



# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL385 Gen10

(2.50 GHz, AMD EPYC 7502)

SPECspeed®2017\_int\_base = 7.64

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 3

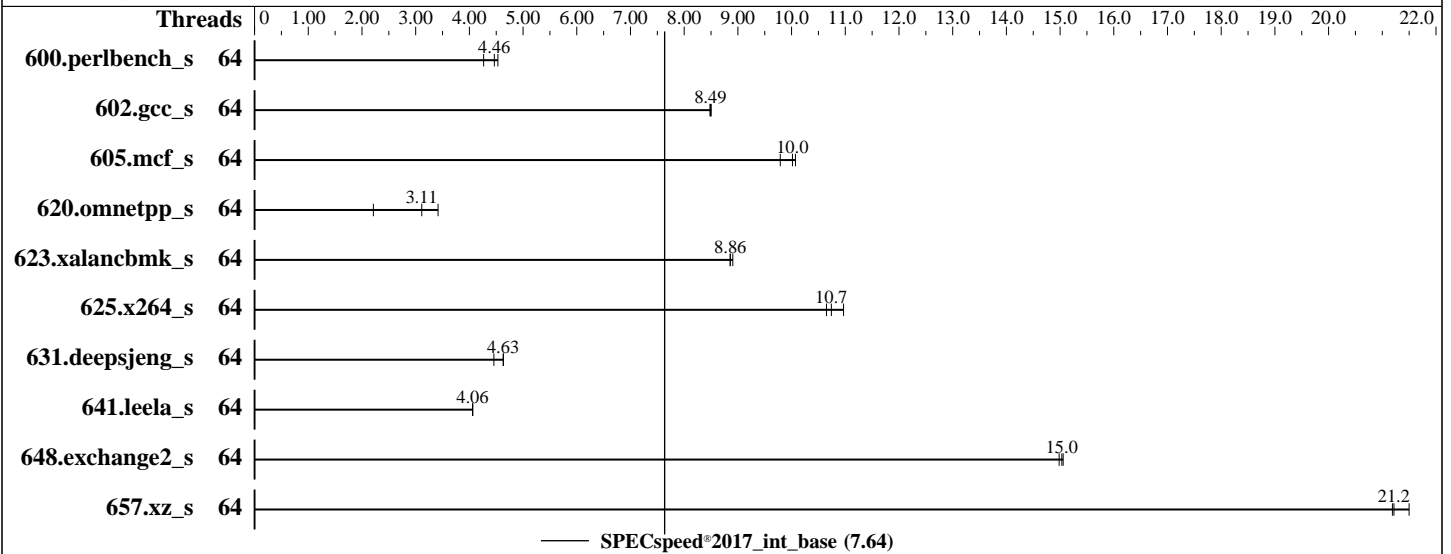
Test Sponsor: HPE

Tested by: HPE

Test Date: Aug-2019

Hardware Availability: Oct-2019

Software Availability: Jun-2019



### Hardware

CPU Name: AMD EPYC 7502  
 Max MHz: 3350  
 Nominal: 2500  
 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 chip,  
 16 MB shared / 4 cores  
 Other: None  
 Memory: 1 TB (16 x 64 GB 4Rx4 PC4-2933Y-L)  
 Storage: 1 x 400 GB SAS SSD, RAID 0  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 (x86\_64) SP1  
 Kernel 4.12.14-195-default  
 Compiler: C/C++: Version 1.3.0 of AOCC  
 Fortran: Version 4.8.2 of GCC  
 Parallel: Yes  
 Firmware: HPE BIOS Version A40 07/20/2019 released Oct-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: jemalloc: jemalloc memory allocator library v5.1.0;  
 Power Management: --



