



# SPEC CPU®2017 Integer Speed Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL385 Gen11

(2.75 GHz, AMD EPYC 9454)

SPECspeed®2017\_int\_base = 14.2

SPECspeed®2017\_int\_peak = 14.5

CPU2017 License: 3

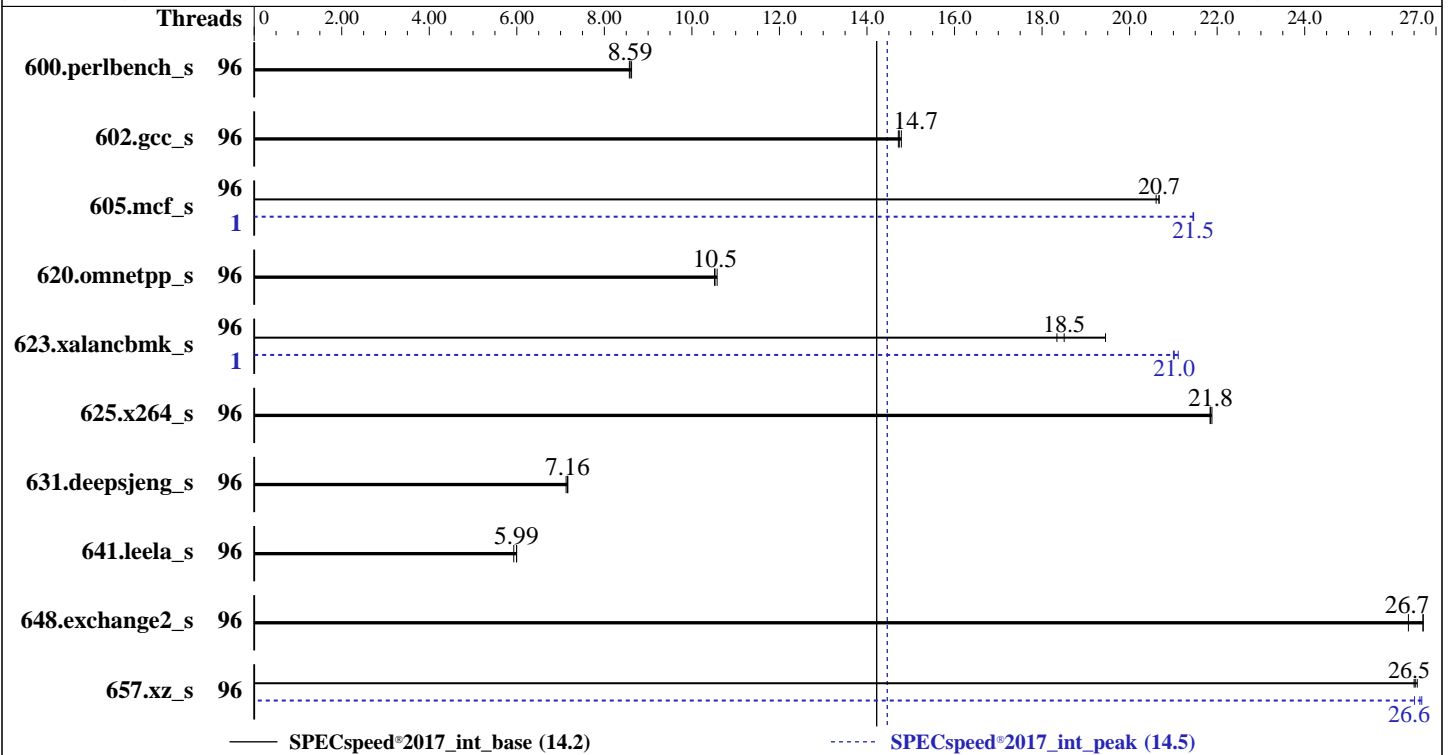
Test Sponsor: HPE

Tested by: HPE

Test Date: Jan-2023

Hardware Availability: Dec-2022

Software Availability: Nov-2022



### Hardware

CPU Name: AMD EPYC 9454  
 Max MHz: 3800  
 Nominal: 2750  
 Enabled: 96 cores, 2 chips  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 256 MB I+D on chip per chip,  
 32 MB shared / 6 cores  
 Other: None  
 Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)  
 Storage: 1 x 480 GB SATA SSD  
 Other: None

