**SPEC® CPU2017 Floating Point Speed Result**

Lenovo Global Technology

ThinkSystem SR860

(3.00 GHz, Intel Xeon Gold 5217)

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

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### Hardware

**CPU Name:** Intel Xeon Gold 5217

**Max MHz.:** 3700

**Nominal:** 3000

**Enabled:** 32 cores, 4 chips, 2 threads/core

**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:** 11 MB I+D on chip per chip

**Other:** None

**Memory:** 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)

**Storage:** 800 GB tmpfs

**Other:** None

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### Software

**OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)

**Kernel:** 4.12.14-94.41-default

**Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++

**Compiler Build:** 20181018 for Linux:

**Fortran:** Version 19.0.1.144 of Intel Fortran

**Compiler Build:** 20181018 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:** None

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**threads**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base = 127</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

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**Threads**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base (127)</th>
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<tbody>
<tr>
<td>-----------------------------</td>
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Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds Base</th>
<th>Ratio</th>
<th>Seconds Peak</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>90.1</td>
<td>655</td>
<td>92.0</td>
<td>641</td>
<td>90.6</td>
<td>651</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>143</td>
<td>117</td>
<td>143</td>
<td>117</td>
<td>144</td>
<td>116</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>41.3</td>
<td>127</td>
<td>127</td>
<td>127</td>
<td>41.1</td>
<td>127</td>
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<tr>
<td>621.wrf_s</td>
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<td>126</td>
<td>105</td>
<td>126</td>
<td>105</td>
<td>127</td>
<td>104</td>
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<tr>
<td>627.cam4_s</td>
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<td>115</td>
<td>77.7</td>
<td>115</td>
<td>77.3</td>
<td>113</td>
<td>78.1</td>
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<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>213</td>
<td>55.7</td>
<td>214</td>
<td>55.4</td>
<td>211</td>
<td>56.4</td>
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<tr>
<td>638.imagick_s</td>
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<td>133</td>
<td>108</td>
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<td>108</td>
<td>133</td>
<td>108</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>91.0</td>
<td>192</td>
<td>91.1</td>
<td>192</td>
<td>91.0</td>
<td>192</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>92.4</td>
<td>98.6</td>
<td>91.7</td>
<td>99.4</td>
<td>90.8</td>
<td>100</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>130</td>
<td>121</td>
<td>127</td>
<td>124</td>
<td>130</td>
<td>121</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 127
SPECspeed2017_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_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,compact,1,0"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X 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.
**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.

**Platform Notes**

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

Sysinfo program /home/cpu2017-1.0.5-ic19.0ul/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-61sv Tue May  7 19:38:09 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 5217 CPU @ 3.00GHz
  4 "physical id"s (chips)
  64 "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 : 8
  siblings : 16
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
  physical 2: cores 0 1 2 3 4 5 6 7
  physical 3: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture:       x86_64
CPU op-mode(s):     32-bit, 64-bit
Byte Order:         Little Endian
CPU(s):             64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s):          4
NUMA node(s):       4
Vendor ID:          GenuineIntel
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**Test Sponsor:** Lenovo Global Technology
**Test Date:** May-2019
**Tested by:** Lenovo Global Technology
**Hardware Availability:** Apr-2019
**Software Availability:** Dec-2018

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**Platform Notes (Continued)**

- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Gold 5217 CPU @ 3.00GHz
- **Stepping:** 6
- **CPU MHz:** 3000.000
- **CPU max MHz:** 3700.0000
- **CPU min MHz:** 1200.0000
- **BogoMIPS:** 6000.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 11264K
- **NUMA node0 CPU(s):** 0-7, 32-39
- **NUMA node1 CPU(s):** 8-15, 40-47
- **NUMA node2 CPU(s):** 16-23, 48-55
- **NUMA node3 CPU(s):** 24-31, 56-63

**Flags:** fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi nx mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xapic msr pae mce cx8 apic sep mtrr pge mca cmov 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 abm 3dnowprefetch cpuid_fault ebpx cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb 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 clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaves opt xsaveopt xsavec xsave cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pti lnid pku ospke avx512_vnni flush_l1d 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 32 33 34 35 36 37 38 39
- **Node 0 size:** 193105 MB
- **Node 0 free:** 192815 MB
- **Node 1:** cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
- **Node 1 size:** 193522 MB
- **Node 1 free:** 192534 MB
- **Node 2:** cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
- **Node 2 size:** 193522 MB
- **Node 2 free:** 186631 MB
- **Node 3:** cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
- **Node 3 size:** 193519 MB
- **Node 3 free:** 187725 MB

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

node distances:

<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:</td>
<td>10</td>
<td>21</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td>1:</td>
<td>21</td>
<td>10</td>
<td>31</td>
<td>21</td>
</tr>
<tr>
<td>2:</td>
<td>21</td>
<td>31</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>3:</td>
<td>31</td>
<td>21</td>
<td>21</td>
<td>10</td>
</tr>
</tbody>
</table>

From /proc/meminfo

- MemTotal: 792238792 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

- 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:
Linux linux-61sv 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901) 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 May 7 17:02

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1

<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>

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow

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(Continued on next page)
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Platform Notes (Continued)

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 M393A2K43BB1-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
==============================================================================
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC 607.cactuBSSN_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
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==============================================================================
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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Base Compiler Invocation

C benchmarks:  
icc -m64 -std=c11

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  
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

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### Base Optimization Flags (Continued)

For Fortran benchmarks (continued):
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

For 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

For 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

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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](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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-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.

Tested with SPEC CPU2017 v1.0.5 on 2019-05-07 07:38:08-0400.  
Originally published on 2019-08-20.