



# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Cisco Systems

Cisco UCS C220 M5 (Intel Xeon Gold 6226, 2.70GHz)

SPECspeed®2017\_int\_base = 9.35

SPECspeed®2017\_int\_peak = 9.54

CPU2017 License: 9019

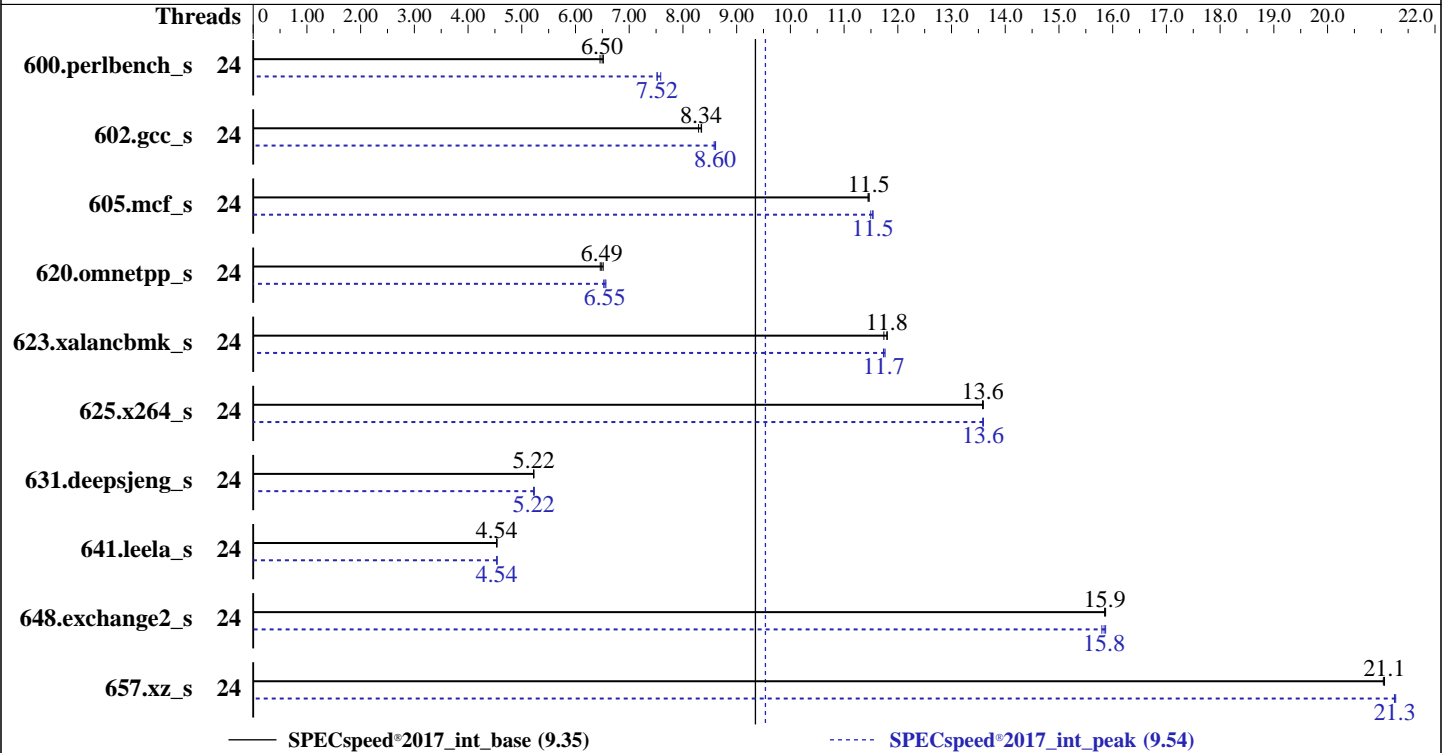
Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2019

