## SPEC® CPU2017 Floating Point Speed Result

### Hewlett Packard Enterprise

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

### SPECspeed2017_fp_base

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>20</td>
<td>96.9</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
<td>71.9</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>20</td>
<td>83.4</td>
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<tr>
<td>621.wrf_s</td>
<td>20</td>
<td>58.7</td>
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<tr>
<td>627.cam4_s</td>
<td>20</td>
<td>61.7</td>
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<tr>
<td>628.pop2_s</td>
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<td>66.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>20</td>
<td>122</td>
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<tr>
<td>644.nab_s</td>
<td>20</td>
<td>66.9</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>20</td>
<td>77.6</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5215  
- **Max MHz.:** 3400  
- **Nominal:** 2500  
- **Enabled:** 20 cores, 2 chips  
- **Orderable:** 1, 2 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:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 400 GB SAS SSD, RAID 0  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
- **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 I41 02/02/2019 released Apr-2019  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.50 GHz, Intel Xeon Gold 5215)

SPECCPU2017 Floating Point Speed Result
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SPECspeed2017_fp_base = 88.6
SPECspeed2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
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<td>649.fotonik3d_s</td>
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<td>67.2</td>
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<tr>
<td>654.roms_s</td>
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<td>77.6</td>
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<td>77.6</td>
<td>202</td>
<td>78.0</td>
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</tbody>
</table>

SPECspeed2017_fp_base = 88.6
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=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
Workload Profile set to General Peak Frequency Compute
   Energy/Performance Bias set to Balanced Power
Workload Profile set to Custom
Nuna Group Size Optimization set to Flat
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on bl460-sles15-6252 Wed Apr 24 19:38:15 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
    2 "physical id"s (chips)
    20 "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
    physical 1: 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): 20
    On-line CPU(s) list: 0-19
    Thread(s) per core: 1
    Core(s) per socket: 10
    Socket(s): 2
    NUMA node(s): 2
    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
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Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(2.50 GHz, Intel Xeon Gold 5215)  

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

Platform Notes (Continued)

```
L3 cache:  14080K
NUMA node0 CPU(s):  0-9
NUMA node1 CPU(s):  10-19
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
        aperf perfctr tscknow_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
        sdbg fma cx16 xtpri pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
        tsck_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
        ebf cat id3 cdp_l3 invpcid_single intel_pni mba tpr_shadow vnmi flexpriority ept
        vpid fsgsbase tsck_adjust bni hle avx2 smep bmi2  erts invpciid rtm cqm mpx rdtd
        avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
        xsaveopt xsaves xgetbv1 xsavec cqm_llc cqm_occurc llc cqm_mbms_total cqm_mbms_local
        ibpb ibrs stibp dtherm ida arat pln pts pkpu ospe avx512_vnni arch_capabilities ssbd
```

From numactl --hardware

```
WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9
node 0 size: 96353 MB
node 0 free: 95970 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19
node 1 size: 96736 MB
node 1 free: 96393 MB
node distances:
   node 0 node 1
  0: 10  21
  1: 21  10
```

From /proc/meminfo

```
MemTotal:        197723888 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"
```

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Tested by: HPE

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Platform Notes (Continued)

```bash
uname -a:
    Linux bl460-sles15-6252 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 Apr 24 19:37

SPEC is set to: /home/cpu2017_u2

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda5      xfs    72G   47G   26G  65% /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 141 02/02/2019
- Memory:
  - 4x UNKNOWN NOT AVAILABLE
  - 12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933, configured at 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.
```

(Continued on next page)
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Compiler Version Notes (Continued)

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.

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

(Continued on next page)
**Base Portability Flags (Continued)**

607.cactuBSSN_s: -DSPEC_LP64
619.1bm_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
-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-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
-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-Platform-Flags-Intel-V1.2-CLX-revA.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-ic19.0u1-flags-linux64.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 2019-04-24 10:08:14-0400.