**SPEC CPU®2017 Integer Speed Result**

<table>
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<tr>
<th>SPECspeed®2017_int_base = 12.3</th>
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</table>

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

ProLiant DL385 Gen10 Plus v2
(2.60 GHz, AMD EPYC 7513)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_peak = 12.3</th>
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CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE  
Hardware Availability: Apr-2021  
Software Availability: Mar-2021

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</table>

**Hardware**

- **CPU Name:** AMD EPYC 7513  
- **Max MHz:** 3650  
- **Nominal:** 2600  
- **Enabled:** 64 cores, 2 chips  
- **Orderable:** 1.2 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 512 KB I+D on chip per core  
- **L3:** 128 MB I+D on chip per core, 32 MB shared / 8 cores  
- **Other:** None  
- **Memory:** 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)  
- **Storage:** 1 x 182 GB SATA SSD, RAID 0  
- **Other:** None

**Software**

- **OS:** Ubuntu 20.04.1 LTS (x86_64)  
- **Kernel:** 5.4.0-42-generic  
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version A42 v2.42 04/29/2021 released Apr-2021  
- **File System:** ext4  
- **System State:** Run level 5 (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
## Results Table

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</tbody>
</table>

**SPECspeed**

### 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
'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>

'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.
### Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/enable' and 'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable Transparent Hugepages (THP) for this run. 'echo madvise > /sys/kernel/mm/transparent_hugepage/enable' run as root for peak runs of 628.pop2_s and 638.imagick_s to enable THP only on request.

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

- `GOMP_CPU_AFFINITY = "0-63"
- `LD_LIBRARY_PATH = 
  
  
  " /home/cpu2017_B1/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017_B1/amd_speed_aocc300_milan_B_lib/32:"
- `MALLOC_CONF = "retain:true"
- `OMP_DYNAMIC = "false"
- `OMP_SCHEDULE = "static"
- `OMP_STACKSIZE = "128M"
- `OMP_THREAD_LIMIT = "64"

### 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
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon May 24 12:49:23 EDT 2021
Submission: cpu2017-20210524-26450.sub

### Platform Notes

BIOS Configuration
- Workload Profile set to General Peak Frequency Compute
- AMD SMT Option set to Disabled
- Determinism Control set to Manual

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.60 GHz, AMD EPYC 7513)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

Platform Notes (Continued)

Performance Determinism set to Power Deterministic
Last-Level Cache (LLC) as NUMA Node set to Enabled
NUMA memory domains per socket set to One memory domain per socket
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
Infinity Fabric Power Management set to Disabled
Infinity Fabric Performance State set to P0
Power Regulator set to OS Control Mode

Sysinfo program /home/cpu2017_B1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on dl385g10v2 Wed Apr 1 12:30:37 2020

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 7513 32-Core Processor
- 2 "physical id"s (chips)
- 64 "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 : 32
  - siblings : 32
  - physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  - physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- Address sizes: 48 bits physical, 48 bits virtual
- CPU(s): 64
- On-line CPU(s) list: 0-63
- Thread(s) per core: 1
- Core(s) per socket: 32
- Socket(s): 2
- NUMA node(s): 8
- Vendor ID: AuthenticAMD
- CPU family: 25
- Model: 1
- Model name: AMD EPYC 7513 32-Core Processor
- Stepping: 1
- Frequency boost: enabled

(Continued on next page)
Hewlett Packard Enterprise  
ProLiant DL385 Gen10 Plus v2  
(2.60 GHz, AMD EPYC 7513)  

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<td>Tested by: HPE</td>
<td>Software Availability: Mar-2021</td>
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</tbody>
</table>

