SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)
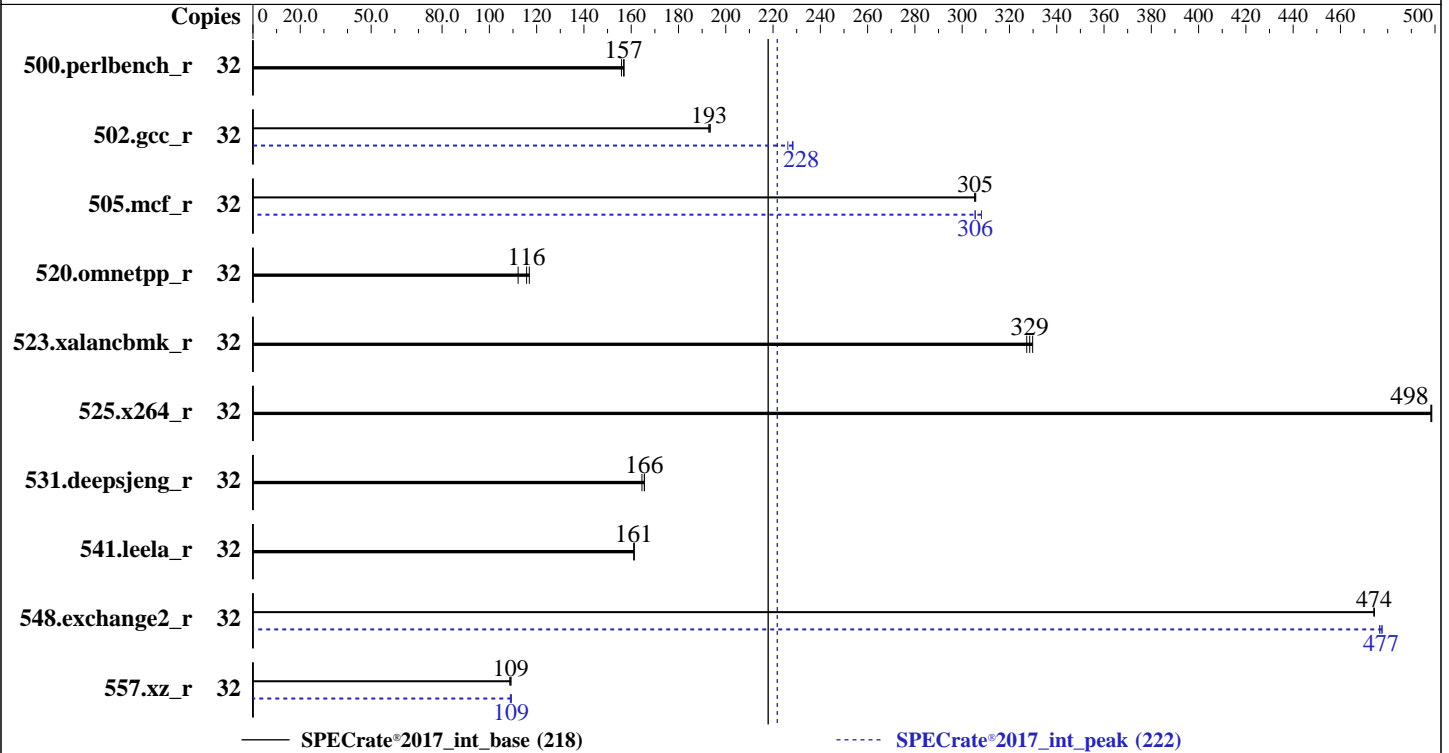
ProLiant DL325 Gen11
(4.10 GHz, AMD EPYC 9174F)

$SPECrate®2017\_int\_base = 218$

$SPECrate®2017\_int\_peak = 222$

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

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

Copies

Benchmark	Copies	Base	Peak
500.perlbench_r	32	157	
502.gcc_r	32	193	228
505.mcf_r	32	305	306
520.omnetpp_r	32	116	
523.xalancbmk_r	32	329	
525.x264_r	32	498	
531.deepsjeng_r	32	166	
541.leela_r	32	161	
548.exchange2_r	32	474	477
557.xz_r	32	109	109

SPECrate®2017_int_base (218)   SPECrate®2017_int_peak (222)

Hardware

CPU Name: AMD EPYC 9174F
 Max MHz: 4400
 Nominal: 4100
Enabled: 16 cores, 1 chip, 2 threads/core
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 / 2 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: 32/64-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/

