## Lenovo Global Technology

**ThinkSystem SR570**  
(2.40 GHz, Intel Xeon Silver 4210R)

**SPECrater®2017_fp_base = 130**  
**SPECrater®2017_fp_peak = Not Run**

### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name</strong></td>
<td>Intel Xeon Silver 4210R</td>
</tr>
<tr>
<td><strong>Max MHz</strong></td>
<td>3200</td>
</tr>
<tr>
<td><strong>Nominal</strong></td>
<td>2400</td>
</tr>
<tr>
<td><strong>Enabled</strong></td>
<td>20 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td><strong>Orderable</strong></td>
<td>1,2 chips</td>
</tr>
<tr>
<td><strong>Cache L1</strong></td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>L2</strong></td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>L3</strong></td>
<td>13.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>None</td>
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</table>

### Software

<table>
<thead>
<tr>
<th>Category</th>
<th>Version/Details</th>
</tr>
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<tbody>
<tr>
<td><strong>OS</strong></td>
<td>SUSE Linux Enterprise Server 15 SP1 (x86_64)</td>
</tr>
<tr>
<td><strong>Kernel</strong></td>
<td>4.12.14-195-default</td>
</tr>
<tr>
<td><strong>Compiler</strong></td>
<td>C/C++: Version 19.1.1.217 of Intel C/C++</td>
</tr>
<tr>
<td><strong>Fortran</strong></td>
<td>Compiler for Linux; Fortran: Version 19.1.1.217 of Intel Fortran</td>
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<tr>
<td><strong>Parallel</strong></td>
<td>No</td>
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<tr>
<td><strong>Firmware</strong></td>
<td>Lenovo BIOS Version TEE155L 2.61 released May-2020</td>
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<tr>
<td><strong>File System</strong></td>
<td>xfs</td>
</tr>
<tr>
<td><strong>System State</strong></td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>Base Pointers</strong></td>
<td>64-bit</td>
</tr>
<tr>
<td><strong>Peak Pointers</strong></td>
<td>Not Applicable</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td><strong>Power Management</strong></td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>503.bwaves_r</td>
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<td>508.namd_r</td>
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<td>510.parest_r</td>
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<tr>
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<td>587</td>
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<td>538.imagick_r</td>
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<td>327</td>
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<tr>
<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
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<td>554.roms_r</td>
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<td>1043</td>
<td>60.9</td>
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<td>61.2</td>
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<td></td>
</tr>
</tbody>
</table>

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

## Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

## 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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.0-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/j
e5.0.1-64"

MALLOC_CONF = "retain:true"
```
Lenovo Global Technology

ThinkSystem SR570
(2.40 GHz, Intel Xeon Silver 4210R)

SPECrate®2017_fp_base = 130
SPECrate®2017_fp_peak = Not Run

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

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
Trusted Execution Technology set to Enable
Workload Configuration set to I/O Sensitive
Patrol Scrub set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on linux-rn74 Tue Jun 9 15:47:50 2020

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) Silver 4210R CPU @ 2.40GHz
  2 "physical id"s (chips)
  40 "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 : 10
siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
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SPECRate®2017_fp_base = 130
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Platform Notes (Continued)

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 48 bits virtual
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2400.000
CPU max MHz: 3200.0000
CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9, 20-29
NUMA node1 CPU(s): 10-19, 30-39
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 xtrunc 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 intel_ppnin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsavesopt xsaveopt xsavec xsaveopt xsaves cqm_llc cqm_occur_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 20 21 22 23 24 25 26 27 28 29

(Continued on next page)
# SPEC CPU®2017 Floating Point Rate Result

**Lenovo Global Technology**  
ThinkSystem SR570  
(2.40 GHz, Intel Xeon Silver 4210R)  

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>130</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jun-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Apr-2020

### Platform Notes (Continued)