Platform Notes (Continued)

```
CPU MHz:                         3143.522
CPU max MHz:                     2600.0000
CPU min MHz:                     1500.0000
BogoMIPS:                        5190.12
Virtualization:                  AMD-V
L1d cache:                       2 MiB
L1i cache:                       2 MiB
L2 cache:                        32 MiB
L3 cache:                        256 MiB
NUMA node0 CPU(s):               0-7
NUMA node1 CPU(s):               8-15
NUMA node2 CPU(s):               16-23
NUMA node3 CPU(s):               24-31
NUMA node4 CPU(s):               32-39
NUMA node5 CPU(s):               40-47
NUMA node6 CPU(s):               48-55
NUMA node7 CPU(s):               56-63
Vulnerability Itlb multihit:     Not affected
Vulnerability Lttf:              Not affected
Vulnerability Mds:               Not affected
Vulnerability Meltdown:          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; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
Vulnerability Srbd:              Not affected
Vulnerability Ttx async abort:   Not affected
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 pni pclmulqdq monitor ssse3 fma cx16 pdcm sse4_1 sse4_2 movbe popcnt aes
                                  xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
                                  misalignsse 3nowprefetch osvw ibs wdt tce topoext perfctr_core perfctr_nb
                                  bpred perfctr_l1d_mwaitx cpb cat_l3 cdpl_l3 invpcid_single hw_pstate ssbd mba ibrs
                                  ibpb stibp vmcall fsgsbase bmi1 avx2 smep bmi2 invpcid cmqm rdr_a rdseed adx smap
                                  clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsaves cqm llc cqm_occup_llc
                                  cqm_mbb_total cqm_mbb_local clzero irperf xsaveerpr wbenoivd arat npt lbv svm_lock
                                  nrip_save tsc_scale vmcb_clean flushbyaid decodeassist psaefilter pfthreshold v_vmsave_vmload vgif umip pkup ospe vaes vpclmulqdq rdpid overflow_recov succor smca

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

(Continued on next page)
**Platform Notes (Continued)**

available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 257799 MB
node 0 free: 257577 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 258046 MB
node 1 free: 257833 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 258046 MB
node 2 free: 257717 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 245935 MB
node 3 free: 245695 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 258021 MB
node 4 free: 257879 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 258046 MB
node 5 free: 257821 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 258046 MB
node 6 free: 257894 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 258043 MB
node 7 free: 257898 MB
node distances:

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From /proc/meminfo
MemTotal:      2101231580 kB
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

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
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SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

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

Platform Notes (Continued)

/usr/bin/lsb_release -d
Ubuntu 20.04.1 LTS

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
  NAME="Ubuntu"
  VERSION="20.04.1 LTS (Focal Fossa)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 20.04.1 LTS"
  VERSION_ID="20.04"
  HOME_URL="https://www.ubuntu.com/"
  SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
  Linux dl385g10v2 5.4.0-42-generic #46-Ubuntu SMP Fri Jul 10 00:24:02 UTC 2020 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
CVE-2018-3639 (Speculative Store Bypass):
  Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):
  Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2):
  Mitigation: Full AMD retpoline, IBPF: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Apr 1 12:23

SPEC is set to: /home/cpu2017_B1

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4 182G 54G 119G 32% /

From /sys/devices/virtual/dmi/id
  Vendor: HPE
  Product: ProLiant DL385 Gen10 Plus
  Product Family: ProLiant

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.60 GHz, AMD EPYC 7513)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

Platform Notes (Continued)

Serial:        CN79340HC3

Additional information from dmidecode 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 Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
16x UNKNOWN NOT AVAILABLE

BIOS:
BIOS Vendor:  HPE
BIOS Version: A42
BIOS Date: 04/29/2021
BIOS Revision: 2.42
Firmware Revision: 2.40

(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 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/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 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

Fortran  | 648.exchange2_s(base, peak)

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.60 GHz, AMD EPYC 7513)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

Compiler Version Notes (Continued)
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/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 -mno-adx -mno-sse4a -W1,-allow-multiple-definition
-W1,-mllvm -W1,-enable-licm-vrp -W1,-mllvm -W1,-region-vectorize
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.60 GHz, AMD EPYC 7513)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

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

Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

Base Optimization Flags (Continued)

C benchmarks (continued):
-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 -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llang -llangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-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 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -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 -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -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 -flto -z muldefs
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llangrti

Base Other Flags

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

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

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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
(2.60 GHz, AMD EPYC 7513)

SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

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

Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

Base Other Flags (Continued)

Fortran benchmarks:
-Wno-return-type

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: basepeak = yes
625.x264_s: basepeak = yes
657.xz_s: basepeak = yes

C++ benchmarks:
620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes

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## SPEC CPU®2017 Integer Speed Result

### Hewlett Packard Enterprise
- **Test Sponsor:** HPE
- **ProLiant DL385 Gen10 Plus v2**
  - **(2.60 GHz, AMD EPYC 7513)**

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**CPU2017 License:** 3  
**Test Date:** Apr-2021  
**Test Sponsor:** HPE  
**Hardware Availability:** Apr-2021

**Tested by:** HPE  
**Software Availability:** Mar-2021

### Peak Optimization Flags (Continued)

- **Fortran benchmarks:**
  - 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:


You can also download the XML flags sources by saving the following links:

- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.xml)

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