## Lenovo Global Technology

**ThinkSystem SN550 V2**  
(2.80 GHz, Intel Xeon Silver 4309Y)

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>7.04</td>
<td>9.53</td>
</tr>
</tbody>
</table>

---

### Hardware

<table>
<thead>
<tr>
<th>CPU Name: Intel Xeon Silver 4309Y</th>
<th>OS: Red Hat Enterprise Linux 8.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz: 3600</td>
<td>(Ootapa)</td>
</tr>
<tr>
<td>Nominal: 2800</td>
<td>Kernel 4.18.0-240.el8.x86_64</td>
</tr>
<tr>
<td>Enabled: 16 cores, 2 chips, 2 threads/core</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>Orderable: 1.2 chips</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 48 KB D on chip per core</td>
<td>Firmware: Lenovo BIOS Version U8E113E 1.10 released Aug-2021</td>
</tr>
<tr>
<td>L2: 1.25 MB I+D on chip per core</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>L3: 12 MB I+D on chip per chip</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Other: None</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)</td>
<td>Peak Pointers: Not Applicable</td>
</tr>
<tr>
<td>Storage: 1 x 960 GB SATA SSD</td>
<td>Other: jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Other: None</td>
<td>Power Management: BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Compiler: 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</th>
<th>OS: Red Hat Enterprise Linux 8.3 (Ootapa)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Date:</strong> Sep-2021</td>
<td><strong>CPU Name:</strong> Intel Xeon Silver 4309Y</td>
</tr>
<tr>
<td><strong>Hardware Availability:</strong> Jul-2021</td>
<td><strong>Max MHz:</strong> 3600</td>
</tr>
<tr>
<td><strong>Software Availability:</strong> Dec-2020</td>
<td><strong>Nominal:</strong> 2800</td>
</tr>
<tr>
<td><strong>Enabled:</strong> 16 cores, 2 chips, 2 threads/core</td>
<td><strong>Orderable:</strong> 1.2 chips</td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 48 KB D on chip per core</td>
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</tr>
<tr>
<td><strong>Cache L3:</strong> 12 MB I+D on chip per chip</td>
<td><strong>Other:</strong> None</td>
</tr>
<tr>
<td><strong>Memory:</strong> 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)</td>
<td><strong>Storage:</strong> 1 x 960 GB SATA SSD</td>
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<tr>
<td><strong>Other:</strong> None</td>
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</tr>
<tr>
<td><strong>Power Management:</strong> BIOS and OS set to prefer performance at the cost of additional power usage</td>
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Lenovo Global Technology
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>32</td>
<td>256</td>
<td>6.93</td>
<td>252</td>
<td>7.04</td>
<td>252</td>
<td>7.04</td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>32</td>
<td>412</td>
<td>9.67</td>
<td>422</td>
<td>9.44</td>
<td>418</td>
<td>9.53</td>
<td></td>
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<tr>
<td>605.mcf_s</td>
<td>32</td>
<td>248</td>
<td>19.1</td>
<td>248</td>
<td>19.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>32</td>
<td>223</td>
<td>7.30</td>
<td>224</td>
<td>7.29</td>
<td>221</td>
<td>7.37</td>
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</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>32</td>
<td>103</td>
<td>13.7</td>
<td>103</td>
<td>13.7</td>
<td>104</td>
<td>13.7</td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>32</td>
<td>104</td>
<td>17.0</td>
<td>103</td>
<td>17.1</td>
<td>104</td>
<td>17.0</td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>32</td>
<td>241</td>
<td>5.95</td>
<td>240</td>
<td>5.96</td>
<td>240</td>
<td>5.96</td>
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<tr>
<td>641.leela_s</td>
<td>32</td>
<td>350</td>
<td>4.88</td>
<td>348</td>
<td>4.90</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>648.exchange2_s</td>
<td>32</td>
<td>141</td>
<td>20.8</td>
<td>141</td>
<td>20.8</td>
<td>142</td>
<td>20.7</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>32</td>
<td>300</td>
<td>20.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 11.1
SPECspeed®2017_int_peak = Not Run

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"
MALLOCONF = "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.

(Continued on next page)
General Notes (Continued)

jemalloc, 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 982a61ec0915b55891ef0e16cafc64d
running on localhost.localdomain Thu Sep 9 22:21:38 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 4309Y CPU @ 2.80GHz
   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 0 1 2 3 4 5 6 7
   physical 1: cores 0 1 2 3 4 5 6 7

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): 32
   On-line CPU(s) list: 0-31
   Thread(s) per core: 2
   Core(s) per socket: 8
   Socket(s): 2
   NUMA node(s): 2
   Vendor ID: GenuineIntel
   CPU family: 6
   Model: 106

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

Copyright 2017-2021 Standard Performance Evaluation Corporation

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SPECspeed®2017_int_base = 11.1
SPECspeed®2017_int_peak = Not Run

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Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Silver 4309Y CPU @ 2.80GHz
Stepping: 6
CPU MHz: 800.779
CPU max MHz: 3600.0000
CPU min MHz: 800.0000
BogoMIPS: 5600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 12288K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
Flags: fpu vme de pse tsc msr pae mce cs c7

/proc/cpuinfo cache data
  cache size: 12288 KB

From numactl --hardware
WARNING: a numactl '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 16 17 18 19 20 21 22 23
    node 0 size: 251628 MB
    node 0 free: 256736 MB
    node 1 cpus:  8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
    node 1 size: 251561 MB
    node 1 free: 256910 MB
    node distances:
      0: 10 20
      1: 20 10

From /proc/meminfo
  MemTotal: 527882480 KB

(Continued on next page)
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SPECspeed®2017_int_base = 11.1
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Platform Notes (Continued)

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"
redhat-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 sanitization
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 Sep 9 17:59
SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB

(Continued on next page)
**Lenovo Global Technology**  
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**Specspeed®2017_int_base = 11.1**  
**Specspeed®2017_int_peak = Not Run**  

**Platform Notes (Continued)**  

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: U8E113E-1.10  
BIOS Date: 08/31/2021  
BIOS Revision: 1.10  
Firmware Revision: 1.41  

(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.  

          | 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,  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
```

(Continued on next page)
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Test Date: Sep-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Compiler Version Notes (Continued)

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 -fiopenmp -Wl,-z,muldefs -xCORE-AVX2
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-1/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto

(Continued on next page)
## Base Optimization Flags (Continued)

**C++ benchmarks (continued):**
- `-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/`  
- `-lqkmalloc`

**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:


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