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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	416	4.27	392	4.53	<b>398</b>	<b>4.46</b>							
602.gcc_s	64	470	8.48	468	8.50	<b>469</b>	<b>8.49</b>							
605.mcf_s	64	482	9.79	469	10.1	<b>471</b>	<b>10.0</b>							
620.omnetpp_s	64	477	3.42	<b>524</b>	<b>3.11</b>	737	2.21							
623.xalancbmk_s	64	<b>160</b>	<b>8.86</b>	160	8.86	159	8.91							
625.x264_s	64	161	11.0	<b>164</b>	<b>10.7</b>	166	10.6							
631.deepsjeng_s	64	<b>310</b>	<b>4.63</b>	322	4.46	309	4.63							
641.leela_s	64	420	4.06	420	4.06	<b>420</b>	<b>4.06</b>							
648.exchange2_s	64	<b>196</b>	<b>15.0</b>	195	15.1	196	15.0							
657.xz_s	64	<b>291</b>	<b>21.2</b>	288	21.5	292	21.2							

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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/>

The AOCC Fortran Plugin version 1.3.0 was used to leverage AOCC optimizers with gfortran. It is available here:  
<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

runspec command invoked through numactl i.e.:  
numactl --interleave=all runspec <etc>

Set dirty\_ratio=8 to limit dirty cache to 8% of memory  
Set swappiness=1 to swap only if necessary  
Set zone\_reclaim\_mode=1 to free local node memory and avoid remote memory  
sync then drop\_caches=3 to reset caches before invoking runcpu

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## Operating System Notes (Continued)

dirty\_ratio, swappiness, zone\_reclaim\_mode and drop\_caches were all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)

## General Notes

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

```
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aoccl30_naples_A_lib/64;
/home/cpu2017/amd_speed_aoccl30_naples_A_lib/32:"
OMP_DYNAMIC = "false"
OMP_PLACES = "cores"
OMP_PROC_BIND = "close"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "192M"
OMP_WAIT_POLICY = "active"
```

Binaries were compiled on a system with 2p AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.6

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.

jemalloc: configured and built with GCC v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto  
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

Thermal Configuration set to Maximum Cooling

SMT Mode set to Disabled

Determinism Control set to Manual

Performance Determinism set to Power Deterministic

Minimum Processor Idle Power core C-State set to C6 State

Memory Patrol Scrubbing set to Disabled

Workload Profile set to General Peak Frequency Compute

Numa Group Size Optimization set to Flat

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on dl385gen10-rome-32c Thu Feb 14 09:31:07 2019

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## Platform Notes (Continued)

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 7502 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: 23

Model: 49

Model name: AMD EPYC 7502 32-Core Processor

Stepping: 0

CPU MHz: 2500.000

CPU max MHz: 2500.0000

CPU min MHz: 1500.0000

BogoMIPS: 4990.84

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 32K

L2 cache: 512K

L3 cache: 16384K

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

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## Platform Notes (Continued)

NUMA node5 CPU(s): 40-47

NUMA node6 CPU(s): 48-55

NUMA node7 CPU(s): 56-63

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 xtopology nonstop\_tsc cpuid extd\_apicid aperfmperf pni  
pclmulqdq monitor ssse3 fma cx16 sse4\_1 sse4\_2 movbe popcnt aes xsave avx fl6c  
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\_l2 mwaitx cpb  
cat\_l3 cdp\_l3 hw\_pstate ssbd ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2  
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 arat npt  
lbrv svm\_lock nrip\_save tsc\_scale vmcb\_clean flushbyasid decodeassists pausefilter  
pfthreshold avic v\_vmsave\_vmload vgif umip 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: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 128731 MB
node 0 free: 128615 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 129021 MB
node 1 free: 128848 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 129021 MB
node 2 free: 128830 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 129009 MB
node 3 free: 128856 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 128992 MB
node 4 free: 128907 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 129021 MB
node 5 free: 128939 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 129021 MB
node 6 free: 128942 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 128812 MB
node 7 free: 128730 MB
node distances:
node 0 1 2 3 4 5 6 7
```

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## Platform Notes (Continued)

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

From /proc/meminfo

