Lenovo Global Technology
ThinkSystem SN550 V2
(3.00 GHz, Intel Xeon Gold 5317)

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

SPECrates

<table>
<thead>
<tr>
<th>Spec CPU®2017_int_base</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrates®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Gold 5317</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3600</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3000</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 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>18 MB I+D on chip per chip</td>
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<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 2933)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 960 GB SATA SSD</td>
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<tr>
<td>Other:</td>
<td>None</td>
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Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux 8.3 (Ootpa)</th>
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</thead>
<tbody>
<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>
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<tr>
<td>Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version U8E111A 1.02 released May-2021</td>
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<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>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
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Lenovo Global Technology
ThinkSystem SN550 V2
(3.00 GHz, Intel Xeon Gold 5317)

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

SPECrate®2017_int_base = 200
SPECrate®2017_int_peak = Not Run

Results Table

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<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>
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<tbody>
<tr>
<td>Perlmutter_r</td>
<td>48</td>
<td>567</td>
<td>135</td>
<td>568</td>
<td>135</td>
<td>568</td>
<td>135</td>
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<tr>
<td>Gcc_r</td>
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<td>420</td>
<td>162</td>
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<td>162</td>
<td>418</td>
<td>162</td>
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<td>Mcf_r</td>
<td>48</td>
<td>228</td>
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<td>228</td>
<td>340</td>
<td>229</td>
<td>338</td>
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<tr>
<td>Numactl_r</td>
<td>48</td>
<td>489</td>
<td>129</td>
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<td>485</td>
<td>130</td>
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<tr>
<td>Xalancbmk_r</td>
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<td>254</td>
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<td>254</td>
<td>200</td>
<td>253</td>
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<td>X264_r</td>
<td>48</td>
<td>204</td>
<td>413</td>
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<td>414</td>
<td>203</td>
<td>413</td>
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<tr>
<td>Deepsjeng_r</td>
<td>48</td>
<td>361</td>
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<td>152</td>
<td>361</td>
<td>152</td>
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<tr>
<td>Leela_r</td>
<td>48</td>
<td>536</td>
<td>148</td>
<td>536</td>
<td>148</td>
<td>536</td>
<td>148</td>
</tr>
<tr>
<td>Exchange2_r</td>
<td>48</td>
<td>305</td>
<td>413</td>
<td>305</td>
<td>413</td>
<td>307</td>
<td>410</td>
</tr>
<tr>
<td>Xz_r</td>
<td>48</td>
<td>482</td>
<td>108</td>
<td>479</td>
<td>108</td>
<td>479</td>
<td>108</td>
</tr>
</tbody>
</table>

SPECrate®2017_int_base = 200
SPECrate®2017_int_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/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202
1.1-revB/lib/ia32:/home/cpu2017-1.1.8-ic2021.1-revB/je5.0.1-32"
MALLOCONF="retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Red Hat Enterprise Linux 8.1
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)
Lenovo Global Technology
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SPECrater®2017_int_base = 200
SPECrater®2017_int_peak = Not Run

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled
DCU Streamer Prefetcher set to Disabled
UPI Link Disable set to Disabled 1 Link
SNC set to Enabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891e6a0e16acaf64d
running on localhost.localdomain Sat Aug 7 00:22:35 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) Gold 5317 CPU @ 3.00GHz
  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 0 1 2 3 4 5 6 7 8 9 10 11
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11

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): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2

(Continued on next page)
Lenovo Global Technology

ThinkSystem SN550 V2  
(3.00 GHz, Intel Xeon Gold 5317)

**SPEC CPU®2017 Integer Rate Result**

Copyright 2017-2021 Standard Performance Evaluation Corporation

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Jul-2021

**Test Date:** Aug-2021  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Dec-2020

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMA node(s): 4</td>
</tr>
<tr>
<td>Vendor ID: GenuineIntel</td>
</tr>
<tr>
<td>CPU family: 6</td>
</tr>
<tr>
<td>Model: 106</td>
</tr>
<tr>
<td>Model name: Intel(R) Xeon(R) Gold 5317 CPU @ 3.00GHz</td>
</tr>
<tr>
<td>Stepping: 6</td>
</tr>
<tr>
<td>CPU MHz: 3403.311</td>
</tr>
<tr>
<td>BogoMIPS: 6000.0</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 48K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1280K</td>
</tr>
<tr>
<td>L3 cache: 18432K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-5,24-29</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 6-11,30-35</td>
</tr>
<tr>
<td>NUMA node2 CPU(s): 12-17,36-41</td>
</tr>
<tr>
<td>NUMA node3 CPU(s): 18-23,42-47</td>
</tr>
<tr>
<td>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 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 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppln ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fpu vt dtes64_64bit_model monitor svm cx8 crpape fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppln ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fpu vt dtes64_64bit_model monitor svm cx8 crpape</td>
</tr>
</tbody>
</table>

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 2 3 4 5 24 25 26 27 28 29  
node 0 size: 127068 MB  
node 0 free: 128001 MB  
node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35  
node 1 size: 127523 MB  
node 1 free: 128445 MB  
node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41  
node 2 size: 127736 MB  
node 2 free: 128477 MB  
node 3 cpus: 18 19 20 21 22 23 42 43 44 45 46 47

(Continued on next page)
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SPECrate®2017_int_base = 200
SPECrate®2017_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Aug-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020

Platform Notes (Continued)

node 3 size: 127512 MB
node 3 free: 128594 MB
node distances:
node 0 1 2 3
0: 10 11 20 20
1: 11 10 20 20
2: 20 20 10 11
3: 20 20 11 10

From /proc/meminfo
MemTotal: 527877736 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/sbin/tuned-adm active
Current active profile: throughput-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:
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/swapgs
barriers and __user pointer
sanitization

(Continued on next page)
Platform Notes (Continued)

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 Aug 6 17:36

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB

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 2933

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       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
| 525.x264_r(base) 557.xz_r(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++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
==============================================================================

(Continued on next page)
## Lenovo Global Technology

ThinkSystem SN550 V2
(3.00 GHz, Intel Xeon Gold 5317)

<table>
<thead>
<tr>
<th>SPEC CPU®2017 Integer Rate Result</th>
</tr>
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<tbody>
<tr>
<td>Lenovo Global Technology</td>
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### SPECrate®2017_int_base = 200

### SPECrate®2017_int_peak = Not Run

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<th>CPU2017 License:</th>
<th>Test Date:</th>
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<tr>
<td>9017</td>
<td>Aug-2021</td>
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</table>

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
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<tr>
<td>Lenovo Global Technology</td>
<td>Lenovo Global Technology</td>
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<thead>
<tr>
<th>Hardware Availability:</th>
<th>Software Availability:</th>
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<tbody>
<tr>
<td>Jul-2021</td>
<td>Dec-2020</td>
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</table>

### Compiler Version Notes (Continued)

<table>
<thead>
<tr>
<th>541.leela_r (base)</th>
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</table>
| 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. |

<table>
<thead>
<tr>
<th>548.exchange2_r (base)</th>
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</thead>
</table>
| 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

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancmk_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
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Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -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
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -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
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-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-ICElake-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-ICElake-F.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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