



# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

## Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen10 Plus v2  
(2.40 GHz, AMD EPYC 7303)

SPECspeed®2017\_int\_base = 11.0

SPECspeed®2017\_int\_peak = 11.1

CPU2017 License: 3

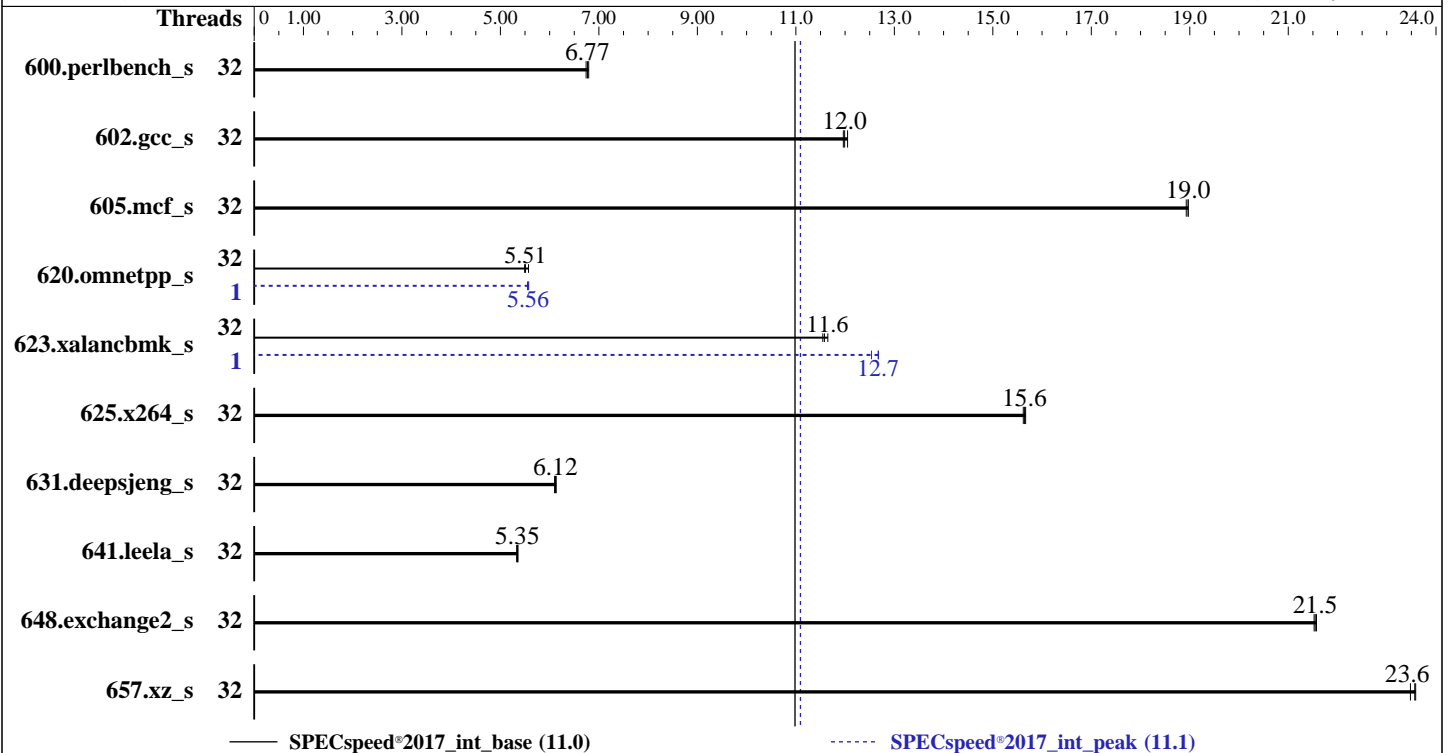
Test Sponsor: HPE

Tested by: HPE

Test Date: Nov-2023

Hardware Availability: Nov-2023

Software Availability: May-2022



### Hardware

CPU Name: AMD EPYC 7303  
 Max MHz: 3400  
 Nominal: 2400  
 Enabled: 32 cores, 2 chips  
 Orderable: 1,2 chips  
 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 / 4 cores  
 Other: None  
 Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-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 3.2.0 of AOCC  
 Parallel: Yes  
 Firmware: HPE BIOS Version 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 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	32	<b>262</b>	<b>6.77</b>	263	6.74	261	6.79	32	<b>262</b>	<b>6.77</b>	263	6.74	261	6.79
602.gcc_s	32	330	12.1	<b>332</b>	<b>12.0</b>	333	12.0	32	330	12.1	<b>332</b>	<b>12.0</b>	333	12.0
605.mcf_s	32	249	18.9	<b>249</b>	<b>19.0</b>	249	19.0	32	249	18.9	<b>249</b>	<b>19.0</b>	249	19.0
620.omnetpp_s	32	297	5.49	293	5.57	<b>296</b>	<b>5.51</b>	1	<b>293</b>	<b>5.56</b>	294	5.55	293	5.57
623.xalancbmk_s	32	<b>122</b>	<b>11.6</b>	122	11.6	123	11.5	1	<b>112</b>	<b>12.7</b>	112	12.7	113	12.5
625.x264_s	32	<b>113</b>	<b>15.6</b>	113	15.6	113	15.7	32	<b>113</b>	<b>15.6</b>	113	15.6	113	15.7
631.deepsjeng_s	32	234	6.13	<b>234</b>	<b>6.12</b>	235	6.10	32	234	6.13	<b>234</b>	<b>6.12</b>	235	6.10
641.leela_s	32	320	5.33	318	5.36	<b>319</b>	<b>5.35</b>	32	320	5.33	318	5.36	<b>319</b>	<b>5.35</b>
648.exchange2_s	32	137	21.5	136	21.6	<b>136</b>	<b>21.5</b>	32	137	21.5	136	21.6	<b>136</b>	<b>21.5</b>
657.xz_s	32	262	23.6	263	23.5	<b>262</b>	<b>23.6</b>	32	262	23.6	263	23.5	<b>262</b>	<b>23.6</b>

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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.

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 = "0-31"
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 = "32"
```

Environment variables set by runcpu during the 620.omnetpp\_s peak run:

```
GOMP_CPU_AFFINITY = "0"
```

Environment variables set by runcpu during the 623.xalancbmk\_s peak run:

```
