SPEC CPU®2017 Integer Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)
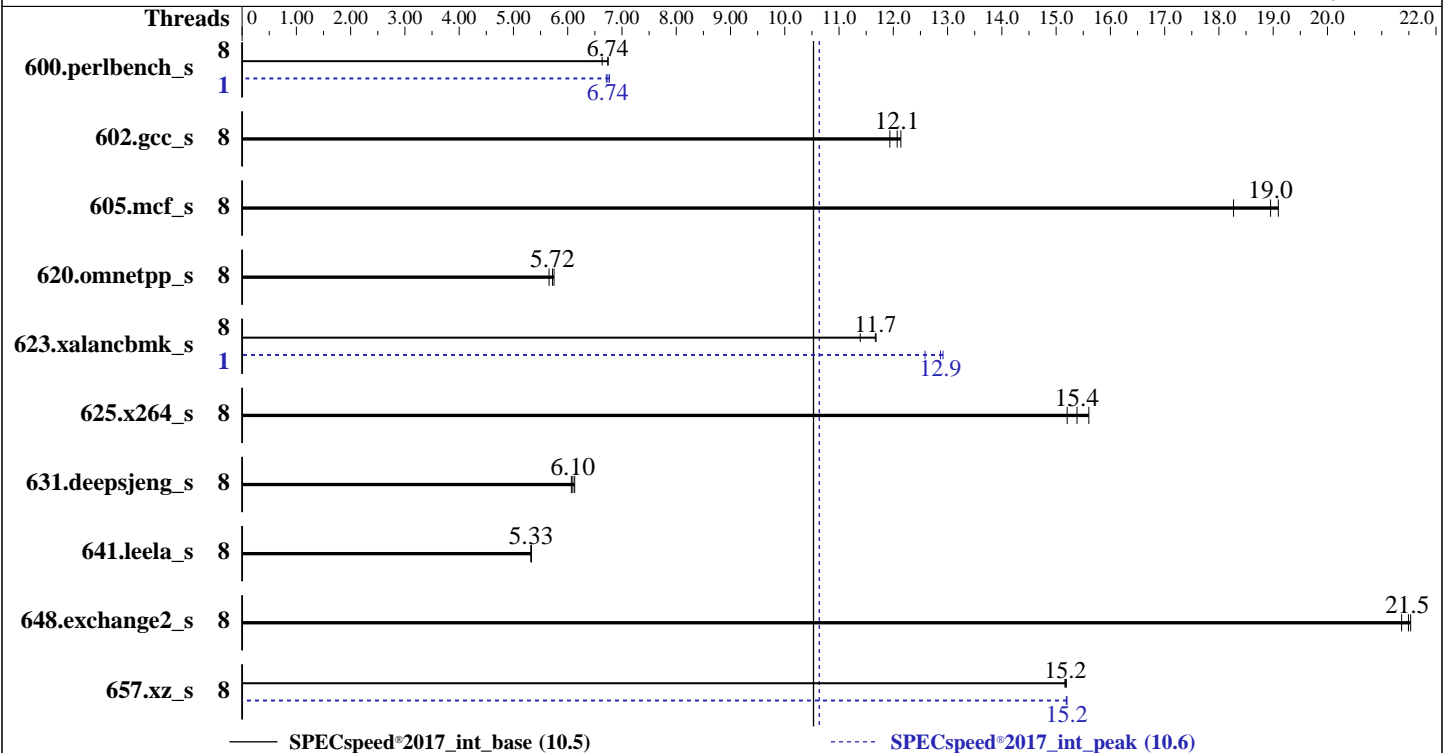
ProLiant DL325 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7203P)

$SPECspeed^{®}2017\_int\_base = 10.5$

$SPECspeed^{®}2017\_int\_peak = 10.6$

CPU2017 License: 3　　　　　　　　　　　　　　　　　　　**Test Date:** Nov-2023
Test Sponsor: HPE　　　　　　　　　　　　　　　　　**Hardware Availability:** Nov-2023
Tested by: HPE　　　　　　　　　　　　　　　　　　**Software Availability:** May-2022

Threads — scale 0 to 22.0

Benchmark	Threads	base	peak
600.perlbench_s	8 / 1	6.74	6.74
602.gcc_s	8	12.1	
605.mcf_s	8	19.0	
620.omnetpp_s	8	5.72	
623.xalancbmk_s	8 / 1	11.7	12.9
625.x264_s	8	15.4	
631.deepsjeng_s	8	6.10	
641.leela_s	8	5.33	
648.exchange2_s	8	21.5	
657.xz_s	8	15.2	15.2

SPECspeed®2017_int_base (10.5)　　　　　　SPECspeed®2017_int_peak (10.6)

Hardware

CPU Name: AMD EPYC 7203P
 Max MHz: 3400
 Nominal: 2800
Enabled: 8 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 64 MB I+D on chip per chip,
  16 MB shared / 2 cores
 Other: None
Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 480 GB SAS 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 3.2.0 of AOCC
Parallel: Yes
Firmware: HPE BIOS Version A43 v2.84 08/17/2023 released
  Aug-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc: jemalloc memory allocator library v5.1.0
Power Management: BIOS set to prefer performance at the cost of
  additional power usage

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Results Table

Benchmark	Base						Peak					
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	8	268	6.63	263	6.75	**263**	**6.74**	1	**263**	**6.74**	262	6.77	264	6.71
602.gcc_s	8	334	11.9	**330**	**12.1**	328	12.1	8	334	11.9	**330**	**12.1**	328	12.1
605.mcf_s	8	258	18.3	**249**	**19.0**	247	19.1	8	258	18.3	**249**	**19.0**	247	19.1
620.omnetpp_s	8	288	5.66	284	5.75	**285**	**5.72**	8	288	5.66	284	5.75	**285**	**5.72**
623.xalancbmk_s	8	124	11.4	**121**	**11.7**	121	11.7	1	113	12.6	**110**	**12.9**	110	12.9
625.x264_s	8	**115**	**15.4**	113	15.6	116	15.2	8	**115**	**15.4**	113	15.6	116	15.2
631.deepsjeng_s	8	**235**	**6.10**	236	6.07	234	6.13	8	**235**	**6.10**	236	6.07	234	6.13
641.leela_s	8	**320**	**5.33**	321	5.32	320	5.33	8	**320**	**5.33**	321	5.32	320	5.33
648.exchange2_s	8	**137**	**21.5**	137	21.5	138	21.4	8	**137**	**21.5**	137	21.5	138	21.4
657.xz_s	8	408	15.2	407	15.2	**407**	**15.2**	8	407	15.2	407	15.2	**407**	**15.2**
SPECspeed®2017_int_base =			**10.5**									
SPECspeed®2017_int_peak =			**10.6**									

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.
```

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Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-15"
LD_LIBRARY_PATH =
    "/home/cpu2017/amd_speed_aocc320_milanx_A_lib/lib;/home/cpu2017/amd_speed_aocc320_milanx_A_lib/lib32:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "16"

Environment variables set by runcpu during the 600.perlbench_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 657.xz_s peak run:
GOMP_CPU_AFFINITY = "0-7"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using openSUSE 15.2

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.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2
```

Platform Notes

```
BIOS Configuration
Workload Profile set to General Peak Frequency Compute
AMD SMT Option set to Disabled
Determinism Control set to Manual
Performance Determinism set to Power Deterministic
Memory Patrol Scrubbing set to disabled
Memory PStates 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
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
Power Regulator set to OS Control Mode

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Wed Nov  1 22:16:25 2023

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

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Software Availability: May-2022

Platform Notes (Continued)

```
        --------------------------------------------------------
        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
           22:16:25 up 35 min,  1 user,  load average: 0.00, 0.00, 0.00
          USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
          root     pts/0      21:42    9.00s  1.13s  0.03s /bin/bash ./amd_speed_aocc320_milanx_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) 2062732
          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
```

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Platform Notes (Continued)

