**Lenovo Global Technology**

ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 6230N)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jun-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Aug-2020</td>
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed\textsuperscript*2017\textsubscript{int} base = 10.2</th>
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</thead>
<tbody>
<tr>
<td>80</td>
<td>SPECspeed\textsuperscript*2017\textsubscript{int} peak = Not Run</td>
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<table>
<thead>
<tr>
<th>ベンチマーク名</th>
<th>スコア</th>
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<tbody>
<tr>
<td>perlbench</td>
<td>6.04</td>
</tr>
<tr>
<td>gcc</td>
<td>9.48</td>
</tr>
<tr>
<td>mcf</td>
<td>12.6</td>
</tr>
<tr>
<td>omnetpp</td>
<td>14.6</td>
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<tr>
<td>xalancbmk</td>
<td>14.8</td>
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<tr>
<td>x264</td>
<td>23.1</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>9.29</td>
</tr>
<tr>
<td>leela</td>
<td>4.33</td>
</tr>
<tr>
<td>exchange2</td>
<td></td>
</tr>
<tr>
<td>xz</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6230N
- **Max MHz:** 3500
- **Nominal:** 2300
- **Enabled:** 80 cores, 4 chips
- **Orderable:** 4 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 27.5 MB I+D on chip per chip
- **Memory:** 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux 8.0 (Ootpa)
- **Kernel:** 4.18.0-80.el8.x86_64
- **Compiler:**
  - C/C++: Version 19.1.2.275 of Intel C/C++ Compiler for Linux
  - Fortran: Version 19.1.2.275 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version TEE156L 2.61 released May-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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SPECspeed®2017_int_base = 10.2
SPECspeed®2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>80</td>
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<td>6.04</td>
<td>294</td>
<td>6.04</td>
<td>293</td>
<td>6.06</td>
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<tr>
<td>602.gcc_s</td>
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<td>9.60</td>
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<td>420</td>
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<td>605.mcf_s</td>
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<td>16.8</td>
<td>280</td>
<td>16.9</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>9.17</td>
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<td>12.5</td>
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<td>12.6</td>
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<td>14.6</td>
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<td></td>
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<tr>
<td>631.deepsjeng_s</td>
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<td>273</td>
<td>5.25</td>
<td></td>
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<tr>
<td>641.leela_s</td>
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<td>4.33</td>
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<td>4.33</td>
<td></td>
<td></td>
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<tr>
<td>648.exchange2_s</td>
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<td>14.7</td>
<td>199</td>
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<td>14.8</td>
<td></td>
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<td>22.7</td>
<td>268</td>
<td>23.1</td>
<td>267</td>
<td>23.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 10.2
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"

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-ic19.1u2/lib/intel64:/home/cpu2017-1.1.0-ic19.1u2/j
e5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.

(Continued on next page)
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<tr>
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<th>10.2</th>
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

General Notes (Continued)

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
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable
DCU Streamer Prefetcher set to Disable
Patrol Scrub set to Disable
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbb1e6e46a485a0011
running on localhost.localdomain Wed Nov 18 19:35:16 2020

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 6230N CPU @ 2.30GHz
  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:
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
Core(s) per socket:   20
Socket(s):            4
NUMA node(s):         4
Vendor ID:            GenuineIntel

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

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6230N CPU @ 2.30GHz
Stepping: 7
CPU MHz: 2828.410
CPU max MHz: 3500.0000
CPU min MHz: 1000.0000
BogoMIPS: 4600.00
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 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 abml 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmm 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 xsaveopt xsavec xsavec cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pkup ospke avx512_vnni flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size: 28160 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 16 17 18 19
node 0 size: 386684 MB
node 0 free: 385573 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: 387043 MB
node 1 free: 386640 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: 387067 MB
node 2 free: 386795 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: 387067 MB

(Continued on next page)
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SPECSpeed®2017_int_peak = Not Run

Test Date: Nov-2020
Hardware Availability: Jun-2020
Software Availability: Aug-2020

Platform Notes (Continued)

node 3 free: 386661 MB
node distances:
node 0 1 2 3
 0: 10 21 21 21
 1: 21 10 21 21
 2: 21 21 10 21
 3: 21 21 21 10

From /proc/meminfo
MemTotal: 1585011068 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.0 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.0"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
    ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga

uname -a:
Linux localhost.localdomain 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: No status reported
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 Nov 18 19:33

SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 839G 65G 774G 8% /home

(Continued on next page)
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#### SPECspeed®2017 int_base = 10.2

**SPECspeed®2017_int_peak = Not Run**

#### Platform Notes (Continued)

From /sys/devices/virtual/dmi/id

- **BIOS:** Lenovo -[TEE156L-2.61]- 05/20/2020
- **Vendor:** Lenovo
- **Product:** ThinkSystem SR850P -[7D2HCTO1WW]-
- **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 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:**
  - 48x 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 Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

C++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
       | 641.teela_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 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 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```
SPEC CPU®2017 Integer Speed Result

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Base Compiler Invocation

C benchmarks:
  icc
C++ benchmarks:
  icpc
Fortran benchmarks:
  ifort

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:
  -m64 -qnextgen -std=c11
  -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
  -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
  -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
  -m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
  -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
  -funroll-loops -qopt-mem-layout-trans=4
  -L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
  -lqkmalloc

Fortran benchmarks:
  -m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512
  -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
  -nostandard-realloc-lhs -align array32byte

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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
-mbranches-within-32B-boundaries

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-I.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.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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