## Lenovo Global Technology

**ThinkSystem SN550**  
(3.60 GHz, Intel Xeon Gold 6244)

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<th>Specrate®2017_fp_base =</th>
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<tbody>
<tr>
<td>Specrate®2017_fp_peak =</td>
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**CPU2017 License:** 9017  
**Test Date:** Oct-2019

**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Apr-2019

**Tested by:** Lenovo Global Technology  
**Software Availability:** Aug-2019

### Copies

<table>
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<th>Benchmark</th>
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<td>510.parest_r</td>
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<tr>
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<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
<td>32</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>32</td>
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</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6244  
- **Max MHz:** 4400  
- **Nominal:** 3600  
- **Enabled:** 16 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  
- **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)  
- **Compiler:** C/C++: Version 19.0.4.227 of Intel  
  Compiler for Linux;  
- **Firmware:** Lenovo BIOS Version IVE142E 2.30 released Aug-2019  
  tested as IVE141E 2.30 Jul-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Power Management:** Disable
Lenovo Global Technology
ThinkSystem SN550
(3.60 GHz, Intel Xeon Gold 6244)
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Results Table

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SPECrate®2017_fp_base = 148
SPECrate®2017_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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u4/lib/intel64"

General Notes
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

(Continued on next page)
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ThinkSystem SN550
(3.60 GHz, Intel Xeon Gold 6244)

General Notes (Continued)

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) 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/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on linux-cq9p Sat Oct 26 00:28:51 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 6244 CPU @ 3.60GHz
2 "physical id"s (chips)
32 "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 : 8
siblings : 16
physical 0: cores 4 8 17 18 19 24 25 27
physical 1: cores 2 3 4 8 17 20 24 26

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
Lenovo Global Technology
ThinkSystem SN550
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Platform Notes (Continued)

On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6244 CPU @ 3.60GHz
Stepping: 6
CPU MHz: 3600.000
CPU max MHz: 4400.0000
CPU min MHz: 1200.0000
BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0,2,5,6,17,18,21,22
NUMA node1 CPU(s): 1,3,4,7,16,19,20,23
NUMA node2 CPU(s): 8,11,12,14,24,27,28,30
NUMA node3 CPU(s): 9,10,13,15,25,26,29,31
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 rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm
pcid dca sse4_1 mce lmvpat cmov cx16 xtpr pdcm pcid dca 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_pmln ssbd mba ibrs ippb stibp tpr_shadow vnni flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdts_a avx512f avx512dq
rdsese addx smap clfsho opt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsave
xgetbv1 xsavee cqm llc cqm_occup llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln
pts pku ospke avx512_vnni flush_l1d arch_capabilities

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 2 5 6 17 18 21 22
node 0 size: 193135 MB
node 0 free: 187004 MB
node 1 cpus: 1 3 4 7 16 19 20 23
node 1 size: 193523 MB
node 1 free: 193236 MB

(Continued on next page)
# Lenovo Global Technology

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<td><strong>2017 fp_base</strong></td>
<td>148</td>
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<tr>
<td><strong>2017 fp_peak</strong></td>
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</tr>
</tbody>
</table>

**Test Date:** Oct-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Aug-2019

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**Platform Notes (Continued)**

```
node 2 cpus:  8 11 12 14 24 27 28 30  
node 2 size:  193495 MB  
node 2 free:  193231 MB  
node 3 cpus:  9 10 13 15 25 26 29 31  
node 3 size:  193521 MB  
node 3 free:  193179 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:       792243708 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-2018-3620 (L1 Terminal Fault):        Not affected  
Microarchitectural Data Sampling:         No status reported  
CVE-2017-5754 (Meltdown):                Not affected  
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp  
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 Oct 26 00:27  

SPEC is set to:  /home/cpu2017-1.1.0-ic19.0u4  

(Continued on next page)
**Lenovo Global Technology**

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
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**Platform Notes (Continued)**

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<td>/dev/sdb3</td>
<td>xfs</td>
<td>893G</td>
<td>75G</td>
<td>818G</td>
<td>9%</td>
<td>/</td>
</tr>
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</table>

From /sys/devices/virtual/dmi/id

BIOS:  Lenovo -[IVE141E-2.30]-  07/02/2019  
Vendor: Lenovo  
Product: ThinkSystem SN550  -[7X16CTO0WW]-  
Product Family: ThinkSystem  
Serial: 1234567890

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.

**Memory:**  
24x Samsung M393A4K40CB2-CVF  32 GB  2 rank  2933

(End of data from sysinfo program)

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**Compiler Version Notes**

```
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<td>C</td>
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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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### Compiler Version Notes (Continued)

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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

### Base Compiler Invocation

**C benchmarks:**  
`icc -m64 -std=c11`

**C++ benchmarks:**  
`icpc -m64`

**Fortran benchmarks:**  
`ifort -m64`

(Continued on next page)
Lenovo Global Technology
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SPECrate®2017_fp_base = 148
SPECrate®2017_fp_peak = Not Run

Base Compiler Invocation (Continued)

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
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

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**SPECrate**

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<th><strong>SPECrate®2017_fp_base</strong></th>
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</tr>
</thead>
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<tr>
<td><strong>SPECrate®2017_fp_peak</strong></td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Oct-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Aug-2019

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**Base Optimization Flags (Continued)**

Benchmarks using both Fortran and C (continued):
- `-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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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-F.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.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-F.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.xml)

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