



# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(2.10 GHz, Intel Xeon Gold 5218T)

SPECspeed®2017\_int\_base = 9.43

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 9017

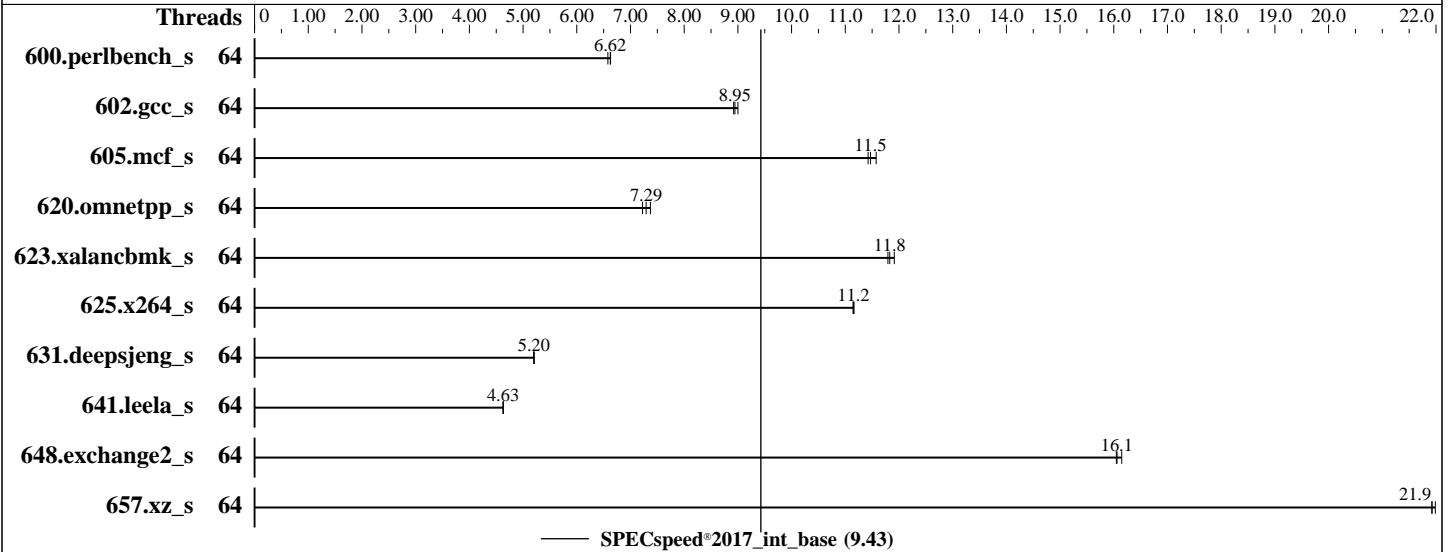
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Aug-2019

Hardware Availability: Jul-2019

Software Availability: May-2019



### Hardware

CPU Name: Intel Xeon Gold 5218T  
 Max MHz: 3800  
 Nominal: 2100  
 Enabled: 64 cores, 4 chips  
 Orderable: 2,3,4 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 22 MB I+D on chip per chip  
 Other: None  
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)  
 Storage: 1 x 800 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 (x86\_64)  
 Kernel 4.12.14-25.13-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 PSE122R 1.53 released Aug-2019  
 tested as PSE121R 1.53 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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## Results Table

Benchmark	Base								Peak							
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio		
600.perlbench_s	64	270	6.58	268	6.63	<b>268</b>	<b>6.62</b>									
602.gcc_s	64	446	8.92	<b>445</b>	<b>8.95</b>	442	9.00									
605.mcf_s	64	413	11.4	408	11.6	<b>412</b>	<b>11.5</b>									
620.omnetpp_s	64	226	7.22	221	7.37	<b>224</b>	<b>7.29</b>									
623.xalancbmk_s	64	119	11.9	<b>120</b>	<b>11.8</b>	120	11.8									
625.x264_s	64	<b>158</b>	<b>11.2</b>	158	11.1	158	11.2									
631.deepsjeng_s	64	276	5.20	<b>275</b>	<b>5.20</b>	275	5.21									
641.leela_s	64	<b>369</b>	<b>4.63</b>	368	4.63	369	4.63									
648.exchange2_s	64	<b>183</b>	<b>16.1</b>	183	16.0	182	16.1									
657.xz_s	64	281	22.0	<b>282</b>	<b>21.9</b>	282	21.9									

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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

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### General Notes (Continued)

sources available from [jemalloc.net](http://jemalloc.net) or <https://github.com/jemalloc/jemalloc/releases>

### Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance  
Choose Operating Mode set to Custom Mode  
CPU P-state Control set to Autonomous  
Hyper-Threading set to Disable  
Trusted Execution Technology set to Enable  
DCU Streamer Prefetcher set to Disable  
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-i7o2 Sat Aug 31 01:05:56 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 5218T CPU @ 2.10GHz
 4 "physical id"s (chips)
 64 "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      : 16
siblings       : 16
physical 0:    cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1:    cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 2:    cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 3:    cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

From lscpu:

```
Architecture:    x86_64
CPU op-mode(s):  32-bit, 64-bit
Byte Order:      Little Endian
CPU(s):          64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 16
Socket(s):       4
NUMA node(s):   4
Vendor ID:       GenuineIntel
CPU family:      6
Model:           85
```

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### Platform Notes (Continued)

```

Model name: Intel(R) Xeon(R) Gold 5218T CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
CPU max MHz: 3800.0000
CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-15
NUMA node1 CPU(s): 16-31
NUMA node2 CPU(s): 32-47
NUMA node3 CPU(s): 48-63

```

```

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
aperfmpperf 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 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single ssbd mba 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_mbm_total cqm_mbm_local
dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 22528 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
node 0 size: 386641 MB
node 0 free: 382649 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
node 1 size: 387051 MB
node 1 free: 386805 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 2 size: 387051 MB
node 2 free: 386788 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 3 size: 387019 MB
node 3 free: 386752 MB
node distances:
node 0 1 2 3

```

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### Platform Notes (Continued)

```

0: 10 31 21 21
1: 31 10 21 21
2: 21 21 10 31
3: 21 21 31 10

```

From /proc/meminfo

```

MemTotal:      1584909728 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

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

```

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:

```

Linux linux-i7o2 4.12.14-25.13-default #1 SMP Tue Aug 14 15:07:35 UTC 2018 (947aa51)
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 31 01:04

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

```

Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sda2        btrfs    742G   57G  685G   8% /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 -[PSE121R-1.53]- 07/03/2019

Memory:

```

48x NO DIMM NO DIMM
48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2666

```

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### Platform Notes (Continued)

(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.

```
=====  
C++   | 620.omnetpp_s(base) 623.xalanbmk_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



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## 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/Intel-ic18.0-official-linux64.2019-04-02.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/Intel-ic18.0-official-linux64.2019-04-02.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](mailto:info@spec.org).

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