# SPEC® CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL580 Gen10  
(2.20 GHz, Intel Xeon Platinum 8276)

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>SPECspeed2017_fp_base = 193</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Test Date: Jun-2019</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Hardware Availability: Apr-2019</td>
</tr>
</tbody>
</table>

### SPECspeed2017_fp_peak

Not Run

| SPECspeed2017_fp_base = 193 |

### Software

**OS:** SUSE Linux Enterprise Server 15 (x86_64)  
Kernel 4.12.14-23-default

**Compiler:** C/C++: Version 19.0.2.187 of Intel C/C++  
Compiler Build 20190117 for Linux;  
Fortran: Version 19.0.2.187 of Intel Fortran  
Compiler Build 20190117 for Linux

**Parallel:** Yes

**Firmware:** HPE BIOS Version U34 04/19/2019 released Apr-2019

**System State:** Run level 3 (multi-user)

**Base Pointers:** 64-bit

**Peak Pointers:** Not Applicable

**Other:** None

### Hardware

**CPU Name:** Intel Xeon Platinum 8276  
Max MHz.: 4000  
Nominal: 2200

**Enabled:** 112 cores, 4 chips  
Orderable: 1, 2, 3, 4 chip(s)

**Cache L1:** 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 38.5 MB I+D on chip per chip

**Other:** None

**Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
Storage: 1 x 400 GB SAS SSD, RAID 0

**Other:** None

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (193)</th>
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
<td>619.lbm_s</td>
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<td>627.cam4_s</td>
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<tr>
<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
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**Threads:** 112

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<td>134</td>
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<td>173</td>
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Standard Performance Evaluation Corporation (info@spec.org)  
https://www.spec.org/
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(2.20 GHz, Intel Xeon Platinum 8276)

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Test Sponsor: HPE
Tested by: HPE

SPECspeed2017_fp_base = 193
SPECspeed2017_fp_peak = Not Run

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<tr>
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<th>Seconds</th>
<th>Ratio</th>
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</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
  sync; echo 3> /proc/sys/vm/drop_caches

General Notes

Environment variables set by runcpu before the start of the run:
  KMP_AFFINITY = "granularity=fine,compact"
  LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/lib/intel64"
  OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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.

Platform Notes

BIOS Configuration:
  Hyper-Threading set to Disabled
  Thermal Configuration set to Maximum Cooling

(Continued on next page)
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SPECspeed2017_fp_base = 193
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 3
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Tested by: HPE

Hardware Availability: Apr-2019
Software Availability: Feb-2019

Test Date: Jun-2019

Platform Notes (Continued)

Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to General Peak Frequency Compute
   Energy/Performance Bias set to Balanced Power
Workload Profile set to Custom
   Numa Group Size Optimization set to Flat
   Advanced Memory Protection set to Advanced ECC
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bced8f2999c33d61f6f4985e45859ea9
running on dl580-sles15 Tue Jun 4 15:00:14 2019

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 : Intel(R) Xeon(R) Platinum 8276 CPU @ 2.20GHz
   4 "physical id"s (chips)
   112 "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 : 28
   siblings : 28
   physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30
   physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30
   physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30
   physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30

From lscpu:
   Architecture: x86_64
   CPU op-mode(s): 32-bit, 64-bit
   Byte Order: Little Endian
   CPU(s): 112
   On-line CPU(s) list: 0-111
   Thread(s) per core: 1
   Core(s) per socket: 28
   Socket(s): 4
   NUMA node(s): 4
   Vendor ID: GenuineIntel
   CPU family: 6
   Model: 85

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

- **Model name**: Intel(R) Xeon(R) Platinum 8276 CPU @ 2.20GHz
- **Stepping**: 7
- **CPU MHz**: 2200.000
- **BogoMIPS**: 4400.00
- **Virtualization**: VT-x
- **L1d cache**: 32K
- **L1i cache**: 32K
- **L2 cache**: 1024K
- **L3 cache**: 39424K
- **NUMA node0 CPU(s)**: 0-27
- **NUMA node1 CPU(s)**: 28-55
- **NUMA node2 CPU(s)**: 56-83
- **NUMA node3 CPU(s)**: 84-111
- **Flags**: fpu vme de pse ts cmov mca pa mcd mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology
- **CPU MHz**: 2200.000
- **BogoMIPS**: 4400.00
- **Virtualization**: VT-x
- **L1d cache**: 32K
- **L1i cache**: 32K
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From /proc/cpuinfo:

```
cache size : 39424 KB
```

Warning: A numactl 'node' might or might not correspond to a physical chip.
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Platform Notes (Continued)

node  0  1  2  3
0:  10 21 21 21
1:  21 10 21 21
2:  21 21 10 21
3:  21 21 21 10

From /proc/meminfo
MemTotal: 792245864 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
NAME="SLES"
VERSION="15"
VERSION_ID="15"
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
Linux dl580-sles15 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
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: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Jun 4 14:59

SPEC is set to: /home/cpu2017_u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2  btrfs  371G  79G  292G  22% /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 U34 04/19/2019
Memory:
24x UNKNOWN NOT AVAILABLE
24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(Continued on next page)
Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
FC  607.cactuBSSN_s(base)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
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FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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Test Date: Jun-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
   -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

(Continued on next page)
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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-06-04 05:30:14-0400.