



# SPEC® CPU2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Dell Inc.

SPECspeed2017\_int\_base = 9.59

PowerEdge T640 (Intel Xeon Gold 6254, 3.10GHz)

SPECspeed2017\_int\_peak = 9.75

CPU2017 License: 55

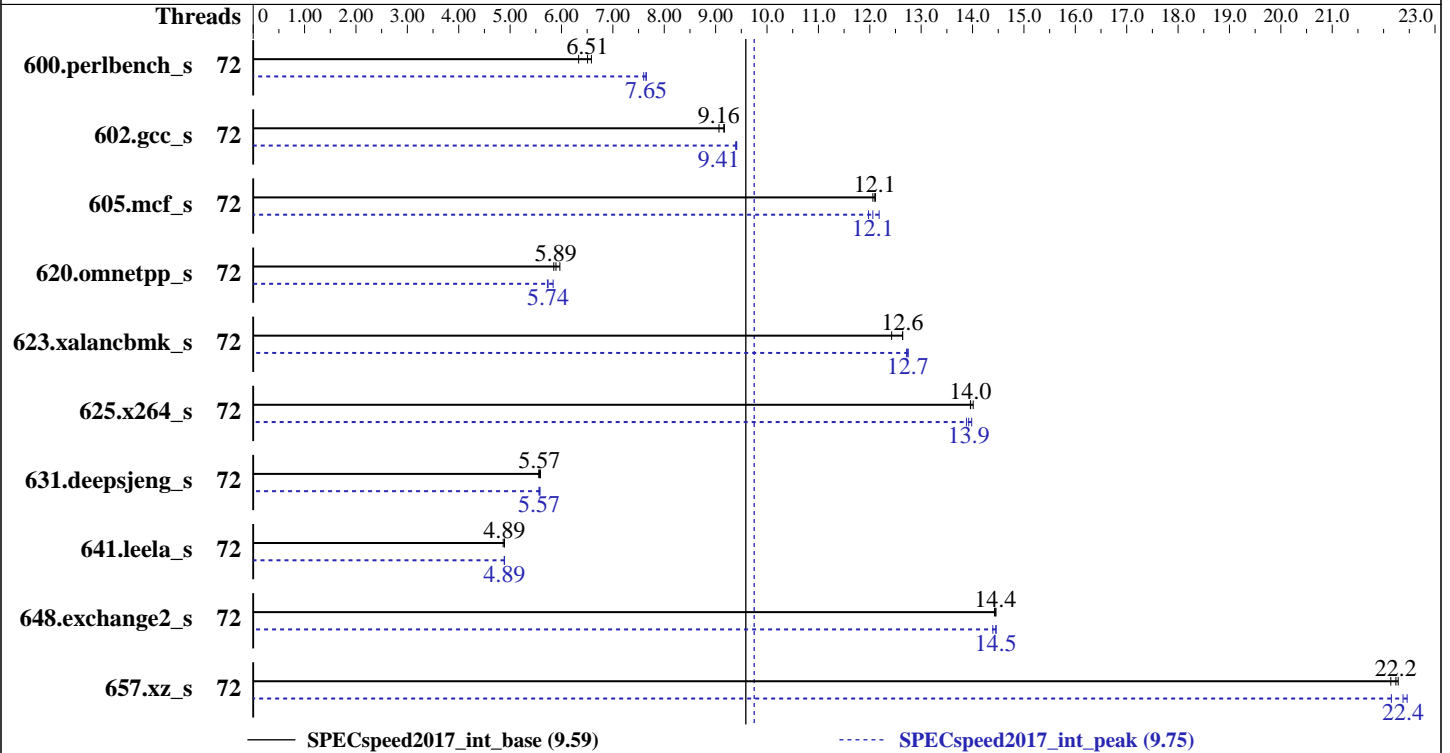
Test Date: May-2019

Test Sponsor: Dell Inc.

Hardware Availability: Apr-2019

Tested by: Dell Inc.

Software Availability: Feb-2019



### Hardware

CPU Name: Intel Xeon Gold 6254  
 Max MHz.: 4000  
 Nominal: 3100  
 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: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: Ubuntu 18.04.2 LTS  
 kernel 4.15.0-45-generic  
 Compiler: C/C++: Version 19.0.1.144 of Intel C/C++  
 Compiler Build 20181018 for Linux;  
 Fortran: Version 19.0.1.144 of Intel Fortran  
 Compiler Build 20181018 for Linux  
 Parallel: Yes  
 Firmware: Version 2.1.8 released Apr-2019  
 File System: ext4  
 System State: Run level 5 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: jemalloc memory allocator V5.0.1



