# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR950**  
(2.70 GHz, Intel Xeon Platinum 8280M)

**BUSINESS UNIT** Lenovo Global Technology  
**DATE TESTED** Oct-2019  
**DATE HARDWARE AVAILABLE** Apr-2019  
**DATE SOFTWARE AVAILABLE** May-2019

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<table>
<thead>
<tr>
<th><strong>SPECspeed®2017_fp_base</strong></th>
<th>228</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPECspeed®2017_fp_peak</strong></td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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### Threads

<table>
<thead>
<tr>
<th>Test Program</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
</tr>
<tr>
<td>619.llvm_s</td>
<td>112</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>112</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>112</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>112</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>112</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>112</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>112</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>112</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_fp_base (228)

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### Hardware

- **CPU Name**: Intel Xeon Platinum 8280M  
- **Max MHz**: 4000  
- **Nominal**: 2700  
- **Enabled**: 112 cores, 4 chips  
- **Orderable**: 2,3,4 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**: 38.5 MB I+D on chip per chip  
- **Other**: None  
- **Memory**: 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R)  
- **Storage**: 1 x 800 GB SATA SSD  
- **Other**: None

---

### Software

- **OS**: SUSE Linux Enterprise Server 15 (x86_64)  
- **Kernel**: 4.12.14-25.13-default  
- **Compiler**: C/C++: Version 19.0.4.227 of Intel C/C++  
- **Compiler for Linux**:  
- **Compiler for Intel Fortran**: Yes  
- **Parallel**: Yes  
- **Firmware**: Lenovo BIOS Version PSE122R 1.53 released Aug-2019 tested as PSE121R 1.53 Jul-2019  
- **File System**: xfs  
- **System State**: Run level 3 (multi-user)  
- **Base Pointers**: 64-bit  
- **Peak Pointers**: Not Applicable  
- **Other**: None  
- **Power Management**: --
Lenovo Global Technology
ThinkSystem SR950
(2.70 GHz, Intel Xeon Platinum 8280M)

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

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>
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<tbody>
<tr>
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<td>818</td>
<td>72.9</td>
<td>810</td>
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<td>607.cactuBSSN_s</td>
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<td>619.lbm_s</td>
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<td>33.4</td>
<td>157</td>
<td>33.0</td>
<td>159</td>
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<tr>
<td>621.wrf_s</td>
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<td>87.5</td>
<td>151</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
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<td>69.2</td>
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<tr>
<td>638.imagick_s</td>
<td>112</td>
<td>53.9</td>
<td>268</td>
<td>54.0</td>
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<td>53.5</td>
<td>270</td>
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<tr>
<td>644.nab_s</td>
<td>112</td>
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<td>79.9</td>
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<td>432</td>
<td>36.5</td>
<td>431</td>
<td>36.5</td>
<td>431</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 228
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"

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-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

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:
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.
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<th>CPU2017 License: 9017</th>
<th>Test Date: Oct-2019</th>
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<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Apr-2019</td>
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<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: May-2019</td>
</tr>
</tbody>
</table>

**Platform Notes**

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
CPU P-state Control set to Autonomous
Hyper-Threading set to Disable
Trusted Execution Technology set to Enable
DCU Streamer Prefetcher set to Disable
MONITOR/MWAIT set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd6f2999c33d61f64985e45859ea9
running on linux-uli8 Fri Oct 25 15:19:40 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 8280M CPU @ 2.70GHz
- 4 "physical id"s (chips)
- 112 "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: 28
  - siblings: 28
  - physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  - physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  - physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  - physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 112
- On-line CPU(s) list: 0-111
- Thread(s) per core: 1
- Core(s) per socket: 28
- Socket(s): 4
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Platinum 8280M CPU @ 2.70GHz
- Stepping: 6

(Continued on next page)
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CPU2017 License: 9017
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CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-27
NUMA node1 CPU(s): 28-55
NUMA node2 CPU(s): 56-83
NUMA node3 CPU(s): 84-111

Platform Notes (Continued)

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
xptr 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_l3
invpcid_single ssbd mba ibrs ibpb tpr_shadow vnmi flexpriority ept vpid
fsal bsale tsxsemantics tm2 tso pae mce cx8首选

/proc/cpuinfo cache data
 cache size : 39424 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 24 25 26 27
 node 0 size: 193116 MB
 node 0 free: 189489 MB
 node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
 53 54 55
 node 1 size: 193515 MB
 node 1 free: 193089 MB
 node 2 cpus: 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
 81 82 83
 node 2 size: 193515 MB
 node 2 free: 193273 MB
 node 3 cpus: 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105
106 107 108 109 110 111
 node 3 size: 193483 MB
 node 3 free: 193132 MB
 node distances:
  node 0 1 2 3
  0: 10 21 21 21

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### Platform Notes (Continued)

```
1:  21  10  21  21  
2:  21  21  10  21  
3:  21  21  21  10  
```

From `/proc/meminfo`  
**MemTotal:** 792197400 kB  
**HugePages_Total:** 0  
**Hugepagesize:** 2048 kB

From `/etc/*release* /etc/*version*`  
**NAME**="SLES"  
**VERSION**="15"  
**VERSION\_ID**="15"  
**PRETTY\_NAME**="SUSE Linux Enterprise Server 15"  
**ID**="sles"  
**ID\_LIKE**="suse"  
**ANSI\_COLOR**="0;32"  
**CPE\_NAME**="cpe:/o:suse:sles:15"

```
uname -a:  
Linux linux-u1b8 4.12.14-25.13-default #1 SMP Tue Aug 14 15:07:35 UTC 2018 (947aa51)  
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 Oct 25 15:18
```

```
SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
```

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   744G   63G  681G   9% /
```

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.

```
BIOS Lenovo -[PSE121R-1.53]- 07/03/2019
Memory:
48x NO DIMM NO DIMM
48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933
```

(End of data from sysinfo program)
Lenovo Global Technology
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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
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)
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Base Compiler Invocation
C benchmarks:
  icc -m64 -std=c11

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Base Compiler Invocation (Continued)

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
-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

(Continued on next page)
## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- `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](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](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.xml)