```
MemTotal:      1056392400 kB
HugePages_Total:      0
Hugepagesize:      2048 kB
```

From /etc/\*release\* /etc/\*version\*

```
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"
```

uname -a:

```
Linux dl385gen10-rome-32c 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019
(8fba516) x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2017-5754 (Meltdown):      Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional,
IBRS_FW, STIBP: disabled, RSB filling
```

run-level 3 Feb 14 09:21

SPEC is set to: /home/cpu2017

```
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sda2        btrfs    371G   59G  311G  16% /home
```

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.

BIOS HPE A40 07/20/2019

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## Platform Notes (Continued)

Memory:

16x HPE P03054-091 64 GB 4 rank 2933

16x UNKNOWN NOT AVAILABLE

(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)
=====

```

```

-----
AOCCL.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
  AOCCL_1_3_0_Release-Build#34) (based on LLVM AOCCL.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aoccl.3.0/AOCCL-1.3.0-Compiler/bin
-----

```

```

=====
C++   | 620.omnetpp_s(base) 623.xalanbmk_s(base) 631.deepsjeng_s(base)
      | 641.leela_s(base)
=====

```

```

-----
AOCCL.LLVM.1.3.0.B34.2018_10_22 clang version 7.0.0 (CLANG: Jenkins
  AOCCL_1_3_0_Release-Build#34) (based on LLVM AOCCL.LLVM.1.3.0.B34.2018_10_22)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/aoccl.3.0/AOCCL-1.3.0-Compiler/bin
-----

```

```

=====
Fortran | 648.exchange2_s(base)
=====

```

```

-----
GNU Fortran (GCC) 4.8.2
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
-----

```

## Base Compiler Invocation

C benchmarks:  
clang

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## Base Compiler Invocation (Continued)

C++ benchmarks:

clang++

Fortran benchmarks:

clang gfortran

## Base Portability Flags

```
600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gc_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:

```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-enable-vectorize-compares -O3 -ffast-math
-march=znver1 -mno-avx2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-freemap-arrays -mllvm -inline-threshold=1000
-flv-function-specialization -mllvm -enable-gvn-hoist
-mllvm -function-specialize -z muldefs -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -ljemalloc
-lamdlibm
```

C++ benchmarks:

```
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-enable-vectorize-compares -O3 -march=znver1
-mllvm -unroll-threshold=100 -finline-aggressive -freemap-arrays
-mllvm -inline-threshold=1000 -mllvm -enable-vectorize-compares=false
-z muldefs -DSPEC_OPENMP -fopenmp -DUSE_OPENMP -fopenmp=libomp -lomp
-lpthread -ldl -ljemalloc -lamdlibm
```

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## Base Optimization Flags (Continued)

Fortran benchmarks:

```

-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -Wl,-mllvm -Wl,-merge-constant
-Wl,-mllvm -Wl,-unroll-aggressive -Wl,-mllvm -Wl,-unroll-threshold=150
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-enable-vectorize-compares -O3 -mavx -madx
-funroll-loops -ffast-math -fpack-arrays -z muldefs
-fplugin=dragonegg.so -specs=integrated-as.specs
-fplugin-arg-dragonegg-llvm-option=-disable-indvar-simplify
-fplugin-arg-dragonegg-llvm-option=-unroll-aggressive
-fplugin-arg-dragonegg-llvm-option=-unroll-threshold:150 -DSPEC_OPENMP
-DUSE_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl
-ljemalloc -lamdlibm -lgfortran

```

## Base Other Flags

C benchmarks:

-Wno-return-type

C++ benchmarks:

-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/aocc130-flags-revA2-HPE.html>

<http://www.spec.org/cpu2017/flags/gcc.2017-11-20.html>

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

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

<http://www.spec.org/cpu2017/flags/aocc130-flags-revA2-HPE.xml>

<http://www.spec.org/cpu2017/flags/gcc.2017-11-20.xml>

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

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