Lenovo Global Technology
ThinkSystem SR860
(2.10 GHz, Intel Xeon Gold 6230)

| SPECs†2017_fp_base |  192 |
| SPECs†2017_fp_peak | Not Run |

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

**Test Date:** Nov-2019
**Hardware Availability:** Apr-2019
**Software Availability:** May-2019

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>80</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>80</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>80</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>80</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>80</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>80</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>80</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>80</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>80</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECs†2017_fp_base (192)</th>
</tr>
</thead>
</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 |
| 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:              | 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 |
| Compiler for Linux:  | Intel Fortran |
| Firmware:            | Yes |
| Lenovo BIOS Version  | TEE142E 2.30 released Aug-2019 |
| File System:         | tmpfs |
| System State:        | Run level 3 (multi-user) |
| Base Pointers:       | 64-bit |
| Peak Pointers:       | Not Applicable |
| Other:               | None |
| Power Management:    | BIOS set to prefer performance at the cost of additional power usage |
SPEC CPU®2017 Floating Point Speed Result
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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

SPECspeed®2017_fp_base = 192
SPECspeed®2017_fp_peak = Not Run

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>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>80</td>
<td>69.8</td>
<td>845</td>
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<td>832</td>
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<tr>
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<td>185</td>
<td>91.1</td>
<td>183</td>
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<tr>
<td>621.wrf_s</td>
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<td>125</td>
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<tr>
<td>627.cam4_s</td>
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<td>135</td>
<td>66.2</td>
<td>134</td>
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<tr>
<td>628.pop2_s</td>
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<td>59.3</td>
<td>204</td>
<td>58.3</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
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<td>128</td>
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<tr>
<td>654.roms_s</td>
<td>80</td>
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<td>50.6</td>
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<td>315</td>
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</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 192
SPECspeed®2017_fp_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"
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_minGranularity_ns
echo 150000000 > /proc/sys/kernel/sched_wakeupGranularity_ns

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages disabled by default
echo never > /sys/kernel/mm/transparent_hugepage/enabled
echo never > /sys/kernel/mm/transparent_hugepage/defrag
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
(Continued on next page)
Lenovo Global Technology
ThinkSystem SR860
(2.10 GHz, Intel Xeon Gold 6230)

**General Notes (Continued)**

```bash
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.

---

**Platform Notes**

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

Sysinfo program /home/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbla6e46a485a0011
running on linux-700n Fri Nov 22 08:22:42 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 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:
```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                80
```
## Lenovo Global Technology

### Lenovo Global Technology

**ThinkSystem SR860**

**(2.10 GHz, Intel Xeon Gold 6230)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>192</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### CPU2017 License:

9017

### Test Sponsor:

Lenovo Global Technology

### Tested by:

Lenovo Global Technology

---

### Platform Notes (Continued)

- 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
- 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 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 pcd pcid 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_pstate ssbd mba ibrs ibpb stibp tpr_shadow vnmi 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 xsaves cqm_llc cqm_occucc_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

---

<table>
<thead>
<tr>
<th>available</th>
<th>4 nodes (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus</td>
<td>0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19</td>
</tr>
<tr>
<td>node 0 size</td>
<td>386668 MB</td>
</tr>
<tr>
<td>node 0 free</td>
<td>386289 MB</td>
</tr>
<tr>
<td>node 1 cpus</td>
<td>20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39</td>
</tr>
<tr>
<td>node 1 size</td>
<td>387057 MB</td>
</tr>
<tr>
<td>node 1 free</td>
<td>386777 MB</td>
</tr>
</tbody>
</table>
**Lenovo Global Technology**  
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<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 192</th>
</tr>
</thead>
</table>

**SPECs**peed®2017_fp_peak = Not Run

---

**Platform Notes (Continued)**

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 free: 373892 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 free: 386835 MB  
node distances:  
0: 10 21 21 31  
1: 21 10 31 21  
2: 21 31 10 21  
3: 31 21 21 10

From /proc/meminfo  
MemTotal: 1584957160 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-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: Indirect Branch Restricted

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR860 (2.10 GHz, Intel Xeon Gold 6230)

<table>
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<tbody>
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</table>

<table>
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<tr>
<th>CPU2017 License:</th>
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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>
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</tbody>
</table>

**Platform Notes (Continued)**

Speculation, IBPB, IBRS_FW

run-level 3 Nov 22 06:42

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4

<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>tmpfs</td>
<td>tmpfs</td>
<td>800G</td>
<td>8.3G</td>
<td>792G</td>
<td>2%</td>
<td>/home</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- BIOS: Lenovo -[TEE141E-2.30]- 07/02/2019
- Vendor: Lenovo
- Product: ThinkSystem SR860 -[7X7025Z000]-
- 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 Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

**Compiler Version Notes**

<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985–2019 Intel Corporation. All rights reserved.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>C++, C, Fortran</th>
<th>607.cactuBSSN_s(base)</th>
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**SPECs**

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

**Test Date:** Nov-2019
**Hardware Availability:** Apr-2019
**Software Availability:** May-2019

**Compiler Version Notes (Continued)**

<table>
<thead>
<tr>
<th>Base Compiler Invocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C benchmarks:</td>
</tr>
<tr>
<td>icc -m64 -std=c11</td>
</tr>
</tbody>
</table>

| Fortran benchmarks:      |
| ifort -m64              |

| Benchmarks using both Fortran and C: |
| ifort -m64 icc -m64 -std=c11       |

| Benchmarks using Fortran, C, and C++: |
| icpc -m64 icc -m64 -std=c11 ifort -m64 |

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl

(Continued on next page)
**Lenovo Global Technology**

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

---

### Base Portability Flags (Continued)

- 638.imagick_s: -DSPEC_LP64
- 644.nab_s: -DSPEC_LP64
- 649.fotonik3d_s: -DSPEC_LP64
- 654.roms_s: -DSPEC_LP64

---

### Base Optimization Flags

**C benchmarks:**

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

**Fortran benchmarks:**

-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
-nostandard-realloc-lhs

**Benchmarks using both Fortran and C:**

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-nostandard-realloc-lhs

**Benchmarks using Fortran, C, and C++:**

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-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-F.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-F.xml

---

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Originally published on 2019-12-24.