# SPEC CPU®2017 Floating Point Speed Result

**Lenovo Global Technology**  
ThinkSystem SR950  
(2.20 GHz, Intel Xeon Platinum 8276)

**CPU2017 License:** 9017  
**Test Date:** Nov-2019  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Apr-2019  
**Tested by:** Lenovo Global Technology  
**Software Availability:** May-2019

## SPECspeed®2017_fp_base = 220

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak = Not Run</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Platinum 8276</td>
<td>OS: SUSE Linux Enterprise Server 15 (x86_64)</td>
</tr>
<tr>
<td>Max MHz: 4000</td>
<td>Kernel 4.12.14-25.13-default</td>
</tr>
<tr>
<td>Nominal: 2200</td>
<td>Compiler: C/C++: Version 19.0.4.227 of Intel</td>
</tr>
<tr>
<td>Enabled: 112 cores, 4 chips</td>
<td>C/C++ Compiler for Linux;</td>
</tr>
<tr>
<td>Orderable: 2,3,4 chips</td>
<td>Fortran: Version 19.0.4.227 of Intel</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>L3: 38.5 MB I+D on chip per chip</td>
<td>Firmware: Lenovo BIOS Version PSE122R 1.53 released Aug-2019 tested as PSE121R 1.53 Jul-2019</td>
</tr>
<tr>
<td>Other: None</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R)</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Storage: 1 x 800 GB SATA SSD</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Other: None</td>
</tr>
<tr>
<td></td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

## Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
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<tr>
<td>619.lbm_s</td>
<td>112</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>112</td>
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<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>
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## SPECspeed®2017_fp_base (220)

**Threads:**

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**Lenovo Global Technology**  
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<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>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
<td>71.8</td>
<td>822</td>
<td>72.7</td>
<td>812</td>
<td>73.9</td>
<td>799</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
<td>75.2</td>
<td>222</td>
<td>75.4</td>
<td>221</td>
<td>75.5</td>
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<tr>
<td>619.lbm_s</td>
<td>112</td>
<td>34.0</td>
<td>154</td>
<td>28.8</td>
<td>182</td>
<td>33.3</td>
<td>157</td>
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<tr>
<td>621.wrf_s</td>
<td>112</td>
<td>92.4</td>
<td>143</td>
<td>92.3</td>
<td>143</td>
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<tr>
<td>627.cam4_s</td>
<td>112</td>
<td>51.3</td>
<td>173</td>
<td>51.7</td>
<td>172</td>
<td>51.2</td>
<td>173</td>
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<tr>
<td>628.pop2_s</td>
<td>112</td>
<td>182</td>
<td>65.3</td>
<td>178</td>
<td>66.8</td>
<td>178</td>
<td>66.9</td>
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<tr>
<td>638.imagick_s</td>
<td>112</td>
<td>57.0</td>
<td>253</td>
<td>57.4</td>
<td>251</td>
<td>57.3</td>
<td>252</td>
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<tr>
<td>644.nab_s</td>
<td>112</td>
<td>37.4</td>
<td>467</td>
<td>37.4</td>
<td>467</td>
<td>37.4</td>
<td>467</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>112</td>
<td>79.6</td>
<td>114</td>
<td>79.9</td>
<td>114</td>
<td>79.7</td>
<td>114</td>
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<tr>
<td>654.roms_s</td>
<td>112</td>
<td>37.4</td>
<td>420</td>
<td>37.0</td>
<td>425</td>
<td>37.2</td>
<td>424</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 220**  
**SPECspeed®2017_fp_peak = Not Run**

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

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:
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)
Lenovo Global Technology
ThinkSystem SR950
(2.20 GHz, Intel Xeon Platinum 8276)

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

SPECspeed®2017_fp_base = 220
SPECspeed®2017_fp_peak = Not Run

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

General Notes (Continued)

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
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/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on linux-u1b8 Thu Nov 14 16:27:43 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

From lscpu:

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 220
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

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 8276 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
BogoMIPS: 4400.00
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
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
aperfmprefl 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_l3
invpcid_single ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 etsms invpcid rtm cqm mpx rdtil a avx512f
avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsaves xgetbv1 xsavec qcm OCCUP_LLCC qcm_mbm_local dtherm ida arat pfn pts hwp-epp pku ospke avx512_vnni flush_l1d arch_capabilities

/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)
ode 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: 188621 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: 192877 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: 193486 MB

(Continued on next page)
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Platform Notes (Continued)

node 2 free: 193195 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: 193512 MB
node 3 free: 193282 MB
node distances:
node 0 1 2 3
do: 10 21 21 21
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-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 15:44

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

Filesystem  Type          Size  Used Avail Use% Mounted on
(Continued on next page)
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Platform Notes (Continued)
/dev/sda2 xfs 744G 75G 670G 10% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[PSE121R-1.53]- 07/03/2019
Vendor: Lenovo
Product: ThinkSystem SR950 -[7X12ABC1WW]-
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 NO DIMM NO DIMM
48x Samsung M393A2K43CB2-CVF 16 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
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)
(Continued on next page)
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**Compiler Version Notes (Continued)**

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, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
---------------------------------------------

---

**Base Compiler Invocation**

C benchmarks:

```
icc -m64 -std=c11
```

Fortran benchmarks:

```
ifort -m64
```

Benmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benmarks 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
Lenovo Global Technology

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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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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