



# SPEC CPU®2017 Integer Speed Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

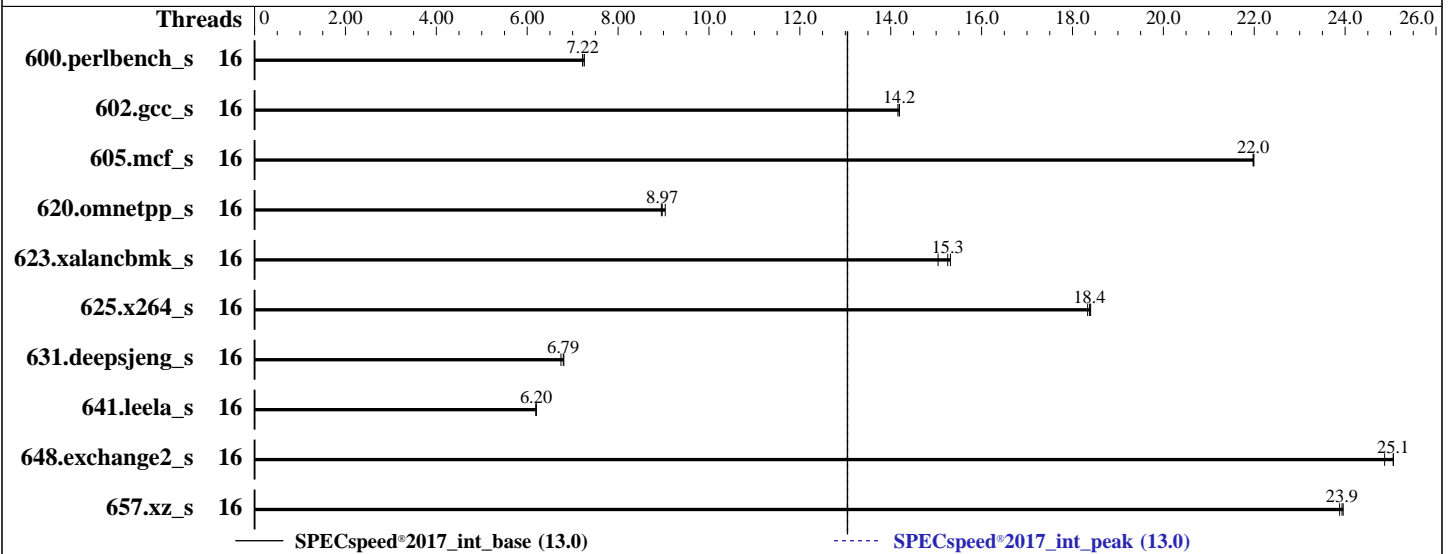
ProLiant DL345 Gen10 Plus  
(3.20 GHz, AMD EPYC 7343)

SPECspeed®2017\_int\_base = 13.0

SPECspeed®2017\_int\_peak = 13.0

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

Test Date: May-2021  
Hardware Availability: Jun-2021  
Software Availability: Mar-2021



### Hardware

CPU Name: AMD EPYC 7343  
Max MHz: 3900  
Nominal: 3200  
Enabled: 16 cores, 1 chip  
Orderable: 1 chip  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 512 KB I+D on chip per core  
L3: 128 MB I+D on chip per chip, 32 MB shared / 4 cores  
Other: None  
Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)  
Storage: 1 x 480 GB SAS SSD, RAID 0  
Other: None

### Software

OS: Ubuntu 20.04.1 LTS (x86\_64)  
Kernel 5.4.0-56-generic  
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC  
Parallel: Yes  
Firmware: HPE BIOS Version A43 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



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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	16	<b>246</b>	<b>7.22</b>	246	7.22	245	7.26	16	<b>246</b>	<b>7.22</b>	246	7.22	245	7.26
602.gcc_s	16	281	14.2	<b>281</b>	<b>14.2</b>	281	14.2	16	281	14.2	<b>281</b>	<b>14.2</b>	281	14.2
605.mcf_s	16	215	22.0	<b>215</b>	<b>22.0</b>	215	22.0	16	215	22.0	<b>215</b>	<b>22.0</b>	215	22.0
620.omnetpp_s	16	182	8.95	<b>182</b>	<b>8.97</b>	180	9.04	16	182	8.95	<b>182</b>	<b>8.97</b>	180	9.04
623.xalancbmk_s	16	94.2	15.0	<b>92.9</b>	<b>15.3</b>	92.5	15.3	16	94.2	15.0	<b>92.9</b>	<b>15.3</b>	92.5	15.3
625.x264_s	16	96.2	18.3	<b>96.0</b>	<b>18.4</b>	95.9	18.4	16	96.2	18.3	<b>96.0</b>	<b>18.4</b>	95.9	18.4
631.deepsjeng_s	16	213	6.74	211	6.81	<b>211</b>	<b>6.79</b>	16	213	6.74	211	6.81	<b>211</b>	<b>6.79</b>
641.leela_s	16	<b>275</b>	<b>6.20</b>	276	6.19	275	6.20	16	<b>275</b>	<b>6.20</b>	276	6.19	275	6.20
648.exchange2_s	16	118	24.9	<b>117</b>	<b>25.1</b>	117	25.1	16	118	24.9	<b>117</b>	<b>25.1</b>	117	25.1
657.xz_s	16	<b>258</b>	<b>23.9</b>	259	23.9	258	24.0	16	<b>258</b>	<b>23.9</b>	259	23.9	258	24.0

SPECspeed®2017\_int\_base = **13.0**

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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.