### Software

OS: Ubuntu 22.04.1 LTS  
 Kernel 5.15.0-56-generic  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: Yes  
 Firmware: HPE BIOS Version v1.12 11/24/2022 released  
 Nov-2022  
 File System: ext4  
 System State: Run level 5 (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 | 96      | 207               | 8.57               | <b><u>207</u></b> | <b><u>8.59</u></b> | 206                | 8.62               | 96      | 207                | 8.57               | <b><u>207</u></b> | <b><u>8.59</u></b> | 206                | 8.62               |
| 602.gcc_s       | 96      | 271               | 14.7               | 269               | 14.8               | <b><u>270</u></b>  | <b><u>14.7</u></b> | 96      | 271                | 14.7               | 269               | 14.8               | <b><u>270</u></b>  | <b><u>14.7</u></b> |
| 605.mcf_s       | 96      | <b><u>228</u></b> | <b><u>20.7</u></b> | 229               | 20.6               | 228                | 20.7               | 1       | <b><u>220</u></b>  | <b><u>21.5</u></b> | 220               | 21.5               | 220                | 21.5               |
| 620.omnetpp_s   | 96      | <b><u>155</u></b> | <b><u>10.5</u></b> | 154               | 10.6               | 155                | 10.5               | 96      | <b><u>155</u></b>  | <b><u>10.5</u></b> | 154               | 10.6               | 155                | 10.5               |
| 623.xalancbmk_s | 96      | 72.9              | 19.4               | 77.3              | 18.3               | <b><u>76.6</u></b> | <b><u>18.5</u></b> | 1       | <b><u>67.4</u></b> | <b><u>21.0</u></b> | 67.5              | 21.0               | 67.1               | 21.1               |
| 625.x264_s      | 96      | 80.8              | 21.8               | 80.6              | 21.9               | <b><u>80.7</u></b> | <b><u>21.8</u></b> | 96      | 80.8               | 21.8               | 80.6              | 21.9               | <b><u>80.7</u></b> | <b><u>21.8</u></b> |
| 631.deepsjeng_s | 96      | 200               | 7.17               | 201               | 7.13               | <b><u>200</u></b>  | <b><u>7.16</u></b> | 96      | 200                | 7.17               | 201               | 7.13               | <b><u>200</u></b>  | <b><u>7.16</u></b> |
| 641.leela_s     | 96      | 288               | 5.93               | <b><u>285</u></b> | <b><u>5.99</u></b> | 284                | 6.00               | 96      | 288                | 5.93               | <b><u>285</u></b> | <b><u>5.99</u></b> | 284                | 6.00               |
| 648.exchange2_s | 96      | <b><u>110</u></b> | <b><u>26.7</u></b> | 110               | 26.7               | 111                | 26.4               | 96      | <b><u>110</u></b>  | <b><u>26.7</u></b> | 110               | 26.7               | 111                | 26.4               |
| 657.xz_s        | 96      | 233               | 26.6               | 233               | 26.5               | <b><u>233</u></b>  | <b><u>26.5</u></b> | 96      | 233                | 26.5               | <b><u>232</u></b> | <b><u>26.6</u></b> | 232                | 26.7               |

SPECspeed®2017\_int\_base = **14.2**

SPECspeed®2017\_int\_peak = **14.5**

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.

(Continued on next page)



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## Operating System Notes (Continued)

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.

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
GOMP\_CPU\_AFFINITY = "0-95"  
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 = "96"

Environment variables set by runcpu during the 605.mcf\_s peak run:  
GOMP\_CPU\_AFFINITY = "15"

Environment variables set by runcpu during the 623.xalanbmk\_s peak run:  
GOMP\_CPU\_AFFINITY = "15"

Environment variables set by runcpu during the 657.xz\_s peak run:  
GOMP\_CPU\_AFFINITY = "0-95"  
LIBOMP\_NUM\_HIDDEN\_HELPER\_THREADS = "8"

## 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  
Determinism Control set to Manual

(Continued on next page)



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## Platform Notes (Continued)

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

The system ROM used for this result contains microcode version 0xa10110e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version GenoaPI 1.0.0.1-L6

Sysinfo program /home/cpu2017/bin/sysinfo  
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
 running on admin1 Mon Jun 27 19:46:18 2022

SUT (System Under Test) info as seen by some common utilities.  
 For more information on this section, see  
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

```
From /proc/cpuinfo
model name : AMD EPYC 9454 48-Core Processor
 2 "physical id"s (chips)
 96 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 48
siblings : 48
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61
```

```
From lscpu from util-linux 2.37.2:
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): 96
On-line CPU(s) list: 0-95
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9454 48-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
```

(Continued on next page)



