SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)
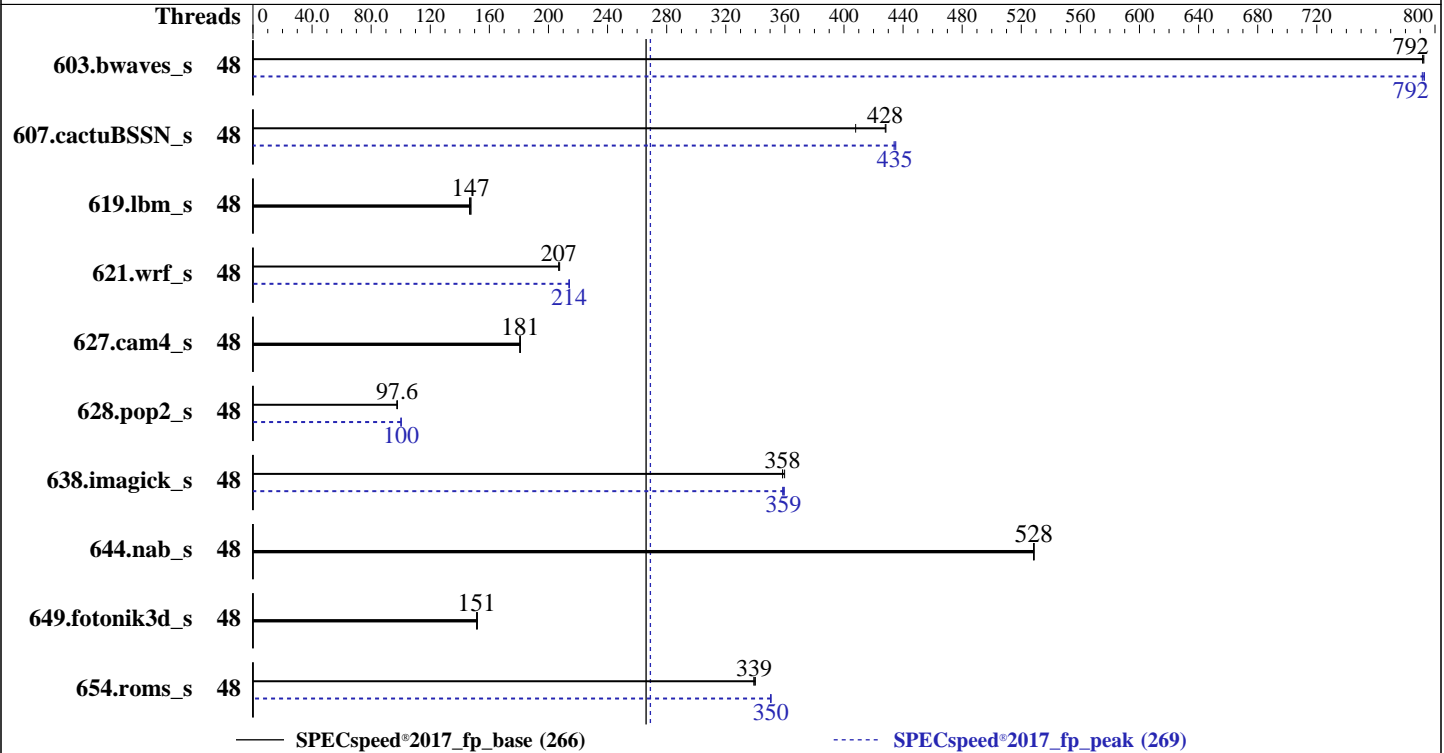
ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed®2017\_fp\_base = 266$

$SPECspeed®2017\_fp\_peak = 269$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2023

Hardware Availability: Aug-2023

Software Availability: Apr-2023

Threads

Benchmark	Threads	base	peak
603.bwaves_s	48	792	792
607.cactuBSSN_s	48	428	435
619.lbm_s	48	147	
621.wrf_s	48	207	214
627.cam4_s	48	181	
628.pop2_s	48	97.6	100
638.imagick_s	48	358	359
644.nab_s	48	528	
649.fotonik3d_s	48	151	
654.roms_s	48	339	350

SPECspeed®2017_fp_base (266) — SPECspeed®2017_fp_peak (269)

