# SPEC CPU®2017 Integer Speed Result

**Lenovo Global Technology**

**ThinkSystem SN550**

(3.30 GHz, Intel Xeon Gold 6246)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>10.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Hardware**

**CPU Name:** Intel Xeon Gold 6246

**Max MHz:** 4200

**Nominal:** 3300

**Enabled:** 24 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:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)

**Storage:** 1 x 960 GB SATA SSD

**Other:** None

<table>
<thead>
<tr>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OS:</strong> SUSE Linux Enterprise Server 15 (x86_64)</td>
</tr>
<tr>
<td><strong>Kernel:</strong> 4.12.14-25.13-default</td>
</tr>
<tr>
<td><strong>Compiler:</strong> 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</td>
</tr>
<tr>
<td><strong>Parallel:</strong> Yes</td>
</tr>
<tr>
<td><strong>Firmware:</strong> Lenovo BIOS Version IVE142E 2.30 released Aug-2019 tested as IVE141E 2.30 Jul-2019</td>
</tr>
<tr>
<td><strong>File System:</strong> xfs</td>
</tr>
<tr>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>Base Pointers:</strong> 64-bit</td>
</tr>
<tr>
<td><strong>Peak Pointers:</strong> Not Applicable</td>
</tr>
<tr>
<td><strong>Other:</strong> jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td><strong>Power Management:</strong> --</td>
</tr>
</tbody>
</table>

---

**Test Date:** Sep-2019

**Hardware Availability:** Jul-2019

**Software Availability:** May-2019
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
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</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>48</td>
<td>244</td>
<td>7.29</td>
<td>354</td>
<td>10.2</td>
<td>359</td>
<td>13.2</td>
<td></td>
<td></td>
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<tr>
<td>602.gcc_s</td>
<td>48</td>
<td>390</td>
<td>10.2</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>605.mcf_s</td>
<td>48</td>
<td>361</td>
<td>13.1</td>
<td>358</td>
<td>13.2</td>
<td>359</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>48</td>
<td>206</td>
<td>7.91</td>
<td>213</td>
<td>7.65</td>
<td>209</td>
<td>7.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>48</td>
<td>107</td>
<td>13.2</td>
<td>107</td>
<td>13.2</td>
<td>107</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>48</td>
<td>118</td>
<td>15.0</td>
<td>117</td>
<td>15.1</td>
<td>117</td>
<td>15.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>48</td>
<td>247</td>
<td>5.80</td>
<td>247</td>
<td>5.81</td>
<td>247</td>
<td>5.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>48</td>
<td>332</td>
<td>5.13</td>
<td>332</td>
<td>5.13</td>
<td>332</td>
<td>5.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>48</td>
<td>164</td>
<td>17.9</td>
<td>164</td>
<td>17.9</td>
<td>164</td>
<td>17.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>48</td>
<td>259</td>
<td>23.9</td>
<td>259</td>
<td>23.9</td>
<td>259</td>
<td>23.9</td>
<td></td>
<td></td>
</tr>
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</table>

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

**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:

KMP_AFFINITY = "granularity=fine,scatter"

LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u4/lib/intel64"

LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic19.0u4/je5.0.1-64"

OMP_STACKSIZE = "192M"

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
```

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.  

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.

jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
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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>

### General Notes (Continued)

Sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

### Platform Notes

BIOS configuration:
- Choose Operating Mode set to Custom Mode
- Energy Efficient Turbo set to Disable
- C-States set to Disable
- Platform Controlled Type set to Efficiency-Favor Power
- Page Policy set to Adaptive
- Trusted Execution Technology set to Enable
- Workload Configuration set to I/O Sensitive
- Stale AtoS set to Enable
- Sysinfo program: /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
- Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
- Running on Linux-cq9p Sat Sep 7 03:56:43 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 6246 CPU @ 3.30GHz
- 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 2 3 4 9 10 11 16 17 20 25 27
  - physical 1: cores 0 2 4 8 9 10 11 17 18 19 25 27

From lscpu:
- 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
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6246 CPU @ 3.30GHz

(Continued on next page)
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SPECSpeed®2017_int_base = 10.7
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Platform Notes (Continued)

Stepping: 7
CPU MHz: 3300.000
BogoMIPS: 6600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-11,24-35
NUMA node1 CPU(s): 12-36

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 noplapic xtopology nonstop_tsc

From /proc/cpuinfo

Cache data

cache size : 25344 KB

From numactl --hardware

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

node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 24 25 26 27 28 29 30 31 32 33 34 35
node 0 size: 386628 MB
node 0 free: 380057 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 36 37 38 39 40 41 42 43 44 46 47
node 1 size: 387044 MB
node 1 free: 386517 MB

dnode distances:

node   0   1
0:  10  21
1:  21  10

From /proc/meminfo

MemTotal: 792241040 kB
HugePages_Total: 0
Hugepagesize: 4096 kB

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

os-release:
NAME="SLES"

(Continued on next page)
**Platform Notes (Continued)**

```
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 7 03:55
```

```
SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sdb3       xfs   893G   61G  833G   7% /
```

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 -[IVE141E-2.30]- 07/02/2019
- Memory:
  24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

**Compiler Version Notes**

```
C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
        | 625.x264_s(base) 657.xz_s(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.
```

(Continued on next page)
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SPECspeed®2017_int_base = 10.7
SPECspeed®2017_int_peak = Not Run

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**Compiler Version Notes (Continued)**

```
C++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
       | 641.leela_s(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 | 648.exchange2_s(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
```

---

**Base Portability Flags**

```
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```
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CPU\textsuperscript{2017\_License}: 9017
Test\textsuperscript{Sponsor}: Lenovo Global Technology
Test\textsuperscript{ed by}: Lenovo Global Technology
Test\textsuperscript{ Date}: Sept-2019
Hardware\textsuperscript{Availability}: Jul-2019
Software\textsuperscript{Availability}: May-2019

### Base Optimization Flags

C benchmarks:
```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

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:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs
```

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

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

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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\textsuperscript{2017\_v1.0.5} on 2019-09-06 15:56:43-0400.
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