### SPEC® CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.40 GHz, Intel Xeon Platinum 8260M)

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>May-2019</th>
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<tbody>
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<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Feb-2019</td>
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</table>

#### Summary

- **SPECspeed2017_fp_base = 200**
- **SPECspeed2017_fp_peak = Not Run**

#### Hardware

- **CPU Name:** Intel Xeon Platinum 8260M
- **Max MHz.:** 3900
- **Nominal:** 2400
- **Enabled:** 96 cores, 4 chips
- **Orderable:** 1, 2, 4 chip(s)
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 35.75 MB I+D on chip per chip
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage:** 1 x 400 GB SAS SSD, RAID 0

#### 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 U34 02/02/2019 released Apr-2019
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable

#### Results

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<tr>
<th>SPECspeed2017_fp_base</th>
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### Table

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**Tested by:** HPE  
**Test Date:** May-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

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**SPECspeed2017_fp_base = 200**  
**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)
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Tested by: HPE

Test Date: May-2019
Hardware Availability: Apr-2019
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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
Advanced Memory Protection set to Advanced ECC
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-erfc Sat May 4 23:20:20 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 8260M CPU @ 2.40GHz
  4 "physical id"s (chips)
  96 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8260M CPU @ 2.40GHz
Stepping: 6
CPU MHz: 2400.000
BogoMIPS: 4800.00

(Continued on next page)
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#### CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE  

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**Platform Notes (Continued)**

Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 36608K  
NUMA node0 CPU(s): 0-23  
NUMA node1 CPU(s): 24-47  
NUMA node2 CPU(s): 48-71  
NUMA node3 CPU(s): 72-95  
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 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_13 cdp_13 invpcid_single intel_puin mba tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bna 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 xsavec cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb ibrs dtherm ida arat pln pts kpu ospke avx512_vnni arch_capabilities ssbd

/proc/cpuinfo cache data  
cache size: 36608 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  
node 0 size: 193116 MB  
node 0 free: 192667 MB  
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47  
node 1 size: 193531 MB  
node 1 free: 193222 MB  
node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71  
node 2 size: 193502 MB  
node 2 free: 193328 MB  
node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95  
node 3 size: 193529 MB  
node 3 free: 193355 MB  
node distances:  
node 0 1 2 3  
0: 10 21 21 21  
1: 21 10 21 21  
2: 21 21 10 21  
3: 21 21 21 21  

From /proc/meminfo  

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

MemTotal: 792248072 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 linux-erfc 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 4 23:18

SPEC is set to: /home/cpu2017_u2  
```
Filesystem  Type  Size  Used  Avail Use% Mounted on
/dev/sda2  btrfs  371G  104G  266G  29%  /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 U34 02/02/2019  
Memory:  
24x UNKNOWN NOT AVAILABLE  
24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)
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Compiler Version Notes

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CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
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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.

==============================================================================
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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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
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Base Compiler Invocation

C benchmarks:
  icc -m64 -std=c11

(Continued on next page)
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#### Base Compiler Invocation (Continued)

**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

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<tr>
<td>607.cactuBSSN_s:</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>619.lbm_s:</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>621.wrf_s:</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
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<tr>
<td>627.cam4_s:</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG</td>
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<tr>
<td>628.pop2_s:</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>638.imagick_s:</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>644.nab_s:</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>649.fotonik3d_s:</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>654.roms_s:</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

#### Base Optimization Flags

**C benchmarks:**  
-xCORE-AVX512 -ipo -O3 -no-prec-div -gopt-prefetch  
-ffinite-math-only -gopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

**Fortran benchmarks:**  
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -gopt-prefetch  
-ffinite-math-only -gopt-mem-layout-trans=4 -qopenmp  
-nostandard-realloc-lhs

**Benchmarks using both Fortran and C:**  
-xCORE-AVX512 -ipo -O3 -no-prec-div -gopt-prefetch  
-ffinite-math-only -gopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-nostandard-realloc-lhs

**Benchmarks using Fortran, C, and C++:**  
-xCORE-AVX512 -ipo -O3 -no-prec-div -gopt-prefetch  
-ffinite-math-only -gopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(2.40 GHz, Intel Xeon Platinum 8260M)

| SPECspeed2017_fp_base | 200 |
| SPECspeed2017_fp_peak | Not Run |

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

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

### Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
`-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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-03.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.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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