# SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology  
ThinkSystem SN850  
(2.10 GHz, Intel Xeon Gold 6238)

| SPECspeed®2017_int_base = 9.89 | SPECspeed®2017_int_peak = Not Run |

**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

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<thead>
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<th>Threads</th>
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## Hardware

| CPU Name: Intel Xeon Gold 6238  
Max MHz: 3700  
Nominal: 2100  
Enabled: 88 cores, 4 chips, 2 threads/core  
Orderable: 2.4 chips  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 30.25 MB I+D on chip per chip  
Other: None  
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)  
Storage: 1 x 960 GB SATA SSD  
Other: None |

## Software

| OS: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
Kernel 3.10.0-957.el7.x86_64  
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: -- |
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Seconds</th>
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</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 = "/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:

```bash
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)
General Notes (Continued)

Platform Notes

BIOS configuration:
Choose Operating Mode set to Custom Mode
Page Policy set to Adaptive
Trusted Execution Technology set to Enable
CPU Frequency Limits set to Restrict Maximum Frequency
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Fri Sep  6 20:23:02 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 6238 CPU @ 2.10GHz
  4 "physical id"s (chips)
  176 "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 : 22
siblings : 44
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
  physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 176
On-line CPU(s) list: 0-175
Thread(s) per core: 2
Core(s) per socket: 22
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6238 CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000

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

SPECspeed®2017_int_base = 9.89
SPECspeed®2017_int_peak = Not Run

Platform Notes (Continued)

BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 30976K
NUMA node0 CPU(s): 0-21,88-109
NUMA node1 CPU(s): 22-43,110-131
NUMA node2 CPU(s): 44-65,132-153
NUMA node3 CPU(s): 66-87,154-175

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
aperfmperpf eagerfpu pni pclmulqdq dtes64 monitor 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 abm 3nowprefetch epb cat_l3 cdp_l3 intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi 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 avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm Occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln
pts hwp_epp pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 30976 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 4 nodes (0-3)
  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 88 89 90 91 92 93
  node 0 size: 392885 MB
  node 0 free: 383903 MB
  node 1 cpus: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 110 111
  node 1 size: 393216 MB
  node 1 free: 384156 MB
  node 2 cpus: 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 132 133
  node 2 size: 393216 MB
  node 2 free: 384156 MB
  node 3 cpus: 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 154 155
  node 3 size: 393216 MB
  node 3 free: 383366 MB
  node distances:
    node 0 1 2 3
    0: 10 21 21 21

(Continued on next page)
## Platform Notes (Continued)

1:  21 10 21 21  
2:  21 21 10 21  
3:  21 21 21 10  

From `/proc/meminfo`  
- MemTotal: 1584959312 kB  
- HugePages_Total: 0  
- Hugepagesize: 2048 kB  

From `/etc/*release* /etc/*version*`  
- NAME="Red Hat Enterprise Linux Server"  
- VERSION="7.6 (Maipo)"  
- ID="rhel"  
- ID_LIKE="fedora"  
- VARIANT="Server"  
- VARIANT_ID="server"  
- VERSION_ID="7.6"  
- PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"  
- redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)  
- system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)  

```bash
uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
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: Load fences, __user pointer sanitization  
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS  

run-level 3 Sep 6 17:59

**SPEC is set to**: /home/cpu2017-1.0.5-ic19.0u4  
- Filesystem     Type  Size  Used Avail Use% Mounted on  
- /dev/sda2      xfs  839G  24G  815G  3% /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 -[IVE141E-2.30]- 07/02/2019  
- Memory:
  - 48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(Continued on next page)
## Lenovo Global Technology

ThinkSystem SN850  
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<td>Software Availability: May-2019</td>
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### SPECspeed®2017 Int base = 9.89

SPECspeed®2017 Int peak = Not Run

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### Platform Notes (Continued)

(End of data from sysinfo program)

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### Compiler Version Notes

<table>
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<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)</th>
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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.

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<table>
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<tr>
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<td>641.leela_s(base)</td>
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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.

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<table>
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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`
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</table>

**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

**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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