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Results Table

Benchmark	**Base**						**Peak**					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	32	**325**	**157**	327	156	324	157	32	**325**	**157**	327	156	324	157
502.gcc_r	32	234	193	235	193	**235**	**193**	32	**199**	**228**	198	228	200	226
505.mcf_r	32	**169**	**305**	169	305	169	306	32	168	308	**169**	**306**	169	305
520.omnetpp_r	32	359	117	374	112	**363**	**116**	32	359	117	374	112	**363**	**116**
523.xalancbmk_r	32	**103**	**329**	103	327	102	330	32	**103**	**329**	103	327	102	330
525.x264_r	32	112	499	112	498	**112**	**498**	32	112	499	112	498	**112**	**498**
531.deepsjeng_r	32	223	165	**222**	**166**	221	166	32	223	165	**222**	**166**	221	166
541.leela_r	32	329	161	329	161	**329**	**161**	32	329	161	329	161	**329**	**161**
548.exchange2_r	32	177	474	177	474	**177**	**474**	32	176	477	176	478	**176**	**477**
557.xz_r	32	318	109	317	109	**317**	**109**	32	316	109	317	109	**317**	**109**

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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.
tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"

To enable Transparent Hugepages (THP) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
```

(Continued on next page)

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Operating System Notes (Continued)

```
'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
 Determinism Control set to Manual
  Performance Determinism set to Power Deterministic
 Memory Patrol Scrubbing set to Disabled
 Last-Level Cache (LLC) as NUMA Node set to Enabled
 NUMA memory domains per socket set to Four memory domains per socket
 ACPI CST C2 Latency set to 18 microseconds
 Thermal Configuration set to Maximum Cooling
 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 Fri Oct 13 12:49:25 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
```

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Platform Notes (Continued)

```
   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
      12:49:25 up 2 min,  2 users,  load average: 0.09, 0.03, 0.00
     USER     TTY          LOGIN@   IDLE   JCPU   PCPU WHAT
     root     tty1         07Apr22 554days  0.00s  0.00s -bash
     root     pts/0        07Apr22 13.00s  0.76s  0.02s /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) 3094800
     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) 3094800
     virtual memory              (kbytes, -v) unlimited
     file locks                        (-x) unlimited


   ------------------------------------------------------------
   5. sysinfo process ancestry
    /usr/lib/systemd/systemd --switched-root --system --deserialize 30
    sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
    sshd: root [priv]
    sshd: root@pts/0
    -bash
    python3 ./run_intrate.py
```

(Continued on next page)

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Platform Notes (Continued)

```
/bin/bash ./amd_rate_aocc400_znver4_A1.sh
runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 intrate
runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
  --runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.002/templogs/preenv.intrate.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017


-------------------------------------------------------------
6. /proc/cpuinfo
     model name       : AMD EPYC 9174F 16-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        : 16
     siblings         : 32
     1 physical ids (chips)
     32 processors (hardware threads)
     physical id 0: core ids 0-15
     physical id 0: apicids 0-31
  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):                    32
  On-line CPU(s) list:       0-31
  Vendor ID:                 AuthenticAMD
  BIOS Vendor ID:            Advanced Micro Devices, Inc.
  Model name:                AMD EPYC 9174F 16-Core Processor
  BIOS Model name:           AMD EPYC 9174F 16-Core Processor
  CPU family:                25
  Model:                     17
  Thread(s) per core:        2
  Core(s) per socket:        16
  Socket(s):                 1
  Stepping:                  1
  BogoMIPS:                  8187.70
  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_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local avx512_bf16
                             clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv svm_lock
```

(Continued on next page)

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Platform Notes (Continued)

```
                              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:                  512 KiB (16 instances)
  L1i cache:                  512 KiB (16 instances)
  L2 cache:                   16 MiB (16 instances)
  L3 cache:                   256 MiB (8 instances)
  NUMA node(s):               8
  NUMA node0 CPU(s):          0,1,16,17
  NUMA node1 CPU(s):          2,3,18,19
  NUMA node2 CPU(s):          4,5,20,21
  NUMA node3 CPU(s):          6,7,22,23
  NUMA node4 CPU(s):          8,9,24,25
  NUMA node5 CPU(s):          10,11,26,27
  NUMA node6 CPU(s):          12,13,28,29
  NUMA node7 CPU(s):          14,15,30,31
  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 always-on, RSB
                                 filling
  Vulnerability Srbds:           Not affected
  Vulnerability Tsx async abort: Not affected