```
node 0 size: 192826 MB  
node 0 free: 192170 MB  
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39  
node 1 size: 193531 MB  
node 1 free: 193171 MB  
node distances:  
node 0  1  
0:  10  21  
1:  21  10
```

From `/proc/meminfo`  
```plaintext`
MemTotal:       395630232 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB
```

From `/etc/*release* /etc/*version*`  
```plaintext`
os-release:  
NAME="SLES"  
VERSION="15-SP1"  
VERSION_ID="15.1"  
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"  
ID="sles"  
ID_LIKE="suse"  
ANSI_COLOR="0;32"  
CPE_NAME="cpe:/o:suse:sles:15:sp1"
```

```
uname -a:  
Linux linux-rn74 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)  
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2018-3620** (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- **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: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Jun 9 15:43

```
SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda3 xfs 892G 41G 851G 5% /
```

(Continued on next page)
Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE155L-2.61]- 05/20/2020
Vendor: Lenovo
Product: ThinkSystem SR570 -[7Y02RCZ000]-
Product Family: ThinkSystem
Serial: 1234567890

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:
4x NO DIMM NO DIMM
12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
This system support 8 DIMMs per processor, total 16 DIMMs.
12 DIMM slots installed with 32 GB DIMM for this run, and running at 2400 due to CPU limitation.

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1</td>
<td></td>
</tr>
<tr>
<td>NextGen Build 20200304</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>
==============================================================================

==============================================================================
<table>
<thead>
<tr>
<th>C++</th>
<th>508.namd_r(base) 510.parest_r(base)</th>
</tr>
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<tbody>
<tr>
<td>Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1</td>
<td></td>
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<td>NextGen Build 20200304</td>
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</tbody>
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==============================================================================

==============================================================================
<table>
<thead>
<tr>
<th>C++, C</th>
<th>511.povray_r(base) 526.blender_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1</td>
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</table>
==============================================================================

(Continued on next page)
### Lenovo Global Technology

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<table>
<thead>
<tr>
<th><strong>CPU2017 License:</strong></th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test Sponsor:</strong></td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td><strong>Tested by:</strong></td>
<td>Lenovo Global Technology</td>
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</tbody>
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**SPECrate®2017_fp_base = 130**

**SPECrate®2017_fp_peak = Not Run**

**Compiler Version Notes (Continued)**

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

```
------------------------------------------------------------------------------
C++, C, Fortran | 507.cactuBSSN_r(base)
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Fortran         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306
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------------------------------------------------------------------------------
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
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NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

### Base Compiler Invocation

- **C benchmarks:**
  - icc

- **C++ benchmarks:**
  - icpc

- **Fortran benchmarks:**
  - ifort

(Continued on next page)
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CPU2017 License: 9017
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Test Date: Jun-2020
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Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

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:
-m64 -gnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld.gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -gnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld.gold -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)
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Hardware Availability: Mar-2020
Software Availability: Apr-2020

Base Optimization Flags (Continued)

Fortran benchmarks:

-`-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
-`-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch`
-`-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles`
-`-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte`
-`-auto -mbbranches-within-32B-boundaries`
-`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using both Fortran and C:

-`-m64 -qnextgen -std=c11`
-`-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
-`-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse`
-`-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div`
-`-qopt-prefetch -ffinite-math-only`
-`-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs`
-`-align array32byte -auto -mbbranches-within-32B-boundaries`
-`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using both C and C++:

-`-m64 -qnextgen -std=c11`
-`-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
-`-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse`
-`-funroll-loops -qopt-mem-layout-trans=4`
-`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using Fortran, C, and C++:

-`-m64 -qnextgen -std=c11`
-`-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
-`-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse`
-`-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div`
-`-qopt-prefetch -ffinite-math-only`
-`-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs`
-`-align array32byte -auto -mbbranches-within-32B-boundaries`
-`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

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-I.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.xml
# Lenovo Global Technology

ThinkSystem SR570  
(2.40 GHz, Intel Xeon Silver 4210R)

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

Tested with SPEC CPU\textsuperscript{*}2017 v1.1.0 on 2020-06-09 03:47:49-0400.  
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