Hardware

CPU Name: AMD EPYC 9474F
  Max MHz: 4100
  Nominal: 3600
Enabled: 48 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,
    32 MB shared / 6 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: Yes
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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	48	74.5	792	**74.5**	**792**	74.4	792	48	74.5	791	74.4	793	**74.5**	**792**
607.cactuBSSN_s	48	38.9	428	**39.0**	**428**	40.9	408	48	38.3	435	**38.4**	**435**	38.4	434
619.lbm_s	48	**35.6**	**147**	35.7	147	35.5	148	48	**35.6**	**147**	35.7	147	35.5	148
621.wrf_s	48	**63.9**	**207**	63.9	207	63.7	208	48	61.7	214	61.8	214	**61.8**	**214**
627.cam4_s	48	**49.0**	**181**	49.1	181	49.0	181	48	**49.0**	**181**	49.1	181	49.0	181
628.pop2_s	48	122	97.7	122	97.4	**122**	**97.6**	48	118	100	**118**	**100**	118	100
638.imagick_s	48	**40.2**	**358**	40.2	358	40.1	360	48	40.2	358	**40.2**	**359**	40.1	360
644.nab_s	48	33.1	528	33.0	529	**33.1**	**528**	48	33.1	528	33.0	529	**33.1**	**528**
649.fotonik3d_s	48	60.0	152	**60.2**	**151**	60.2	151	48	60.0	152	**60.2**	**151**	60.2	151
654.roms_s	48	46.3	340	**46.4**	**339**	46.4	339	48	44.9	350	44.9	351	**44.9**	**350**
SPECspeed®2017_fp_base =	**266**													
SPECspeed®2017_fp_peak =	**269**													

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.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
```

(Continued on next page)

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed®2017\_fp\_base = 266$

$SPECspeed®2017\_fp\_peak = 269$

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

Operating System Notes (Continued)

```
run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-47"
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc400_znver4_A_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "48"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 24 1 25 2 26 3 27 4 28 5 29 6 30 7 31 8 32 9 33 10 34 11 35 12 36 13 37 14 38 15 39
       16 40 17 41 18 42 19 43 20 44 21 45 22 46 23 47"
```

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 Peak Frequency Compute
```

(Continued on next page)

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

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed®2017\_fp\_base = 266$

$SPECspeed®2017\_fp\_peak = 269$

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

Test Date: Oct-2023
Hardware Availability: Aug-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
  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
  Memory PStates set to Disabled
  ACPI CST C2 Latency set to 18 microseconds
  Thermal Configuration set to Maximum Cooling
  Memory Patrol Scrubbing set to Disabled
  Workload Profile set to Custom
    Power Regulator set to OS Control Mode
  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 GenoaPI 1.0.0.8

  Sysinfo program /home/cpu2017/bin/sysinfo
  Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
  running on localhost.localdomain Mon Oct  2 11:22:18 2023

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

  ------------------------------------------------------------
  Table of contents
  ------------------------------------------------------------
   1. uname -a
   2. w
   3. Username
   4. ulimit -a
   5. sysinfo process ancestry
   6. /proc/cpuinfo
   7. lscpu
   8. numactl --hardware
   9. /proc/meminfo
  10. who -r
  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
     11:22:18 up 1 min,  1 user,  load average: 0.07, 0.02, 0.00
    USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
    root     pts/0      11:21   13.00s  0.81s  0.03s /bin/bash ./amd_speed_aocc400_znver4_A1.sh

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

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed®2017\_fp\_base = 266$

$SPECspeed®2017\_fp\_peak = 269$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2023

