## SPEC CPU®2017 Integer Speed Result

**Lenovo Global Technology**

**ThinkSystem SD650**

(2.20 GHz, Intel Xeon Platinum 8276)

**SPECs**

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<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Oct-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

---

### Performance Results

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECs(^{2017_\text{int_base}})</th>
<th>SPECs(^{2017_\text{int_peak}})</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>7.02</td>
<td>Not Run</td>
</tr>
<tr>
<td>112</td>
<td>10.1</td>
<td>12.8</td>
</tr>
<tr>
<td>8.94</td>
<td>12.6</td>
<td>14.6</td>
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<tr>
<td>5.58</td>
<td></td>
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<tr>
<td>4.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Hardware

**CPU Name:** Intel Xeon Platinum 8276

**Max MHz:** 4000

**Nominal:** 2200

**Enabled:** 56 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:** 38.5 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (12 x 32 GB 2Rx4 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++

**Fortran:** Version 19.0.4.227 of Intel Fortran

**Parallel:** Yes

**Firmware:** Lenovo BIOS Version OTE142F 2.30 released Aug-2019 tested as OTE141F 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:** --
Lenovo Global Technology
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SPECspeed®2017_int_base = 10.6
SPECspeed®2017_int_peak = Not Run

Results Table

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

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-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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SPECSpeed®2017_int_base = 10.6
SPECSpeed®2017_int_peak = Not Run

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

Test Date: Oct-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

General Notes (Continued)

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
Memory Power Management set to Automatic
C-States set to Legacy
Adjacent Cache Prefetch set to Disable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-55rv Fri Oct 11 05:21:15 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) Platinum 8276 CPU @ 2.20GHz
  2 "physical id"s (chips)
  112 "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: 28
siblings: 56
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000

(Continued on next page)


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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology

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**CPU max MHz:** 4000.0000  
**CPU min MHz:** 1000.0000  
**BogoMIPS:** 4400.00  
**Virtualization:** VT-x  
**L1d cache:** 32K  
**L1i cache:** 32K  
**L2 cache:** 1024K  
**L3 cache:** 39424K  

---

**NUMA node0 CPU(s):** 0-27,56-83  
**NUMA node1 CPU(s):** 28-55,84-111  
**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 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 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_pni ssbd mba ibrs ibpb tpr_shadow vnlm flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtmetherm ida arat pin pts pku ospke avx512_vnni flush_l1d arch_capabilities

---

**/proc/cpuinfo cache data**  
**cache size:** 39424 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 18 19 20 21 22 23 24 25 26 27 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83  
**node 0 size:** 193087 MB  
**node free:** 192588 MB  
**node 1 cpus:** 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 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 107 108 109 110 111  
**node 1 size:** 193502 MB  
**node free:** 192698 MB  
**node distances:**  
**node 0:** 0 1  
**node 1:** 0 1  
**node 0:** 10 21  
**node 1:** 21 10

---

From `/proc/meminfo`  
**MemTotal:** 395868392 KB  
**HugePages_Total:** 0  
**Hugepagesize:** 2048 KB

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(Continued on next page)
Platform Notes (Continued)

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

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 Oct 11 05:17

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

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb3</td>
<td>xfs</td>
<td>893G</td>
<td>65G</td>
<td>829G</td>
<td>8%</td>
<td>/</td>
</tr>
</tbody>
</table>

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 -[OTE141F-2.30]- 07/02/2019
Memory:
    4x NO DIMM NO DIMM
    12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
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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.
------------------------------------------------------------------------------
==============================================================================
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.
------------------------------------------------------------------------------
(Continued on next page)
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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-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -gopenmp -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-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

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Tested with SPEC CPU®2017 v1.0.5 on 2019-10-11 05:21:15-0400.
Originally published on 2019-10-29.