# SPEC CPU®2017 Integer Rate Result

**Lenovo Global Technology**

ThinkSystem SD530  
(3.30 GHz, Intel Xeon Gold 6234)

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>9017</th>
</tr>
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</table>

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

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<tr>
<th>Test Date</th>
<th>Aug-2019</th>
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<tbody>
<tr>
<td>Hardware Availability</td>
<td>Jul-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

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## Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Gold 6234</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz</td>
<td>4000</td>
</tr>
<tr>
<td>Nominal</td>
<td>3300</td>
</tr>
<tr>
<td>Enabled</td>
<td>16 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 + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>24.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>OS</th>
<th>SUSE Linux Enterprise Server 15 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>C/C++: Version 19.0.4.227 of Intel</td>
</tr>
<tr>
<td>Compiler for Linux</td>
<td></td>
</tr>
<tr>
<td>Fortran</td>
<td>Intel Fortran</td>
</tr>
<tr>
<td>Compiler for Linux</td>
<td></td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Lenovo BIOS Version TEE142E 2.30 released Aug-2019 test as TEE141E 2.30 Jul-2019</td>
</tr>
<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>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Power Management</td>
<td>--</td>
</tr>
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<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>123</th>
</tr>
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<tbody>
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<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
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</table>
**Lenovo Global Technology**

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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlibench_r</td>
<td>32</td>
<td>562</td>
<td>90.7</td>
<td>563</td>
<td>90.5</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>32</td>
<td>458</td>
<td>99.0</td>
<td>455</td>
<td>99.5</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>32</td>
<td>314</td>
<td>165</td>
<td>313</td>
<td>165</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>32</td>
<td>559</td>
<td>75.0</td>
<td>557</td>
<td>75.3</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>32</td>
<td>220</td>
<td>154</td>
<td>223</td>
<td>151</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>32</td>
<td>223</td>
<td>252</td>
<td>222</td>
<td>252</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>32</td>
<td>367</td>
<td>100</td>
<td>367</td>
<td>100</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>32</td>
<td>551</td>
<td>96.2</td>
<td>560</td>
<td>94.6</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>32</td>
<td>342</td>
<td>245</td>
<td>342</td>
<td>245</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>32</td>
<td>445</td>
<td>77.7</td>
<td>447</td>
<td>77.4</td>
</tr>
</tbody>
</table>

**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)
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SPECrate®2017_int_base = 123
SPECrate®2017_int_peak = Not Run

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
Choose Operating Mode set 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 Aug 23 17:50:38 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 6234 CPU @ 3.30GHz
  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 2 3 4 8 9 18 25 27
physical 1: cores 2 4 8 18 19 20 24 25

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): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85

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

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

Test Date: Aug-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Gold 6234 CPU @ 3.30GHz
Stepping: 7
CPU MHz: 3300.000
CPU max MHz: 4000.0000
CPU min MHz: 1200.0000
BogoMIPS: 6600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0,3,4,6,16,19,20,22
NUMA node1 CPU(s): 1,2,5,7,17,18,21,23
NUMA node2 CPU(s): 8,10,14,15,24,26,30,31
NUMA node3 CPU(s): 9,11-13,25,27-29
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi 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 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 cdp_l3

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 3 4 6 16 19 20 22
node 0 size: 96367 MB
node 0 free: 92999 MB
node 1 cpus: 1 2 5 7 17 18 21 23
node 1 size: 96727 MB
node 1 free: 96516 MB
node 2 cpus: 8 10 14 15 24 26 30 31
node 2 size: 96756 MB
node 2 free: 96556 MB
node 3 cpus: 9 11 12 13 25 27 28 29
node 3 size: 96753 MB
node 3 free: 96514 MB
node distances:
node 0 1 2 3

(Continued on next page)
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Platform Notes (Continued)

0: 10 11 21 21
1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
MemTotal: 395882616 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 Aug 23 17:49

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

(Continued on next page)
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**SPECrate®2017_int_base = 123**

**SPECrate®2017_int_peak = Not Run**

#### Platform Notes (Continued)

(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) 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.

C++
  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 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran
  548.exchange2_r(base)

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`
# SPEC CPU®2017 Integer Rate Result

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## 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:**
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=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-trans=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-trans=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-D.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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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