**SPEC® CPU2017 Floating Point Speed Result**

Lenovo Global Technology

ThinkSystem SR860
(2.20 GHz, Intel Xeon Platinum 8253)

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

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**SPECspeed2017_fp_base =** 153

**SPECspeed2017_fp_peak =** Not Run

### Hardware

**CPU Name:** Intel Xeon Platinum 8253

<table>
<thead>
<tr>
<th>Max MHz.:</th>
<th>3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal:</td>
<td>2200</td>
</tr>
<tr>
<td>Enabled:</td>
<td>64 cores, 4 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>2,4 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3:</td>
<td>22 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>800 GB tmpfs</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### 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 TEE135T 2.10 released 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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SPECspeed2017_fp_base = 153
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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>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>63.9</td>
<td>923</td>
<td>63.8</td>
<td>925</td>
<td>64.0</td>
<td>922</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>107</td>
<td>156</td>
<td>107</td>
<td>156</td>
<td>106</td>
<td>157</td>
<td></td>
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</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>39.0</td>
<td>134</td>
<td>39.0</td>
<td>134</td>
<td>38.4</td>
<td>136</td>
<td></td>
<td></td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
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<td>116</td>
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<td>116</td>
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</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>84.4</td>
<td>105</td>
<td>84.6</td>
<td>105</td>
<td>84.7</td>
<td>105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>261</td>
<td>45.6</td>
<td>268</td>
<td>44.3</td>
<td>258</td>
<td>46.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>109</td>
<td>132</td>
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<td>143</td>
<td>97.1</td>
<td>149</td>
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<tr>
<td>644.nab_s</td>
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<td>65.0</td>
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<td>65.0</td>
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<td></td>
<td></td>
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<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
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<td>111</td>
<td>82.7</td>
<td>110</td>
<td>81.7</td>
<td>112</td>
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<tr>
<td>654.roms_s</td>
<td>64</td>
<td>99.2</td>
<td>159</td>
<td>99.9</td>
<td>158</td>
<td>103</td>
<td>153</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 153
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"
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.
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SPECspeed2017_fp_base = 153
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

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
Hyper-Threading set to Disable
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 9bcd8f2999c33d61f64985e45859ea9
running on linux-700n Fri May 31 10:22:43 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) Platinum 8253 CPU @ 2.20GHz
   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 : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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: 1
Core(s) per socket: 16
Socket(s): 4
NUMA node(s): 4

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

**ThinkSystem SR860**

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<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor ID:</td>
</tr>
<tr>
<td>CPU family:</td>
</tr>
<tr>
<td>Model:</td>
</tr>
<tr>
<td>Model name:</td>
</tr>
<tr>
<td>Stepping:</td>
</tr>
<tr>
<td>CPU MHz:</td>
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<tr>
<td>CPU max MHz:</td>
</tr>
<tr>
<td>CPU min MHz:</td>
</tr>
<tr>
<td>BogoMIPS:</td>
</tr>
<tr>
<td>Virtualization:</td>
</tr>
<tr>
<td>L1d cache:</td>
</tr>
<tr>
<td>L1i cache:</td>
</tr>
<tr>
<td>L2 cache:</td>
</tr>
<tr>
<td>L3 cache:</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
</tr>
<tr>
<td>Flags:</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

  cache size : 22528 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
  node 0 size: 386670 MB
  node 0 free: 380967 MB
  node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  node 1 size: 387058 MB
  node 1 free: 379349 MB
  node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  node 2 size: 387058 MB
  node 2 free: 386785 MB
  node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  node 3 size: 387026 MB

(Continued on next page)
Platform Notes (Continued)

node 3 free: 386776 MB
node distances:
node 0 1 2 3
0: 10 21 21 31
1: 21 10 31 21
2: 21 31 10 21
3: 31 21 21 10

From /proc/meminfo
MemTotal: 1584961648 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-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 31 07:16

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 800G 8.3G 792G 2% /home

Additional information from dmidecode follows. WARNING: Use caution when you interpret
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**Platform Notes (Continued)**

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.

BIOS Lenovo -[TEE135T-2.10]- 03/21/2019
Memory:
48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

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**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,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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.

Intel(R) Fortran 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  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
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CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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Copyright (Continued)
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.

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.caucubSSN_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

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**Base Optimization Flags (Continued)**

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-A.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-A.xml

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