Hardware Availability: Apr-2019

Software Availability: May-2019



### Hardware

CPU Name: Intel Xeon Gold 6226  
 Max MHz: 3700  
 Nominal: 2700  
 Enabled: 24 cores, 2 chips  
 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: 19.25 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933V-R)  
 Storage: 1 x 1.9 TB SSD SAS  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 (x86\_64) 4.12.14-23-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: Version 4.0.4g released Jul-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 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	24	275	6.46	<b><u>273</u></b>	<b><u>6.50</u></b>	272	6.52	24	236	7.52	234	7.59	<b><u>236</u></b>	<b><u>7.52</u></b>
602.gcc_s	24	480	8.29	<b><u>477</u></b>	<b><u>8.34</u></b>	477	8.35	24	464	8.58	463	8.61	<b><u>463</u></b>	<b><u>8.60</u></b>
605.mcf_s	24	412	11.5	<b><u>412</u></b>	<b><u>11.5</u></b>	412	11.4	24	409	11.5	411	11.5	<b><u>409</u></b>	<b><u>11.5</u></b>
620.omnetpp_s	24	<b><u>251</u></b>	<b><u>6.49</u></b>	252	6.46	250	6.52	24	<b><u>249</u></b>	<b><u>6.55</u></b>	250	6.52	248	6.57
623.xalancbmk_s	24	120	11.8	121	11.7	<b><u>120</u></b>	<b><u>11.8</u></b>	24	120	11.8	<b><u>121</u></b>	<b><u>11.7</u></b>	121	11.7
625.x264_s	24	<b><u>130</u></b>	<b><u>13.6</u></b>	130	13.6	130	13.6	24	130	13.6	130	13.6	<b><u>130</u></b>	<b><u>13.6</u></b>
631.deepsjeng_s	24	275	5.22	274	5.22	<b><u>274</u></b>	<b><u>5.22</u></b>	24	274	5.23	<b><u>274</u></b>	<b><u>5.22</u></b>	274	5.22
641.leela_s	24	376	4.54	<b><u>376</u></b>	<b><u>4.54</u></b>	377	4.53	24	376	4.54	376	4.54	<b><u>376</u></b>	<b><u>4.54</u></b>
648.exchange2_s	24	185	15.9	<b><u>185</u></b>	<b><u>15.9</u></b>	185	15.9	24	<b><u>186</u></b>	<b><u>15.8</u></b>	185	15.9	186	15.8
657.xz_s	24	<b><u>294</u></b>	<b><u>21.1</u></b>	294	21.1	294	21.0	24	291	21.3	<b><u>291</u></b>	<b><u>21.3</u></b>	291	21.2

SPECspeed®2017\_int\_base = **9.35**

SPECspeed®2017\_int\_peak = **9.54**

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/intel64:/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  
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.

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:

Intel HyperThreading Technology set to Disabled  
CPU performance set to Enterprise  
Power Performance Tuning set to OS Controls  
SNC set to Disabled  
Patrol Scrub set to Disabled  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on linux-ylla Sat Sep 14 04:17:16 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 6226 CPU @ 2.70GHz  
2 "physical id"s (chips)  
24 "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 : 12  
siblings : 12  
physical 0: cores 1 2 3 4 5 6 8 9 10 11 12 13  
physical 1: cores 0 2 3 4 5 6 8 9 10 11 13 14

From lscpu:  
Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 24  
On-line CPU(s) list: 0-23  
Thread(s) per core: 1  
Core(s) per socket: 12  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Gold 6226 CPU @ 2.70GHz  
Stepping: 7  
CPU MHz: 2700.000  
CPU max MHz: 3700.0000  
CPU min MHz: 1200.0000  
BogoMIPS: 5400.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K

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### Platform Notes (Continued)

```

L2 cache:          1024K
L3 cache:          19712K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
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
aperfperf tsc_known_freq 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 intel_ppin mba 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
ibpb ibrs stibp dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku
ospke avx512_vnni arch_capabilities ssbd

```

```

/proc/cpuinfo cache data
cache size : 19712 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
node 0 size: 385636 MB
node 0 free: 384908 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
node 1 size: 387028 MB
node 1 free: 386683 MB
node distances:
node    0    1
 0:    10    21
 1:    21    10

```

```

From /proc/meminfo
MemTotal:      791208848 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"

```

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### Platform Notes (Continued)

```
ANSI_COLOR="0;32"  
CPE_NAME="cpe:/o:suse:sles:15"
```

```
uname -a:  
Linux linux-ylla 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)  
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 Sep 14 04:11
```

```
SPEC is set to: /home/cpu2017  
Filesystem      Type  Size  Used Avail Use% Mounted on  
/dev/sdb2       xfs   559G   55G  505G  10% /
```

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 Cisco Systems, Inc. C220M5.4.0.4g.0.0712190011 07/12/2019  
Memory:  
24x 0xCE00 M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2934
```

(End of data from sysinfo program)

### Compiler Version Notes

```
=====  
C      | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base,  
      | peak) 625.x264_s(base, peak) 657.xz_s(base, peak)  
-----
```

```
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, peak) 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,
```

(Continued on next page)



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### Compiler Version Notes (Continued)

Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

-----  
Fortran | 648.exchange2\_s(base, peak)

-----  
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  
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

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## Base Optimization Flags (Continued)

C benchmarks (continued):

`-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`

## 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`

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## Peak Optimization Flags (Continued)

602.gcc\_s (continued):

```
-no-prec-div -DSPEC_SUPPRESS_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```
605.mcf_s: -w1,-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
```

```
625.x264_s: -w1,-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: -w1,-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: -w1,-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_2019.4.227/linux/compiler/lib/intel64
-lqkmallo
```

```
623.xalancbmk_s: -w1,-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
-lqkmallo
```

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-ic19.0u1-official-linux64.2019-07-09.html>

<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.2019-07-31.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml>

<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.2019-07-31.xml>





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