## SPEC ® CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML110 Gen10  
(2.50 GHz, Intel Xeon Gold 5215)  

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>10</td>
<td>59.5</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>10</td>
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</tr>
<tr>
<td>619.lbm_s</td>
<td>10</td>
<td>37.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>10</td>
<td>60.8</td>
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<td>627.cam4_s</td>
<td>10</td>
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<tr>
<td>628.pop2_s</td>
<td>10</td>
<td>49.4</td>
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<tr>
<td>638.imagick_s</td>
<td>10</td>
<td>35.5</td>
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<tr>
<td>644.nab_s</td>
<td>10</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>10</td>
<td>40.1</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>10</td>
<td>41.3</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5215  
- **Max MHz.:** 3400  
- **Nominal:** 2500  
- **Enabled:** 10 cores, 1 chip  
- **Orderable:** 1 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 13.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 96 GB (6 x 16 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++  
- **Fortran:** Version 19.0.2.187 of Intel Fortran  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version U33 02/02/2019 released Apr-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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<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
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</table>

**CPU2017 License:** 3  
**Test Date:** May-2019  
**Test Sponsor:** HPE  
**Tested by:** HPE  

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

### Results Table

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

**SPECspeed2017_fp_base =** 52.7  
**SPECspeed2017_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_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 = 52.7
SPECspeed2017_fp_peak = Not Run

Platform Notes (Continued)

Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
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
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on ml110-sles15 Fri May 3 15:51:09 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) Gold 5215 CPU @ 2.50GHz
  1 "physical id"s (chips)
 10 "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 : 10
siblings : 10
physical 0: cores 0 1 2 3 4 8 9 10 11 12
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                10
On-line CPU(s) list:   0-9
Thread(s) per core:    1
Core(s) per socket:    10
Socket(s):             1
NUMA node(s):          1
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 5215 CPU @ 2.50GHz
Stepping:              6
CPU MHz:               2500.000
BogoMIPS:              5000.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              14080K
```

(Continued on next page)
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Test Sponsor: HPE
Tested by: HPE

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

Platform Notes (Continued)

NUMA node0 CPU(s):   0-9
Flags:               fpu vme de pse tsc msr pae mca cmov pat pse36 cfldts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc 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_l3 invpcid_single intel_pinn tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrms invpcid rtm cqm mpx cmx152 avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

/cache data

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 8 9
node 0 size: 96325 MB
node 0 free: 95809 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal:       98637336 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 ml110-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:

(Continued on next page)
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Platform Notes (Continued)

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 May 3 15:48
SPEC is set to: /home/cpu2017_u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 313G 43G 270G 14% /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 U33 02/02/2019
Memory: 6x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(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
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------------------------------------------------------------------------

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Copyright 2017-2019 Standard Performance Evaluation Corporation

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Compiler Version Notes (Continued)

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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.
==============================================================================

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

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**Base Portability Flags (Continued)**

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<th>644.nab_s: -DSPEC_LP64</th>
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**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  
- -qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range

**Fortran benchmarks:**
- -DSPEC/OpenMP -xCORE-AVX512 -ipo -O3 -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-reallocate-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  
- -qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range  
- -nostandard-reallocate-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-reallocate-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-revA.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.html)  
- [http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.html](http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.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-revA.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.xml)  
- [http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml](http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml)