SPEC CPU®2017 Integer Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11
(2.25 GHz, AMD EPYC 9754)

$SPECspeed®2017\_int\_base = 11.3$

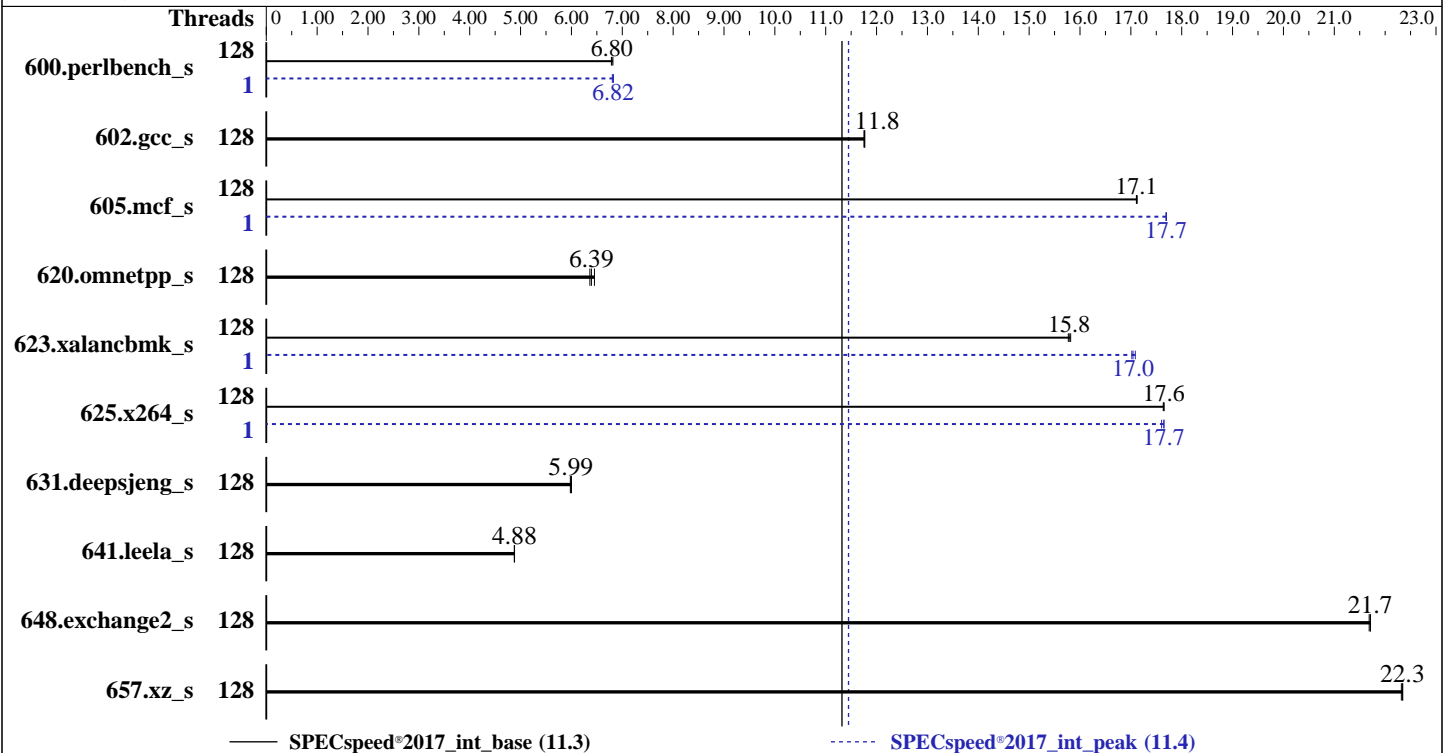$SPECspeed®2017\_int\_peak = 11.4$

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

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

Threads

Benchmark	Threads	
600.perlbench_s	128	6.80
	1	6.82
602.gcc_s	128	11.8
605.mcf_s	128	17.1
	1	17.7
620.omnetpp_s	128	6.39
623.xalancbmk_s	128	15.8
	1	17.0
625.x264_s	128	17.6
	1	17.7
631.deepsjeng_s	128	5.99
641.leela_s	128	4.88
648.exchange2_s	128	21.7
657.xz_s	128	22.3

SPECspeed®2017_int_base (11.3)   SPECspeed®2017_int_peak (11.4)

