



# SPEC CPU®2017 Integer Speed Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

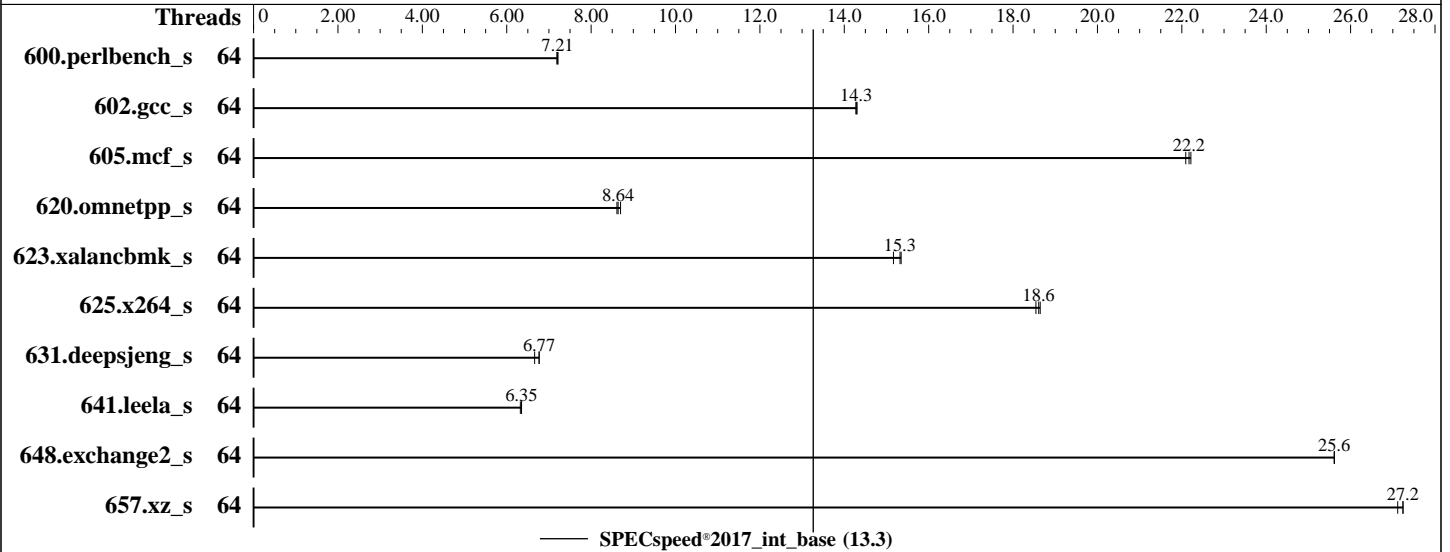
ProLiant XL225n Gen10 Plus  
(2.95 GHz, AMD EPYC 75F3)

SPECspeed®2017\_int\_base = 13.3

SPECspeed®2017\_int\_peak = Not Run

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

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



### Hardware

CPU Name: AMD EPYC 75F3  
 Max MHz: 4000  
 Nominal: 2950  
 Enabled: 64 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: 256 MB I+D on chip per chip, 32 MB shared / 4 cores  
 Other: None  
 Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)  
 Storage: 1 x 960 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 A46 v2.42 02/15/2021 released Feb-2021  
 File System: ext4  
 System State: Run level 5 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 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	64	<b>246</b>	<b>7.21</b>	246	7.21	247	7.19							
602.gcc_s	64	278	14.3	<b>279</b>	<b>14.3</b>	279	14.3							
605.mcf_s	64	214	22.1	213	22.2	<b>213</b>	<b>22.2</b>							
620.omnetpp_s	64	188	8.70	189	8.61	<b>189</b>	<b>8.64</b>							
623.xalancbmk_s	64	92.3	15.3	93.4	15.2	<b>92.5</b>	<b>15.3</b>							
625.x264_s	64	94.6	18.6	<b>94.8</b>	<b>18.6</b>	95.1	18.5							
631.deepsjeng_s	64	212	6.77	215	6.66	<b>212</b>	<b>6.77</b>							
641.leela_s	64	270	6.32	269	6.35	<b>269</b>	<b>6.35</b>							
648.exchange2_s	64	115	25.6	<b>115</b>	<b>25.6</b>	115	25.6							
657.xz_s	64	227	27.2	<b>227</b>	<b>27.2</b>	228	27.1							

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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 = "0-63"  
LD\_LIBRARY\_PATH =  
"/home/cpu2017/amd\_speed\_aocc300\_milan\_B\_lib/64;/home/cpu2017/amd\_speed\_aocc300\_milan\_B\_lib/32:"  
MALLOCONF = "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>

## 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 One memory domain per socket  
Thermal Configuration set to Maximum Cooling  
Workload Profile set to Custom  
Infinity Fabric Power Management set to Disabled

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## Platform Notes (Continued)

Infinity Fabric Performance State set to P0  
Power Regulator set to OS Control Mode

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on ubuntu Wed Apr 1 22:57:11 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 75F3 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):               16
Vendor ID:                   AuthenticAMD
CPU family:                  25
Model:                       1
Model name:                  AMD EPYC 75F3 32-Core Processor
Stepping:                   1
Frequency boost:            enabled
CPU MHz:                     1496.748
CPU max MHz:                 2950.0000
CPU min MHz:                 1500.0000
BogoMIPS:                   5888.81
Virtualization:             AMD-V
L1d cache:                   2 MiB
```

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## Platform Notes (Continued)