GOMP_CPU_AFFINITY = "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  
Determinism Control set to Manual  
Performance Determinism set to Power Deterministic  
Memory Patrol Scrubbing set to Disabled  
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  
Memory PStates set to Disabled  
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 Fri Nov 10 23:40:18 2023

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

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## Platform Notes (Continued)

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.e19_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.e19_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
x86_64 x86_64 GNU/Linux
-----
```

```
-----
2. w
23:40:18 up 7 min,  2 users,  load average: 0.00, 0.08, 0.06
USER      TTY      LOGIN@  IDLE   JCPU   PCPU   WHAT
root     tty1      19May23 175days 0.00s  0.00s  -bash
root     pts/0    19May23  9.00s  1.12s  0.01s  /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) 2062690
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) 2062690
virtual memory                (kbytes, -v) unlimited
file locks                   (-x) unlimited
-----
```

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## Platform Notes (Continued)

```

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_aocc320_milanx_A1.py
/bin/bash ./amd_speed_aocc320_milanx_A1.sh
runcpu --configfile 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/CPU2017.092/templogs/preenv.intspeed.092.0.log --lognum 092.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

```

```

6. /proc/cpuinfo
model name      : AMD EPYC 7303 16-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      : 16
siblings       : 16
2 physical ids (chips)
32 processors (hardware threads)
physical id 0: core ids 0-15
physical id 1: core ids 0-15
physical id 0: apicids 0-15
physical id 1: apicids 16-31

```

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:      48 bits physical, 48 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 7303 16-Core Processor
BIOS Model name:   AMD EPYC 7303 16-Core Processor
CPU family:         25
Model:              1
Thread(s) per core: 1
Core(s) per socket: 16
Socket(s):          2
Stepping:           1
Frequency boost:    enabled
CPU max MHz:        2400.0000
CPU min MHz:        1500.0000

