# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

ThinkSystem SR860  
(2.70 GHz, Intel Xeon Platinum 8270)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>218</th>
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<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
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### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>104</td>
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<tr>
<td>619.lbm_s</td>
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<td>627.cam4_s</td>
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<td>628.pop2_s</td>
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</tr>
<tr>
<td>638.imagick_s</td>
<td>104</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>104</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>104</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>104</td>
</tr>
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</table>

### SPECspeed®2017_fp_base (218)

### Hardware

- **CPU Name**: Intel Xeon Platinum 8270  
  - Max MHz: 4000  
  - Nominal: 2700  
  - Enabled: 104 cores, 4 chips  
  - 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: 35.75 MB I+D on chip per chip  
  - Other: None  
  - 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)  
  - Kernel 4.12.14-94.41-default  
- **Compiler**:  
  - C/C++: Version 19.0.4.227 of Intel  
  - Compiler for Linux;  
  - Fortran: Version 19.0.4.227 of Intel Fortran  
  - Compiler for Linux
- **Parallel**: Yes
- **Firmware**: Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-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
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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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Ratio</th>
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<td>104</td>
<td>70.1</td>
<td>841</td>
<td>71.2</td>
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<td>607.cactuBSSN_s</td>
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<td>628.pop2_s</td>
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<td>66.5</td>
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<td>66.6</td>
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<td>47.1</td>
<td>334</td>
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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 2400000000 > /proc/sys/kernel/sched_latency_ns
echo 50000000 > /proc/sys/kernel/sched_migration_cost_ns
echo 1000000000 > /proc/sys/kernel/sched_min_granularity_ns
echo 1500000000 > /proc/sys/kernel/sched_wakeup_granularity_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/defrag
Prior to runcpu invocation
Filesystem page cache synced and cleared with:

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

```bash
csync; 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 295195f888a3d7eddb1e6e46a485a0011  
running on linux-61sv Thu Nov 14 15:46:58 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`

```plaintext
  model name: Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz  
  4  "physical id"s (chips)  
  104 "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 : 26  
  siblings : 26  
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29  
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29  
  physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29  
  physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
```

From `lscpu`:

(Continued on next page)
## Lenovo Global Technology

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

### Platform Notes (Continued)

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **CPU:** 104
- **On-line CPU(s) list:** 0-103
- **Thread(s) per core:** 1
- **Core(s) per socket:** 26
- **Socket(s):** 4
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz
- **Stepping:** 6
- **CPU MHz:** 2700.000
- **CPU max MHz:** 4000.0000
- **CPU min MHz:** 1000.0000
- **BogoMIPS:** 5400.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 36608K
- **NUMA node0 CPU(s):** 0-25
- **NUMA node1 CPU(s):** 26-51
- **NUMA node2 CPU(s):** 52-77
- **NUMA node3 CPU(s):** 78-103
- **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 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 abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_c3 invpcid_single intel_pmm ssbd mba ibrs ibpb stibp tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rdmsk cmx mxrm rd_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsavecf qword_data

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 24 25
  - node 0 size: 386634 MB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR860
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CPU2017 License: 9017
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Test Date: Nov-2019
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Platform Notes (Continued)

node 0 free: 373327 MB
node 1 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
51
node 1 size: 387056 MB
node 1 free: 386803 MB
node 2 cpus: 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76
77
node 2 size: 387056 MB
node 2 free: 386778 MB
node 3 cpus: 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101
102 103
node 3 size: 387054 MB
node 3 free: 386828 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:       1584949380 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:

(Continued on next page)
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SPECspeed®2017_fp_base = 218
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Platform Notes (Continued)

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 Speculation, IBPB, IBRS_FW

run-level 3 Nov 14 15:41
SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 800G 8.3G 792G 2% /home

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

==============================================================================
C | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416

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Copyright 2017-2019 Standard Performance Evaluation Corporation

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Compiler Version Notes (Continued)

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran

| 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 19.0.4.227 Build 20190416
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Fortran, C

| 621.wrf\_s(base) 627.cam4\_s(base) 628.pop2\_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
```
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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
-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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