Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276)

SPECrate2017_fp_base = 233
SPECrate2017_fp_peak = Not Run

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>May-2019</th>
</tr>
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<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

| Copies | 0  | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 |
|--------|----|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 503.bwaves_r | 112 | 208 |
| 507.cactuBSSN_r | 112 | 185 |
| 508.namd_r | 112 | 121 |
| 510.parest_r | 112 | 280 |
| 511.povray_r | 112 | 119 |
| 519.lbm_r | 112 | 218 |
| 521.wrf_r | 112 | 278 |
| 526.blender_r | 112 | 281 |
| 527.cam4_r | 112 | 644 |
| 538.imagick_r | 112 | 461 |
| 544.nab_r | 112 | 160 |
| 549.fotonik3d_r | 112 | 95.0 |

--- SPECrate2017_fp_base (233) ---

**Hardware**
- CPU Name: Intel Xeon Platinum 8276
- Max MHz.: 4000
- Nominal: 2200
- Enabled: 56 cores, 2 chips, 2 threads/core
- Orderable: 1.2 chips
- 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 PC4-2666V-R)
- Storage: 1 x 960 GB SATA SSD
- Other: None

**Software**
- OS: SUSE Linux Enterprise Server 15 (x86_64)
- Compiler: C/C++: Version 19.0.1.144 of Intel C/C++
- Compiler Build 20181018 for Linux;
  Fortran: Version 19.0.1.144 of Intel Fortran
- Compiler Build 20181018 for Linux
- Parallel: No
- Firmware: Lenovo BIOS Version IVE135M 2.10 released Jan-2019
- File System: xfs
- System State: Run level 3 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: Not Applicable
- Other: None
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Results Table

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<td>995</td>
<td>119</td>
<td>993</td>
<td>119</td>
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<td>521.wrf_r</td>
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<td>461</td>
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<td>474</td>
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<td>549.fotonik3d_r</td>
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<td>1881</td>
<td>94.6</td>
</tr>
</tbody>
</table>

SPECrate2017_fp_base = 233
SPECrate2017_fp_peak = Not Run

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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
SPEC CPU2017 Floating Point Rate Result

Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276)

SPECrate2017_fp_base = 233
SPECrate2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

General Notes (Continued)
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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Trusted Execution Technology set to Enable
SNC set to Enable
CPU Frequency Limits set to Restrict Maximum Frequency
Workload Configuration set to I/O Sensitive
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-cq9p Wed May 22 16:52:24 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 8276 CPU @ 2.20GHz
  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 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): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28

(Continued on next page)
## Lenovo Global Technology

### ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276)

<table>
<thead>
<tr>
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<th>233</th>
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<tbody>
<tr>
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<table>
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<td>Lenovo Global Technology</td>
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<tr>
<td>Test Date</td>
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<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

### 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 8276 CPU @ 2.20GHz
- **Stepping:** 6
- **CPU MHz:** 2200.000
- **CPU max MHz:** 4000.0000
- **CPU min MHz:** 1000.0000
- **BogoMIPS:** 4400.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 39424K
- **NUMA node0 CPU(s):** 0, 1, 2, 3, 7, 8, 9, 14, 15, 16, 17, 21, 22, 23, 56, 57, 58, 65, 70, 71, 72, 73, 77, 78, 79
- **NUMA node1 CPU(s):** 4, 5, 6, 10, 11, 12, 13, 18, 19, 20, 24, 25, 26, 27, 60, 61, 62, 66, 67, 68, 69, 74, 75, 76, 80, 81, 82, 83
- **NUMA node2 CPU(s):** 28, 29, 30, 31, 35, 36, 37, 38, 41, 46, 47, 48, 52, 55, 56, 65, 70, 71, 72, 73, 77, 78, 79
- **NUMA node3 CPU(s):** 32, 33, 34, 38, 40, 41, 42, 43, 44, 45, 49, 50, 51, 70, 71, 72, 73, 77, 78, 79

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 arch_perfemon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmerf pni pclmulqdq dtes64 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
rdand rahn_ml abm 3dnowprefetch cpuid_fault epb cat_13 cdp_13 invpcid_single ssbd
mba ibs ibpb stibp tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bm1
kle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap
clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaveopt xsaves
xsave qcm_l1c qcm_occup_l1c qcm_mbm_total qcm_mbm_local dtherm ida arat pln pts pku ospke
avx512_vnni flush_lld arch_capabilities
```

/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)

<table>
<thead>
<tr>
<th>node 0 cpus:</th>
<th>0 1 2 3 7 8 9 14 15 16 17 21 22 23 56 57 58 59 63 64 65 70 71 72 73 77 78 79</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 size:</td>
<td>96363 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>89868 MB</td>
</tr>
<tr>
<td>node 1 cpus:</td>
<td>4 5 6 10 11 12 13 18 19 20 24 25 26 27 60 61 62 66 67 68 69 74 75 76 80 81 82 83</td>
</tr>
<tr>
<td>node 1 size:</td>
<td>96752 MB</td>
</tr>
<tr>
<td>node 1 free:</td>
<td>96506 MB</td>
</tr>
<tr>
<td>node 2 cpus:</td>
<td>28 29 30 31 35 36 37 42 43 44 45 49 50 51 84 85 86 87 91 92 93 98 99 100</td>
</tr>
</tbody>
</table>

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

```
101 105 106 107
node 2 size: 96752 MB
node 2 free: 96495 MB
node 3 cpus: 32 33 34 38 40 41 46 47 48 52 53 54 55 88 89 90 94 95 96 97 102 103 104
108 109 110 111
node 3 size: 96720 MB
node 3 free: 96470 MB
node distances:
node  0   1   2   3
0:  10  11  21  21
1:  11  10  21  21
2:  21  21  10  11
3:  21  21  11  10
```

From `/proc/meminfo`
MemTotal: 395867608 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:
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 22 16:50

SPEC is set to: `/home/cpu2017-1.0.5-ic19.0u1`
```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 893G 39G 855G 5% /
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276)

SPECraten2017_fp_base = 233
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Platform Notes (Continued)

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 Lenovo -[IVE135M-2.10]- 01/16/2019
Memory:
24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666

Compiler Version Notes

CC 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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CXXC 508.namd_r(base) 510.parest_r(base)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CC 511.povray_r(base) 526.blender_r(base)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
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(Continued on next page)
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Test Sponsor: Lenovo Global Technology
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Software Availability: Nov-2018

Compiler Version Notes (Continued)

Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC  503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
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==============================================================================
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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
Lenovo Global Technology

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(2.20 GHz, Intel Xeon Platinum 8276)

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CPU2017 License: 9017  
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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=4

C++ benchmarks:  
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:  
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -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=4 -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=4

Benchmarks using Fortran, C, and C++:  
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte
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SPECrated2017_fp_base = 233

SPECrated2017_fp_peak = Not Run

The flags files that were used to format this result can be browsed at:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.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 2019-05-22 04:52:23-0400.
Originally published on 2019-06-11.