# Lenovo Global Technology

## ThinkSystem SR860 (2.10 GHz, Intel Xeon Gold 6230)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>80</td>
<td>10.2</td>
<td>Not Run</td>
</tr>
<tr>
<td>gcc_s</td>
<td>80</td>
<td>12.5</td>
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<tr>
<td>mcf_s</td>
<td>80</td>
<td>8.14</td>
<td></td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>80</td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>80</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td>x264_s</td>
<td>80</td>
<td>8.14</td>
<td></td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>80</td>
<td>16.7</td>
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</tr>
<tr>
<td>leela_s</td>
<td>80</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td>80</td>
<td>24.4</td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td>80</td>
<td>24.4</td>
<td></td>
</tr>
</tbody>
</table>

## Hardware

- **CPU Name**: Intel Xeon Gold 6230
- **Max MHz.**: 3900
- **Nominal**: 2100
- **Enabled**: 80 cores, 4 chips
- **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**: 27.5 MB I+D on chip per chip
- **Memory**: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage**: 800 GB tmpfs
- **Other**: None

## Software

- **OS**: SUSE Linux Enterprise Server 12 SP4 (x86_64)
- **Compiler**: C/C++: Version 19.0.4.227 of Intel C/C++, Compiler for Linux;
- **Compiler for Linux**: Fortran: Version 19.0.4.227 of Intel Fortran
- **Compiler for Linux**: Intel Compiler for Linux
- **Parallel**: Yes
- **Firmware**: Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE135T 2.10 Mar-2019
- **File System**: tmpfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: jemalloc memory allocator V5.0.1
Lenovo Global Technology

ThinkSystem SR860 (2.10 GHz, Intel Xeon Gold 6230)

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

Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
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<td>6.78</td>
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<td>602.gcc_s</td>
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<td>404</td>
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<td>605.mcf_s</td>
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<td>115</td>
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<tr>
<td>625.x264_s</td>
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<td>14.5</td>
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<tr>
<td>631.deepsjeng_s</td>
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<td>641.leela_s</td>
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<td>4.77</td>
<td>358</td>
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<tr>
<td>648.exchange2_s</td>
<td>80</td>
<td>176</td>
<td>16.7</td>
<td>177</td>
<td>16.6</td>
<td>176</td>
<td>16.7</td>
<td></td>
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<tr>
<td>657.xz_s</td>
<td>80</td>
<td>254</td>
<td>24.4</td>
<td>254</td>
<td>24.4</td>
<td>254</td>
<td>24.4</td>
<td></td>
<td></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"
Tmpfs filesystem can be set with:
  mount -t tmpfs -o size=800g tmpfs /home
Process tuning setting:
  echo 50000 > /proc/sys/kernel/sched_cfs_bandwidth_slice_us
  echo 240000000 > /proc/sys/kernel/sched_latency_ns
  echo 5000000 > /proc/sys/kernel/sched_migration_cost_ns
  echo 100000000 > /proc/sys/kernel/sched_min_granularity_ns
  echo 150000000 > /proc/sys/kernel/sched_wakeup_granularity_ns

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.

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

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.


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**Platform Notes**

**BIOS configuration:**
- Choose Operating Mode set to Maximum Performance
- Choose Operating Mode set to Custom Mode
- Hyper-Threading set to Disable
- Adjacent Cache Prefetch set to Disable
- MONITOR/MWAIT set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9 running on linux-61sv Wed Jun 26 09:44:08 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
```plaintext
model name : Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
  4 "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 : 20
  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
  physical 2: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 3: 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
CPU(s):            80
On-line CPU(s) list: 0-79
Thread(s) per core: 1
```

(Continued on next page)
Lenovo Global Technology
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(2.10 GHz, Intel Xeon Gold 6230)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jun-2019
Hardware Availability: Apr-2019
Tested by: Lenovo Global Technology
Software Availability: May-2019

Platform Notes (Continued)

Core(s) per socket: 20
Socket(s): 4
NUMA node(s): 4
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
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
NUMA node1 CPU(s): 20-39
NUMA node2 CPU(s): 40-59
NUMA node3 CPU(s): 60-79
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acp1 mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref perf pni pclmulqdq dtes64 monitor ds_cpl vmx smm 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 abrd cfno prefetch cpuid_fault epb cat _cdp _ls
invcldingle ssbd mba ibrs ibpb stibp trp_shadow vmmi flexpriority ept vpid
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rdtm cqm mpx rdt_a avx512f
avx512dq rdseed adx clflushopt clwb intel _pt avx512cd avx512bw avx512vl
xsaveopt xsave xsavec xgetbv1 xsaves cqm _l1c cqm _ocq _l1c cqm _mbm _total cqm _mbm _local
dtherm ida arat pln pts pkup ospe avx512_vnni flush_lld arch_capabilities

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 16 17 18 19
node 0 size: 386636 MB
node 0 free: 386241 MB
node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
node 1 size: 387057 MB
node 1 free: 386839 MB
node 2 cpus: 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
node 2 size: 387057 MB

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SPECspeed2017_int_base = 10.2
SPECspeed2017_int_peak = Not Run

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Platform Notes (Continued)

node 2 free: 374439 MB
node 3 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
node 3 size: 387055 MB
node 3 free: 386299 MB
node distances:
  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: 1584954384 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 Jun 26 09:40

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
  Filesystem Type  Size Used Avail Use% Mounted on
(Continued on next page)
Platform Notes (Continued)

tmpfs          tmpfs  800G  8.3G  792G   2% /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 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS Lenovo -[TEE135T-2.10]- 03/21/2019
Memory:
48x 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

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

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

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SPECspeed2017_int_peak = Not Run

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Base Compiler Invocation (Continued)

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

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
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<td>Software Availability: May-2019</td>
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</table>

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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