  From lscpu --cache:
       NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
       L1d       32K     512K    8 Data            1    64        1             64
       L1i       32K     512K    8 Instruction     1    64        1             64
       L2         1M      16M    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: 0-1,16-17
    node 0 size: 96520 MB
    node 0 free: 96363 MB
    node 1 cpus: 2-3,18-19
    node 1 size: 96766 MB
    node 1 free: 96607 MB
    node 2 cpus: 4-5,20-21
    node 2 size: 96730 MB
    node 2 free: 96539 MB
    node 3 cpus: 6-7,22-23
    node 3 size: 96766 MB
    node 3 free: 96580 MB
    node 4 cpus: 8-9,24-25
    node 4 size: 96766 MB
    node 4 free: 96584 MB
    node 5 cpus: 10-11,26-27
    node 5 size: 96766 MB
    node 5 free: 96613 MB
    node 6 cpus: 12-13,28-29
    node 6 size: 96766 MB
```

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Platform Notes (Continued)

```
   node 6 free: 96465 MB
   node 7 cpus: 14-15,30-31
   node 7 size: 96718 MB
   node 7 free: 96341 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  12  12  12  12  12  12
     1:  11  10  12  12  12  12  12  12
     2:  12  12  10  11  12  12  12  12
     3:  12  12  11  10  12  12  12  12
     4:  12  12  12  12  10  11  12  12
     5:  12  12  12  12  11  10  12  12
     6:  12  12  12  12  12  12  10  11
     7:  12  12  12  12  12  12  11  10


  --------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       792375792 kB


  --------------------------------------------------------------
  10. who -r
     run-level 3 Apr 7 05:30


  --------------------------------------------------------------
  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:
       Unable to determine current policy
       boost state support:
         Supported: yes
         Active: yes
         Boost States: 0
```

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Platform Notes (Continued)

```
        Total States: 3
        Pstate-P0:  4100MHz


    ----------------------------------------------------------
    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
      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  358G   4% /home


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

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Platform Notes (Continued)

```
  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
        Firmware Revision: 1.40
```

Compiler Version Notes

```
==================================================================================================
C        | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------------------


==================================================================================================
C        | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
         | 557.xz_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        | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------------------


==================================================================================================
C        | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
         | 557.xz_r(base, peak)
```

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(4.10 GHz, AMD EPYC 9174F)

$SPECrate®2017\_int\_base = 218$

$SPECrate®2017\_int\_peak = 222$

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

Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------------
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++    | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
       | 541.leela_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 | 548.exchange2_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
--------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Base Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen11
(4.10 GHz, AMD EPYC 9174F)

SPECrate®2017_int_base = 218

SPECrate®2017_int_peak = 222

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

Base Portability Flags (Continued)

557.xz_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
-z muldefs -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 -lflang
-lamdalloc
```

C++ benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang
-lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

Base Other Flags

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

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

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SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(4.10 GHz, AMD EPYC 9174F)

SPECrate®2017_int_base = 218

SPECrate®2017_int_peak = 222

Base Other Flags (Continued)

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

Peak Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Peak Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LINUX -DSPEC_LP64`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Peak Optimization Flags

C benchmarks:

500.perlbench_r: `basepeak = yes`

502.gcc_r: `-m32 -flto -z muldefs -Ofast -march=znver4`
`-fveclib=AMDLIBM -ffast-math -fstruct-layout=7`
`-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -fgnu89-inline`
`-lamdalloc`

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_int_base = 218

ProLiant DL325 Gen11
(4.10 GHz, AMD EPYC 9174F)

SPECrate®2017_int_peak = 222

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

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

Peak Optimization Flags (Continued)

505.mcf_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast`
`-march=znver4 -fveclib=AMDLIBM -ffast-math`
`-fstruct-layout=7 -mllvm -unroll-threshold=50`
`-fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -lamdlibm`
`-lflang -lamdalloc`

525.x264_r: `basepeak = yes`

557.xz_r: `Same as 505.mcf_r`

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

523.xalancbmk_r: `basepeak = yes`

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `basepeak = yes`

Fortran benchmarks:
`-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop`
`-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM`
`-ffast-math -fepilog-vectorization-of-inductions`
`-mllvm -optimize-strided-mem-cost -floop-transform`
`-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm`
`-lflang -lamdalloc`

Peak Other Flags

C benchmarks (except as noted below):
`-Wno-unused-command-line-argument`

502.gcc_r: `-L/usr/lib32 -Wno-unused-command-line-argument`
`-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32`

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

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(4.10 GHz, AMD EPYC 9174F)

SPECrate®2017_int_base = 218

SPECrate®2017_int_peak = 222

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

Peak Other Flags (Continued)

Fortran benchmarks:

```
-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-rev1.5.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-rev1.5.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.2023-09-13.xml

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