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## Platform Notes (Continued)

```

Core(s) per socket:      48
Socket(s):               2
Stepping:               1
Frequency boost:        enabled
CPU max MHz:            3812.0000
CPU min MHz:            400.0000
BogoMIPS:               5492.16
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
aperfmpperf 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 cppc 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_lld
Virtualization:        AMD-V
L1d cache:             3 MiB (96 instances)
L1i cache:             3 MiB (96 instances)
L2 cache:              96 MiB (96 instances)
L3 cache:              512 MiB (16 instances)
NUMA node(s):         16
NUMA node0 CPU(s):    0-5
NUMA node1 CPU(s):    24-29
NUMA node2 CPU(s):    12-17
NUMA node3 CPU(s):    36-41
NUMA node4 CPU(s):    18-23
NUMA node5 CPU(s):    42-47
NUMA node6 CPU(s):    6-11
NUMA node7 CPU(s):    30-35
NUMA node8 CPU(s):    48-53
NUMA node9 CPU(s):    72-77
NUMA node10 CPU(s):   60-65
NUMA node11 CPU(s):   84-89
NUMA node12 CPU(s):   66-71
NUMA node13 CPU(s):   90-95
NUMA node14 CPU(s):   54-59
NUMA node15 CPU(s):   78-83
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:     Not affected
Vulnerability Mds:     Not affected

```

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## Platform Notes (Continued)

Vulnerability Meltdown: Not affected  
 Vulnerability Mmio stale data: Not affected  
 Vulnerability Retbleed: Not affected  
 Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp  
 Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and \_\_user pointer sanitization  
 Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS\_FW, STIBP disabled, RSB filling, PBRSE-eIBRS Not affected  
 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      | 3M       | 8    | Data        | 1     | 64    | 1        | 64             |
| L1i  | 32K      | 3M       | 8    | Instruction | 1     | 64    | 1        | 64             |
| L2   | 1M       | 96M      | 8    | Unified     | 2     | 2048  | 1        | 64             |
| L3   | 32M      | 512M     | 16   | Unified     | 3     | 32768 | 1        | 64             |

```
/proc/cpuinfo cache data
cache size : 1024 KB
```

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

```
available: 16 nodes (0-15)
node 0 cpus: 0 1 2 3 4 5
node 0 size: 96456 MB
node 0 free: 96315 MB
node 1 cpus: 24 25 26 27 28 29
node 1 size: 96766 MB
node 1 free: 96631 MB
node 2 cpus: 12 13 14 15 16 17
node 2 size: 96730 MB
node 2 free: 96612 MB
node 3 cpus: 36 37 38 39 40 41
node 3 size: 96766 MB
node 3 free: 96641 MB
node 4 cpus: 18 19 20 21 22 23
node 4 size: 96766 MB
node 4 free: 96649 MB
node 5 cpus: 42 43 44 45 46 47
node 5 size: 96766 MB
node 5 free: 96655 MB
node 6 cpus: 6 7 8 9 10 11
node 6 size: 96766 MB
node 6 free: 96641 MB
node 7 cpus: 30 31 32 33 34 35
```

(Continued on next page)



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## Platform Notes (Continued)

```

node 7 size: 96766 MB
node 7 free: 96655 MB
node 8 cpus: 48 49 50 51 52 53
node 8 size: 96766 MB
node 8 free: 96587 MB
node 9 cpus: 72 73 74 75 76 77
node 9 size: 96766 MB
node 9 free: 96660 MB
node 10 cpus: 60 61 62 63 64 65
node 10 size: 96766 MB
node 10 free: 96567 MB
node 11 cpus: 84 85 86 87 88 89
node 11 size: 96766 MB
node 11 free: 96625 MB
node 12 cpus: 66 67 68 69 70 71
node 12 size: 96766 MB
node 12 free: 96613 MB
node 13 cpus: 90 91 92 93 94 95
node 13 size: 96766 MB
node 13 free: 96621 MB
node 14 cpus: 54 55 56 57 58 59
node 14 size: 96766 MB
node 14 free: 96587 MB
node 15 cpus: 78 79 80 81 82 83
node 15 size: 96716 MB
node 15 free: 96582 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
  0: 10 11 12 12 12 12 12 12 32 32 32 32 32 32 32 32
  1: 11 10 12 12 12 12 12 12 12 32 32 32 32 32 32 32
  2: 12 12 10 11 12 12 12 12 12 32 32 32 32 32 32 32
  3: 12 12 11 10 12 12 12 12 12 32 32 32 32 32 32 32
  4: 12 12 12 12 10 11 12 12 12 32 32 32 32 32 32 32
  5: 12 12 12 12 11 10 12 12 12 32 32 32 32 32 32 32
  6: 12 12 12 12 12 12 10 11 12 32 32 32 32 32 32 32
  7: 12 12 12 12 12 12 11 10 12 32 32 32 32 32 32 32
  8: 32 32 32 32 32 32 32 32 10 11 12 12 12 12 12 12
  9: 32 32 32 32 32 32 32 32 11 10 12 12 12 12 12 12
 10: 32 32 32 32 32 32 32 32 12 12 10 11 12 12 12 12
 11: 32 32 32 32 32 32 32 32 12 12 11 10 12 12 12 12
 12: 32 32 32 32 32 32 32 32 12 12 12 12 10 11 12 12
 13: 32 32 32 32 32 32 32 32 12 12 12 12 11 10 12 12
 14: 32 32 32 32 32 32 32 32 12 12 12 12 12 12 10 11
 15: 32 32 32 32 32 32 32 32 12 12 12 12 12 12 11 10

