### Lenovo Global Technology

**ThinkSystem SR850P**  
(1.80 GHz, Intel Xeon Gold 6222V)

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#### Software

- **OS:** Red Hat Enterprise Linux 8.0 (Ootpa)  
- **Compiler:**  
  - C++: Version 19.1.2.275 of Intel C++  
  - 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

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#### Hardware

- **CPU Name:** Intel Xeon Gold 6222V  
- **Max MHz:** 3600  
- **Nominal:** 1800  
- **Enabled:** 80 cores, 4 chips  
- **Orderable:** 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  
- **Other:** None  
- **Memory:** 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

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#### Test 

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Test Date:** Nov-2020

**Hardware Availability:** Jun-2020

**TRA License:** 9409

**Test Sponsor:** Lenovo Global Technology

**Hardware Availability:** Aug-2020

---

### SPEC CPU®2017 Integer Speed Result

**Lenovo Global Technology**  
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---

### SPEC Speed®2017_int_base = 10.4

**SPEC Speed®2017_int_peak = Not Run**

---

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>6.20</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>9.55</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>9.46</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>12.9</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>14.5</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>5.37</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4.45</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>15.2</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>22.8</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>22.8</td>
</tr>
</tbody>
</table>

---

**Threads**

- 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
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<td>80</td>
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<td>6.20</td>
<td>287</td>
<td>6.19</td>
<td>285</td>
<td>6.23</td>
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<tr>
<td>gcc_s</td>
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<td>416</td>
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<td>mcf_s</td>
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<tr>
<td>omnetpp_s</td>
<td>80</td>
<td>169</td>
<td>9.66</td>
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<td>9.46</td>
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<tr>
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<td>110</td>
<td>12.9</td>
</tr>
<tr>
<td>x264_s</td>
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<td>122</td>
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<td>121</td>
<td>14.5</td>
<td>121</td>
<td>14.5</td>
</tr>
<tr>
<td>deepsjeng_s</td>
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<td>5.37</td>
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<tr>
<td>exchange2_s</td>
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<td>15.2</td>
<td>194</td>
<td>15.2</td>
<td>193</td>
<td>15.2</td>
</tr>
<tr>
<td>xz_s</td>
<td>80</td>
<td>271</td>
<td>22.8</td>
<td>271</td>
<td>22.8</td>
<td>271</td>
<td>22.8</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 10.4**

**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

- 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"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"

## General Notes

- Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
- 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)
### Lenovo Global Technology

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<tr>
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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>Nov-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Jun-2020</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Aug-2020</td>
</tr>
</tbody>
</table>

### 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 295195f888a3d7eddb1e6e46a485a0011
running on localhost.localdomain Wed Nov 25 17:42:21 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

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)
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**Software Availability:** Aug-2020

### Platform Notes (Continued)

- **CPU family:** 6  
- **Model:** 85  
- **Model name:** Intel(R) Xeon(R) Gold 6222V CPU @ 1.80GHz  
- **Stepping:** 7  
- **CPU MHz:** 1241.649  
- **CPU max MHz:** 3600.0000  
- **CPU min MHz:** 800.0000  
- **BogoMIPS:** 3600.00  
- **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 cmp cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpes gb 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 abcm ldm prefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb sibp ibrs_enhanced tpr_shadow vmni 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 xsavec xgetbv1 xsaveas cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities

/pro/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: 386346 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: 387067 MB  
  - node 1 free: 386705 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: 386864 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: 387042 MB

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

```plaintext
node 3 free: 385911 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: 1585011092 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
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 25 17:40

SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
```

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>839G</td>
<td>65G</td>
<td>774G</td>
<td>8%</td>
<td>/home</td>
</tr>
</tbody>
</table>

(Continued on next page)
**SPEC CPU®2017 Integer Speed Result**

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### PLATFORM NOTES (CONTINUED)

From /sys/devices/virtual/dmi/id  

**BIOS:** Lenovo -[TEE156L-2.61]- 05/20/2020  
**Vendor:** Lenovo  
**Product:** ThinkSystem SR850P -[7D2HCT01WW]-  
**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)  

Memory on this system run at 2400 MHz due to CPU limitation.

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**COMPILER VERSION NOTES**

```plaintext
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.
```

```plaintext
C++               620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)  
                  641.leela_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.
```

```plaintext
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.
```

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**SPEC CPU®2017 Test Results**

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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

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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