Hardware

CPU Name: AMD EPYC 9754
 Max MHz: 3100
 Nominal: 2250
Enabled: 128 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 256 MB I+D on chip per chip,
 16 MB shared / 8 cores
 Other: None
Memory: 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 960 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 v1.30 03/06/2023 released
 Mar-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS and OS set to prefer performance at
 the cost of additional power usage

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	128	260	6.82	**261**	**6.80**	262	6.79	1	**260**	**6.82**	261	6.80	260	6.83
602.gcc_s	128	338	11.8	**339**	**11.8**	339	11.8	128	338	11.8	**339**	**11.8**	339	11.8
605.mcf_s	128	**276**	**17.1**	276	17.1	276	17.1	1	**267**	**17.7**	267	17.7	267	17.7
620.omnetpp_s	128	**255**	**6.39**	253	6.45	256	6.36	128	**255**	**6.39**	253	6.45	256	6.36
623.xalancbmk_s	128	89.9	15.8	**89.8**	**15.8**	89.6	15.8	1	82.9	17.1	**83.1**	**17.0**	83.3	17.0
625.x264_s	128	100	17.6	99.9	17.7	**100**	**17.6**	1	99.9	17.7	100	17.6	**99.9**	**17.7**
631.deepsjeng_s	128	240	5.98	239	6.00	**239**	**5.99**	128	240	5.98	239	6.00	**239**	**5.99**
641.leela_s	128	350	4.88	349	4.88	**350**	**4.88**	128	350	4.88	349	4.88	**350**	**4.88**
648.exchange2_s	128	136	21.7	135	21.7	**135**	**21.7**	128	136	21.7	135	21.7	**135**	**21.7**
657.xz_s	128	**277**	**22.3**	277	22.3	277	22.3	128	**277**	**22.3**	277	22.3	277	22.3
SPECspeed®2017_int_base =				**11.3**										
SPECspeed®2017_int_peak =				**11.4**										

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 = "0-127"
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc400_genoa_B_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 = "128"

Environment variables set by runcpu during the 600.perlbench_s peak run:
GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 605.mcf_s peak run:
GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:
GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 625.x264_s peak run:
GOMP_CPU_AFFINITY = "15"
```

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
 AMD SMT Option set to Disabled
 Determinism Control set to Manual
 Performance Determinism set to Power Deterministic
 Last-Level Cache (LLC) as NUMA Node set to Enabled
 NUMA memory domains per socket set to Four memory domains per socket
 Memory PStates set to Disabled
 ACPI CST C2 Latency set to 18 microseconds
 Thermal Configuration set to Maximum Cooling

The reported date by sysinfo is incorrect due to computer clock being not set correctly.
The correct test date is: May-2023.

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Thu Apr  7 05:31:41 2022

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

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

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Test Date: May-2023
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Platform Notes (Continued)

```
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-------------------------------------------------------------
 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. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. 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
  05:31:41 up 1 min,  2 users,  load average: 0.24, 0.13, 0.05
  USER     TTY       LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1      05:30   44.00s  0.00s  0.00s -bash
  root     pts/0     05:31   13.00s  1.10s  0.04s /bin/bash ./amd_speed_aocc400_genoa_B1.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) 3094694
  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) 3094694
  virtual memory              (kbytes, -v) unlimited
```

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Platform Notes (Continued)

```
   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_aocc400_genoa_B1.sh
 runcpu --config amd_speed_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 intspeed
 runcpu --configfile amd_speed_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 --nopower
   --runmode speed --tune base:peak --size test:train:refspeed intspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.007/templogs/preenv.intspeed.007.0.log --lognum 007.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017


   ----------------------------------------------------------
6. /proc/cpuinfo
   model name      : AMD EPYC 9754 128-Core Processor
   vendor_id       : AuthenticAMD
   cpu family      : 25
   model           : 160
   stepping        : 2
   bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
   TLB size        : 3584 4K pages
   cpu cores       : 128
   siblings        : 128
   1 physical ids (chips)
   128 processors (hardware threads)
   physical id 0: core ids
   0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
   240-247
   physical id 0: apicids
   0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
   240-247
  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):                 128
   On-line CPU(s) list:    0-127
   Vendor ID:              AuthenticAMD
   BIOS Vendor ID:         Advanced Micro Devices, Inc.
   Model name:             AMD EPYC 9754 128-Core Processor
   BIOS Model name:        AMD EPYC 9754 128-Core Processor
   CPU family:             25
   Model:                  160
   Thread(s) per core:     1
   Core(s) per socket:     128
   Socket(s):              1
   Stepping:               2
```

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Platform Notes (Continued)

```
     BogoMIPS:                        4493.43
     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 x2apic movbe
                                      popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy
                                      abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext
                                      perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3
                                      invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1
                                      avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
                                      avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
                                      xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                                      avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
                                      svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                                      pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
                                      umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                                      avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
     Virtualization:                  AMD-V
     L1d cache:                       4 MiB (128 instances)
     L1i cache:                       4 MiB (128 instances)
     L2 cache:                        128 MiB (128 instances)
     L3 cache:                        256 MiB (16 instances)
     NUMA node(s):                    16
     NUMA node0 CPU(s):               0-7
     NUMA node1 CPU(s):               8-15
     NUMA node2 CPU(s):               64-71
     NUMA node3 CPU(s):               72-79
     NUMA node4 CPU(s):               32-39
     NUMA node5 CPU(s):               40-47
     NUMA node6 CPU(s):               96-103
     NUMA node7 CPU(s):               104-111
     NUMA node8 CPU(s):               48-55
     NUMA node9 CPU(s):               56-63
     NUMA node10 CPU(s):              112-119
     NUMA node11 CPU(s):              120-127
     NUMA node12 CPU(s):              16-23
     NUMA node13 CPU(s):              24-31
     NUMA node14 CPU(s):              80-87
     NUMA node15 CPU(s):              88-95
     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       4M    8 Data              1     64        1             64
       L1i       32K       4M    8 Instruction       1     64        1             64
       L2         1M     128M    8 Unified           2   2048        1             64
       L3        16M     256M   16 Unified           3  16384        1             64


   ------------------------------------------------------------
   8. numactl --hardware
   NOTE: a numactl 'node' might or might not correspond to a physical chip.
```

(Continued on next page)

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Platform Notes (Continued)

```
available: 16 nodes (0-15)
node 0 cpus: 0-7
node 0 size: 48135 MB
node 0 free: 47877 MB
node 1 cpus: 8-15
node 1 size: 48382 MB
node 1 free: 47965 MB
node 2 cpus: 64-71
node 2 size: 48382 MB
node 2 free: 47870 MB
node 3 cpus: 72-79
node 3 size: 48382 MB
node 3 free: 48104 MB
node 4 cpus: 32-39
node 4 size: 48382 MB
node 4 free: 48277 MB
node 5 cpus: 40-47
node 5 size: 48382 MB
node 5 free: 48284 MB
node 6 cpus: 96-103
node 6 size: 48382 MB
node 6 free: 48215 MB
node 7 cpus: 104-111
node 7 size: 48382 MB
node 7 free: 48282 MB
node 8 cpus: 48-55
node 8 size: 48382 MB
node 8 free: 48213 MB
node 9 cpus: 56-63
node 9 size: 48382 MB
node 9 free: 48291 MB
node 10 cpus: 112-119
node 10 size: 48382 MB
node 10 free: 48237 MB
node 11 cpus: 120-127
node 11 size: 48382 MB
node 11 free: 48266 MB
node 12 cpus: 16-23
node 12 size: 48382 MB
node 12 free: 48110 MB
node 13 cpus: 24-31
node 13 size: 48345 MB
node 13 free: 48153 MB
node 14 cpus: 80-87
node 14 size: 48382 MB
node 14 free: 48192 MB
node 15 cpus: 88-95
node 15 size: 48328 MB
node 15 free: 48123 MB
node distances:
node   0    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
  0:  10   11   11   11   12   12   12   12   12   12   12   12   12   12   12   12
  1:  11   10   11   11   12   12   12   12   12   12   12   12   12   12   12   12
  2:  11   11   10   11   12   12   12   12   12   12   12   12   12   12   12   12
  3:  11   11   11   10   12   12   12   12   12   12   12   12   12   12   12   12
  4:  12   12   12   12   10   11   11   11   12   12   12   12   12   12   12   12
  5:  12   12   12   12   11   10   11   11   12   12   12   12   12   12   12   12
  6:  12   12   12   12   11   11   10   11   12   12   12   12   12   12   12   12
  7:  12   12   12   12   11   11   11   10   12   12   12   12   12   12   12   12
  8:  12   12   12   12   12   12   12   12   10   11   11   11   12   12   12   12
```

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

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Platform Notes (Continued)