Hardware Availability: Aug-2023

Software Availability: Apr-2023

Platform Notes (Continued)

```
  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) 3094787
    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) 3094787
    virtual memory              (kbytes, -v) unlimited
    file locks                      (-x) unlimited


    ------------------------------------------------------------
  5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 28
   sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   sshd: root [priv]
   sshd: root@pts/0
   -bash
   python3 ./run_fpspeed.py
   /bin/bash ./amd_speed_aocc400_znver4_A1.sh
   runcpu --config amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fpspeed
   runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
     --runmode speed --tune base:peak --size test:train:refspeed fpspeed --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.020/templogs/preenv.fpspeed.020.0.log --lognum 020.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
  $SPEC = /home/cpu2017


    ------------------------------------------------------------
  6. /proc/cpuinfo
    model name       : AMD EPYC 9474F 48-Core Processor
    vendor_id        : AuthenticAMD
    cpu family       : 25
    model            : 17
    stepping         : 1
    microcode        : 0xa10113e
    bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size         : 3584 4K pages
    cpu cores        : 48
    siblings         : 48
    1 physical ids (chips)
    48 processors (hardware threads)
    physical id 0: core ids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
    physical id 0: apicids 0-5,8-13,16-21,24-29,32-37,40-45,48-53,56-61
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems.  Use the above data carefully.


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

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed®2017\_fp\_base = 266$

$SPECspeed®2017\_fp\_peak = 269$

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

Test Date: Oct-2023
Hardware Availability: Aug-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
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):                          48
  On-line CPU(s) list:             0-47
  Vendor ID:                       AuthenticAMD
  BIOS Vendor ID:                  Advanced Micro Devices, Inc.
  Model name:                      AMD EPYC 9474F 48-Core Processor
  BIOS Model name:                 AMD EPYC 9474F 48-Core Processor
  CPU family:                      25
  Model:                           17
  Thread(s) per core:              1
  Core(s) per socket:              48
  Socket(s):                       1
  Stepping:                        1
  Frequency boost:                 enabled
  CPU max MHz:                     3600.0000
  CPU min MHz:                     1500.0000
  BogoMIPS:                        7188.89
  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 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_mbm_total 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:                       1.5 MiB (48 instances)
  L1i cache:                       1.5 MiB (48 instances)
  L2 cache:                        48 MiB (48 instances)
  L3 cache:                        256 MiB (8 instances)
  NUMA node(s):                    8
  NUMA node0 CPU(s):               0-5
  NUMA node1 CPU(s):               6-11
  NUMA node2 CPU(s):               12-17
  NUMA node3 CPU(s):               18-23
  NUMA node4 CPU(s):               24-29
  NUMA node5 CPU(s):               30-35
  NUMA node6 CPU(s):               36-41
  NUMA node7 CPU(s):               42-47
  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
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

$SPECspeed®2017\_fp\_base = 266$

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed®2017\_fp\_peak = 269$

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

Test Date: Oct-2023
Hardware Availability: Aug-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
  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     1.5M    8 Data            1     64        1             64
     L1i       32K     1.5M    8 Instruction     1     64        1             64
     L2         1M      48M    8 Unified         2   2048        1             64
     L3        32M     256M   16 Unified         3  32768        1             64


 -----------------------------------------------------------
 8. numactl --hardware
 NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 8 nodes (0-7)
   node 0 cpus: 0-5
   node 0 size: 96520 MB
   node 0 free: 96281 MB
   node 1 cpus: 6-11
   node 1 size: 96766 MB
   node 1 free: 96522 MB
   node 2 cpus: 12-17
   node 2 size: 96766 MB
   node 2 free: 96537 MB
   node 3 cpus: 18-23
   node 3 size: 96766 MB
   node 3 free: 96476 MB
   node 4 cpus: 24-29
   node 4 size: 96766 MB
   node 4 free: 96558 MB
   node 5 cpus: 30-35
   node 5 size: 96681 MB
   node 5 free: 96462 MB
   node 6 cpus: 36-41
   node 6 size: 96766 MB
   node 6 free: 96524 MB
   node 7 cpus: 42-47
   node 7 size: 96766 MB
   node 7 free: 96381 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  11  11  11  11  11  11
     1:  11  10  11  11  11  11  11  11
     2:  11  11  10  11  11  11  11  11
     3:  11  11  11  10  11  11  11  11
     4:  11  11  11  11  10  11  11  11
     5:  11  11  11  11  11  10  11  11
     6:  11  11  11  11  11  11  10  11
     7:  11  11  11  11  11  11  11  10


 -----------------------------------------------------------
 9. /proc/meminfo
   MemTotal:      792372400 kB


 -----------------------------------------------------------
 10. who -r
   run-level 3 Oct 2 11:21


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

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Test Date: Oct-2023
Hardware Availability: Aug-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
   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 3.60 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:  3600MHz


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


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

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

$SPECspeed^{®}2017\_fp\_base = 266$

$SPECspeed^{®}2017\_fp\_peak = 269$

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

Test Date: Oct-2023
Hardware Availability: Aug-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
  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
  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
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Test Date: Oct-2023
Hardware Availability: Aug-2023
Software Availability: Apr-2023

Platform Notes (Continued)

```
     Firmware Revision: 1.40
```

Compiler Version Notes

```
==============================================================================
C                 | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(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, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran           | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(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        | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(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
```

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Base Compiler Invocation (Continued)

Fortran benchmarks:
```
flang
```

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

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

Base Portability Flags

603.bwaves_s: `-DSPEC_LP64`
607.cactuBSSN_s: `-DSPEC_LP64`
619.lbm_s: `-DSPEC_LP64`
621.wrf_s: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
627.cam4_s: `-DSPEC_CASE_FLAG -DSPEC_LP64`
628.pop2_s: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
638.imagick_s: `-DSPEC_LP64`
644.nab_s: `-DSPEC_LP64`
649.fotonik3d_s: `-DSPEC_LP64`
654.roms_s: `-DSPEC_LP64`

Base Optimization Flags

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

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp -lomp
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-lamdlibm -lamdalloc -lflang
```

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 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -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 -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Base Other Flags

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

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

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

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

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Peak Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp`
`-flto -fstruct-layout=9 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt`
`-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang`

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP`
`-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math`
`-fopenmp -Mrecursive -mllvm -reduce-array-computations=3`
`-fvector-transform -fscalar-transform -fopenmp=libomp`
`-lomp -lamdlibm -lamdalloc -lflang`

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Peak Optimization Flags (Continued)

649.fotonik3d_s: basepeak = yes

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -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 -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

627.cam4_s: basepeak = yes

628.pop2_s: -m64 -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 -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fvector-transform -fscalar-transform
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

Benchmarks using Fortran, C, and C++:
-m64 -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 -fopenmp -flto -fstruct-layout=9
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -finline-aggressive -mllvm -unroll-threshold=100
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base = 266

SPECspeed®2017_fp_peak = 269

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

Peak Other Flags

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

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

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

Benchmarks using Fortran, C, and C++:
```
-Wno-return-type -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/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.

Tested with SPEC CPU®2017 v1.1.9 on 2023-10-02 01:52:18-0400.
Report generated on 2023-10-25 10:36:31 by CPU2017 PDF formatter v6716.
Originally published on 2023-10-24.