## Lenovo Global Technology

ThinkSystem SR860 V2  
(3.00 GHz, Intel Xeon Platinum 8360HL)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 12.1</th>
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</thead>
</table>

### Test Information

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

### Threads

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base (12.1)</th>
</tr>
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</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name: Intel Xeon Platinum 8360HL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max MHz:</strong> 4200</td>
</tr>
<tr>
<td><strong>Nominal:</strong> 3000</td>
</tr>
<tr>
<td><strong>Enabled:</strong> 96 cores, 4 chips, 2 threads/core</td>
</tr>
<tr>
<td><strong>Orderable:</strong> 2.4 chips</td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>L2:</strong> 1 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>L3:</strong> 33 MB I+D on chip per chip</td>
</tr>
<tr>
<td><strong>Memory:</strong> 768 GB (48 x 16 GB 2Rx8 PC4-3200AA-R)</td>
</tr>
<tr>
<td><strong>Storage:</strong> 1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS: Red Hat Enterprise Linux 8.2 (Ootpa)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kernel:</strong> 4.18.0-193.el8.x86_64</td>
</tr>
<tr>
<td><strong>Compiler:</strong> 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</td>
</tr>
<tr>
<td><strong>Parallel:</strong> Yes</td>
</tr>
<tr>
<td><strong>Firmware:</strong> Lenovo BIOS Version M5E107H 1.00 released Oct-2020</td>
</tr>
<tr>
<td><strong>File System:</strong> xfs</td>
</tr>
<tr>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>Base Pointers:</strong> 64-bit</td>
</tr>
<tr>
<td><strong>Peak Pointers:</strong> Not Applicable</td>
</tr>
<tr>
<td><strong>Other:</strong> jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td><strong>Power Management:</strong> BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
SPEC CPU®2017 Integer Speed Result

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ThinkSystem SR860 V2
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SPECSpeed®2017_int_base = 12.1
SPECSpeed®2017_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600:perlbench_s</td>
<td>192</td>
<td>246</td>
<td>7.23</td>
<td>245</td>
<td>7.24</td>
<td>246</td>
<td>7.23</td>
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<tr>
<td>602:gcc_s</td>
<td>192</td>
<td>362</td>
<td>11.0</td>
<td>361</td>
<td>11.0</td>
<td>361</td>
<td>11.0</td>
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<tr>
<td>605:mfcs</td>
<td>192</td>
<td>247</td>
<td>19.1</td>
<td>245</td>
<td>19.2</td>
<td>246</td>
<td>19.2</td>
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<tr>
<td>620:omnetpp_s</td>
<td>192</td>
<td>152</td>
<td>10.7</td>
<td>150</td>
<td>10.9</td>
<td>151</td>
<td>10.8</td>
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<td></td>
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<tr>
<td>623:xalanbcmk_s</td>
<td>192</td>
<td>94.4</td>
<td>15.0</td>
<td>94.5</td>
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<td>625:x264_s</td>
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<td>101</td>
<td>17.4</td>
<td>101</td>
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<tr>
<td>641:leela_s</td>
<td>192</td>
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<td>5.19</td>
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<td>5.19</td>
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<tr>
<td>648:exchange2_s</td>
<td>192</td>
<td>166</td>
<td>17.7</td>
<td>166</td>
<td>17.7</td>
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<td>17.7</td>
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<tr>
<td>657:xz_s</td>
<td>192</td>
<td>227</td>
<td>27.2</td>
<td>229</td>
<td>27.0</td>
<td>228</td>
<td>27.1</td>
<td></td>
<td></td>
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<td></td>
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</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-ic19.1u2/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
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)
SPEC CPU®2017 Integer Speed Result
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SPECspeed®2017_int_base = 12.1
SPECspeed®2017_int_peak = Not Run

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

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

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 Enabled

Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on localhost.localdomain Fri Nov 20 22:38:25 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) Platinum 8360HL CPU @ 3.00GHz
  4 "physical id"s (chips)
  192 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 192
On-line CPU(s) list: 0-191
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8360HL CPU @ 3.00GHz
Stepping: 11

(Continued on next page)
Platform Notes (Continued)

CPU MHz: 3857.559
CPU max MHz: 4200.0000
CPU min MHz: 1200.0000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 33792K
NUMA node0 CPU(s): 0-23,96-119
NUMA node1 CPU(s): 24-47,120-143
NUMA node2 CPU(s): 48-71,144-167
NUMA node3 CPU(s): 72-95,168-191
Flags: fpu vme de pse tsc msr pae mce cmov 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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrnd lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_puin ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vni
flexpriority ept vpid fs.gsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rd.t a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 33792 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 20 21 22 23 96 97 98 99
  100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
  node 0 size: 193087 MB
  node 0 free: 192435 MB

  node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140
  141 142 143
  node 1 size: 193087 MB
  node 1 free: 193110 MB

  node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
  144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165
  166 167
  node 2 size: 193087 MB
  node 2 free: 193312 MB

  node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95

(Continued on next page)
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<table>
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<tr>
<th>SPECspeed®2017_int_base</th>
<th>12.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**Test Date:** Nov-2020  
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---

#### Platform Notes (Continued)

```
168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189
190 191
node 3 size: 193523 MB
node 3 free: 193277 MB
node distances:
node 0 1 2 3
  0: 10 20 20 20
  1: 20 10 20 20
  2: 20 20 10 20
  3: 20 20 20 10
```

From `/proc/meminfo`
```
MemTotal:       792229640 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From `/usr/bin/lsb_release -d`
```
Red Hat Enterprise Linux release 8.2 (Ootpa)
```

From `/etc/*release* /etc/*version*`
```
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.2 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.2"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux
```

**Kernel self-reported vulnerability status:**

- **itlb_multihit:** Not affected
- **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: usercopy/swapgs barriers and __user pointer sanitization

(Continued on next page)
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Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
tsx_async_abort: Not affected

run-level 3 Nov 20 22:37

SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 892G 36G 856G 5% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo M5E107H-1.00 10/18/2020
Vendor: Lenovo
Product: ThinkSystem SR860 V2
Product Family: ThinkSystem
Serial: none

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 SK Hynix HMA82GR7CJR8N-XN 16 GB 2 rank 3200

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>625.x264_s(base) 657.xz_s(base)</td>
</tr>
</tbody>
</table>
==============================================================================

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.

==============================================================================
<table>
<thead>
<tr>
<th>C++</th>
<th>620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)</th>
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Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200604
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Compiler Version Notes (Continued)

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

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### Base Optimization Flags (Continued)

**C++ benchmarks:**  
-m64 -gqnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries  
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse  
-ffast-math -flto -mfpmath=sse  
-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  
-mbranches-within-32B-boundaries  

The flags files that were used to format this result can be browsed at:  

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-Cooperlake-A.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-11-20 09:38:25-0500.  
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