```
  max user processes              (-u) 2062732
  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_intspeed.py
 /bin/bash ./amd_speed_aocc320_milanx_A1.sh
 runcpu --config amd_speed_aocc320_milanx_A1.cfg --tune all --reportable --iterations 3 intspeed
 runcpu --configfile amd_speed_aocc320_milanx_A1.cfg --tune all --reportable --iterations 3 --nopower
   --runmode speed --tune base:peak --size test:train:refspeed intspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.010/templogs/preenv.intspeed.010.0.log --lognum 010.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017


  -------------------------------------------------------------
6. /proc/cpuinfo
    model name      : AMD EPYC 7203P 8-Core Processor
    vendor_id       : AuthenticAMD
    cpu family      : 25
    model           : 1
    stepping        : 1
    microcode       : 0xa0011d1
    bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size        : 2560 4K pages
    cpu cores       : 8
    siblings        : 8
    1 physical ids (chips)
    8 processors (hardware threads)
    physical id 0: core ids 0-7
    physical id 0: apicids 0-7
  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:             48 bits physical, 48 bits virtual
  Byte Order:                Little Endian
  CPU(s):                    8
  On-line CPU(s) list:       0-7
  Vendor ID:                 AuthenticAMD
  BIOS Vendor ID:            Advanced Micro Devices, Inc.
  Model name:                AMD EPYC 7203P 8-Core Processor
  BIOS Model name:           AMD EPYC 7203P 8-Core Processor
  CPU family:                25
  Model:                     1
  Thread(s) per core:        1
  Core(s) per socket:        8
  Socket(s):                 1
  Stepping:                  1
  Frequency boost:           enabled
```

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Platform Notes (Continued)

```
  CPU max MHz:                    2800.0000
  CPU min MHz:                    1500.0000
  BogoMIPS:                       5589.78
  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 rdseed adx smap clflushopt clwb sha_ni xsaveopt
                                  xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                                  clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv svm_lock
                                  nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
                                  pfthreshold v_vmsave_vmload vgif v_spec_ctrl umip pku ospke vaes
                                  vpclmulqdq rdpid overflow_recov succor smca fsrm
  Virtualization:                 AMD-V
  L1d cache:                      256 KiB (8 instances)
  L1i cache:                      256 KiB (8 instances)
  L2 cache:                       4 MiB (8 instances)
  L3 cache:                       64 MiB (4 instances)
  NUMA node(s):                   4
  NUMA node0 CPU(s):              0,1
  NUMA node1 CPU(s):              2,3
  NUMA node2 CPU(s):              4,5
  NUMA node3 CPU(s):              6,7
  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     256K    8 Data             1     64        1             64
      L1i       32K     256K    8 Instruction      1     64        1             64
      L2       512K       4M    8 Unified          2   1024        1             64
      L3        16M      64M   16 Unified          3  16384        1             64

  ------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 4 nodes (0-3)
    node 0 cpus: 0-1
    node 0 size: 128739 MB
    node 0 free: 128469 MB
    node 1 cpus: 2-3
    node 1 size: 129022 MB
    node 1 free: 128848 MB
    node 2 cpus: 4-5
    node 2 size: 129022 MB
    node 2 free: 128804 MB
    node 3 cpus: 6-7
    node 3 size: 129002 MB
```

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Platform Notes (Continued)

```
   node 3 free: 128631 MB
   node distances:
   node   0   1   2   3
     0:  10  12  12  12
     1:  12  10  12  12
     2:  12  12  10  12
     3:  12  12  12  10

   --------------------------------------------------------------
   9. /proc/meminfo
     MemTotal:      528166564 kB

   --------------------------------------------------------------
   10. who -r
     run-level 3 Nov 1 21:41

   --------------------------------------------------------------
   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
     enabled-runtime  systemd-remount-fs
     disabled         blk-availability chrony-wait chronyd console-getty cpupower debug-shell hwloc-dump-hwdata
                      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
                      target targetclid
     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=(hd0,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 2.80 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:  2800MHz

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

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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  9.4G  363G   3% /home


      ----------------------------------------------------------
      21. /sys/devices/virtual/dmi/id
         Vendor:          HPE
         Product:         ProLiant DL325 Gen10 Plus v2
         Product Family:  ProLiant
         Serial:          CN70381LLR
```

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Platform Notes (Continued)

