## SPEC CPU®2017 Integer Rate Result

**Lenovo Global Technology**  
ThinkSystem SD530  
(1.90 GHz, Intel Xeon Gold 5220T)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Sep-2019  
**Hardware Availability:** Jul-2019  
**Software Availability:** May-2019

### Hardware

**CPU Name:** Intel Xeon Gold 5220T  
**Max MHz:** 3900  
**Nominal:** 1900  
**Enabled:** 36 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:** 24.75 MB I+D on chip per chip  
**Other:** None  
**Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)  
**Storage:** 1 x 800 GB SATA SSD  
**Other:** None

### Software

**OS:** SUSE Linux Enterprise Server 15 (x86_64)  
**Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++  
Compiler for Linux;  
Fortran: Version 19.0.4.227 of Intel Fortran  
Compiler for Linux  
**Parallel:** No  
**Firmware:** Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** None  
**Power Management:** --
Lenovo Global Technology
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SPECrater®2017_int_base = 187
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Results Table

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<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
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<td>520.omnetpp_r</td>
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<td>525.x264_r</td>
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<td>152</td>
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<td>148</td>
<td>806</td>
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</tr>
<tr>
<td>548.exchange2_r</td>
<td>72</td>
<td>506</td>
<td>373</td>
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<td>373</td>
<td>507</td>
<td>372</td>
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<tr>
<td>557.xz_r</td>
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<td>124</td>
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<td>123</td>
<td>630</td>
<td>123</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-ic19.0u4/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X 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)
**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 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/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-qxkw Fri Sep 6 15:30:59 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) Gold 5220T CPU @ 1.90GHz
  2 "physical id"s (chips)
  72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
```

From `lscpu`
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220T CPU @ 1.90GHz
```

(Continued on next page)
### Lenovo Global Technology

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#### CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology  
Tested by: Lenovo Global Technology  
Test Date: Sep-2019  
Hardware Availability: Jul-2019  
Software Availability: May-2019

### Platform Notes (Continued)

- Stepping: 7
- CPU MHz: 1900.000
- CPU max MHz: 3900.0000
- CPU min MHz: 800.0000
- BogoMIPS: 3800.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 25344K
- NUMA node0 CPU(s): 0-2, 5, 6, 9, 10, 14, 15, 16-38, 41, 42, 45, 46, 50, 51
- NUMA node1 CPU(s): 3, 4, 7, 8, 11-13, 16, 17, 39, 40, 43, 44, 47-49, 52, 53
- NUMA node2 CPU(s): 18-20, 23, 24, 27, 28, 32, 33, 34, 55-56, 59, 60, 63, 64, 68, 69
- NUMA node3 CPU(s): 21, 22, 25, 26, 29-31, 34, 35, 57, 58, 61, 62, 65-67, 70, 71

### Flags:
- fpu, vme, de, pse, tsc, msr, pae, mce, cx8, apic, sep, mtrr, pge, mca, cmov
- pat, pse36, clflush, dts, dtsc, fpu, acpi, sse, sse2, 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_pnpi, ssbd, mba, ibrs, ibpb, stibp, tpr_shadow, vmni, flexpriority, ept
-impse, fsgsbase, tsc_adjust, bmi1, hle, avx2, smep, bmi2, erta, msrs, invpcid, rtm, cqm, mpx, rt_btd, a
- avx512f, avx512dq, rdseed, adx, smap, clflushopt, clwb, intel_pt, avx512cd, avx512bw, avx512vl, xsaveopt, xsavec, xgetbv1, xsaves, cqm_llc, cqm_occupa_llc, cqm_mbb_manual, cqm_mbb_local, dtherm, ida, arat, pln, pts, pku, ospe, avx512_vnni, flush_l1d, arch_capabilities

/proc/cpuinfo cache data
- cache size: 25344 KB

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 5 6 9 10 14 15 36 37 38 41 42 45 46 50 51  
node 0 size: 96336 MB  
node 0 free: 92806 MB  
node 1 cpus: 3 4 7 8 11 12 13 16 17 39 40 43 44 47 48 49 52 53  
node 1 size: 96754 MB  
node 1 free: 96440 MB  
node 2 cpus: 18 19 20 23 24 27 28 32 33 54 55 56 59 60 63 64 68 69  
node 2 size: 96754 MB  
node 2 free: 96450 MB  
node 3 cpus: 21 22 25 26 29 30 31 34 35 57 58 61 62 65 66 67 70 71  
node 3 size: 96751 MB  
node 3 free: 96533 MB  
node distances:  
node 0 1 2 3  
0: 10 11 21 21  

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Platform Notes (Continued)

1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
MemTotal: 395875044 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
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 Sep 6 15:30

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb3 xfs 737G 98G 640G 14% /

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 SMI BIOS" standard.
BIOS Lenovo -[TEE141E-2.30]- 07/02/2019
Memory:
  4x NO DIMM NO DIMM
  12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)
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### Compiler Version Notes

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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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<th>520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)</th>
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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
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<th>Fortran</th>
<th>548.exchange2_r(base)</th>
</tr>
</thead>
</table>

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

### Base Compiler Invocation

**C benchmarks:**
```
icc -m64 -std=c11
```

**C++ benchmarks:**
```
icpc -m64
```

**Fortran benchmarks:**
```
ifort -m64
```

### 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
```

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**Base Optimization Flags**

**C benchmarks:**

- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
- `-Lqkmalloc`

**C++ benchmarks:**

- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
- `-Lqkmalloc`

**Fortran benchmarks:**

- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout=4 -nostandard-realloc-lhs -align array32byte`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/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-F.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-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-CLX-F.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.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 v1.0.5 on 2019-09-06 03:30:58-0400.**


Originally published on 2019-10-29.