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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	72	270	6.58	<b><u>273</u></b>	<b><u>6.51</u></b>	280	6.33	72	232	7.65	<b><u>232</u></b>	<b><u>7.65</u></b>	234	7.60
602.gcc_s	72	<b><u>435</u></b>	<b><u>9.16</u></b>	439	9.07	434	9.17	72	424	9.39	423	9.41	<b><u>423</u></b>	<b><u>9.41</u></b>
605.mcf_s	72	391	12.1	390	12.1	<b><u>390</u></b>	<b><u>12.1</u></b>	72	<b><u>391</u></b>	<b><u>12.1</u></b>	388	12.2	394	12.0
620.omnetpp_s	72	279	5.85	273	5.97	<b><u>277</u></b>	<b><u>5.89</u></b>	72	<b><u>284</u></b>	<b><u>5.74</u></b>	279	5.84	285	5.73
623.xalancbmk_s	72	<b><u>112</u></b>	<b><u>12.6</u></b>	114	12.4	112	12.6	72	<b><u>111</u></b>	<b><u>12.7</u></b>	111	12.7	111	12.7
625.x264_s	72	126	14.0	<b><u>126</u></b>	<b><u>14.0</u></b>	126	14.0	72	127	13.9	126	14.0	<b><u>127</u></b>	<b><u>13.9</u></b>
631.deepsjeng_s	72	256	5.59	258	5.56	<b><u>257</u></b>	<b><u>5.57</u></b>	72	257	5.58	<b><u>257</u></b>	<b><u>5.57</u></b>	258	5.56
641.leela_s	72	<b><u>349</u></b>	<b><u>4.89</u></b>	351	4.87	349	4.89	72	349	4.89	349	4.89	<b><u>349</u></b>	<b><u>4.89</u></b>
648.exchange2_s	72	204	14.4	203	14.5	<b><u>204</u></b>	<b><u>14.4</u></b>	72	203	14.5	<b><u>203</u></b>	<b><u>14.5</u></b>	204	14.4
657.xz_s	72	279	22.1	277	22.3	<b><u>278</u></b>	<b><u>22.2</u></b>	72	275	22.5	279	22.2	<b><u>276</u></b>	<b><u>22.4</u></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/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

OMP\_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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.

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
```

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>



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## Platform Notes

BIOS settings:

```

ADDDC setting disabled
Sub NUMA Cluster disabled
Virtualization Technology disabled
DCU Streamer Prefetcher disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
ClE disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on intel-sut Wed May 22 17:13:08 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 6254 CPU @ 3.10GHz
 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):   4
Vendor ID:       GenuineIntel
CPU family:      6
Model:          85

```

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## Platform Notes (Continued)

```

Model name: Intel(R) Xeon(R) Gold 6254 CPU @ 3.10GHz
Stepping: 6
CPU MHz: 3360.277
BogoMIPS: 6200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71
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
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 aes xsave avx f16c rdrand
lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single 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 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 : 25344 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 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
node 0 size: 46763 MB
node 0 free: 46469 MB
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69
node 1 size: 48380 MB
node 1 free: 48094 MB
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70
node 2 size: 48380 MB
node 2 free: 48106 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71
node 3 size: 48379 MB
node 3 free: 48190 MB
node distances:
node  0  1  2  3
0:  10  21  11  21
1:  21  10  21  11

```

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## Platform Notes (Continued)

```
2: 11 21 10 21
3: 21 11 21 10
```

```
From /proc/meminfo
MemTotal:      196509044 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS
```

```
From /etc/*release* /etc/*version*
debian_version: buster/sid
os-release:
  NAME="Ubuntu"
  VERSION="18.04.2 LTS (Bionic Beaver)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 18.04.2 LTS"
  VERSION_ID="18.04"
  HOME_URL="https://www.ubuntu.com/"
  SUPPORT_URL="https://help.ubuntu.com/"
```

```
uname -a:
Linux intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 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: Enhanced IBRS, IBPB
```

```
run-level 5 May 22 17:04
```

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       ext4  439G   19G  398G   5% /
```

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 Dell Inc. 2.1.8 04/30/2019
Memory:
1x 002C0632002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933
7x 002C069D002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933
```

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## Platform Notes (Continued)

4x 00AD069D00AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933  
12x Not Specified Not Specified

(End of data from sysinfo program)

## Compiler Version Notes

=====  
CC 600.perlbench\_s(base) 602.gcc\_s(base) 605.mcf\_s(base) 625.x264\_s(base,  
peak) 657.xz\_s(base)

-----  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 600.perlbench\_s(peak) 602.gcc\_s(peak) 605.mcf\_s(peak) 657.xz\_s(peak)

-----  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CXXC 620.omnetpp\_s(base) 623.xalancbmk\_s(base, peak) 631.deepsjeng\_s(base,  
peak) 641.leela\_s(base, peak)

-----  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CXXC 620.omnetpp\_s(peak)

-----  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 648.exchange2\_s(base, peak)

-----  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018

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## Compiler Version Notes (Continued)

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## 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
```

## 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_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

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## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs
```

## Peak Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -fno-strict-overflow
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```
602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```
605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

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## Peak Optimization Flags (Continued)

625.x264\_s: -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

657.xz\_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2  
-xCORE-AVX512 -qopt-mem-layout-trans=4 -ipo -O3  
-no-prec-div -DSPEC\_SUPPRESS\_OPENMP -qopenmp  
-DSPEC\_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

620.omnetpp\_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4  
-DSPEC\_SUPPRESS\_OPENMP  
-L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.1.144/linux/compiler/lib/intel64  
-lqkmalloc

623.xalancbmk\_s: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers\_and\_libraries\_2019.1.144/linux/compiler/lib/intel64  
-lqkmalloc

631.deepsjeng\_s: Same as 623.xalancbmk\_s

641.leela\_s: Same as 623.xalancbmk\_s

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/Dell-Platform-Flags-PowerEdge14G-revE2.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/Dell-Platform-Flags-PowerEdge14G-revE2.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).

Tested with SPEC CPU2017 v1.0.5 on 2019-05-22 13:13:08-0400.

Report generated on 2019-06-11 17:14:59 by CPU2017 PDF formatter v6067.

Originally published on 2019-06-11.