# SPEC CPU®2017 Floating Point Speed Result

## Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (145)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s 56</td>
<td>186</td>
</tr>
<tr>
<td>607.cactuBSSN_s 56</td>
<td>103</td>
</tr>
<tr>
<td>619.lbm_s 56</td>
<td>122</td>
</tr>
<tr>
<td>621.wrf_s 56</td>
<td>120</td>
</tr>
<tr>
<td>627.cam4_s 56</td>
<td>52.3</td>
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<tr>
<td>628.pop2_s 56</td>
<td>170</td>
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<tr>
<td>638.imagick_s 56</td>
<td>80.5</td>
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<tr>
<td>644.nab_s 56</td>
<td>317</td>
</tr>
<tr>
<td>649.fotonik3d_s 56</td>
<td>128</td>
</tr>
<tr>
<td>654.roms_s 56</td>
<td></td>
</tr>
</tbody>
</table>

### CPU Name: Intel Xeon Platinum 8280
- **Max MHz:** 4000
- **Nominal:** 2700
- **Enabled:** 56 cores, 2 chips
- **Orderable:** 1, 2, 3, 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:** 38.5 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage:** 1 x 600 GB SATA SSD, RAID 0

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 (x86_64)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Compiler:</th>
<th>C/C++: Version 19.0.2.187 of Intel C/C++</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compiler Build 20190117 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran</td>
</tr>
<tr>
<td></td>
<td>Compiler Build 20190117 for Linux</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parallel:</th>
<th>Yes</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Firmware:</th>
<th>HPE BIOS Version U34 02/02/2019 released Apr-2019</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>System State:</th>
<th>Run level 3 (multi-user)</th>
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</thead>
<tbody>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Peak Pointers:</th>
<th>Not Applicable</th>
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</thead>
<tbody>
<tr>
<td>Other: None</td>
<td></td>
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<table>
<thead>
<tr>
<th>Power Management:</th>
<th>--</th>
</tr>
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SPEC CPU® 2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL580 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

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

SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = Not Run

Results Table

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

SPECspeed®2017_fp_base = 145
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:
  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

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:
  Hyper-Threading set to Disabled

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL580 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = Not Run

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

Platform Notes (Continued)

Thermal Configuration set to Maximum Cooling
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 Maximum Performance
Workload Profile set to Custom
Uncore Frequency Scaling set to Auto
Numa Group Size Optimization set to Flat
Advanced Memory Protection set to AdvancedECC
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on linux-1j21 Thu Mar 14 18:10:18 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 8280 CPU @ 2.70GHz
  2 "physical id"s (chips)
  56 "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

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8280 CPU @ 2.70GHz
Stepping: 7

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
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SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = Not Run

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

Platform Notes (Continued)

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
Flags: fpu vme de pse ts c hyper tss mg mce mmx fsb 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 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 ebpf cat_i cdp_i invpcid_single intel_pdn mba tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtl_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaves opt xsavec xgetbv1 xsave vcpu l1c l1d l2c l2d l3c l3d

/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: 2 nodes (0-1)
    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: 193115 MB
    node 0 free: 191131 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 53 54 55
    node 1 size: 193500 MB
    node 1 free: 190763 MB

From /proc/meminfo
MemTotal: 395895420 kB
MemFree: 29730328 kB
Buffers: 972152 kB
Cached: 4552952 kB
HugePages_Total: 0
HugePages_Free: 0
HugePages_Rsvd: 0
HugePages_Lrs: 0

From /etc/*release*/etc/*version*
  os-release:
    NAME="SLES"

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

```plaintext
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"
```

```plaintext
uname -a:
Linux linux-lj2l 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

```plaintext
run-level 3 Mar 14 15:54
```

**SPEC is set to: /home/cpu2017_u2**

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb3</td>
<td>xfs</td>
<td>141G</td>
<td>91G</td>
<td>50G</td>
<td>65%</td>
<td>/home</td>
</tr>
</tbody>
</table>

**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:
  - 36x UNKNOWN NOT AVAILABLE
  - 12x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(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 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

(Continued on next page)
### 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
  ```

### Compiler Version Notes (Continued)

```markdown
C++, C, Fortran | 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
Copyright (C) 1985-2019 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 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
---

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

---
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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| SPECspeed®2017_fp_base = | 145 |
| SPECspeed®2017_fp_peak = | Not Run |

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

### 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
- 644.nab_s: -DSPEC_LP64
- 649.fotonik3d_s: -DSPEC_LP64
- 654.roms_s: -DSPEC_LP64

### Base Optimization Flags

**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-Platform-Flags-Intel-V1.2-CLX-revA.html](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/HPE-Platform-Flags-Intel-V1.2-CLX-revA.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.xml)  
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Test Sponsor: HPE  
Tested by: HPE  
Test Date: Mar-2019  
Hardware Availability: Apr-2019  
Software Availability: Feb-2019

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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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