```

```

From /proc/meminfo
MemTotal: 1585015528 kB

```

(Continued on next page)



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## Platform Notes (Continued)

HugePages\_Total: 0  
Hugepagesize: 2048 kB

/sbin/tuned-adm active  
Current active profile: throughput-performance

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has  
performance

/usr/bin/lsb\_release -d  
Ubuntu 22.04.1 LTS

```
From /etc/*release* /etc/*version*
debian_version: bookworm/sid
os-release:
  PRETTY_NAME="Ubuntu 22.04.1 LTS"
  NAME="Ubuntu"
  VERSION_ID="22.04"
  VERSION="22.04.1 LTS (Jammy Jellyfish)"
  VERSION_CODENAME=jammy
  ID=ubuntu
  ID_LIKE=debian
  HOME_URL="https://www.ubuntu.com/"
```

```
uname -a:
Linux admin1 5.15.0-56-generic #62-Ubuntu SMP Tue Nov 22 19:54:14 UTC 2022 x86_64
x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

|  |   |
|--|---|
| CVE-2018-12207 (iTLB Multihit):                        | Not affected  |
| CVE-2018-3620 (L1 Terminal Fault):                     | Not affected  |
| Microarchitectural Data Sampling:                      | Not affected  |
| CVE-2017-5754 (Meltdown):                              | Not affected  |
| mmio_stale_data:                                       | Not affected  |
| retbleed:  | Not affected  |
| CVE-2018-3639 (Speculative Store Bypass):              | Mitigation: Speculative Store Bypass disabled via prctl and seccomp   |
| CVE-2017-5753 (Spectre variant 1):                     | Mitigation: usercopy/swapgs barriers and __user pointer sanitization  |
| CVE-2017-5715 (Spectre variant 2):                     | Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling, PBRSE-eIBRS: Not affected |
| CVE-2020-0543 (Special Register Buffer Data Sampling): | Not affected  |

(Continued on next page)





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## Platform Notes (Continued)

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Jun 27 18:30

SPEC is set to: /home/cpu2017

| Filesystem                        | Type | Size | Used | Avail | Use% | Mounted on |
|-----------------------------------|------|------|------|-------|------|------------|
| /dev/mapper/ubuntu--vg-ubuntu--lv | ext4 | 437G | 21G  | 398G  | 5%   | /          |

From /sys/devices/virtual/dmi/id

```
Vendor:          HPE
Product:         ProLiant DL385 Gen11
Product Family: ProLiant
Serial:          DL385GEN11-003
```

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:

```
13x Hynix HMC94MEBRA121N 64 GB 2 rank 4800
11x Hynix HMC94MEBRA123N 64 GB 2 rank 4800
```

BIOS:

```
BIOS Vendor:      HPE
BIOS Version:     1.12
BIOS Date:        11/24/2022
BIOS Revision:    1.12
Firmware Revision: 1.10
```

(End of data from sysinfo program)

## 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.xalanbmk_s(base, peak)  
=====
```

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# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL385 Gen11**

(2.75 GHz, AMD EPYC 9454)

SPECspeed®2017\_int\_base = 14.2

SPECspeed®2017\_int\_peak = 14.5

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

**Test Date:** Jan-2023  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022

## Compiler Version Notes (Continued)

| 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

## 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



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## 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
```

## 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
```



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SPECspeed®2017\_int\_base = 14.2

SPECspeed®2017\_int\_peak = 14.5

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Jan-2023

**Hardware Availability:** Dec-2022

**Software Availability:** Nov-2022

## 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: basepeak = yes

602.gcc\_s: basepeak = yes

605.mcf\_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

625.x264\_s: basepeak = yes

657.xz\_s: Same as 605.mcf\_s

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

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SPECspeed®2017\_int\_base = 14.2

SPECspeed®2017\_int\_peak = 14.5

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Jan-2023

**Hardware Availability:** Dec-2022

**Software Availability:** Nov-2022

## Peak Optimization Flags (Continued)

623.xalancbmk\_s (continued):

```
-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-Genoa-rev2.1.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.2023-02-15.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-rev2.1.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.2023-02-15.xml>

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