# Lenovo Global Technology

ThinkSystem SN550 V2  
(2.30 GHz, Intel Xeon Silver 4316)

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## SPEC CPU®2017 Integer Speed Result

### Lenovo Global Technology  
**Test Date:** Jun-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Dec-2020

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Run</td>
<td>11.4</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Silver 4316</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3400</td>
</tr>
<tr>
<td>Nominal</td>
<td>2300</td>
</tr>
<tr>
<td>Enabled</td>
<td>40 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>30 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Feature</th>
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</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux 8.3 (Ootpa)</td>
</tr>
<tr>
<td>Kernel</td>
<td>4.18.0-240.el8.x86_64</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++, Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;</td>
</tr>
<tr>
<td>Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware</td>
<td>Lenovo BIOS Version U8E111A 1.02 released May-2021</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
LENNOVO GLOBAL TECHNOLOGY

ThinkSystem SN550 V2
(2.30 GHz, Intel Xeon Silver 4316)

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jun-2021

Hardware Availability: Jul-2021

Software Availability: Dec-2020

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>80</td>
<td>257</td>
<td>6.89</td>
<td>256</td>
<td>6.94</td>
<td>256</td>
<td>6.94</td>
<td>80</td>
<td>256</td>
<td>6.94</td>
<td>256</td>
<td>6.94</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>80</td>
<td>389</td>
<td>10.2</td>
<td>390</td>
<td>10.2</td>
<td>390</td>
<td>10.2</td>
<td>80</td>
<td>390</td>
<td>10.2</td>
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<td>10.2</td>
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<tr>
<td>605.mcf_s</td>
<td>80</td>
<td>253</td>
<td>18.7</td>
<td>254</td>
<td>18.6</td>
<td>258</td>
<td>18.3</td>
<td>80</td>
<td>254</td>
<td>18.6</td>
<td>258</td>
<td>18.3</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>80</td>
<td>153</td>
<td>10.7</td>
<td>153</td>
<td>10.7</td>
<td>153</td>
<td>10.7</td>
<td>80</td>
<td>153</td>
<td>10.7</td>
<td>153</td>
<td>10.7</td>
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<tr>
<td>625.x264_s</td>
<td>80</td>
<td>107</td>
<td>16.6</td>
<td>107</td>
<td>16.6</td>
<td>107</td>
<td>16.6</td>
<td>80</td>
<td>107</td>
<td>16.6</td>
<td>107</td>
<td>16.6</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>80</td>
<td>253</td>
<td>5.66</td>
<td>253</td>
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<td>253</td>
<td>5.66</td>
<td>80</td>
<td>253</td>
<td>5.66</td>
<td>253</td>
<td>5.66</td>
</tr>
<tr>
<td>641.leela_s</td>
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<td>369</td>
<td>4.63</td>
<td>368</td>
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<td>4.63</td>
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<tr>
<td>648.exchange2_s</td>
<td>80</td>
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<td>19.5</td>
<td>150</td>
<td>19.7</td>
<td>150</td>
<td>19.6</td>
<td>80</td>
<td>151</td>
<td>19.5</td>
<td>150</td>
<td>19.6</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>80</td>
<td>273</td>
<td>22.6</td>
<td>273</td>
<td>22.6</td>
<td>273</td>
<td>22.6</td>
<td>80</td>
<td>273</td>
<td>22.6</td>
<td>273</td>
<td>22.6</td>
</tr>
</tbody>
</table>

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

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202
1.1-revB/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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
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.
Lenovo Global Technology
ThinkSystem SN550 V2
(2.30 GHz, Intel Xeon Silver 4316)

SPECspeed®2017_int_base = 11.4
SPECspeed®2017_int_peak = Not Run

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

Test Date: Jun-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

General Notes (Continued)

ejemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled
CPU P-state Control set to Cooperative with Legacy
C-States set to Legacy
UPI Link Disable set to Disabled 1 Link
UPI Prefetcher set to Disabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Sun Jun 27 12:11:27 2021

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) Silver 4316 CPU @ 2.30GHz
  2 "physical id"s (chips)
  80 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106

(Continued on next page)
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Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
Stepping: 6
CPU MHz: 1297.868
CPU max MHz: 3400.0000
CPU min MHz: 800.0000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 30720K
NUMA node0 CPU(s): 0-19,40-59
NUMA node1 CPU(s): 20-39,60-79

Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpes gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor 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 3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppte ssbd mba ibrs ibpb stibi ibrs_enhanced tpr_shadow vmi fpxprec ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmq rdt_a avx512f avx512dq rdseed adx smap avx512sfma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavevc xsavec xsaves cmqm_llc cmqm_occuup_llc cmqm_mbm_total cmqm_mbm_local split_lock_detect wbnoiwv dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbm1 umip pku ospke avx512_vbmi2 gfn vaes vpclmulqdq avx512_vnni avx512_vbitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld
arch_capabilities

/proc/cpuinfo cache data
  cache size: 30720 KB

From numacl --hardware
WARNING: a numacl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 40 41 42 43 44 45 46 47
    48 49 50 51 52 53 54 55 56 57 58 59
  node 0 size: 244563 MB
  node 0 free: 256443 MB
  node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 60 61 62 63 64
    65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  node 1 size: 246528 MB
  node 1 free: 257074 MB
  node distances:
    node 0 1
      0: 10 20
      1: 20 10

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

From `/proc/meminfo`
- MemTotal: 527872096 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/sbin/tuned-adm active
- Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From `/etc/*release* /etc/*version*`
- os-release:
  - NAME="Red Hat Enterprise Linux"
  - VERSION="8.3 (Ootpa)"
  - ID=rhel
  - ID_LIKE="fedora"
  - VERSION_ID="8.3"
  - PLATFORM_ID="platform:el8"
  - PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
  - ANSI_COLOR="0;31"

redehat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
- Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
- x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- CVE-2018-12207 (iTLB Multihit): Not affected
- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- 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: usercopy/swaps barriers and __user pointer sanitation
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
- CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 27 08:00

(Continued on next page)
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SPECspeed®2017_int_base = 11.4
SPECspeed®2017_int_peak = Not Run

Platform Notes (Continued)

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 818G 110G 708G 14% /home

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SN550 V2
Product Family: ThinkSystem
Serial: 1234567890

Additional information from dmidecode 3.2 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:
16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Lenovo
BIOS Version: U8E111A-1.02
BIOS Date: 05/07/2021
BIOS Revision: 1.2
Firmware Revision: 1.40

(End of data from sysinfo program)

Compiler Version Notes

=================================================================================================
C | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
   625.x264_s(base) 657.xz_s(base)
=================================================================================================

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=================================================================================================
C++ | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
    641.leela_s(base)
=================================================================================================

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 11.4**  
**SPECspeed®2017_int_peak = Not Run**

**Compiler Version Notes (Continued)**

```plaintext
==============================================================================
Fortran | 648.exchange2_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

**Base Compiler Invocation**

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

**Base Portability Flags**

```
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```

**Base Optimization Flags**

C benchmarks:
- -DSPEC_OPENMP -std=c11 -m64 -ffopenmp -W1, -z, muldefs -xCORE-AVX2
- -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
- -gopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Base Optimization Flags (Continued)

C++ benchmarks:
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin/
-1qkmalloc

Fortran benchmarks:
-m64 -xCORE-AVX2 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries

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-ICElake-E.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-ICElake-E.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_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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