

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

 -----------------------------------------------------------
 Table of contents
 -----------------------------------------------------------
  1. uname -a
  2. w
  3. Username
```

(Continued on next page)

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Platform Notes (Continued)

```
   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 250 (250-6.el9_0)
  12. Services, from systemctl list-unit-files
  13. Linux kernel boot-time arguments, from /proc/cmdline
  14. cpupower frequency-info
  15. tuned-adm active
  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 localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
    x86_64 x86_64 GNU/Linux


    ----------------------------------------------------------
  2. w
     10:33:17 up 23:47,  1 user,  load average: 0.00, 0.00, 0.00
    USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
    root     pts/0      10:30    13.00s 1.28s  0.10s /bin/bash ./amd_rate_aocc400_znver4_A1.sh


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


    ----------------------------------------------------------
  4. ulimit -a
    real-time non-blocking time  (microseconds, -R) unlimited
    core file size              (blocks, -c) 0
    data seg size               (kbytes, -d) unlimited
    scheduling priority             (-e) 0
    file size                   (blocks, -f) unlimited
    pending signals                 (-i) 3094709
    max locked memory           (kbytes, -l) 2097152
    max memory size             (kbytes, -m) unlimited
    open files                      (-n) 1024
    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) 3094709
    virtual memory              (kbytes, -v) unlimited
    file locks                      (-x) unlimited


    ----------------------------------------------------------
  5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 18
```

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Platform Notes (Continued)

```
  sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
  sshd: root [priv]
  sshd: root@pts/0
  -bash
  python3 ./run_fprate.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
    --runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.009/templogs/preenv.fprate.009.0.log --lognum 009.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017


  ------------------------------------------------------------
6. /proc/cpuinfo
     model name      : AMD EPYC 9734 112-Core Processor
     vendor_id       : AuthenticAMD
     cpu family      : 25
     model           : 160
     stepping        : 2
     microcode       : 0xaa00212
     bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
     TLB size        : 3584 4K pages
     cpu cores       : 112
     siblings        : 112
     1 physical ids (chips)
     112 processors (hardware threads)
     physical id 0: core ids
     0-6,8-14,16-22,24-30,32-38,40-46,48-54,56-62,64-70,72-78,80-86,88-94,96-102,104-110,112-118,120-126
     physical id 0: apicids
     0-6,8-14,16-22,24-30,32-38,40-46,48-54,56-62,64-70,72-78,80-86,88-94,96-102,104-110,112-118,120-126
  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 2.37.4:
  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):                  112
  On-line CPU(s) list:     0-111
  Vendor ID:               AuthenticAMD
  BIOS Vendor ID:          Advanced Micro Devices, Inc.
  Model name:              AMD EPYC 9734 112-Core Processor
  BIOS Model name:         AMD EPYC 9734 112-Core Processor
  CPU family:              25
  Model:                   160
  Thread(s) per core:      1
  Core(s) per socket:      112
  Socket(s):               1
  Stepping:                2
  Frequency boost:         enabled
  CPU max MHz:             2200.0000
  CPU min MHz:             1500.0000
  BogoMIPS:                4393.48
  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
```

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Platform Notes (Continued)

```
                       constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf rapl
                       pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 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 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:           3.5 MiB (112 instances)
  L1i cache:           3.5 MiB (112 instances)
  L2 cache:            112 MiB (112 instances)
  L3 cache:            256 MiB (16 instances)
  NUMA node(s):        16
  NUMA node0 CPU(s):   0-6
  NUMA node1 CPU(s):   7-13
  NUMA node2 CPU(s):   14-20
  NUMA node3 CPU(s):   21-27
  NUMA node4 CPU(s):   28-34
  NUMA node5 CPU(s):   35-41
  NUMA node6 CPU(s):   42-48
  NUMA node7 CPU(s):   49-55
  NUMA node8 CPU(s):   56-62
  NUMA node9 CPU(s):   63-69
  NUMA node10 CPU(s):  70-76
  NUMA node11 CPU(s):  77-83
  NUMA node12 CPU(s):  84-90
  NUMA node13 CPU(s):  91-97
  NUMA node14 CPU(s):  98-104
  NUMA node15 CPU(s):  105-111
  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
  Vulnerability Spectre v1:       Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:       Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, 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     3.5M     8 Data          1    64        1             64
     L1i       32K     3.5M     8 Instruction   1    64        1             64
     L2         1M     112M     8 Unified       2  2048        1             64
     L3        16M     256M    16 Unified       3 16384        1             64

