



# SPEC CPU®2017 Integer Speed Result

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## Lenovo Global Technology

SPECspeed®2017\_int\_base = 9.73

ThinkSystem SN850  
(3.80 GHz, Intel Xeon Platinum 8256)

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 9017

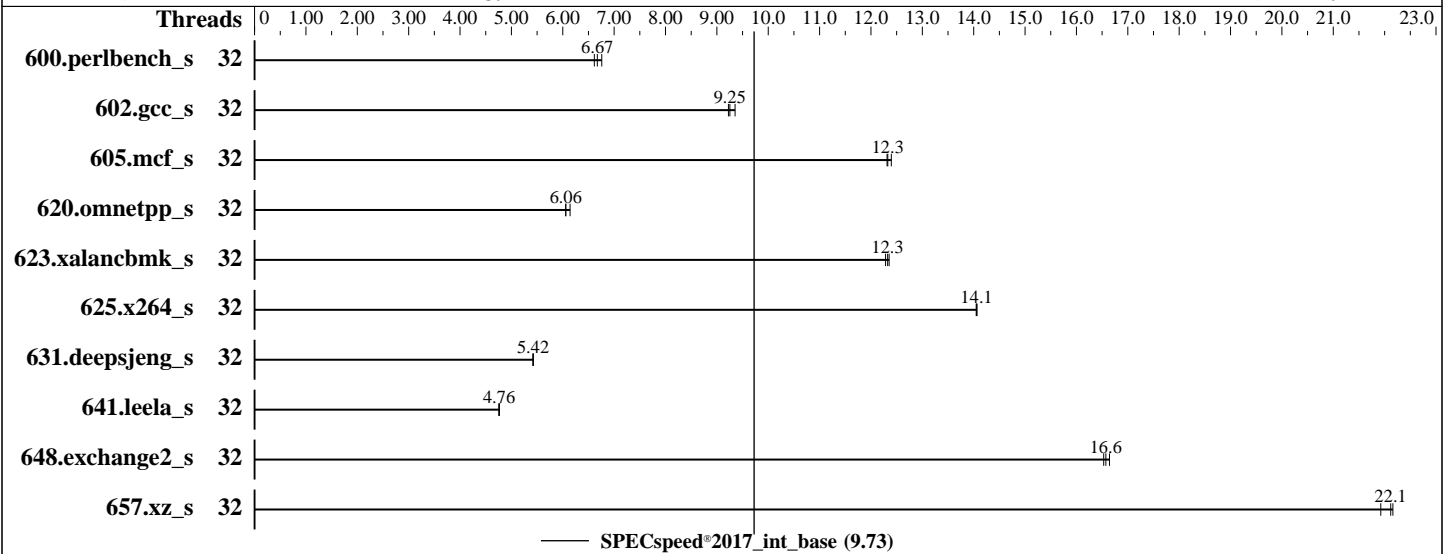
Test Date: Sep-2019

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2019

Tested by: Lenovo Global Technology

Software Availability: May-2019



### Hardware

CPU Name: Intel Xeon Platinum 8256  
 Max MHz: 3900  
 Nominal: 3800  
 Enabled: 16 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: 16.5 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 2Rx8 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: --



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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	32	268	6.61	263	6.76	<b>266</b>	<b>6.67</b>							
602.gcc_s	32	432	9.23	426	9.35	<b>430</b>	<b>9.25</b>							
605.mcf_s	32	383	12.3	381	12.4	<b>383</b>	<b>12.3</b>							
620.omnetpp_s	32	266	6.14	269	6.06	<b>269</b>	<b>6.06</b>							
623.xalancbmk_s	32	115	12.3	115	12.4	<b>115</b>	<b>12.3</b>							
625.x264_s	32	<b>125</b>	<b>14.1</b>	126	14.0	125	14.1							
631.deepsjeng_s	32	<b>264</b>	<b>5.42</b>	264	5.42	264	5.42							
641.leela_s	32	359	4.76	358	4.77	<b>358</b>	<b>4.76</b>							
648.exchange2_s	32	178	16.5	<b>177</b>	<b>16.6</b>	177	16.6							
657.xz_s	32	279	22.2	282	21.9	<b>279</b>	<b>22.1</b>							

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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 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

MONITOR/MWAIT set to Enable

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 Thu Sep 19 18:12:25 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 8256 CPU @ 3.80GHz

    4 "physical id"s (chips)

    32 "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 : 4

    siblings : 8

    physical 0: cores 1 2 5 13

    physical 1: cores 1 5 9 13

    physical 2: cores 2 5 9 13

    physical 3: cores 4 8 9 13

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 32

On-line CPU(s) list: 0-31

Thread(s) per core: 2

Core(s) per socket: 4

Socket(s): 4

NUMA node(s): 4

Vendor ID: GenuineIntel

CPU family: 6

Model: 85

Model name: Intel(R) Xeon(R) Platinum 8256 CPU @ 3.80GHz

Stepping: 6

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### Platform Notes (Continued)

```

CPU MHz:          3800.000
BogoMIPS:         7600.00
Virtualization:   VT-x
L1d cache:       32K
L1i cache:       32K
L2 cache:        1024K
L3 cache:        16896K
NUMA node0 CPU(s): 0-3,16-19
NUMA node1 CPU(s): 4-7,20-23
NUMA node2 CPU(s): 8-11,24-27
NUMA node3 CPU(s): 12-15,28-31
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
aperfperf 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 3dnowprefetch epb cat_l3 cdp_l3 intel_ppin
intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced 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 avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_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 : 16896 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 16 17 18 19
node 0 size: 196278 MB
node 0 free: 191771 MB
node 1 cpus: 4 5 6 7 20 21 22 23
node 1 size: 196608 MB
node 1 free: 192219 MB
node 2 cpus: 8 9 10 11 24 25 26 27
node 2 size: 196608 MB
node 2 free: 191840 MB
node 3 cpus: 12 13 14 15 28 29 30 31
node 3 size: 196608 MB
node 3 free: 192141 MB
node distances:
node  0  1  2  3
0:  10  21  21  21
1:  21  10  21  21
2:  21  21  10  21
3:  21  21  21  10

```

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### Platform Notes (Continued)

```

From /proc/meminfo
MemTotal:          792237492 kB
HugePages_Total:    0
Hugepagesize:      2048 kB

From /etc/*release* /etc/*version*
os-release:
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)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.6:ga:server

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 19 18:10

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       xfs   839G  29G  811G   4% /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 M393A2K43CB2-CVF 16 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.
=====

```

## 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

```

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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 -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
-lqkmallocc
```

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-F.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-F.xml>

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