# SPEC® CPU2017 Floating Point Rate Result

**Lenovo Global Technology**  
ThinkSystem SR650  
(2.20 GHz, Intel Xeon Platinum 8276M)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>252</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Date:** Apr-2019  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Apr-2019  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Nov-2018  

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base (252)</th>
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<tbody>
<tr>
<td>CPU Name: Intel Xeon Platinum 8276M</td>
</tr>
<tr>
<td>OS: Red Hat Enterprise Linux Server release 7.6 (Maipo)</td>
</tr>
<tr>
<td><strong>Max MHz.:</strong> 4000</td>
</tr>
<tr>
<td><strong>Nominal:</strong> 2200</td>
</tr>
<tr>
<td><strong>Enabled:</strong> 56 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td><strong>Orderable:</strong> 1.2 chips</td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>L2:</strong> 1 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>L3:</strong> 38.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td><strong>Memory:</strong> 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)</td>
</tr>
<tr>
<td><strong>Storage:</strong> 1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
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<td><strong>Compiler:</strong> 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</td>
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<tr>
<td><strong>Parallel:</strong> No</td>
</tr>
<tr>
<td><strong>Firmware:</strong> Lenovo BIOS Version IVE135R 2.10 released Feb-2019</td>
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<tr>
<td><strong>File System:</strong> xfs</td>
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<tr>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>Base Pointers:</strong> 64-bit</td>
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<tr>
<td><strong>Peak Pointers:</strong> Not Applicable</td>
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<td><strong>Other:</strong> None</td>
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| Test Sponsor: Lenovo Global Technology |
| Software Availability: Nov-2018 |

| Test Date: Apr-2019 |
| Hardware Availability: Apr-2019 |

| Hardware |
| Software |
|-----------------|-----------------|
| **CPU Name:** Intel Xeon Platinum 8276M | **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo) |
| **Max MHz.:** 4000 | **Kernel 3.10.0-957.el7.x86_64** |
| **Nominal:** 2200 | **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 |
| **Enabled:** 56 cores, 2 chips, 2 threads/core | **Parallel:** No |
| **Orderable:** 1.2 chips | **Firmware:** Lenovo BIOS Version IVE135R 2.10 released Feb-2019 |
| **Cache L1:** 32 KB I + 32 KB D on chip per core | **File System:** xfs |
| **L2:** 1 MB I+D on chip per core | **System State:** Run level 3 (multi-user) |
| **L3:** 38.5 MB I+D on chip per chip | **Base Pointers:** 64-bit |
| **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R) | **Peak Pointers:** Not Applicable |
| **Storage:** 1 x 800 GB SATA SSD | **Other:** None |
| **Other:** None | |
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**Lenovo Global Technology**

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**Results Table**

<table>
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<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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**Submit Notes**

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

**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:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"

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  
runcpu command invoked through numaclt i.e.:
numaclt --interleave=all runcpu <etc>  
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
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**SPECrate2017_fp_base =** 252
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**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

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**General Notes (Continued)**

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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**Platform Notes**

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C-states set to Legacy
SNC set to Enable
DCU Streamer Prefetcher set to Disable
Trusted Execution Technology set to Enable
Stale AtoS set to Enable
LLC dead line alloc set to Disable
Patrol Scrub set to Disable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Thu Apr 25 17:46:19 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 8276M CPU @ 2.20GHz
  2 "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 : 56
  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
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
```

(Continued on next page)
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SPECrater2017_fp_base = 252
SPECrater2017_fp_peak = Not Run

Platform Notes (Continued)

CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276M 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): 0-3,7-9,14-17,21-23,56-59,63-65,70-73,77-79
NUMA node1 CPU(s): 4-6,10-13,18-20,24-27,60-62,66-69,74-76,80-83
NUMA node2 CPU(s): 28-31,35-37,42-45,49-51,84-87,91-93,98-101,105-107
NUMA node3 CPU(s): 32-34,38-41,46-48,52-55,88-90,94-97,102-104,108-111
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
aperfmpref eagerfpu 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 fl64 rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pt ssbd mba
ibr ibpb stibp ibrs_enhanced tpr_shadow vnni flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cmqm mpx rdtd_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1
cmq_llc cmake_2cc_mmb_total cmqm_mmb_local dtherm ida arat pln pku ospke
avx512_vnni spec_ctrl intel_stibp flush_lld 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 7 8 9 14 15 16 17 21 22 23 56 57 58 59 63 64 65 70 71 72 73 77 78 79
node 0 size: 196220 MB
node 0 free: 191627 MB
node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 60 61 62 66 67 68 69 74 75 76 80 81
82 83
node 1 size: 196608 MB
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Platform Notes (Continued)

node 1 free: 192096 MB
node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 84 85 86 87 91 92 93 98 99 100 101 105 106 107
node 2 size: 196608 MB
node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 58 88 90 94 95 96 97 102 103 104 108 109 110 111
node 3 size: 196608 MB
node 3 free: 191680 MB
node distances:
node 0 1 2 3
0: 10 11 21 21
1: 11 10 21 21
2: 21 21 10 11
3: 21 21 11 10

From /proc/meminfo
MemTotal: 792178244 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS
run-level 3 Apr 25 17:43

(Continued on next page)
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SPECrates:
SPECrates2017_fp_base = 252
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Platform Notes (Continued)

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb2 xfs 689G 116G 573G 17% /home

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 -[IVE135R-2.10]- 02/27/2019
Memory:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

Compiler Version Notes

==============================================================================
CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(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.
==============================================================================
CXXC 508.namd_r(base) 510.parest_r(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.
==============================================================================
CC  511.povray_r(base) 526.blender_r(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.
FC  507.cactuBSSN_r(base)
==============================================================================

(Continued on next page)
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Compiler Version Notes (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.

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.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

(Continued on next page)
**Base Compiler Invocation (Continued)**

Benchmarks using Fortran, C, and C++:
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

---

**Base Portability Flags**

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_LINUX -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

---

**Base Optimization Flags**

C benchmarks:
```
-XCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only 
-qopt-mem-layout-trans=4
```

C++ benchmarks:
```
-XCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only 
-qopt-mem-layout-trans=4
```

Fortran benchmarks:
```
-XCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only 
-qopt-mem-layout-trans=4 
-auto -nostandard-realloc-lhs 
-align array32byte
```

Benchmarks using both Fortran and C:
```
-XCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only 
-qopt-mem-layout-trans=4 
-auto -nostandard-realloc-lhs 
-align array32byte
```

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**Base Optimization Flags (Continued)**

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

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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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 2019-04-25 05:46:19-0400.
Originally published on 2019-06-11.