## SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL20 Gen10  
(4.00 GHz, Intel Xeon E-2274G)  

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
</tr>
<tr>
<td>Tested by:</td>
<td>HPE</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeak®2017_fp_base</th>
<th>SPECspeak®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>8</td>
<td>78.0</td>
<td>Not Run</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>8</td>
<td>41.7</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>8</td>
<td>33.5</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>8</td>
<td>24.0</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>8</td>
<td>29.0</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>8</td>
<td>21.7</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>8</td>
<td>16.7</td>
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</tr>
<tr>
<td>644.nab_s</td>
<td>8</td>
<td>49.7</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>8</td>
<td>14.1</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>8</td>
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<td></td>
</tr>
</tbody>
</table>

### SPECspeak®2017_fp_base (28.0)

### Hardware

- **CPU Name:** Intel Xeon E-2274G  
- **Max MHz:** 4900  
- **Nominal:** 4000  
- **Enabled:** 4 cores, 1 chip, 2 threads/core  
- **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:** 8 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)  
- **Storage:** 1 x 400 GB SATA 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 19.0.1.144 of Intel C/C++  
  Compiler Build 20181018 for Linux;  
  Fortran: Version 19.0.1.144 of Intel Fortran  
  Compiler Build 20181018 for Linux  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version U43 09/05/2019 released Sep-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None  
- **Power Management:** --
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**SPECspeed®2017_fp_base = 28.0**

**SPECspeed®2017_fp_peak = Not Run**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
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<tr>
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<td>369</td>
<td>24.0</td>
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<tr>
<td>628.pop2_s</td>
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<td>29.2</td>
<td>409</td>
<td>29.0</td>
<td>410</td>
<td>28.9</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
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<tr>
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<td>14.1</td>
<td>1122</td>
<td>14.0</td>
<td>1120</td>
<td>14.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</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/lib/ia32:/home/cpu2017/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
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.

**Platform Notes**

BIOS Configuration:
Thermal Configuration set to Maximum Cooling

(Continued on next page)
Platform Notes (Continued)

LLC Prefetch set to Enabled
Workload Profile set to General Peak Frequency Compute
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd08f2999c33d61f64985e45859ea9
running on linux-vb4y Sat Oct 19 15:05:29 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-2274G CPU @ 4.00GHz
  1 "physical id"s (chips)
  8 "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: 4
    siblings: 8
    physical 0: cores 0 1 2 3

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  Address sizes: 39 bits physical, 48 bits virtual
  CPU(s): 8
  On-line CPU(s) list: 0-7
  Thread(s) per core: 2
  Core(s) per socket: 4
  Socket(s): 1
  NUMA node(s): 1
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 158
  Model name: Intel(R) Xeon(R) E-2274G CPU @ 4.00GHz
  Stepping: 10
  CPU MHz: 4000.000
  BogoMIPS: 8016.00
  Virtualization: VT-x
  L1d cache: 32K
  L1i cache: 32K
  L2 cache: 256K
  L3 cache: 8192K
  NUMA node0 CPU(s): 0-7
  Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
  pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpegb rdtscp
  lm constant_tsc art arch_perfmonitor pebs bts rep_good nopl xtopology nonstop_tsc cpuid

(Continued on next page)
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SPECspeed®2017_fp_base = 28.0
SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Oct-2019
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Platform Notes (Continued)

aperfmperp tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpc pcid ssse4_1 ssse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single pti ssbd ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsqsbse tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed clflushopt intel_pt xsaveopt xsaves dtherm ida arat pln pts md_clear flush_lld

/proc/cpuinfo cache data
cache size : 8192 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 6 7
node 0 size: 64022 MB
node 0 free: 63489 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65559328 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 linux-vb4y 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): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

(Continued on next page)
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SPECspeed®2017_fp_base = 28.0
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Platform Notes (Continued)

run-level 3 Oct 19 15:03

SPEC is set to: /home/cpu2017

Filesystem     Type    Size  Used  Avail  Use% Mounted on
/dev/sda3      xfs      270G   64G  206G  24% /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 U43 09/05/2019
Memory:
  4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

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 19.0.1.144 Build 20181018
| Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018
| Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
| Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
| Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018
| Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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

Test Date: Oct-2019
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Compiler Version Notes (Continued)

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

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.cactusBSSN_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
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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-ic19.0u1-flags-linux64.2019-12-10.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-linux64.2019-12-10.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.

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