## SPEC CPU® 2017 Floating Point Rate Result

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL380 Gen10

(2.70 GHz, Intel Xeon Platinum 8280)

**SPEC CPU® 2017 Floating Point Rate Result**

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Copyright 2017-2020 Standard Performance Evaluation Corporation**

<table>
<thead>
<tr>
<th>Copies</th>
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</table>

**SPECrate® 2017_fp_peak = Not Run**

**SPECrate® 2017_fp_base = 278**

**Test Date:** Feb-2019

**Hardware Availability:** Apr-2019

**Software Availability:** Sep-2018

### Hardware

**CPU Name:** Intel Xeon Platinum 8280

**Max MHz:** 4000

**Nominal:** 2700

**Enabled:** 56 cores, 2 chips, 2 threads/core

**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:** 38.5 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)

**Storage:** 1 x 960 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 19.0.0.117 of Intel

**Compiler Build:** 20180804 for Linux;

**Fortran:** Version 19.0.0.117 of Intel Fortran

**Compiler Build:** 20180804 for Linux

**Parallel:** No

**Firmware:** HPE BIOS Version U30 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:** --
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SPECrate®2017_fp_base = 278
SPECrate®2017_fp_peak = Not Run

Results Table

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</tbody>
</table>

SPECrate®2017_fp_base = 278
SPECrate®2017_fp_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes
The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

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
runcpu command invoked through numactl i.e.:
    numactl --interleave=all runcpu <etc>

General Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017_fprate/lib/ia32:/home/cpu2017_fprate/lib/intel64:
    /home/cpu2017_fprate/je5.0.1-32:/home/cpu2017_fprate/je5.0.1-64"
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)

(Continued on next page)
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General Notes (Continued)

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:
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 Throughput Compute
Workload Profile set to Custom
Minimum Processor Idle Power Core C-State set to C1E State
Sysinfo program /home/cpu2017_fprate/bin/sysinfo
Rev: r5974 of 2018-05-19 9bced8f2999c33d61f6498e45859ea9
running on linux-9mbf Thu Feb 28 04:00:36 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)
  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 : 56
  physical 0: cores 0 1 2 3 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 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: 2
Core(s) per socket: 28

(Continued on next page)
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<th>CPU2017 License: 3</th>
<th>Test Date: Feb-2019</th>
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<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Apr-2019</td>
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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2018</td>
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</tbody>
</table>

**SPECrate®2017_fp_base = 278**

**SPECrate®2017_fp_peak = Not Run**

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**Platform Notes (Continued)**

- **Socket(s):** 2
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Platinum 8280 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):** 0-13,56-69
- **NUMA node1 CPU(s):** 14-27,70-83
- **NUMA node2 CPU(s):** 28-41,84-97
- **NUMA node3 CPU(s):** 42-55,98-111
- **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 aperfmpref tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr 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_l3 cdp_l3 invpcid_single intel_pinn mba tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnow dpop clflushopt clwb intel_pt avx512cd avx512bw avx512v1 xsavesopt xsaveopt xsave xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occur_llc cqm_mbm_total cqm_mbm_local ibpb ibrs stibp dtherm ida arat pln pts pkup ospe avx512_vnni arch_capabilities ssbd

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 56 57 58 59 60 61 62 63 64 65 66 67 68 69
node 0 size: 96277 MB
node 0 free: 88554 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 70 71 72 73 74 75 76 77 78 79 80 81 82 83
node 1 size: 96762 MB
node 1 free: 90997 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 84 85 86 87 88 89 90 91 92 93 94 95 96 97
node 2 size: 96733 MB
node 2 free: 90905 MB

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

```
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 98 99 100 101 102 103 104 105
106 107 108 109 110 111
node 3 size: 96564 MB
node 3 free: 90813 MB
node distances:
node   0   1   2   3
0:  10  21  31  31
1:  21  10  31  31
2:  31  31  10  21
3:  31  31  21  10
```

From `/proc/meminfo`

- MemTotal: 395609624 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 linux-9mbf 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 Feb 27 17:36

SPEC is set to: `/home/cpu2017_fprate`

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<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
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<tbody>
<tr>
<td>/dev/sdb4</td>
<td>xfs</td>
<td>436G</td>
<td>169G</td>
<td>268G</td>
<td>39%</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
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SPECrate®2017_fp_base = 278
SPECrate®2017_fp_peak = Not Run

Test Date: Feb-2019
Hardware Availability: Apr-2019
Software Availability: Sep-2018

Platform Notes (Continued)

frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS HPE U30 02/02/2019
Memory:
24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++ | 508.namd_r(base) 510.parest_r(base)
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==============================================================================
C++, C | 511.povray_r(base) 526.blender_r(base)
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)

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SPECrates®

CPU2017 License: 3
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Compiler Version Notes (Continued)

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Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
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Fortran, C | 521.wrf_r(base) 527.cam4_r(base)
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.0.117 Build 20180804
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64
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Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
-align array32byte
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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/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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