# SPEC® CPU2017 Floating Point Rate Result

**Lenovo Global Technology**  
ThinkSystem SR650  
(3.80 GHz, Intel Xeon Gold 5222)

---

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
</table>
| OS: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
Kernel 3.10.0-957.el7.x86_64  
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: No  
Compiler Build 20181018 for Linux  
Firmware: Lenovo BIOS Version IVE135R 2.10 released Feb-2019  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: None | CPU Name: Intel Xeon Gold 5222  
Max MHz.: 3900  
Nominal: 3800  
Enabled: 8 cores, 2 chips, 2 threads/core  
Orderable: 1.2 chips  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 16.5 MB I+D on chip per chip  
Other: None  
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
Storage: 1 x 800 GB SATA SSD  
Other: None |

---

**SPECrate2017_fp_base = 77.7**  
**SPECrate2017_fp_peak = Not Run**

---

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

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### Copies

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<tr>
<td>549.fotonik3d_r</td>
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<tr>
<td>554.roms_r</td>
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### Hardware

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Results Table

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<tr>
<th>Benchmark</th>
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</tr>
</tbody>
</table>

SPECrate2017_fp_base = 77.7
SPECrate2017_fp_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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 numactl i.e.:
  numactl --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.
**SPEC CPU2017 Floating Point Rate Result**

**Lenovo Global Technology**

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| SPECrate2017_fp_base | 77.7 |
| SPECrate2017_fp_peak | Not Run |

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Test Date:** Jun-2019

**Hardware Availability:** Apr-2019

**Tested by:** Lenovo Global Technology

**Software Availability:** Nov-2018

### 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.

### 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 Mon Jun 17 21:32:05 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) Gold 5222 CPU @ 3.80GHz
  2 "physical id"s (chips)
  16 "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 : 4
siblings : 8
physical 0: cores 2 5 9 13
physical 1: cores 5 8 9 13
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                16
On-line CPU(s) list:   0-15
```
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Platform Notes (Continued)

Thread(s) per core: 2
Core(s) per socket: 4
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
Stepping: 6
CPU MHz: 3800.000
BogoMIPS: 7600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,2,8,10
NUMA node1 CPU(s): 1,3,9,11
NUMA node2 CPU(s): 4,7,12,15
NUMA node3 CPU(s): 5,6,13,14
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 perf 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 f16c rdrand lahf_lm abm 3dnowprefetch ebpb cat_l3 cdp_l3 intel_pt ssbd mba
ibpb ibrs stibp ibrs_enhanced trp_shadow vmmi flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erns invpcid rtm cqm mpx rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512v l xsaveopt xsavec xgetbv l
cqm_llc cqum_occup_llccqum_mbb_total cqm_mbb_local dtherm ida arat pln pts pkupospke
avx512_vnni spec_ctrl intel_stibp flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size : 16896 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 2 8 10
node 0 size: 196221 MB
node 0 free: 191574 MB
node 1 cpus: 1 3 9 11
node 1 size: 196608 MB
node 1 free: 191994 MB
node 2 cpus: 4 7 12 15
node 2 size: 196608 MB
node 2 free: 191987 MB

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# SPEC CPU2017 Floating Point Rate Result

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## Platform Notes (Continued)

```plaintext
node 3 cpus: 5 6 13 14
node 3 size: 196608 MB
node 3 free: 191940 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: 792179284 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

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

```plaintext
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)"
```

```plaintext
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
```

```plaintext
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
```

```plaintext
```

```plaintext
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 Jun 17 16:33

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1

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<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb2</td>
<td>xfs</td>
<td>689G</td>
<td>116G</td>
<td>573G</td>
<td>17%</td>
</tr>
</tbody>
</table>

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow

(Continued on next page)
Platform Notes (Continued)

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

(End of data from sysinfo program)

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)
------------------------------------------------------------------------------
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,
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CPU2017 License: 9017
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Compiler Version Notes (Continued)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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Base Compiler Invocation
C benchmarks:
```plaintext
icc -m64 -std=c11
```
C++ benchmarks:
```plaintext
icpc -m64
```
Fortran benchmarks:
```plaintext
ifort -m64
```
Benchmarks using both Fortran and C:
```plaintext
ifort -m64 icc -m64 -std=c11
```
Benchmarks using both C and C++:
```plaintext
icpc -m64 icc -m64 -std=c11
```
Benchmarks using Fortran, C, and C++:
```plaintext
icpc -m64 icc -m64 -std=c11 ifort -m64
```
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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_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

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
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The flags files that were used to format this result can be browsed at:
- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html](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:
- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml)

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