Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Silver 4209T)

**SPECrate2017_int_base** = 82.5

**SPECrate2017_int_peak** = Not Run

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>CPU2017 License</td>
<td>9017</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Nov-2018</td>
</tr>
<tr>
<td>Test Date</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name**: Intel Xeon Silver 4209T
- **Max MHz.**: 3200
- **Nominal**: 2200
- **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**: 11 MB I+D on chip per chip
- **Memory**: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **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 19.0.1.144 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 IVE135M 2.10 released Jan-2019
- **File System**: xfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: None

---

### SPECrate2017_int_base

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_int_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>32</td>
<td>82.5</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>32</td>
<td>115</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>32</td>
<td>149</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>32</td>
<td>61.3</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>32</td>
<td>142</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>32</td>
<td>61.3</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>32</td>
<td>115</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>32</td>
<td>149</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>32</td>
<td>62.4</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>32</td>
<td>54.8</td>
</tr>
</tbody>
</table>

---

**Hardware**

- **CPU Name**: Intel Xeon Silver 4209T
- **Max MHz.**: 3200
- **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**: 11 MB I+D on chip per chip
- **Other**: None
- **Memory**: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **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 19.0.1.144 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 IVE135M 2.10 released Jan-2019
- **File System**: xfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: None

---

**SPECrate2017_int_base** = 82.5

**SPECrate2017_int_peak** = Not Run

---

Page 1

Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Silver 4209T)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>32</td>
<td>816</td>
<td>62.4</td>
<td>816</td>
<td>62.4</td>
<td>818</td>
<td>62.3</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>32</td>
<td>631</td>
<td>71.8</td>
<td>628</td>
<td>72.1</td>
<td>637</td>
<td>71.2</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>32</td>
<td>449</td>
<td>115</td>
<td>451</td>
<td>115</td>
<td>450</td>
<td>115</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>32</td>
<td>711</td>
<td>59.1</td>
<td>717</td>
<td>58.6</td>
<td>716</td>
<td>58.6</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>32</td>
<td>334</td>
<td>101</td>
<td>332</td>
<td>102</td>
<td>334</td>
<td>101</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>32</td>
<td>372</td>
<td>151</td>
<td>376</td>
<td>149</td>
<td>376</td>
<td>149</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>32</td>
<td>542</td>
<td>67.6</td>
<td>543</td>
<td>67.5</td>
<td>543</td>
<td>67.5</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>32</td>
<td>865</td>
<td>61.3</td>
<td>866</td>
<td>61.2</td>
<td>854</td>
<td>62.1</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>32</td>
<td>589</td>
<td>142</td>
<td>590</td>
<td>142</td>
<td>590</td>
<td>142</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>32</td>
<td>631</td>
<td>54.8</td>
<td>630</td>
<td>54.9</td>
<td>630</td>
<td>54.8</td>
</tr>
</tbody>
</table>

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>
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)
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Silver 4209T)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base =</th>
<th>82.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

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

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
Stale AtoS set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-4brr Mon May 13 09:43:28 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) Silver 4209T CPU @ 2.20GHz
  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:
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: 85
Model name: Intel(R) Xeon(R) Silver 4209T CPU @ 2.20GHz
Stepping: 6

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Silver 4209T)

SPECrate2017_int_base = 82.5
SPECrate2017_int_peak = Not Run

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

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

Platform Notes (Continued)

CPU MHz: 2200.000
CPU max MHz: 3200.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
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 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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmperf 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 fl64c
rdrand lahf_lm abm 3dnsowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd
mba ibrs ibpb stibp tpr_shadow vnni flexpriority ept vpid fsgsbase tsc_adjust bmi1
hle avx2 smep bmi2 emms invpcid rdmsk rdt_a avx512f avx512dq rdseed adx smap
cflushopt clwb intel_pt avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
ccm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pin 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: 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: 386632 MB
node 0 free: 380248 MB
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
node 1 size: 387045 MB
node 1 free: 386421 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo

MemTotal: 792246304 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

os-release:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Silver 4209T)

SPECrate2017_int_base = 82.5
SPECrate2017_int_peak = Not Run

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

Platform Notes (Continued)

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 May 13 09:41

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1

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 -[IVE135M-2.10]- 01/16/2019
Memory:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
557.xz_r(base)
==============================================================================

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.

(Continued on next page)
**SPEC CPU2017 Integer Rate Result**

**Lenovo Global Technology**
ThinkSystem SN550  
(2.20 GHz, Intel Xeon Silver 4209T)  

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>82.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

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

---

### Compiler Version Notes (Continued)

```plaintext
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)  
541.leela_r(base)
```

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.

```plaintext
FC 548.exchange2_r(base)
```

Intel(R) Fortran 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.

---

### Base Compiler Invocation

**C benchmarks:**

```plaintext
icc -m64 -std=c11
```

**C++ benchmarks:**

```plaintext
icpc -m64
```

**Fortran benchmarks:**

```plaintext
ifort -m64
```

---

### Base Portability Flags

```plaintext
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
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
```
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Silver 4209T)

SPECrate2017_int_base = 82.5
SPECrate2017_int_peak = Not Run

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

Base Optimization Flags

C benchmarks:
- ./w1, -z, muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
- -lqkmalloc

C++ benchmarks:
- ./w1, -z, muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
- -lqkmalloc

Fortran benchmarks:
- ./w1, -z, muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
- -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/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-A.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-A.xml

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-05-12 21:43:27-0400.
Originally published on 2019-05-29.