```
    9:  12  12  12  12  12  12  12  12  11  10  11  11  12  12  12  12
   10:  12  12  12  12  12  12  12  12  11  11  10  11  12  12  12  12
   11:  12  12  12  12  12  12  12  12  11  11  11  10  12  12  12  12
   12:  12  12  12  12  12  12  12  12  12  12  12  12  10  11  11  11
   13:  12  12  12  12  12  12  12  12  12  12  12  12  11  10  11  11
   14:  12  12  12  12  12  12  12  12  12  12  12  12  11  11  10  11
   15:  12  12  12  12  12  12  12  12  12  12  12  12  11  11  11  10


   ----------------------------------------------------------
   9. /proc/meminfo
      MemTotal:       792348912 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 udisks2
      enabled-runtime   systemd-remount-fs
      disabled          blk-availability console-getty cpupower debug-shell hwloc-dump-hwdata kvm_stat
                        man-db-restart-cache-update nftables 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=(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:
        Unable to determine current policy
        boost state support:
          Supported: yes
          Active: yes
          Boost States: 0
          Total States: 3
          Pstate-P0:  2250MHz


   ----------------------------------------------------------
   15. sysctl
      kernel.numa_balancing             1
      kernel.randomize_va_space         0
      vm.compaction_proactiveness       20
      vm.dirty_background_bytes         0
```

(Continued on next page)

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(Test Sponsor: HPE)

ProLiant DL345 Gen11
(2.25 GHz, AMD EPYC 9754)

$SPECspeed®2017\_int\_base = 11.3$

$SPECspeed®2017\_int\_peak = 11.4$

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

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

Platform Notes (Continued)

```
    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


    -------------------------------------------------------------
16. /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


    -------------------------------------------------------------
17. /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


    -------------------------------------------------------------
18. 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)


    -------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   819G  9.6G  809G   2% /home


    -------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL345 Gen11
    Product Family: ProLiant
    Serial:         DL345G11-004


    -------------------------------------------------------------
21. 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:
```

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CPU2017 License: 3
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Test Date: May-2023
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Software Availability: Nov-2022

Platform Notes (Continued)

```
     12x Hynix HMCG94AEBRA103N 64 GB 2 rank 4800


     --------------------------------------------------------------
     22. BIOS
     (This section combines info from /sys/devices and dmidecode.)
        BIOS Vendor:       HPE
        BIOS Version:      1.30
        BIOS Date:         03/06/2023
        BIOS Revision:     1.30
        Firmware Revision: 1.20
```

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 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
----------------------------------------------------------------------------------------------


==============================================================================================
Fortran | 648.exchange2_s(base, peak)
----------------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
----------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

SPEC CPU®2017 Integer Speed Result

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Hewlett Packard Enterprise
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SPECspeed®2017_int_base = 11.3

ProLiant DL345 Gen11
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SPECspeed®2017_int_peak = 11.4

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

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,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -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 -lflang
-lamdalloc
```

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
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -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 -fopenmp -flto -mllvm -optimize-strided-mem-cost
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc
```

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(2.25 GHz, AMD EPYC 9754)

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SPECspeed®2017_int_peak = 11.4

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

Base Other Flags

C benchmarks:

```
-Wno-return-type -Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -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
```

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

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

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

Peak Optimization Flags (Continued)

605.mcf_s: `Same as 600.perlbench_s`

625.x264_s: `Same as 600.perlbench_s`

657.xz_s: `basepeak = yes`

C++ benchmarks:

620.omnetpp_s: `basepeak = yes`

623.xalancbmk_s: `-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-do-block-reorder=aggressive -Ofast`
`-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp`
`-flto -finline-aggressive -mllvm -unroll-threshold=100`
`-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt`
`-mllvm -do-block-reorder=aggressive`
`-fvirtual-function-elimination -fvisibility=hidden`
`-fopenmp=libomp -lomp -lamdlibm -lamdalloc-ext -lflang`

631.deepsjeng_s: `basepeak = yes`

641.leela_s: `basepeak = yes`

Fortran benchmarks:

648.exchange2_s: `basepeak = yes`

Peak Other Flags

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

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

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-Bergamo-rev1.0.html
http://www.spec.org/cpu2017/flags/aocc400-flags.html

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Tested by:	HPE	**Software Availability:**	Nov-2022

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Bergamo-rev1.0.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.xml

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