```

L1i cache:                2 MiB
L2 cache:                  32 MiB
L3 cache:                  512 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
NUMA node4 CPU(s):        16-19
NUMA node5 CPU(s):        20-23
NUMA node6 CPU(s):        24-27
NUMA node7 CPU(s):        28-31
NUMA node8 CPU(s):        32-35
NUMA node9 CPU(s):        36-39
NUMA node10 CPU(s):       40-43
NUMA node11 CPU(s):       44-47
NUMA node12 CPU(s):       48-51
NUMA node13 CPU(s):       52-55
NUMA node14 CPU(s):       56-59
NUMA node15 CPU(s):       60-63
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 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
```

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## Platform Notes (Continued)

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
node 0 size: 128777 MB
node 0 free: 128677 MB
node 1 cpus: 4 5 6 7
node 1 size: 129022 MB
node 1 free: 128931 MB
node 2 cpus: 8 9 10 11
node 2 size: 129022 MB
node 2 free: 128943 MB
node 3 cpus: 12 13 14 15
node 3 size: 129022 MB
node 3 free: 128898 MB
node 4 cpus: 16 17 18 19
node 4 size: 129022 MB
node 4 free: 128485 MB
node 5 cpus: 20 21 22 23
node 5 size: 129022 MB
node 5 free: 128907 MB
node 6 cpus: 24 25 26 27
node 6 size: 129022 MB
node 6 free: 128932 MB
node 7 cpus: 28 29 30 31
node 7 size: 116909 MB
node 7 free: 116824 MB
node 8 cpus: 32 33 34 35
node 8 size: 129022 MB
node 8 free: 128883 MB
node 9 cpus: 36 37 38 39
node 9 size: 129022 MB
node 9 free: 128939 MB
node 10 cpus: 40 41 42 43
node 10 size: 129022 MB
node 10 free: 128935 MB
node 11 cpus: 44 45 46 47
node 11 size: 129022 MB
node 11 free: 128929 MB
node 12 cpus: 48 49 50 51
node 12 size: 128998 MB
node 12 free: 128845 MB
node 13 cpus: 52 53 54 55
node 13 size: 129022 MB
node 13 free: 128853 MB
node 14 cpus: 56 57 58 59
node 14 size: 129022 MB

```

(Continued on next page)



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## Platform Notes (Continued)

```

node 14 free: 128928 MB
node 15 cpus: 60 61 62 63
node 15 size: 129018 MB
node 15 free: 128943 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  11  11  11  11  11  32  32  32  32  32  32  32
 1:  11  10  11  11  11  11  11  11  11  32  32  32  32  32  32  32
 2:  11  11  10  11  11  11  11  11  11  32  32  32  32  32  32  32
 3:  11  11  11  10  11  11  11  11  11  32  32  32  32  32  32  32
 4:  11  11  11  11  10  11  11  11  11  32  32  32  32  32  32  32
 5:  11  11  11  11  11  10  11  11  11  32  32  32  32  32  32  32
 6:  11  11  11  11  11  11  10  11  11  32  32  32  32  32  32  32
 7:  11  11  11  11  11  11  11  10  11  32  32  32  32  32  32  32
 8:  32  32  32  32  32  32  32  32  10  11  11  11  11  11  11  11
 9:  32  32  32  32  32  32  32  32  11  10  11  11  11  11  11  11
10:  32  32  32  32  32  32  32  32  11  11  10  11  11  11  11  11
11:  32  32  32  32  32  32  32  32  11  11  11  10  11  11  11  11
12:  32  32  32  32  32  32  32  32  11  11  11  11  10  11  11  11
13:  32  32  32  32  32  32  32  32  11  11  11  11  11  10  11  11
14:  32  32  32  32  32  32  32  32  11  11  11  11  11  11  10  11
15:  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  10

```

```

From /proc/meminfo
MemTotal:      2101226648 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
ondemand

```

```

/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:

```

(Continued on next page)



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## Platform Notes (Continued)

Linux ubuntu 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/swapgs 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 22:53

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/vgubuntu-root	ext4	878G	9.3G	824G	2%	/

From /sys/devices/virtual/dmi/id

Vendor:	HPE
Product:	ProLiant XL225n Gen10 Plus
Product Family:	ProLiant
Serial:	CN700303ZH

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 UNKNOWN HMABAGL7ABR4N-XN 128 GB 4 rank 3200

BIOS:

BIOS Vendor:	HPE
BIOS Version:	A46
BIOS Date:	02/15/2021
BIOS Revision:	2.42
Firmware Revision:	2.40

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## Platform Notes (Continued)

(End of data from sysinfo program)

## Compiler Version Notes

```

=====
C          | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
          | 625.x264_s(base) 657.xz_s(base)
-----

```

```

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) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
          | 641.leela_s(base)
-----

```

```

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)
-----

```

```

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++

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## Base Compiler Invocation (Continued)

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 -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
-freemap-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 -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
```

(Continued on next page)



# SPEC CPU®2017 Integer Speed Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant XL225n Gen10 Plus**  
(2.95 GHz, AMD EPYC 75F3)

SPECspeed®2017\_int\_base = 13.3

SPECspeed®2017\_int\_peak = Not Run

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Mar-2021

**Hardware Availability:** Apr-2021

**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-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
-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
```

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>

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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