-----------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 16 nodes (0-15)
  node 0 cpus: 0-6
  node 0 size: 48135 MB
```

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Platform Notes (Continued)

```
    node 0 free: 47759 MB
    node 1 cpus: 7-13
    node 1 size: 48382 MB
    node 1 free: 48022 MB
    node 2 cpus: 14-20
    node 2 size: 48382 MB
    node 2 free: 48033 MB
    node 3 cpus: 21-27
    node 3 size: 48345 MB
    node 3 free: 48011 MB
    node 4 cpus: 28-34
    node 4 size: 48382 MB
    node 4 free: 48020 MB
    node 5 cpus: 35-41
    node 5 size: 48382 MB
    node 5 free: 48022 MB
    node 6 cpus: 42-48
    node 6 size: 48382 MB
    node 6 free: 47956 MB
    node 7 cpus: 49-55
    node 7 size: 48382 MB
    node 7 free: 48059 MB
    node 8 cpus: 56-62
    node 8 size: 48382 MB
    node 8 free: 48062 MB
    node 9 cpus: 63-69
    node 9 size: 48382 MB
    node 9 free: 48060 MB
    node 10 cpus: 70-76
    node 10 size: 48382 MB
    node 10 free: 48061 MB
    node 11 cpus: 77-83
    node 11 size: 48382 MB
    node 11 free: 48056 MB
    node 12 cpus: 84-90
    node 12 size: 48382 MB
    node 12 free: 48070 MB
    node 13 cpus: 91-97
    node 13 size: 48382 MB
    node 13 free: 48042 MB
    node 14 cpus: 98-104
    node 14 size: 48382 MB
    node 14 free: 48066 MB
    node 15 cpus: 105-111
    node 15 size: 48329 MB
    node 15 free: 48019 MB
    node distances:
    node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
      0:  10  11  11  11  12  12  12  12  12  12  12  12  12  12  12  12
      1:  11  10  11  11  12  12  12  12  12  12  12  12  12  12  12  12
      2:  11  11  10  11  12  12  12  12  12  12  12  12  12  12  12  12
      3:  11  11  11  10  12  12  12  12  12  12  12  12  12  12  12  12
      4:  12  12  12  12  10  11  11  11  12  12  12  12  12  12  12  12
      5:  12  12  12  12  11  10  11  11  12  12  12  12  12  12  12  12
      6:  12  12  12  12  11  11  10  11  12  12  12  12  12  12  12  12
      7:  12  12  12  12  11  11  11  10  12  12  12  12  12  12  12  12
      8:  12  12  12  12  12  12  12  12  10  11  11  11  12  12  12  12
      9:  12  12  12  12  12  12  12  12  11  10  11  11  12  12  12  12
     10:  12  12  12  12  12  12  12  12  11  11  10  11  12  12  12  12
     11:  12  12  12  12  12  12  12  12  11  11  11  10  12  12  12  12
```

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Platform Notes (Continued)

```
    12:  12  12  12  12  12  12  12  12  12  12  12  12  10  11  11  11
    13:  12  12  12  12  12  12  12  12  12  12  12  12  11  10  11  11
    14:  12  12  12  12  12  12  12  12  12  12  12  12  11  11  10  11
    15:  12  12  12  12  12  12  12  12  12  12  12  12  11  11  11  10


    ---------------------------------------------------------------
    9. /proc/meminfo
       MemTotal:       792352308 kB


    ---------------------------------------------------------------
    10. who -r
      run-level 3 Sep 20 10:45


    ---------------------------------------------------------------
    11. Systemd service manager version: systemd 250 (250-6.el9_0)
      Default Target  Status
      multi-user      running


    ---------------------------------------------------------------
    12. Services, from systemctl list-unit-files
      STATE            UNIT FILES
      enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond
                       dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode
                       nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd
                       systemd-network-generator tuned udisks2 upower
      enabled-runtime  systemd-remount-fs
      disabled         blk-availability canberra-system-bootup canberra-system-shutdown
                       canberra-system-shutdown-reboot chrony-wait chronyd console-getty cpupower debug-shell
                       hwloc-dump-hwdata ipsec kvm_stat man-db-restart-cache-update nftables powertop rdisc rhsm
                       rhsm-facts rpmdb-rebuild serial-getty@ sshd-keygen@ systemd-boot-check-no-failures
                       systemd-pstore systemd-sysext
      indirect         sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo


    ---------------------------------------------------------------
    13. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=(hd2,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
      root=/dev/mapper/rhel-root
      ro
      resume=/dev/mapper/rhel-swap
      rd.lvm.lv=rhel/root
      rd.lvm.lv=rhel/swap


    ---------------------------------------------------------------
    14. cpupower frequency-info
      analyzing CPU 0:
        current policy: frequency should be within 1.50 GHz and 2.20 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:  2200MHz


    ---------------------------------------------------------------
    15. tuned-adm active
      Current active profile: throughput-performance


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

(Continued on next page)

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(Test Sponsor: HPE)

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

$SPECrate®2017\_fp\_base = 679$

$SPECrate®2017\_fp\_peak = 680$

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Sep-2023
Hardware Availability: Sep-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
 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


  ----------------------------------------------------------
 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     Red Hat Enterprise Linux 9.0 (Plow)
  redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
  system-release Red Hat Enterprise Linux release 9.0 (Plow)


  ----------------------------------------------------------
 20. Disk information
 SPEC is set to: /home/cpu2017
  Filesystem            Type  Size  Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs   372G   15G  357G   4% /home


  ----------------------------------------------------------
 21. /sys/devices/virtual/dmi/id
    Vendor:        HPE
    Product:       ProLiant DL325 Gen11
    Product Family: ProLiant
    Serial:        DL325GEN11-002


  ----------------------------------------------------------
 22. dmidecode
```

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SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

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ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_fp_base = 679

SPECrate®2017_fp_peak = 680

CPU2017 License: 3		**Test Date:**	Sep-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

Platform Notes (Continued)

```
    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:
      11x Hynix HMCG94AEBRA103N 64 GB 2 rank 4800
      1x Hynix HMCG94MEBRA121N 64 GB 2 rank 4800


  -----------------------------------------------------------
  23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       HPE
     BIOS Version:      1.42
     BIOS Date:         08/16/2023
     BIOS Revision:     1.42
     Firmware Revision: 1.40
```

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)
```

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SPEC CPU®2017 Floating Point Rate Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

$SPECrate^{®}2017\_fp\_base = 679$

$SPECrate^{®}2017\_fp\_peak = 680$

Compiler Version Notes (Continued)

```
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
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
```

SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_fp_base = 679

SPECrate®2017_fp_peak = 680

CPU2017 License: 3	**Test Date:**	Sep-2023
Test Sponsor: HPE	**Hardware Availability:**	Sep-2023
Tested by: HPE	**Software Availability:**	Apr-2023

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
526.blender_r: `-funsigned-char -DSPEC_LP64`
527.cam4_r: `-DSPEC_CASE_FLAG -DSPEC_LP64`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

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

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

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

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_fp_base = 679

SPECrate®2017_fp_peak = 680

CPU2017 License: 3		**Test Date:**	Sep-2023
Test Sponsor: HPE		**Hardware Availability:**	Sep-2023
Tested by: HPE		**Software Availability:**	Apr-2023

Base Optimization Flags (Continued)

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

Benchmarks using both C and C++:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-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
```

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_fp_base = 679

SPECrate®2017_fp_peak = 680

CPU2017 License: 3		**Test Date:**	Sep-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

Base Other Flags (Continued)

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

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

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

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

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

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

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

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_fp_base = 679

ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_fp_peak = 680

CPU2017 License: 3	**Test Date:** Sep-2023
Test Sponsor: HPE	**Hardware Availability:** Sep-2023
Tested by: HPE	**Software Availability:** Apr-2023

Peak Optimization Flags (Continued)

519.lbm_r (continued):
```
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: `-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: basepeak = yes

Fortran benchmarks:

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

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

554.roms_r: basepeak = yes

Benchmarks using both Fortran and C:

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

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ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

$SPECrate^{®}2017\_fp\_base = 679$

$SPECrate^{®}2017\_fp\_peak = 680$

CPU2017 License:	3	**Test Date:**	Sep-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

Peak Optimization Flags (Continued)

521.wrf_r: `basepeak = yes`

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: `basepeak = yes`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

Peak Other Flags

C benchmarks:
`-Wno-unused-command-line-argument`

C++ benchmarks:
`-Wno-unused-command-line-argument`

Fortran benchmarks:
`-Wno-unused-command-line-argument`

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

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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ProLiant DL325 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_fp_base = 679

SPECrate®2017_fp_peak = 680

CPU2017 License:	3	**Test Date:**	Sep-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

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

http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-X-rev1.0.html
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.html

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

http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-X-rev1.0.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.xml

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

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