# Lenovo Global Technology

**ThinkSystem SR650**
(2.30 GHz, Intel Xeon Silver 4210T)

**SPEC CPU®2017 Integer Rate Result**

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**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Apr-2020

**Hardware Availability:** Mar-2020

**Software Availability:** Sep-2019

---

## Hardware

- **CPU Name:** Intel Xeon Silver 4210T
- **Max MHz:** 3200
- **Nominal:** 2300
- **Enabled:** 20 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:** 13.75 MB I+D on chip per chip
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 800 GB SATA SSD
- **Other:** None

---

## Software

- **OS:** SUSE Linux Enterprise Server 15 SP1 (x86_64)
  - Kernel 4.12.14-195-default
- **Compiler:**
  - C/C++: Version 19.0.5.281 of Intel C/C++
  - Fortran: Version 19.0.5.281 of Intel Fortran
- **Parallel:** No
- **Firmware:** Lenovo BIOS Version IVE152L 2.51 released Feb-2020 tested as IVE151L 2.51 Jan-2020
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
## Lenovo Global Technology

ThinkSystem SR650
(2.30 GHz, Intel Xeon Silver 4210T)

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### Results Table

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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"

---

### Environment Variables Notes

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

```bash
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.0-ic19.0u5/lib/intel64:/home/cpu2017-1.1.0-ic19.0u5/lib/ia32:/home/cpu2017-1.1.0-ic19.0u5/je5.0.1-32"
```

---

### 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>`

(Continued on next page)
General Notes (Continued)

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
DCU Streamer Prefetcher set to Disable
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbb1e6e46a485a0011
running on linux-xpyz Thu Apr 2 23:45:12 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 4210T CPU @ 2.30GHz
  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

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

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR650
(2.30 GHz, Intel Xeon Silver 4210T)

SPECratenew_int_base = 106
SPECratenew_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Apr-2020
Tested by: Lenovo Global Technology
Hardware Availability: Mar-2020
Software Availability: Sep-2019

Platform Notes (Continued)

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 4210T CPU @ 2.30GHz
Stepping:  7
CPU MHz:  2300.000
CPU max MHz: 3200.0000
CPU min MHz: 1000.0000
BogoMIPS:  4600.00
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 mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc 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 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abtm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_puin ssbd mba ibrs ibpb stibp ibrs Enhanced tpr_shadow vmx flexpriority ept vpds base tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl vsxveopt xsaves xsaveopt xsavec xsave xsavec cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pkup ospe avx512_vnni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size : 14080 KB

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
node 0 size: 386658 MB
node 0 free: 385901 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: 387067 MB
node 1 free: 386668 MB
node distances:
node 0 1
0: 10 21

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SR650  
(2.30 GHz, Intel Xeon Silver 4210T)  
SPECraten®2017_int_base = 106  
SPECraten®2017_int_peak = Not Run

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<td>Lenovo Global Technology</td>
<td>Software Availability</td>
<td>Sep-2019</td>
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</table>

Platform Notes (Continued)

1: 21 10

From /proc/meminfo
- MemTotal: 792295104 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
- 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:
- 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 Apr 2 23:39

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5
- Filesystem Type Size Used Avail Use% Mounted on
- /dev/sda3 xfs 737G 41G 697G 6% /

From /sys/devices/virtual/dmi/id
- BIOS: Lenovo -[IVE151L-2.51]- 01/14/2020
- Vendor: Lenovo
- Product: ThinkSystem SR650 -[7X05RCZ000]-
- Product Family: ThinkSystem
- Serial: 1234567890

Additional information from dmidecode follows. WARNING: Use caution when you interpret

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650
(2.30 GHz, Intel Xeon Silver 4210T)

SPECratre®2017_int_base = 106
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CPU2017 License: 9017
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Test Date: Apr-2020
Hardware Availability: Mar-2020
Software Availability: Sep-2019

Platform Notes (Continued)

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:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
       | 525.x264_r(base) 557.xz_r(base)
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 19.0.5
   NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
       | 541.leela_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 19.0.5
   NextGen Technology Build 20190729
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
   64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
  icc

C++ benchmarks:
  icpc

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ThinkSystem SR650
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| Test Sponsor: | Lenovo Global Technology |
| Tested by: | Lenovo Global Technology |

Test Date: Apr-2020
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**Base Compiler Invocation (Continued)**

Fortran benchmarks:
ifort

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### Base Portability Flags

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### Base Optimization Flags

#### C benchmarks:

- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto
- mfpmath=sse -funroll-loops -qnxtgen -fuse-ld=gold
- qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
- -lqkmalloc

#### C++ benchmarks:

- m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto -mfpmath=sse
- -funroll-loops -qnxtgen -fuse-ld=gold -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
- -lqkmalloc

#### Fortran benchmarks:

- m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
- qopt-mem-layout-trans=4 -nostandard-realloc-lhs
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
- -lqkmalloc

---

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-G.html
## SPEC CPU®2017 Integer Rate Result

### Lenovo Global Technology

**ThinkSystem SR650**  
(2.30 GHz, Intel Xeon Silver 4210T)

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<th>SPECrate®2017_int_base = 106</th>
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<td>SPECrate®2017_int_peak = Not Run</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Apr-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Sep-2019

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-G.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-G.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 CPU®2017 v1.1.0 on 2020-04-02 11:45:11-0400.  