## Lenovo Global Technology

**ThinkSystem SR590**  
(1.90 GHz, Intel Xeon Gold 5220T)

<table>
<thead>
<tr>
<th><strong>CPU2017 License:</strong></th>
<th>9017</th>
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<tr>
<td><strong>Test Sponsor:</strong></td>
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</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base (10.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>72</td>
<td>6.78</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>72</td>
<td>9.89</td>
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<tr>
<td>605.mcf_s</td>
<td>72</td>
<td>12.5</td>
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<tr>
<td>620.omnetpp_s</td>
<td>72</td>
<td>7.83</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>72</td>
<td>12.4</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>72</td>
<td>14.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>72</td>
<td>5.41</td>
</tr>
<tr>
<td>641.jeela_s</td>
<td>72</td>
<td>4.71</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>72</td>
<td>17.1</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>72</td>
<td>22.8</td>
</tr>
</tbody>
</table>

### Software

**OS:**  
SUSE Linux Enterprise Server 12 SP4 (x86_64)  
Kernel 4.12.14-94.41-default

**Compiler:**  
C/C++: Version 19.0.4.227 of Intel C/C++  
Compiler for Linux;

**Fortran:**  
Version 19.0.4.227 of Intel Fortran  
Compiler for Linux

**Parallel:**  
Yes

**Firmware:**  
Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-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

**Power Management:**  
--
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**Test Date:** Aug-2019  
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---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peaked</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>262</td>
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<td>407</td>
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<td>172</td>
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<td>72</td>
<td><strong>271</strong></td>
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<td>271</td>
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<td></td>
<td></td>
<td>271</td>
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</tr>
</tbody>
</table>

---

**SPECspeed®2017_int_base = 10.2**  
**SPECspeed®2017_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-ic19.0u4/lib/intel64"
- LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic19.0u4/je5.0.1-64"
- OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Files system page cache synced and cleared with:  
sync; echo 3>/proc/sys/vm/drop_caches  
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.  
jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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(Continued on next page)
Lenovo Global Technology
ThinkSystem SR590
(1.90 GHz, Intel Xeon Gold 5220T)

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

General Notes (Continued)

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-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-2uov Mon Aug 26 12:23:30 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 5220T CPU @ 1.90GHz
  2 "physical id"s (chips)
  72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lsccpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220T CPU @ 1.90GHz
Stepping: 7
CPU MHz: 1900.000
CPU max MHz: 3900.000

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SR590**  
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**Platform Notes (Continued)**

- CPU min MHz: 800.0000
- BogoMIPS: 3800.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 25344K
- NUMA node0 CPU(s): 0-17,36-53
- NUMA node1 CPU(s): 18-35,54-71

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 noapic xtopology nonstop_tsc cpuid
- aperfmperf pni pclmulqdq dtes64monitor 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 3dsnowprefetch cpuid_fault epb cat_l3 cdp_l3
- invpcid_single intel_pmcgov ssbd 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 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_pkgreq pku ospke avx512_vnni
- flush_l1d arch_capabilities

/proc/cpuinfo cache data
- cache size: 25344 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 10 11 12 13 14 15 16 17 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
- node 0 size: 96323 MB
- node 0 free: 95202 MB
- node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
- node 1 size: 96738 MB
- node 1 free: 95711 MB
- node distances:
  - node 0 1
  - 0: 10 21
  - 1: 21 10

From /proc/meminfo
- MemTotal: 197694664 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version* (Continued on next page)
Lenovo Global Technology
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SPECSpeed®2017_int_base = 10.2
SPECSpeed®2017_int_peak = Not Run

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Platform Notes (Continued)

SuSE–release:
   SUSE Linux Enterprise Server 12 (x86_64)
   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.

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"

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 Aug 26 10:04

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sdb3 btrfs 740G 43G 697G 6% /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 -[TEE141E-2.30]- 07/02/2019
   Memory:
   4x NO DIMM NO DIMM
   12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)
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**Compiler Version Notes**

<table>
<thead>
<tr>
<th>Language</th>
<th>Benchmark(s)</th>
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</table>
| C        | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)  
|          | 625.x264_s(base) 657.xz_s(base)                   |
|          |                                                   |
|          | Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
|          | Version 19.0.4.227 Build 20190416  
|          | Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
|          |                                                   |
| C++      | 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 19.0.4.227 Build 20190416  
|          | Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
|          |                                                   |
| Fortran  | 648.exchange2_s(base)                             |
|          |                                                   |
|          | Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
|          | Version 19.0.4.227 Build 20190416  
|          | Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  

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**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

(Continued on next page)
# SPEC CPU®2017 Integer Speed Result

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### Base Portability Flags (Continued)

- 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
- 625.x264_s: -DSPEC_LP64
- 631.deepsjeng_s: -DSPEC_LP64
- 641.leela_s: -DSPEC_LP64
- 648.exchange2_s: -DSPEC_LP64
- 657.xz_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**
- -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4 -openmp -DSPEC_OPENMP
- -L/usr/local/je5.0.1-64/lib -ljemalloc

**C++ benchmarks:**
- -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

**Fortran benchmarks:**
- -xCORE-AVX2 -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:

- [http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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 v1.0.5 on 2019-08-26 00:23:29-0400.  
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