# Lenovo Global Technology

## ThinkSystem SD530
(2.10 GHz, Intel Xeon Gold 5218R)

### SPEC CPU®2017 Integer Rate Result

**Lenovo Global Technology**

**Test Date:** Jun-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Apr-2020

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base =</th>
<th>237</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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</thead>
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<tr>
<td>500.perlbench_r 80</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td>502.gcc_r 80</td>
<td>186</td>
<td></td>
</tr>
<tr>
<td>505.mcf_r 80</td>
<td></td>
<td>391</td>
</tr>
<tr>
<td>520.omnetpp_r 80</td>
<td></td>
<td>159</td>
</tr>
<tr>
<td>523.xalancbmk_r 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>525.x264_r 80</td>
<td></td>
<td>310</td>
</tr>
<tr>
<td>531.deepsjeng_r 80</td>
<td></td>
<td>182</td>
</tr>
<tr>
<td>541.leela_r 80</td>
<td></td>
<td>179</td>
</tr>
<tr>
<td>548.exchange2_r 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>557.xz_r 80</td>
<td></td>
<td>142</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5218R  
- **Max MHz:** 4000  
- **Nominal:** 2100  
- **Enabled:** 40 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I+ 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 27.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 800 GB SATA SSD  
- **Other:** None  

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP1 (x86_64)  
  Kernel 4.12.14-195-default  
- **Compiler:** C/C++: Version 19.1.1.217 of Intel  
  C/C++ Compiler for Linux;  
  Fortran: Version 19.1.1.217 of Intel Fortran  
  Compiler for Linux  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version TEE155L 2.61 released May-2020  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SD530
(2.10 GHz, Intel Xeon Gold 5218R)

SPECRate®2017_int_base = 237
SPECRate®2017_int_peak = Not Run

<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>
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<tr>
<td>500.perlbench_r</td>
<td>80</td>
<td>800</td>
<td>159</td>
<td>802</td>
<td>159</td>
<td>801</td>
<td>159</td>
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<tr>
<td>502.gcc_r</td>
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<td>609</td>
<td>186</td>
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<td>186</td>
<td>611</td>
<td>185</td>
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<tr>
<td>505.mcf_r</td>
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<td>331</td>
<td>391</td>
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<td>330</td>
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</tr>
<tr>
<td>523.xalanbmk_r</td>
<td>80</td>
<td>272</td>
<td>310</td>
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<td>311</td>
<td>272</td>
<td>310</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>80</td>
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<td>484</td>
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<td>482</td>
<td>292</td>
<td>480</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>80</td>
<td>505</td>
<td>182</td>
<td>504</td>
<td>182</td>
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<td>182</td>
</tr>
<tr>
<td>541.leela_r</td>
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<td>178</td>
<td>739</td>
<td>179</td>
<td>735</td>
<td>180</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>80</td>
<td>468</td>
<td>448</td>
<td>469</td>
<td>447</td>
<td>469</td>
<td>446</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>80</td>
<td>605</td>
<td>143</td>
<td>607</td>
<td>142</td>
<td>608</td>
<td>142</td>
</tr>
</tbody>
</table>

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

Compiler Notes
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

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-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/lib/ia32:/home/cpu2017-1.1.0-ic19.1.1/je5.0.1-32"
MALLOCP_CONF = "retain:true"
## SPEC CPU®2017 Integer Rate Result

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ThinkSystem SD530  
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</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Date:** Jun-2020  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

### 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  
runcpu command invoked through numactl i.e.:  
umactl --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  
DCU Streamer Prefetcher set to Disable  
MONITOR/MWAIT set to Enable  
SNC set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7eddb1e6e46a485a0011  
running on linux-jq95 Wed Jun 10 13:42:38 2020

**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

```bash
From /proc/cpuinfo
  model name : Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
    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 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
```

```bash
From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
```

