Lenovo Global Technology
ThinkSystem SN550
(2.70 GHz, Intel Xeon Gold 5220S)

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

SPECsrun®2017_int_base = 10.1
SPECsrun®2017_int_peak = Not Run

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Value</th>
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</thead>
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<tr>
<td>600.perlbench_s</td>
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<tr>
<td>602.gcc_s</td>
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<tr>
<td>605.mcf_s</td>
<td>12.5</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>7.65</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>12.5</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>14.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>5.45</td>
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<tr>
<td>641.leela_s</td>
<td>4.77</td>
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<tr>
<td>648.exchange2_s</td>
<td>16.6</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>23.0</td>
</tr>
</tbody>
</table>

SOFTWARE

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 IVE142E 2.30 released Aug-2019 tested as IVE141E 2.30 Jul-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: --

HARDWARE

CPU Name: Intel Xeon Gold 5220S
Max MHz: 3900
Nominal: 2700
Enabled: 36 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: 24.75 MB I+D on chip per chip
Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</tbody>
</table>

SPECspeed®2017_int_base = 10.1
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
Filesystem 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-2017-5715 (Spectre variant 3a) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (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)
**SPEC CPU®2017 Integer Speed Result**

**Lenovo Global Technology**

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

**General Notes (Continued)**

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

**Platform Notes**

BIOS configuration:
- Choose Operating Mode set to Custom Mode
- Energy Efficient Turbo set to Disable
- C-States set to Disable
- Platform Controlled Type set to Efficiency-Favor Power
- Page Policy set to Adaptive
- Trusted Execution Technology set to Enable
- Workload Configuration set to I/O Sensitive
- Stale AtOS set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9  
running on linux-4brr Tue Sep 17 09:51:58 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 5220S CPU @ 2.70GHz  
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 lscpu:

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 5220S CPU @ 2.70GHz

(Continued on next page)
## Lenovo Global Technology

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<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
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</tr>
</tbody>
</table>

### SPEC CPU®2017 Integer Speed Result

**SPECspeed®2017_int_base = 10.1**  
**SPECspeed®2017_int_peak = Not Run**

### Platform Notes (Continued)

- Stepping: 7  
- CPU MHz: 2700.000  
- BogoMIPS: 5400.00  
- 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 nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 l ssse3 mda 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_pinn ssbd mba ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust mmr hle avx2 smep bmi2 erm msipv6 imeintel rdseed clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtether ida arat pin pts hwp_epp pkup ospke avx512_vnni flush_l1d arch_capabilities

From `/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: 193119 MB  
- node 0 free: 186664 MB  
- node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 45 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71  
- node 1 size: 193477 MB  
- node 1 free: 192967 MB

From `/proc/meminfo`  
- MemTotal: 395875240 kB  
- HugePages_Total: 0  
- Hugepagesize: 2048 kB

From `/etc/*release` `/etc/*version`

(Continued on next page)
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Platform Notes (Continued)

os-release:
  NAME="SLES"
  VERSION="15"
  VERSION_ID="15"
  PRETTY_NAME="SUSE Linux Enterprise Server 15"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15"

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 17 09:50

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sdb3      xfs   891G   76G  816G   9% /

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 -[IVE141E-2.30]- 07/02/2019
Memory:
  24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
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.

(Continued on next page)
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**Compiler Version Notes (Continued)**

```
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.
```

---

**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
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
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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-SPEC\textsc{\textregistered}cpu2017-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-SPEC\textsc{\textregistered}cpu2017-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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