## SPEC CPU®2017 Integer Speed Result

### Lenovo Global Technology

**ThinkSystem SR590**<br>**(2.70 GHz, Intel Xeon Gold 6226)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>9.52</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Sep-2019  
**Hardware Availability:** Jul-2019  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** May-2019

### Hardware

- **CPU Name:** Intel Xeon Gold 6226  
- **Max MHz:** 3700  
- **Nominal:** 2700  
- **Enabled:** 24 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:** 19.25 MB I+D on chip per chip  
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)  
- **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 19.0.4.227 of Intel  
  C/C++ Compiler for Linux;  
  Fortran: Version 19.0.4.227 of Intel Fortran  
- **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:** --

---

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>48</td>
<td>6.49</td>
<td></td>
</tr>
<tr>
<td>gcc</td>
<td>48</td>
<td>9.20</td>
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<td>mcf</td>
<td>48</td>
<td>12.0</td>
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<td>omnetpp</td>
<td>48</td>
<td>6.54</td>
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<tr>
<td>xalancbmk</td>
<td>48</td>
<td>11.8</td>
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<td>x264</td>
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<tr>
<td>deepsjeng</td>
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<td>5.22</td>
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<td>ldleela</td>
<td>48</td>
<td>4.52</td>
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<tr>
<td>exchange2</td>
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<td>15.8</td>
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<tr>
<td>xz</td>
<td>48</td>
<td></td>
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</tr>
</tbody>
</table>

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**Threads**

- 0 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 20.0 21.0 22.0

---

**SPECspeed®2017_int_base (9.52)**

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**SPECspeed®2017_int_peak = Not Run**
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### Results Table

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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
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<td>600.perlbench_s</td>
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<td>273</td>
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<tr>
<td>602.gcc_s</td>
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<td>9.11</td>
<td>433</td>
<td>9.20</td>
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<td>620.omnetpp_s</td>
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<td>641.leela_s</td>
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<td>377</td>
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</table>

**SPECspeed®2017_int_base =** 9.52
**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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SPECspeed®2017_int_base = 9.52
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CPU2017 License: 9017
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cpu cores : 12
siblings : 24
physical 0: cores 1 2 3 4 5 6 8 9 10 11 12 14
physical 1: cores 0 2 3 4 5 6 8 9 10 11 12 13

From lsclpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6226 CPU @ 2.70GHz
Stepping: 7
CPU MHz: 2700.000
CPU max MHz: 3700.0000

(Continued on next page)
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Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes (Continued)

CPU min MHz: 1200.0000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0-11,24-35
NUMA node1 CPU(s): 12-23,36-47
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 aperfmperf
pci clflushopt dts acpi mmx fxsr sse sse2 ss movbe li2ei mcm xsaes xtpr pdcm pni
dca mmca sse4_1 mcm xsaes xtpr pdcm pni dca mmca sse4_1 mmca 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_pipn ssbd mba ibrs ibpb stibp tpr_shadow vmmx
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrm invpcid rtm cmqm
mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw
avx512vl xsaves ovp棍v1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
dthrmd ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni
flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 19712 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 24 25 26 27 28 29 30 31 32 33 34 35
node 0 size: 96326 MB
node 0 free: 95913 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 36 37 38 39 40 41 42 43 44 45 46 47
node 1 size: 96740 MB
node 1 free: 96001 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 197700228 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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Platform Notes (Continued)

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 Sep 4 10:07

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4

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

Compiler Version Notes

C 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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### SPECspeed®2017_int_peak = Not Run

### Compiler Version Notes (Continued)

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.

<table>
<thead>
<tr>
<th>C++</th>
<th>620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)</th>
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<tr>
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<td>641.leela_s(base)</td>
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</table>

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.

### 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  
631.deepsjeng_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_2019.4.227/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
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

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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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