## Lenovo Global Technology

**ThinkSystem ST550**  
(2.10 GHz, Intel Xeon Gold 6230)

### SPECspeed2017_int_base = 9.57

**SPECspeed2017_int_peak = Not Run**

<table>
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### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>80</td>
<td>6.55</td>
</tr>
<tr>
<td>gcc_s</td>
<td>80</td>
<td>9.91</td>
</tr>
<tr>
<td>mcf_s</td>
<td>80</td>
<td>11.5</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>80</td>
<td>7.29</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>80</td>
<td>9.94</td>
</tr>
<tr>
<td>x264_s</td>
<td>80</td>
<td>13.6</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>80</td>
<td>5.44</td>
</tr>
<tr>
<td>leela_s</td>
<td>80</td>
<td>4.73</td>
</tr>
<tr>
<td>exchange2_s</td>
<td>80</td>
<td>14.2</td>
</tr>
<tr>
<td>xz_s</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

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### Hardware

- **CPU Name:** Intel Xeon Gold 6230
- **Max MHz.:** 3900
- **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
- **L2:** 1 MB I+D on chip per core
- **L3:** 27.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)
- **Kernel:** 4.12.14-25.13-default
- **Compiler:** C/C++: Version 19.0.0.117 of Intel C/C++
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version OOE135M 2.10 released Jan-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** jemalloc memory allocator V5.0.1
SPEC CPU2017 Integer Speed Result

Lenovo Global Technology
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SPECSpeed2017_int_base = 9.57
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</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>600.perlbench_s</td>
<td>80</td>
<td>272</td>
<td>6.52</td>
<td>271</td>
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<td>6.62</td>
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<tr>
<td>602.gcc_s</td>
<td>80</td>
<td>398</td>
<td>10.0</td>
<td>402</td>
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<td>9.83</td>
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<td>605.mcf_s</td>
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<td>405</td>
<td>11.7</td>
<td>410</td>
<td>11.5</td>
<td>420</td>
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<tr>
<td>620.omnetpp_s</td>
<td>80</td>
<td>224</td>
<td>7.29</td>
<td>223</td>
<td>7.31</td>
<td>225</td>
<td>7.24</td>
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<tr>
<td>623.xalancbmk_s</td>
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<td>9.94</td>
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<td>9.94</td>
<td>144</td>
<td>9.87</td>
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<tr>
<td>625.x264_s</td>
<td>80</td>
<td>130</td>
<td>13.6</td>
<td>129</td>
<td>13.6</td>
<td>129</td>
<td>13.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>80</td>
<td>263</td>
<td>5.44</td>
<td>264</td>
<td>5.43</td>
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<tr>
<td>641.leela_s</td>
<td>80</td>
<td>361</td>
<td>4.73</td>
<td>360</td>
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<td>648.exchange2_s</td>
<td>80</td>
<td>207</td>
<td>14.2</td>
<td>207</td>
<td>14.2</td>
<td>207</td>
<td>14.2</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>80</td>
<td>260</td>
<td>23.8</td>
<td>260</td>
<td>23.7</td>
<td>260</td>
<td>23.8</td>
</tr>
</tbody>
</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/lib/ia32:/home/cpu2017-1.0.5.ic19/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5.ic19/je5.0.1-32:/home/cpu2017-1.0.5.ic19/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
Filesyste page cache synced and cleared with:
Yes: 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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Test Date: Mar-2019
Hardware Availability: Apr-2019
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General Notes (Continued)

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
Stale AtoS set to Enable
LLC dead line alloc set to Disable
Patrol Scrub set to Disable
C-States set to legacy

Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-pork Fri Mar 15 20:08:20 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 6230 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

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 80
  On-line CPU(s) list: 0-79
  Thread(s) per core: 2
  Core(s) per socket: 20
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
  Stepping: 6
  CPU MHz: 2100.000

(Continued on next page)
# SPEC CPU2017 Integer Speed Result

## Lenovo Global Technology

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### Platform Notes (Continued)

- **CPU max MHz:** 3900.0000
- **CPU min MHz:** 800.0000
- **BogoMIPS:** 4200.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 28160K
- **NUMA node0 CPU(s):** 0-19,40-59
- **NUMA node1 CPU(s):** 20-39,60-79
- **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 cdp_l3 invpcid_single ssbd mba ibrs ibpb tpr_shadow vnumap flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erk3 invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaves cmqm cmq_occum llc cmqm_mbm_total cmqm_mbm_local dtherm ida arat pin pts pku ospke avx512_vnni flush_l1d arch_capabilities

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

```
available: 2 nodes (0-1)
node 0 cpus:  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 40 41 42 43 44 45 46 47
  48 49 50 51 52 53 54 55 56 57 58 59
node 0 size: 193119 MB
node 0 free: 188371 MB
node 1 cpus:  20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 60 61 62 63 64
  65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
node 1 size: 193476 MB
node 1 free: 193202 MB
node distances:
node 0: 1 10 21
     1:  21 10
```

From `/proc/meminfo`  
**MemTotal:** 395873960 KB  
**HugePages_Total:** 0  
**Hugepagesize:** 2048 KB

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

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#### Platform Notes (Continued)

```
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 Mar 15 17:42

SPEC is set to: /home/cpu2017-1.0.5-ic19
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sdc3      xfs   445G   32G  414G   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 -[00E135M-2.10]- 01/16/2019
    Memory:
        12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)

---

#### Compiler Version Notes

```
==============================================================================
CC  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 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

(Continued on next page)
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Compiler Version Notes (Continued)

==============================================================================
CXXC 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 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------
FC  648.exchange2_s(base)
-----------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 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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**Base Optimization Flags**

C benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -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=3 -L/usr/local/je5.0.1-64/lib -ljemalloc`

Fortran benchmarks:
- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

You can also download the XML flags sources by saving the following links:


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

Tested with SPEC CPU2017 v1.0.5 on 2019-03-15 08:08:19-0400.  
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