## Lenovo Global Technology

**ThinkSystem SR850**

(2.10 GHz, Intel Xeon Gold 5218T)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Sep-2019</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

### Software

- **OS:**
  - SUSE Linux Enterprise Server 12 SP4 (x86_64)
  - Kernel 4.12.14-94.41-default
- **Compiler:**
  - C/C++: Version 19.0.4.227 of Intel C/C++
  - Fortran: Version 19.0.4.227 of Intel Fortran
- **Parallel:**
  - Yes
- **Firmware:**
  - Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019
- **File System:**
  - btrfs
- **System State:**
  - Run level 3 (multi-user)
- **Base Pointers:**
  - 64-bit
- **Peak Pointers:**
  - Not Applicable
- **Other:**
  - jemalloc memory allocator V5.0.1
- **Power Management:**
  - --

### Hardware

- **CPU Name:** Intel Xeon Gold 5218T
- **Max MHz:** 3800
- **Nominal:** 2100
- **Enabled:** 64 cores, 4 chips, 2 threads/core
- **Orderable:** 2.4 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 22 MB I+D on chip per chip
- **Other:** None
- **Memory:** 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
- **Storage:** 1 x 800 GB SATA SSD
- **Other:** None

### SPEC CPU®2017 Integer Speed Result

**SPECspeed®2017_int_base = 9.68**

**SPECspeed®2017_int_peak = Not Run**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base (9.68)</th>
</tr>
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<tbody>
<tr>
<td>128</td>
<td>6.66</td>
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<td>9.71</td>
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<td>128</td>
<td>12.2</td>
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<tr>
<td>128</td>
<td>7.16</td>
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<tr>
<td>128</td>
<td>12.1</td>
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<tr>
<td>128</td>
<td>11.2</td>
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<tr>
<td>128</td>
<td>5.23</td>
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<tr>
<td>128</td>
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<tr>
<td>128</td>
<td>16.2</td>
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<td>128</td>
<td>24.0</td>
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**CPU2017 License:** 9017  
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
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<th>Seconds</th>
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<tr>
<td>620.omnetpp_s</td>
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<td>657.xz_s</td>
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</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 9.68**  
**SPECspeed®2017_int_peak = Not Run**

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

General Notes (Continued)


Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C-States set to Legacy
Trusted Execution Technology set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-hxhl Wed Sep 11 20:57:04 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 5218T CPU @ 2.10GHz
  4 "physical id"s (chips)
  128 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218T CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000

(Continued on next page)
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Platform Notes (Continued)

CPU max MHz: 3800.0000
CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-15,64-79
NUMA node1 CPU(s): 16-31,80-95
NUMA node2 CPU(s): 32-47,96-111
NUMA node3 CPU(s): 48-63,112-127
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 rdtsscp
        lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
        aperfmpref pfni 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 intel_pipb ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept
        vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmp tpds rdt_a
        avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
        xsavesopt xsaveopt xsave xgetbv1 xsaves cmq_llc cmq_occmap_llc cmq_mbb_total cmq_mbb_local
        dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size: 22528 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 3 4 5 6 7 8 9 10 11 12 13 14 15 64 65 66 67 68 69 70 71 72 73 74 75
76 77 78 79
node 0 size: 193128 MB
node 0 free: 192324 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95
node 1 size: 193519 MB
node 1 free: 193216 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 96 97 98 99 100 101 102
103 104 105 106 107 108 109 110 111
node 2 size: 193519 MB
node 2 free: 193224 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 112 113 114 115 116 117
118 119 120 121 122 123 124 125 126 127
node 3 size: 193488 MB
node 3 free: 193231 MB
node distances:

(Continued on next page)
Platform Notes (Continued)

node  0  1  2  3
  0:  10  21  21  31
  1:  21  10  31  21
  2:  21  31  10  21
  3:  31  21  21  10

From /proc/meminfo
  MemTotal: 3792223448 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 4
    # This file is deprecated and will be removed in a future service pack or release.
    # Please check /etc/os-release for details about this release.
  os-release:
    NAME="SLES"
    VERSION="12-SP4"
    VERSION_ID="12.4"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp4"

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 11 20:54

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
  Filesystem Type  Size Used Avail Use% Mounted on
  /dev/sda2 btrfs 744G 40G 704G 6% /home

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
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Platform Notes (Continued)

frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
BIOS Lenovo -[TEE141E-2.30]- 07/02/2019
Memory:
48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

(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.

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
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### Base Portability Flags

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<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
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<tr>
<td>657.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-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.

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