# SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML30 Gen10  
(3.80 GHz, Intel Xeon E-2276G)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3</th>
<th>Test Date:</th>
<th>Sep-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
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<td>Hardware Availability:</td>
<td>Nov-2019</td>
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<td>HPE</td>
<td>Software Availability:</td>
<td>May-2019</td>
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## SPECspeed®2017_fp_base = 32.8

| SPECspeed®2017_fp_peak = Not Run |

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### Threads

<table>
<thead>
<tr>
<th>Task</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>6</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>6</td>
</tr>
<tr>
<td>619.libm_s</td>
<td>6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>6</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>6</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>6</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>6</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>6</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>6</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>6</td>
</tr>
</tbody>
</table>

| SPECspeed®2017_fp_base (32.8) |

### Hardware

- **CPU Name:** Intel Xeon E-2276G  
- **Max MHz:** 4900  
- **Nominal:** 3800  
- **Enabled:** 6 cores, 1 chip  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 256 KB I+D on chip per core  
- **L3:** 12 MB I+D on chip per chip  
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)  
- **Storage:** 1 x 400 GB SAS SSD, RAID 0  
- **Other:** None  
- **Power Management:** --

### Software

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
  - Kernel 4.12.14-23-default  
- **Compiler:**  
  - C/C++: Version 19.0.4.227 of Intel C/C++  
  - Compiler Build 20190416 for Linux;  
  - Fortran: Version 19.0.4.227 of Intel Fortran  
  - Compiler Build 20190416 for Linux;  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version U44 09/05/2019 released Nov-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None
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**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
<td>603.bwaves_s</td>
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<td><strong>80.3</strong></td>
<td>734</td>
<td>80.4</td>
<td>736</td>
<td>80.1</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>53.7</td>
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<tr>
<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<td>334</td>
<td>39.6</td>
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<td>40.5</td>
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<tr>
<td>627.cam4_s</td>
<td>6</td>
<td>341</td>
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<td>340</td>
<td>26.1</td>
<td>342</td>
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<tr>
<td>628.pop2_s</td>
<td>6</td>
<td>321</td>
<td><strong>37.0</strong></td>
<td>320</td>
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<td>321</td>
<td>36.9</td>
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<td>6</td>
<td>479</td>
<td>30.1</td>
<td><strong>480</strong></td>
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<td>481</td>
<td>30.0</td>
</tr>
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<td>6</td>
<td>299</td>
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<td>649.fotonik3d_s</td>
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<td>524</td>
<td><strong>17.4</strong></td>
<td>524</td>
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<tr>
<td>654.roms_s</td>
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<td>928</td>
<td>17.0</td>
<td><strong>927</strong></td>
<td><strong>17.0</strong></td>
</tr>
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**SPECspeed®2017_fp_base = 32.8**
**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=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017_u4/lib/ia32:/home/cpu2017_u4/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5

Yes: 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.
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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE

**Test Date:** Sep-2019  
**Hardware Availability:** Nov-2019  
**Software Availability:** May-2019

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### Platform Notes

**BIOS Configuration:**  
Hyper-Threading set to Disabled  
Thermal Configuration set to Maximum Cooling  
LLC Prefetch set to Enabled  
Workload Profile set to General Peak Frequency Compute  
Sysinfo program /home/cpu2017_u4/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9  
running on ml30-sles15 Mon Sep 23 14:37:57 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) E-2276G CPU @ 3.80GHz  
  1 "physical id"s (chips)  
  6 "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 : 6  
  siblings : 6  
  physical 0: cores 0 1 2 3 4 5

From lscpu:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 6  
On-line CPU(s) list: 0-5  
Thread(s) per core: 1  
Core(s) per socket: 6  
Socket(s): 1  
NUMA node(s): 1  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 158  
Model name: Intel(R) Xeon(R) E-2276G CPU @ 3.80GHz  
Stepping: 10  
CPU MHz: 3800.000  
BogomIPS: 7584.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 256K  
L3 cache: 12288K  
NUMA node0 CPU(s): 0-5  
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

(Continued on next page)
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Platform Notes (Continued)

pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpelgb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 sse3
sdbg fma cx16 xtrr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
pti tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep
bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsavec
xgetbv1 xsaves ibpb ibrs stibp dtherm ida arat pln pts ssbd

/proc/cpuinfo cache data
  cache size : 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 1 nodes (0)
    node 0 cpus: 0 1 2 3 4 5
    node 0 size: 64265 MB
    node 0 free: 63787 MB
    node distances:
      node 0
        0: 10

From /proc/meminfo
  MemTotal: 65808100 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  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 ml30-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): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
Platform Notes (Continued)

IBPB, IBRS_FW

run-level 3 Sep 23 14:36

SPEC is set to: /home/cpu2017_u4

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   344G   40G  305G  12% /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 U44 09/05/2019
Memory:
4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2667

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<p>| 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 19.0.4.227 Build 20190416 |</p>
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<tr>
<td>Fortran</td>
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Compiler Version Notes (Continued)

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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 byteincl
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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

**Fortran benchmarks:**
-DSPEC_OPENMP -xCORE-AVX2 -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-AVX2 -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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
- [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-Platform-Flags-Intel-V1.2-CLX-revB.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml)

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### Notes

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

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