## SPEC CPU®2017 Integer Rate Result

**Lenovo Global Technology**  
ThinkSystem ST550  
(2.40 GHz, Intel Xeon Silver 4214R)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Mar-2020</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Mar-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Sep-2019</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Silver 4214R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3500</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled:</td>
<td>24 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>16.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 SP1 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.5.281 of Intel</td>
</tr>
<tr>
<td></td>
<td>C/C++ Compiler for Linux; Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version oOe152L 2.51 released Feb-2020 tested as O0E151L 2.51 Jan-2020</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
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<tr>
<td>Other:</td>
<td>None</td>
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<tr>
<td>Power Management:</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
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</table>

### SPECrate®2017_int_base = 147

| SPECrate®2017_int_peak = Not Run |

### SPECrate®2017_int_base (147)

| Copies | 0 | 15 | 30 | 45 | 60 | 75 | 90 | 105 | 120 | 135 | 150 | 165 | 180 | 195 | 210 | 225 | 240 | 255 | 270 | 285 | 300 | 315 |
|--------|---|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 48 | 106 | 121 |
| 502.gcc_r       | 48 | 182 |
| 505.mcf_r       | 48 | 106 |
| 520.omnetpp_r   | 48 | 185 |
| 523.xalancbmk_r | 48 | 122 |
| 525.x264_r      | 48 | 107 |
| 531.deepsjeng_r | 48 | 275 |
| 541.libquantum_r| 48 | 107 |
| 548.exchange2_r | 48 | 91.8 |
| 557.xz_r        | 48 |     |

Copies: (147)

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SPEC CPU®2017 Integer Rate Result

Lenovo Global Technology
ThinkSystem ST550
(2.40 GHz, Intel Xeon Silver 4214R)

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

Results Table

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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>48</td>
<td>719</td>
<td>106</td>
<td>720</td>
<td>106</td>
<td>721</td>
<td>106</td>
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<tr>
<td>502.gcc_r</td>
<td>48</td>
<td><strong>560</strong></td>
<td><strong>121</strong></td>
<td>562</td>
<td>121</td>
<td>556</td>
<td>122</td>
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<tr>
<td>505.mcf_r</td>
<td>48</td>
<td><strong>426</strong></td>
<td><strong>182</strong></td>
<td>426</td>
<td>182</td>
<td>427</td>
<td>182</td>
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<tr>
<td>520.omnetpp_r</td>
<td>48</td>
<td>592</td>
<td>106</td>
<td>592</td>
<td>106</td>
<td>593</td>
<td>106</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>48</td>
<td>273</td>
<td>185</td>
<td>272</td>
<td>186</td>
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<td><strong>185</strong></td>
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<tr>
<td>525.x264_r</td>
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<td>269</td>
<td>312</td>
<td>270</td>
<td>311</td>
<td>274</td>
<td>307</td>
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<tr>
<td>531.deepsjeng_r</td>
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<td>451</td>
<td>122</td>
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<td>122</td>
<td>451</td>
<td>122</td>
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<tr>
<td>541.leela_r</td>
<td>48</td>
<td><strong>744</strong></td>
<td><strong>107</strong></td>
<td>753</td>
<td>105</td>
<td>735</td>
<td>108</td>
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<tr>
<td>548.exchange2_r</td>
<td>48</td>
<td>457</td>
<td>275</td>
<td>457</td>
<td>275</td>
<td><strong>457</strong></td>
<td><strong>275</strong></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>48</td>
<td><strong>565</strong></td>
<td><strong>91.8</strong></td>
<td>561</td>
<td>92.4</td>
<td>566</td>
<td>91.6</td>
</tr>
</tbody>
</table>

SPECrate®2017_int_base = 147
SPECrate®2017_int_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"

Environment Variables Notes

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

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SPECrater®2017_int_base = 147
SPECrater®2017_int_peak = Not Run

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
Patrol Scrub set to Disable
SNC set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on linux-9n08 Sun Mar 15 12:00:44 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 4214R CPU @ 2.40GHz
  2 "physical id"s (chips)
  48 "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: 12
    siblings: 24
    physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
    physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

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): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per core: 12

(Continued on next page)
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Software Availability: Sep-2019

Platform Notes (Continued)

Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2400.000
CPU max MHz: 3500.0000
CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0-2, 6-8, 24-26, 30-32
NUMA node1 CPU(s): 3-5, 9-11, 27-29, 33-35
NUMA node2 CPU(s): 12-14, 18-20, 36-38, 42-44
NUMA node3 CPU(s): 15-17, 21-23, 39-41, 45-47
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perflogo pni pclmulqdq dtes64 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 abrmd 48bit Silence cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pinn ssbd mba ibrs ibrf ibrs_enabled tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdset_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsave ctxsave xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtc eaf ida atpl 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: 4 nodes (0-3)
node 0 cpus: 0 1 2 6 7 8 24 25 26 30 31 32
node 0 size: 47972 MB
node 0 free: 47580 MB
node 1 cpus: 3 4 5 9 10 11 27 28 29 33 34 35
node 1 size: 48381 MB
node 1 free: 48072 MB
node 2 cpus: 12 13 14 18 19 20 36 37 38 42 43 44
node 2 size: 48381 MB
node 2 free: 47924 MB

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Platform Notes (Continued)

node 3 cpus: 15 16 17 21 22 23 39 40 41 45 46 47
node 3 size: 48380 MB
node 3 free: 48076 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: 197751208 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:
Linux linux-9n08 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 Mar 15 10:22

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 445G 32G 413G 8% /

(Continued on next page)
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**Tested by:** Lenovo Global Technology

**Platform Notes (Continued)**

From `/sys/devices/virtual/dmi/id`  
BIOS: Lenovo -[00E151L-2.51]- 01/14/2020  
Vendor: Lenovo  
Product: System X -[7X09TOZ000]-  
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:  
12x SK Hynix HMA82GR7CJR8N-WM 16 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.

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**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.

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**Fortran**

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.
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Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -flto
-mfpmath=sse -funroll-loops -qnextgen -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 -qnextgen -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
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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](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](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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