**SPEC® CPU2017 Integer Speed Result**

**Lenovo Global Technology**

**ThinkSystem SR590**
(2.20 GHz, Intel Xeon Silver 4210)

<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>
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<tr>
<td>SPECspeed2017_int_base =</td>
<td>7.97</td>
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<tr>
<td>SPECspeed2017_int_peak =</td>
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<tr>
<td>Test Date:</td>
<td>Apr-2019</td>
</tr>
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<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2018</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name**: Intel Xeon Silver 4210
- **Max MHz.**: 3200
- **Nominal**: 2200
- **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
- **Other**: None
- **Memory**: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)
- **Storage**: 1 x 960 GB SATA SSD
- **Other**: None

**Software**

- **OS**: SUSE Linux Enterprise Server 12 SP4 (x86_64)
- **Kernel**: 4.12.14-94.41-default
- **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**: Yes
- **Firmware**: Lenovo BIOS Version TEE135L 2.10 released Jan-2019
- **File System**: btrfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: jemalloc memory allocator V5.0.1

---

### Benchmark Results

| Benchmark      | Threads | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 |
|----------------|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 600.perlbench | 40      | 5.46 | 5.46 | 7.91 | 7.91 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| 602.gcc       | 40      | 3.91 | 3.91 | 4.55 | 4.55 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 |
| 605.mcf       | 40      | 3.91 | 3.91 | 4.55 | 4.55 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 |
| 620.omnetpp   | 40      | 4.55 | 4.55 | 5.18 | 5.18 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 |
| 623.xalancbk  | 40      | 3.91 | 3.91 | 4.55 | 4.55 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 |
| 625.x264      | 40      | 3.91 | 3.91 | 4.55 | 4.55 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 | 5.18 |
| 631.deepsjeng | 40      | 4.55 | 4.55 | 5.18 | 5.18 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 |
| 641.leela     | 40      | 4.55 | 4.55 | 5.18 | 5.18 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 |
| 648.exchange2 | 40      | 4.55 | 4.55 | 5.18 | 5.18 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 |
| 657.xz        | 40      | 4.55 | 4.55 | 5.18 | 5.18 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 5.81 | 18.6
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ThinkSystem SR590
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CPU2017 License: 9017
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SPECspeed2017_int_base = 7.97
SPECspeed2017_int_peak = Not Run

Results Table

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<th>Seconds</th>
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</tbody>
</table>

SPECspeed2017_int_base = 7.97
SPECspeed2017_int_peak = Not Run

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

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic19.0u1/je5.0.1-64"
OMP_STACKSIZE = "192M"

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

Yes: 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.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
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**CPU2017 License**: 9017  
**Test Date**: Apr-2019  
**Test Sponsor**: Lenovo Global Technology  
**Tested by**: Lenovo Global Technology  
**Hardware Availability**: Apr-2019  
**Software Availability**: Dec-2018

### General Notes (Continued)

Sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

### Platform Notes

- **BIOS configuration**:  
  - Choose Operating Mode set to Maximum Performance  
  - Choose Operating Mode set to Custom Mode  
  - Memory Power Management set to Automatic  
  - CPU P-state Control set to Cooperative  
  - MONITOR/MWAIT set to Enable

- **Sysinfo program** /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo  
  - Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
  - Running on linux-o16r Sun Apr 7 05:31:43 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) Silver 4210 CPU @ 2.20GHz
  - 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
  - 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 4210 CPU @ 2.20GHz
  - Stepping: 6
  - CPU MHz: 2200.000
  - CPU max MHz: 3200.000

(Continued on next page)
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Platform Notes (Continued)

CPU min MHz: 1000.0000
BogoMIPS: 4400.00
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 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
xtrarme dll 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 ssbd mba ibrs ibpb stibp 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
xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni
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: 96059 MB
    node 0 free: 95196 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: 96712 MB
    node 1 free: 95698 MB
  node distances:
    node 0 1
    0:  10  21
    1:  21  10

From /proc/meminfo
  MemTotal: 197398204 kB
  HugePages_Total: 0
  Hugepagesize: 4096 kB

From /etc/*release*/etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)

(Continued on next page)
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**SPEC**

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**Platform Notes (Continued)**

```plaintext
VERSION = 12  
PATCHLEVEL = 4  
# This file is deprecated and will be removed in a future service pack or release.  
# Please check /etc/os-release for details about this release.
```

```plaintext
os-release:
  NAME="SLES"
  VERSION="12-SP4"
  VERSION_ID="12.4"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

```plaintext
uname -a:
  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: __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

**run-level 3 Apr 6 23:42**

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

**Filesystem**  
- Type  
- Size  
- Used  
- Avail  
- Use%  
- Mounted on

```
Filesystem Type  Size  Used  Avail  Use% Mounted on
/dev/sda3  btrfs  740G  35G  706G  5%  /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 -[TEE135L-2.10]- 01/10/2019
- Memory:
  - 4x NO DIMM NO DIMM
  - 12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2400

(End of data from sysinfo program)

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**Compiler Version Notes**

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CC 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(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.

------------------------------------------------------------------------------
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
  641.leela_s(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.
------------------------------------------------------------------------------
FC  648.exchange2_s(base)
------------------------------------------------------------------------------
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

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
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**Base Portability Flags (Continued)**

- 641.leela_s: -DSPEC_LP64  
- 648.exchange2_s: -DSPEC_LP64  
- 657.xz_s: -DSPEC_LP64

**Base Optimization Flags**

**C benchmarks:**

- Wl, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
- qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- L/usr/local/je5.0.1-64/lib -ljemalloc

**C++ benchmarks:**

- Wl, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
- qopt-mem-layout-trans=4  
- L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64 -lqkmalloc

**Fortran benchmarks:**

- xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4  
- nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at:


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 2019-04-06 17:31:42-0400.  