```
     -----------------------------------------------------------
    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:
         8x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200


     -----------------------------------------------------------
    23. BIOS
    (This section combines info from /sys/devices and dmidecode.)
       BIOS Vendor:       HPE
       BIOS Version:      A43
       BIOS Date:         08/17/2023
       BIOS Revision:     2.84
       Firmware Revision: 2.72
```

Compiler Version Notes

```
==============================================================================
C        | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak)
         | 657.xz_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
C++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
         | 641.leela_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran | 648.exchange2_s(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:

```
clang
```

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SPEC CPU®2017 Integer Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7203P)

SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.6

Base Compiler Invocation (Continued)

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

Fortran benchmarks:
```
flang
```

Base Portability Flags

600.perlbench_s: `-DSPEC_LINUX_X64 -DSPEC_LP64`
602.gcc_s: `-DSPEC_LP64`
605.mcf_s: `-DSPEC_LP64`
620.omnetpp_s: `-DSPEC_LP64`
623.xalancbmk_s: `-DSPEC_LINUX -DSPEC_LP64`
625.x264_s: `-DSPEC_LP64`
631.deepsjeng_s: `-DSPEC_LP64`
641.leela_s: `-DSPEC_LP64`
648.exchange2_s: `-DSPEC_LP64`
657.xz_s: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-m64 -Wl,-allow-multiple-definition -Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

C++ benchmarks:
```
-m64 -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -flv-function-specialization
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen10 Plus v2
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SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.6

CPU2017 License:	3	**Test Date:**	Nov-2023
Test Sponsor:	HPE	**Hardware Availability:**	Nov-2023
Tested by:	HPE	**Software Availability:**	May-2022

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp=true
-mllvm -convert-pow-exp-to-int=false -z muldefs
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

Fortran benchmarks:
```
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -z muldefs
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

Base Other Flags

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

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

Fortran benchmarks:
```
-Wno-return-type
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL325 Gen10 Plus v2
(2.80 GHz, AMD EPYC 7203P)

SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.6

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

Test Date: Nov-2023
Hardware Availability: Nov-2023
Software Availability: May-2022

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

```
 600.perlbench_s: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=5 -mllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

```
 602.gcc_s: basepeak = yes
```

```
 605.mcf_s: basepeak = yes
```

```
 625.x264_s: basepeak = yes
```

```
 657.xz_s: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -do-block-reorder=aggressive -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

C++ benchmarks:

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Hewlett Packard Enterprise
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CPU2017 License:	3	**Test Date:**	Nov-2023
Test Sponsor:	HPE	**Hardware Availability:**	Nov-2023
Tested by:	HPE	**Software Availability:**	May-2022

Peak Optimization Flags (Continued)

620.omnetpp_s: `basepeak = yes`

623.xalancbmk_s: `-m64 -Wl,-mllvm -Wl,-function-specialize`
`-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-do-block-reorder=aggressive -Ofast`
`-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp`
`-flto -finline-aggressive -mllvm -unroll-threshold=100`
`-flv-function-specialization -mllvm -enable-licm-vrp`
`-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch`
`-mllvm -reduce-array-computations=3`
`-mllvm -global-vectorize-slp=true`
`-mllvm -do-block-reorder=aggressive`
`-fvirtual-function-elimination -fvisibility=hidden`
`-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc`
`-lflang`

631.deepsjeng_s: `basepeak = yes`

641.leela_s: `basepeak = yes`

Fortran benchmarks:

648.exchange2_s: `basepeak = yes`

Peak Other Flags

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

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

Fortran benchmarks:
`-Wno-return-type`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.3-EPYC-revS.html`
`http://www.spec.org/cpu2017/flags/aocc320-flags-A1.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.3-EPYC-revS.xml`
`http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml`

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SPECspeed®2017_int_base = 10.5

SPECspeed®2017_int_peak = 10.6

CPU2017 License:	3	**Test Date:**	Nov-2023
Test Sponsor:	HPE	**Hardware Availability:**	Nov-2023
Tested by:	HPE	**Software Availability:**	May-2022

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

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