## 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.
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable
```

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## Operating System Notes (Continued)

Transparent Hugepages (THP) for this run.  
'echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled' 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 = "0-15"  
LD\_LIBRARY\_PATH =  
"/home/SPEC\_CPU2017/cpu2017/amd\_speed\_aocc300\_milan\_B\_lib/64;/home/SPEC\_CPU2017/cpu2017/amd\_speed\_aocc300\_milan\_B\_lib/32:"  
MALLOCONF = "retain:true"  
OMP\_DYNAMIC = "false"  
OMP\_SCHEDULE = "static"  
OMP\_STACKSIZE = "128M"  
OMP\_THREAD\_LIMIT = "16"

## 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 12:35:35 EDT 2021  
Submission: cpu2017-20210524-26406.sub

## 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

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## Platform Notes (Continued)

NUMA memory domains per socket set to One memory domain per socket  
Thermal Configuration set to Maximum Cooling  
Infinity Fabric Power Management set to Disabled  
Infinity Fabric Performance State set to P0  
Workload Profile set to Custom  
Power Regulator set to OS Control Mode

Sysinfo program /home/SPEC\_CPU2017/cpu2017/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on admin Wed Apr 1 17:27:21 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 7343 16-Core Processor
 1 "physical id"s (chips)
 16 "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 : 16
siblings  : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

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): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 16
Socket(s): 1
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7343 16-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1796.112
CPU max MHz: 3200.0000
CPU min MHz: 1500.0000
BogoMIPS: 6388.22
Virtualization: AMD-V
```

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## Platform Notes (Continued)

```

L1d cache:                512 KiB
L1i cache:                512 KiB
L2 cache:                 8 MiB
L3 cache:                 128 MiB
NUMA node0 CPU(s):       0-3
NUMA node1 CPU(s):       4-7
NUMA node2 CPU(s):       8-11
NUMA node3 CPU(s):       12-15
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 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 Srbds:       Not affected
Vulnerability Tsx 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 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 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 wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

```

```

/proc/cpuinfo cache data
cache size : 512 KB

```

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

```

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3
node 0 size: 257801 MB
node 0 free: 257337 MB
node 1 cpus: 4 5 6 7
node 1 size: 258022 MB
node 1 free: 257761 MB
node 2 cpus: 8 9 10 11
node 2 size: 258046 MB

```

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## Platform Notes (Continued)

```
node 2 free: 257793 MB
node 3 cpus: 12 13 14 15
node 3 size: 245935 MB
node 3 free: 245680 MB
node distances:
node   0   1   2   3
  0:  10  11  11  11
  1:  11  10  11  11
  2:  11  11  10  11
  3:  11  11  11  10
```

```
From /proc/meminfo
MemTotal:      1044281840 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
performance
```

```
/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 admin 5.4.0-56-generic #62-Ubuntu SMP Mon Nov 23 19:20:19 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
```

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## Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaggs barriers and \_\_user pointer sanitization

CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: 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 17:23

SPEC is set to: /home/SPEC\_CPU2017/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv	ext4	196G	83G	104G	45%	/

From /sys/devices/virtual/dmi/id

Vendor: HPE  
 Product: ProLiant DL345 Gen10 Plus  
 Product Family: ProLiant  
 Serial: J20APP000K

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:  
 8x Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200  
 8x UNKNOWN NOT AVAILABLE

BIOS:  
 BIOS Vendor: HPE  
 BIOS Version: A43  
 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)

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## Compiler Version Notes (Continued)

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)

=====  
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

(Continued on next page)





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## Base Portability Flags (Continued)

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 -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 -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 -fopenmp=libomp -lomp -lamdlibm -ljemalloc  
-lflang -lflangrti

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 -lflang  
-lflangrti

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

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## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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 -lflang  
-lflangrti
```

## Base Other Flags

C benchmarks:

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

C++ benchmarks:

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

Fortran benchmarks:

```
-Wno-return-type
```

## Peak Compiler Invocation

C benchmarks:

```
clang
```

C++ benchmarks:

```
clang++
```

Fortran benchmarks:

```
flang
```

## Peak Portability Flags

Same as Base Portability Flags



# SPEC CPU®2017 Integer Speed Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus  
(3.20 GHz, AMD EPYC 7343)

SPECspeed®2017\_int\_base = 13.0

SPECspeed®2017\_int\_peak = 13.0

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** May-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## 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

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/aocc300-flags-A1.html>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.html>



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

<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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