## SPEC CPU®2017 Floating Point Speed Result

### Hewlett Packard Enterprise

**Synergy 660 Gen10**

(2.70 GHz, Intel Xeon Platinum 8280M)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 217</th>
<th>SPECspeed®2017_fp_peak = Not Run</th>
</tr>
</thead>
</table>

**Test Sponsor:** HPE  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

### Hardware

**CPU Name:** Intel Xeon Platinum 8280M  
**Max MHz:** 4000  
**Nominal:** 2700  
**Enabled:** 112 cores, 4 chips  
**Orderable:** 2, 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:** 38.5 MB I+D on chip per chip  
**Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
**Storage:** 1 x 480 GB SATA 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 I43 02/02/2019 released Apr-2019  
**File System:** btrfs  
**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>
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</tbody>
</table>

**SPECspeed®2017_fp_base = 217**

**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:
  ```bash
  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)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.70 GHz, Intel Xeon Platinum 8280M)

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

SPECspeed®2017_fp_base = 217
SPECspeed®2017_fp_peak = Not Run

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

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
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on sy660-gen10 Sat May 18 05:24:13 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) Platinum 8280M CPU @ 2.70GHz
  4 "physical id"s (chips)
  112 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 112
  On-line CPU(s) list: 0-111
  Thread(s) per core: 1
  Core(s) per socket: 28
  Socket(s): 4
  NUMA node(s): 4
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85

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

- **Model name:** Intel(R) Xeon(R) Platinum 8280M CPU @ 2.70GHz
- **Stepping:** 6
- **CPU MHz:** 2700.000
- **BogoMIPS:** 5400.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 39424K
- **NUMA node0 CPU(s):** 0-27
- **NUMA node1 CPU(s):** 28-55
- **NUMA node2 CPU(s):** 56-83
- **NUMA node3 CPU(s):** 84-111

**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 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 xtrvr pdcm pclid 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_l3 invpcid_single intel_puin mba tpr_shadow vmx f11e priority ept
- vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms 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 stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

```
/proc/cpuinfo cache data
cache size : 39424 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 22 23 24 25 26 27
- **node 0 size:** 193043 MB
- **node 0 free:** 192462 MB
- **node 1 cpus:** 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
- **node 1 size:** 193530 MB
- **node 1 free:** 193332 MB
- **node 2 cpus:** 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
- **node 2 size:** 193501 MB
- **node 2 free:** 193194 MB
- **node 3 cpus:** 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105
- **node 3 size:** 193321 MB
- **node 3 free:** 193133 MB
- **node distances:**

(Continued on next page)
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Platform Notes (Continued)

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
MemTotal:       791958772 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 sy660-gen10 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 May 18 05:23
SPEC is set to: /home/cpu2017_u2
  Filesystem  Type  Size  Used  Avail  Use% Mounted on
/dev/sdb2  btrfs  445G  113G  332G   26%  /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 I43 02/02/2019
  Memory:
    24x UNKNOWN NOT AVAILABLE
    24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(Continued on next page)
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CPU2017 License: 3
Test Sponsor: HPE
Test Date: May-2019
Hardware Availability: Apr-2019
Tested by: HPE
Software Availability: Feb-2019

Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

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<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</th>
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</thead>
</table>
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.
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CPU2017 License: 3
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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 byteeelcl
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

(Continued on next page)
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**CPU2017 License:** 3  
**Test Date:** May-2019  
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### Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

- `-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-Platform-Flags-Intel-V1.2-CLX-revA.html)  
- [http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.2019-04-03.00.html](http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.2019-04-03.00.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-linux64.2019-04-03.00.xml](http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.2019-04-03.00.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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