## Lenovo Global Technology

**ThinkSystem ST550**  
(2.10 GHz, Intel Xeon Gold 5218R)

| Threads | 0 | 1.0 | 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 | 20.0 | 21.0 | 22.0 | 23.0 | 24.0 |
|---------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 600.perlbench_s  | 80 |     |     |     |     |     |     |     |     |     | 6.62 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 602.gcc_s  | 80 |     |     |     |     |     |     |     |     |     | 9.77 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 605.mcf_s  | 80 |     |     |     |     |     |     |     |     |     | 12.0 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 620.omnetpp_s  | 80 |     |     |     |     |     |     |     |     |     | 8.27 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 623.xalancbmk_s  | 80 |     |     |     |     |     |     |     |     |     | 12.2 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 625.x264_s  | 80 |     |     |     |     |     |     |     |     |     | 5.49 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 631.deepsjeng_s  | 80 |     |     |     |     |     |     |     |     |     | 14.2 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 641.leea_s  | 80 |     |     |     |     |     |     |     |     |     | 4.66 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 648.exchange2_s  | 80 |     |     |     |     |     |     |     |     |     | 16.0 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 657.xz_s  | 80 |     |     |     |     |     |     |     |     |     | 23.5 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

---

### SPECspeed®2017_int_base (10.1)

#### 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  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 27.5 MB I+D on chip per chip  
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 480 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 19.0.4.227 of Intel  
  
  Compiler for Linux;  
  
  Fortran: Version 19.0.4.227 of Intel Fortran  
  
  Compiler for Linux  
  
  Parallel: Yes  
  
  **Firmware:** Lenovo BIOS Version o0e152L 2.51 released Feb-2020 tested as O0E151L 2.51 Jan-2020  
  
  **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  
  
  **Power Management:** BIOS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Integer Speed Result

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Lenovo Global Technology
ThinkSystem ST550
(2.10 GHz, Intel Xeon Gold 5218R)

Lenovo Global Technology

Test Date: Mar-2020
Hardware Availability: Mar-2020
Software Availability: Jun-2019

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
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<td>16.0</td>
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<tr>
<td>657.xz_s</td>
<td>80</td>
<td>263</td>
<td>23.5</td>
<td>263</td>
<td>23.5</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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u4/lib/intel64:/home/cpu2017-1.1.0-ic19.0u4/j e5.0.1-64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X 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)

(Continued on next page)
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**SPECspeed®2017_int_base** = 10.1
**SPECspeed®2017_int_peak** = Not Run

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor</td>
<td>Lenovo Global Technology</td>
</tr>
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<td>Tested by</td>
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<td>Hardware Availability</td>
<td>Mar-2020</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Jun-2019</td>
</tr>
</tbody>
</table>

General Notes (Continued)

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

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it 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/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on linux-9n08 Tue Mar 24 09:27:03 2020

From /proc/cpuinfo

```plaintext
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
```

From lscpu:

```plaintext
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 48 bits virtual
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
```

(Continued on next page)
Lenovo Global Technology  
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SPECspeed®2017_int_base = 10.1  
SPECspeed®2017_int_peak = Not Run

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<th>Test Date:</th>
<th>Mar-2020</th>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Jun-2019</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

```
Vendor ID:           GenuineIntel  
CPU family:          6  
Model:               85  
Model name:          Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz  
Stepping:            7  
CPU MHz:             2100.000  
CPU max MHz:         4000.0000  
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 pdelgb 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  
xtrn 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 intel_ppiin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi  
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm  
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd  
avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbm_total  
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear 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: 96379 MB  
node 0 free: 95524 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: 96729 MB  
node 1 free: 96478 MB  
node distances:  
node 0 1  
0: 10 21  
1: 21 10

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

From `/proc/meminfo`
- MemTotal: 197743964 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/etc/*release* /etc/*version*`
- `os-release`:
  - 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-9n08 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

run-level 3 Mar 24 09:25

SPEC is set to: `/home/cpu2017-1.1.0-ic19.0u4`

From `/sys/devices/virtual/dmi/id`
- BIOS: Lenovo -[00E151L-2.51]- 01/14/2020
- Vendor: Lenovo
- Product: System X -[7X09TO2000]-
- 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
## Platform Notes (Continued)

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:

12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

<table>
<thead>
<tr>
<th>Compiler Type</th>
<th>Base Compiler Invocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td><code>icc -m64 -std=c11</code></td>
</tr>
<tr>
<td>C++</td>
<td><code>icpc -m64</code></td>
</tr>
<tr>
<td>Fortran</td>
<td><code>ifort -m64</code></td>
</tr>
</tbody>
</table>

C benchmarks:

- 600.perlbench_s(base)
- 602.gcc_s(base)
- 605.mcf_s(base)
- 625.x264_s(base)
- 657.xz_s(base)

C++ benchmarks:

- 620.omnetpp_s(base)
- 623.xalancbmk_s(base)
- 631.deepsjeng_s(base)
- 641.leela_s(base)

Fortran benchmarks:

- 648.exchange2_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.

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.

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
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**SPECspeed**
- **SPECspeed®2017_int_base** = 10.1
- **SPECspeed®2017_int_peak** = Not Run

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### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
<td>perbench_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>gcc_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>mcf_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>-DSPEC_LP64</td>
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<td>xalancbmk_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
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<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>xz_s</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### 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-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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Tested with SPEC CPU®2017 v1.1.0 on 2020-03-23 21:27:03-0400.
Originally published on 2020-04-14.