Lenovo Global Technology
ThinkSystem ST550
(1.90 GHz, Intel Xeon Gold 6238T)

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

SPECrate2017_fp_base = 204
SPECrate2017_fp_peak = Not Run

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

Hardware
CPU Name: Intel Xeon Gold 6238T
Max MHz.: 3700
Nominal: 1900
Enabled: 44 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: 30.25 MB I+D on chip per chip
Other: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)
Storage: 1 x 480 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 00E135T 2.10 released Mar-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
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Results Table

<table>
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<tr>
<th>Benchmark</th>
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</tr>
</tbody>
</table>

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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"

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>
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Test Date: Apr-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

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
Choose Operating Mode set to Custom Mode
LLC dead line alloc set to Disable
SNC set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0ul/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-cbcp Thu Apr 25 01:47:23 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) Gold 6238T CPU @ 1.90GHz
             2 "physical id"s (chips)
             88 "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 : 22
  siblings : 44
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 88
On-line CPU(s) list: 0-87
Thread(s) per core: 2
Core(s) per socket: 22
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel

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

- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Gold 6238T CPU @ 1.90GHz
- **Stepping:** 6
- **CPU MHz:** 1900.000
- **CPU max MHz:** 3700.0000
- **CPU min MHz:** 800.0000
- **BogoMIPS:** 3800.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 30976K
- **NUMA node0 CPU(s):** 0-2, 6-8, 11-13, 17, 18, 44-46, 50-52, 55-57, 61, 62
- **NUMA node1 CPU(s):** 3-5, 9, 10, 14-16, 19-21, 47-49, 53, 54, 58-60, 63-65
- **NUMA node2 CPU(s):** 22-24, 28-30, 33-35, 39, 40, 66-68, 72-74, 77-79, 83, 84
- **NUMA node3 CPU(s):** 25-27, 31, 32, 36-38, 41-43, 69-71, 75, 76, 80-82, 85-87
- **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 aperffmapf 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 rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority 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 xsaveprec xsavecap quad_float opt alignmask cpuctrl cmovl cmovu cmovc cr4_legacy fwltra_fixed tm2fs

From numactl --hardware

```plaintext
WARNING: a numactl 'node' might or might not correspond to a physical chip.
```

<table>
<thead>
<tr>
<th>Available</th>
<th>CPUs (0-3)</th>
<th>Size</th>
<th>Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0</td>
<td>0 1 2 6 7 8 11 12 13 17 18 44 45 46 50 51 52 55 56 57 61 62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 0</td>
<td>47980 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 0</td>
<td>47628 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 1</td>
<td>3 4 5 9 10 14 15 16 19 20 21 47 48 49 53 54 58 59 60 63 64 65</td>
<td></td>
<td></td>
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<tr>
<td>node 1</td>
<td>48340 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 1</td>
<td>45117 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 2</td>
<td>22 23 24 28 29 30 33 34 35 39 40 66 67 68 72 73 74 77 78 79 83 84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 2</td>
<td>48369 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 2</td>
<td>48157 MB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>node 3</td>
<td>25 26 27 31 32 36 37 38 41 42 43 69 70 71 75 76 80 81 82 85 86 87</td>
<td></td>
<td></td>
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<td>node 3</td>
<td>48366 MB</td>
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<tr>
<td>node 3</td>
<td>47845 MB</td>
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(Continued on next page)
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SPECrater2017_fp_base = 204
SPECrater2017_fp_peak = Not Run

Platform Notes (Continued)

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: 197691364 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:
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 Apr 25 01:45

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 445G 38G 408G 9% /

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 -[O0E135T-2.10]- 03/21/2019
Memory:
12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933
<table>
<thead>
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<tbody>
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**Test Date:** Apr-2019  
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Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

<table>
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<tr>
<th>Compiler</th>
<th>Version Information</th>
<th>Notes</th>
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<tr>
<td>CC</td>
<td>519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)</td>
<td>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.</td>
</tr>
<tr>
<td>CXXC</td>
<td>508.namd_r(base) 510.parest_r(base)</td>
<td>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.</td>
</tr>
<tr>
<td>CC</td>
<td>511.povray_r(base) 526.blender_r(base)</td>
<td>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.</td>
</tr>
<tr>
<td>FC</td>
<td>507.cactuBSSN_r(base)</td>
<td>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.</td>
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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

Base Portability Flags
503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64

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Base Portability Flags (Continued)

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
-qqopt-mem-layout-trans=4

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

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

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
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The flags files that were used to format this result can be browsed at:

You can also download the XML flags sources by saving the following links:

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Tested with SPEC CPU2017 v1.0.5 on 2019-04-24 13:47:22-0400.  