# SPEC CPU®2017 Floating Point Speed Result

## Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**Hewlett Packard Enterprise**  
**ProLiant DL580 Gen10**  
**CPU2017 License:** 3  
**Test Date:** Jul-2018  
**Test Sponsor:** HPE  
**Hardware Availability:** Apr-2019  
**Tested by:** HPE  
**Software Availability:** Feb-2019

---

### SPECspeed®2017 fp_base = 189

### SPECspeed®2017 fp_peak = Not Run

---

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>88</td>
<td>202</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>88</td>
<td>153</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>88</td>
<td>136</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>88</td>
<td>148</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>88</td>
<td>52.6</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>88</td>
<td>217</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>88</td>
<td>378</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>88</td>
<td>109</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>88</td>
<td>236</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>88</td>
<td></td>
</tr>
</tbody>
</table>

---

### Hardware

- **CPU Name:** Intel Xeon Gold 6238L  
- **Max MHz:** 3700  
- **Nominal:** 2100  
- **Enabled:** 88 cores, 4 chips  
- **Orderable:** 1, 2, 3, 4 chip(s)  
- **Cache L1:** 32 KB I+32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 30.25 MB I+D on chip per chip  
- **Memory:** 768 GB (24 x 32 GB 2Rx8 PC4-2666V-R)  
- **Storage:** 1 x 400 GB SAS SSD, RAID 0  
- **Other:** None

### 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 05/21/2019 released Apr-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None  
- **Power Management:** --
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 189
SPECspeed®2017_fp_peak = Not Run

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=core,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)
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 9bcd8f2999c33d61f64985e45859ea9
running on linux-sypg Sat Sep 15 13:47:09 2018

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) Gold 6238L CPU @ 2.10GHz
  4 "physical id"s (chips)
  88 "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 : 22
    siblings : 22
    physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
    physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
    physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
    physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

From lscpu:
  Architecture:         x86_64
  CPU op-mode(s):       32-bit, 64-bit
  Byte Order:           Little Endian
  CPU(s):               88
  On-line CPU(s) list:  0-87
  Thread(s) per core:   1
  Core(s) per socket:   22
  Socket(s):            4
  NUMA node(s):         4
  Vendor ID:            GenuineIntel
  CPU family:           6
  Model:                85
  Model name:           Intel(R) Xeon(R) Gold 6238L CPU @ 2.10GHz
  Stepping:             7
  CPU MHz:              2100.000
  BogoMIPS:             4200.00

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

<table>
<thead>
<tr>
<th>Virtualization:</th>
<th>VT-x</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>1024K</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>30976K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-21</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>22-43</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>44-65</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>66-87</td>
</tr>
</tbody>
</table>

**Flags:**
fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_13 cdp_13 invpcid_single intel_patin mba tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmis hle avx2 smep bmi2 3dnow invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb ibrs dtlb dtherm ida arat pid pts pkup ospke avx512_vnni arch_capabilities ssbd

```
/proc/cpuinfo cache data
cache size : 30976 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 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
node 0 size: 193116 MB
node 0 free: 192801 MB
node 1 cpus: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
node 1 size: 193531 MB
node 1 free: 193162 MB
node 2 cpus: 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65
node 2 size: 193531 MB
node 2 free: 193096 MB
node 3 cpus: 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
node 3 size: 193501 MB
node 3 free: 193335 MB
node distances:
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`

(Continued on next page)
## SPEC CPU®2017 Floating Point Speed Result

### Hewlett Packard Enterprise

*Test Sponsor: HPE*

**ProLiant DL580 Gen10**

*CPU Frequency: 2.10 GHz, Intel Xeon Gold 6238L*

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>189</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

| Test Date: | Jul-2018 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | Feb-2019 |

### Platform Notes (Continued)

- **MemTotal:** 792249988 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

From `/etc/*release` /`etc/*version`

```plaintext
os-release:
  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 linux-sypg 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 Sep 15 13:45

SPEC is set to: `/home/cpu2017_u2`

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdal</td>
<td>xfs</td>
<td>894G</td>
<td>90G</td>
<td>805G</td>
<td>10%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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 05/21/2019**
- **Memory:**
  - 24x UNKNOWN NOT AVAILABLE
  - 24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2666

(End of data from sysinfo program)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL580 Gen10  
(2.10 GHz, Intel Xeon Gold 6238L)  

 SPECspeed®2017_fp_base = 189  
 SPECspeed®2017_fp_peak = Not Run

Compiler Version Notes

==============================================================================
| C          | 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. |
==============================================================================

==============================================================================
| C++, C, Fortran | 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. |
==============================================================================

==============================================================================
| Fortran     | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base) |
| 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. |
==============================================================================

==============================================================================
| Fortran, C  | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)        |
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==============================================================================

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11
**Base Compiler Invocation (Continued)**

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 -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-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

(Continued on next page)
### Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL580 Gen10
(2.10 GHz, Intel Xeon Gold 6238L)

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

**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++ (continued):
- `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-ic19.0u1-flags-linux64.html)
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.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-ic19.0u1-flags-linux64.xml)
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml)