### Lenovo Global Technology

**ThinkSystem SN550**  
(3.30 GHz, Intel Xeon Gold 6246)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate 2017</th>
<th>Peak Pointers</th>
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</tbody>
</table>

**SPECRate®2017_int_base = 182**  
**SPECrate®2017_int_peak = Not Run**

### Hardware

- **CPU Name:** Intel Xeon Gold 6246  
- **Max MHz:** 4200  
- **Nominal:** 3300  
- **Enabled:** 24 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:** 24.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
- **Kernel:** 4.12.14-25.13-default  
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++  
- **Compiler for Linux:**  
- **Fortran:** Version 19.0.4.227 of Intel Fortran  
- **Compiler for Linux:**  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version IVE142E 2.30 released Aug-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None  
- **Power Management:** --
## RESULTS TABLE

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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</table>

### 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-ic19.0u4/lib/intel64"
```

Binaries compiled on a system with 1x Intel Core i9-799X 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.

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)

(Continued on next page)
General Notes (Continued)

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
Stale AtoS set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on linux-cq9p Fri Sep 6 17:25:04 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 6246 CPU @ 3.30GHz
  2 "physical id"s (chips)
  48 "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 : 12
siblings : 24
  physical 0: cores 2 3 4 9 10 11 16 17 20 25 27
  physical 1: cores 0 2 4 8 9 10 11 17 18 19 25 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6246 CPU @ 3.30GHz

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

**Lenovo Global Technology**

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**SPECrates®2017_int_base** =  182  
**SPECrates®2017_int_peak** = Not Run

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**Platform Notes (Continued)**

Stepping: 7  
CPU MHz: 3300.000  
CPU max MHz: 4200.0000  
CPU min MHz: 1200.0000  
BogoMIPS: 6600.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 25344K  
NUMA node0 CPU(s): 0,1,4,7,8,10,24,25,28,31,32,34  
NUMA node1 CPU(s): 2,3,5,6,9,11,26,27,29,30,33,35  
NUMA node2 CPU(s): 12,13,15,16,19,22,36,37,39,40,43,46  
NUMA node3 CPU(s): 14,17,18,20,21,23,38,41,42,44,45,47  
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 pdmfgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperffmerf 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 fl64 rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_p八n ssbd mba ibrs ibp bts stibp tpr_shadow vnomi flexpriority ept vpid fsgsbse tsc_adjust bni hle avx2 smep bmi2 erms invpcid rtm cmq mpx rdtd_a avx512f avx512dq rdsseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsavebv1 xsvsnm cmq_llc cmq_occup_llc cmq_mbb_total cmq_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities  

/proc/cpuinfo cache data  
cache size : 25344 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 4 7 8 10 24 25 28 31 32 34  
node 0 size: 193134 MB  
node 0 free: 186974 MB  
node 1 cpus: 2 3 5 6 9 11 26 27 29 30 33 35  
node 1 size: 193523 MB  
node 1 free: 193210 MB  
node 2 cpus: 12 13 15 16 19 22 36 37 39 40 43 46  
node 2 size: 193494 MB  
node 2 free: 193246 MB  
node 3 cpus: 14 17 18 20 21 23 38 41 42 44 45 47  
node 3 size: 193520 MB  
node 3 free: 193108 MB  
node distances:  
node 0 1 2 3  
0: 10 11 21 21  

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

**Lenovo Global Technology**

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(3.30 GHz, Intel Xeon Gold 6246)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

```
1:  11  10  21  21
2:  21  21  10  11
3:  21  21  11  10
```

From /proc/meminfo

- MemTotal: 792240704 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 Sep 6 17:24
SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
```

```
  Filesystem    Type  Size  Used Avail Use% Mounted on
  /dev/sdb3      xfs   893G   61G  833G   7% /
```

**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 -[IVE141E-2.30]- 07/02/2019
Memory:
  24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)
Lenovo Global Technology
ThinkSystem SN550
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SPECraten®2017_int_base = 182
SPECraten®2017_int_peak = Not Run

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

Compilera Version Notes
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<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)</th>
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
<table>
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<th>Fortran</th>
<th>548.exchange2_r(base)</th>
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</table>

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64

(Continued on next page)
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<tr>
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<tr>
<td>Test Sponsor:</td>
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<td>Tested by:</td>
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<table>
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<tr>
<th>Test Date:</th>
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<td>Hardware Availability:</td>
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<tr>
<td>Software Availability:</td>
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### Base Portability Flags (Continued)

- 523.xalancbmk_r: DSPEC_LP64 DSPEC_LINUX
- 525.x264_r: DSPEC_LP64
- 531.deepsjeng_r: DSPEC_LP64
- 541.leela_r: DSPEC_LP64
- 548.exchange2_r: DSPEC_LP64
- 557.xz_r: DSPEC_LP64

### Base Optimization Flags

#### C benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

#### C++ benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

#### Fortran benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

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-D.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.xml)

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