(Continued on next page)
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CPU2017 License: 9017
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<table>
<thead>
<tr>
<th>Address sizes:</th>
<th>46 bits physical, 48 bits virtual</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU(s):</td>
<td>80</td>
</tr>
<tr>
<td>On-line CPU(s) list:</td>
<td>0-79</td>
</tr>
<tr>
<td>Thread(s) per core:</td>
<td>2</td>
</tr>
<tr>
<td>Core(s) per socket:</td>
<td>20</td>
</tr>
<tr>
<td>Socket(s):</td>
<td>2</td>
</tr>
<tr>
<td>NUMA node(s):</td>
<td>4</td>
</tr>
<tr>
<td>Vendor ID:</td>
<td>GenuineIntel</td>
</tr>
<tr>
<td>CPU family:</td>
<td>6</td>
</tr>
<tr>
<td>Model:</td>
<td>85</td>
</tr>
<tr>
<td>Model name:</td>
<td>Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz</td>
</tr>
<tr>
<td>Stepping:</td>
<td>7</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2100.000</td>
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<tr>
<td>CPU max MHz:</td>
<td>4000.0000</td>
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<tr>
<td>BogoMIPS:</td>
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<td>VT-x</td>
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<td>L1d cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>32K</td>
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<tr>
<td>L2 cache:</td>
<td>1024K</td>
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<tr>
<td>L3 cache:</td>
<td>28160K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-2,5,6,10-12,15,16,40-42,45,46,50-52,55,56</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>3,4,7-9,13,14,17-19,43,44,47-49,53,54,57-59</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>20-22,25,26,30-32,35,36,60-62,65,66,67-70-72,75,76</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>23,24,27-29,33,34,37-39,63,64,67-69,73,74,77-79</td>
</tr>
<tr>
<td>Flags:</td>
<td>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 pdemtl ptdscpl lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dttes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrunc pclid 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 cdp_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdind aavx512fq avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsave xsavec csxsave xsmm xsavec cqm_llc cqm_occup_llc cqm_mmm_total cqm_mmb_total dtherm ida arat pln pts pkup ospke avx512_vnni md_clear flush_l1d arch_capabilities</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

<table>
<thead>
<tr>
<th>Available: 4 nodes (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus: 0 1 2 3 6 10 11 12 15 16 40 41 42 45 46 50 51 52 55 56</td>
</tr>
<tr>
<td>node 0 size: 47989 MB</td>
</tr>
<tr>
<td>node 0 free: 47456 MB</td>
</tr>
</tbody>
</table>
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SPECrate®2017_int_base = 237
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CPU2017 License: 9017
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Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Platform Notes (Continued)

node 1 cpus: 3 4 7 8 9 13 14 17 18 19 43 44 47 48 49 53 54 57 58 59
node 1 size: 48350 MB
node 1 free: 48068 MB
node 2 cpus: 20 21 22 25 26 30 31 32 35 36 60 61 62 65 66 70 71 72 75 76
node 2 size: 48380 MB
node 2 free: 48087 MB
node 3 cpus: 23 24 27 28 29 33 34 37 38 39 63 64 67 68 69 73 74 77 78 79
node 3 size: 48378 MB
node 3 free: 48163 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: 197733604 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-jq95 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

(Continued on next page)
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Platform Notes (Continued)

run-level 3 Jun 10 13:42

SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1
Filesystem Type Size Used Avail Use% Mounted on
/dev/md124p3 xfs 740G 67G 674G 9% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE155L-2.61]- 05/20/2020
Vendor: Lenovo
Product: THINKSYSTEM SD530 -[7X2104Z000]-
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:
4x NO DIMM NO DIMM
12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)
This system support 8 DIMMs per processor, total 16 DIMMs.
12 DIMM slots installed with 16 GB DIMM for this run,
and running at 2666 due to CPU limitation.

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) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------------

C++      | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
         | 541.leela_r(base)
------------------------------------------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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Software Availability: Apr-2020

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Compiler Version Notes (Continued)

Fortran | 548.exchange2_r(base)

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

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.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

Base Optimization Flags

C benchmarks:
-m64 -qnextgen -std=c11
-W1, -plugin-opt=x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-fuse-ld=gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and-libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc

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

### C++ benchmarks:

- `-m64`  
- `-qnextgen`  
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries`  
- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-O3`  
- `-ffast-math`  
- `-flto`  
- `-mfpmath=sse`  
- `-funroll-loops`  
- `-fuse-ld=gold`  
- `-qopt-mem-layout-trans=4`  
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`  

### Fortran benchmarks:

- `-m64`  
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries`  
- `-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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/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-CLX-I.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.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-I.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.xml)

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

Tested with SPEC CPU®2017 v1.1.0 on 2020-06-10 01:42:38-0400.  
Report generated on 2020-07-07 14:35:34 by CPU2017 PDF formatter v6255.  
Originally published on 2020-07-07.