```

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## Platform Notes (Continued)

```

BogoMIPS:          4790.95
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
                  vplmulqdq rdpid overflow_recov succor smca fsrm

Virtualization:   AMD-V
L1d cache:       1 MiB (32 instances)
L1i cache:       1 MiB (32 instances)
L2 cache:        16 MiB (32 instances)
L3 cache:        128 MiB (8 instances)
NUMA node(s):    8
NUMA node0 CPU(s): 0-3
NUMA node1 CPU(s): 4-7
NUMA node2 CPU(s): 8-11
NUMA node3 CPU(s): 12-15
NUMA node4 CPU(s): 16-19
NUMA node5 CPU(s): 20-23
NUMA node6 CPU(s): 24-27
NUMA node7 CPU(s): 28-31
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 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	1M	8	Data	1	64	1	64
L1i	32K	1M	8	Instruction	1	64	1	64
L2	512K	16M	8	Unified	2	1024	1	64
L3	16M	128M	16	Unified	3	16384	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: 0-3
node 0 size: 64261 MB
node 0 free: 63843 MB
node 1 cpus: 4-7
node 1 size: 64510 MB
node 1 free: 64284 MB
node 2 cpus: 8-11
node 2 size: 64510 MB
node 2 free: 63889 MB

```

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## Platform Notes (Continued)

```

node 3 cpus: 12-15
node 3 size: 64498 MB
node 3 free: 64293 MB
node 4 cpus: 16-19
node 4 size: 64474 MB
node 4 free: 64346 MB
node 5 cpus: 20-23
node 5 size: 64510 MB
node 5 free: 64388 MB
node 6 cpus: 24-27
node 6 size: 64510 MB
node 6 free: 64382 MB
node 7 cpus: 28-31
node 7 size: 64502 MB
node 7 free: 64379 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10  12  12  12  32  32  32  32
1:  12  10  12  12  32  32  32  32
2:  12  12  10  12  32  32  32  32
3:  12  12  12  10  32  32  32  32
4:  32  32  32  32  10  12  12  12
5:  32  32  32  32  12  10  12  12
6:  32  32  32  32  12  12  10  12
7:  32  32  32  32  12  12  12  10

```

```

-----
9. /proc/meminfo
   MemTotal:      528156428 kB

```

```

-----
10. who -r
    run-level 3 May 19 18:03

```

```

-----
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 chronyd 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 chrony-wait console-getty cpupower debug-shell 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-sysex
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=(hd1,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

```

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## Platform Notes (Continued)

```

-----
14. cpupower frequency-info
analyzing CPU 0:
  current policy: frequency should be within 1.50 GHz and 2.40 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: 2400MHz

```

```

-----
15. 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

```

```

-----
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)

```

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## Platform Notes (Continued)

### 19. Disk information

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	372G	25G	347G	7%	/home

### 20. /sys/devices/virtual/dmi/id

```
Vendor:      HPE
Product:    ProLiant DL385 Gen10 Plus
Product Family: ProLiant
Serial:     CN79340HC0
```

### 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:

16x Hynix HMA84GR7DJR4N-XN 32 GB 2 rank 3200

### 22. BIOS

(This section combines info from /sys/devices and dmidecode.)

```
BIOS Vendor:    HPE
BIOS Version:   A42
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  
=====
```

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# SPEC CPU®2017 Integer Speed Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL385 Gen10 Plus v2**  
(2.40 GHz, AMD EPYC 7303)

SPECspeed®2017\_int\_base = 11.0

SPECspeed®2017\_int\_peak = 11.1

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

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

## Compiler Version Notes (Continued)

Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/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

## 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

(Continued on next page)



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**Software Availability:** May-2022

## Base Optimization Flags (Continued)

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
-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
```

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SPECspeed®2017\_int\_peak = 11.1

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Nov-2023

**Hardware Availability:** Nov-2023

**Software Availability:** May-2022

## Peak Compiler Invocation (Continued)

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: basepeak = yes

625.x264\_s: basepeak = yes

657.xz\_s: basepeak = yes

C++ benchmarks:

```
620.omnetpp_s: -m64 -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 -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
-fvirtual-function-elimination -fvisibility=hidden
-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang
```

```
623.xalancbmk_s: -m64 -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
```

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**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Nov-2023

**Hardware Availability:** Nov-2023

**Software Availability:** May-2022

## Peak Optimization Flags (Continued)

623.xalancbmk\_s (continued):

```
-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>



# SPEC CPU<sup>®</sup>2017 Integer Speed Result

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SPECspeed<sup>®</sup>2017\_int\_base = 11.0

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**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Nov-2023

**Hardware Availability:** Nov-2023

**Software Availability:** May-2022

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