# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Dell Inc.

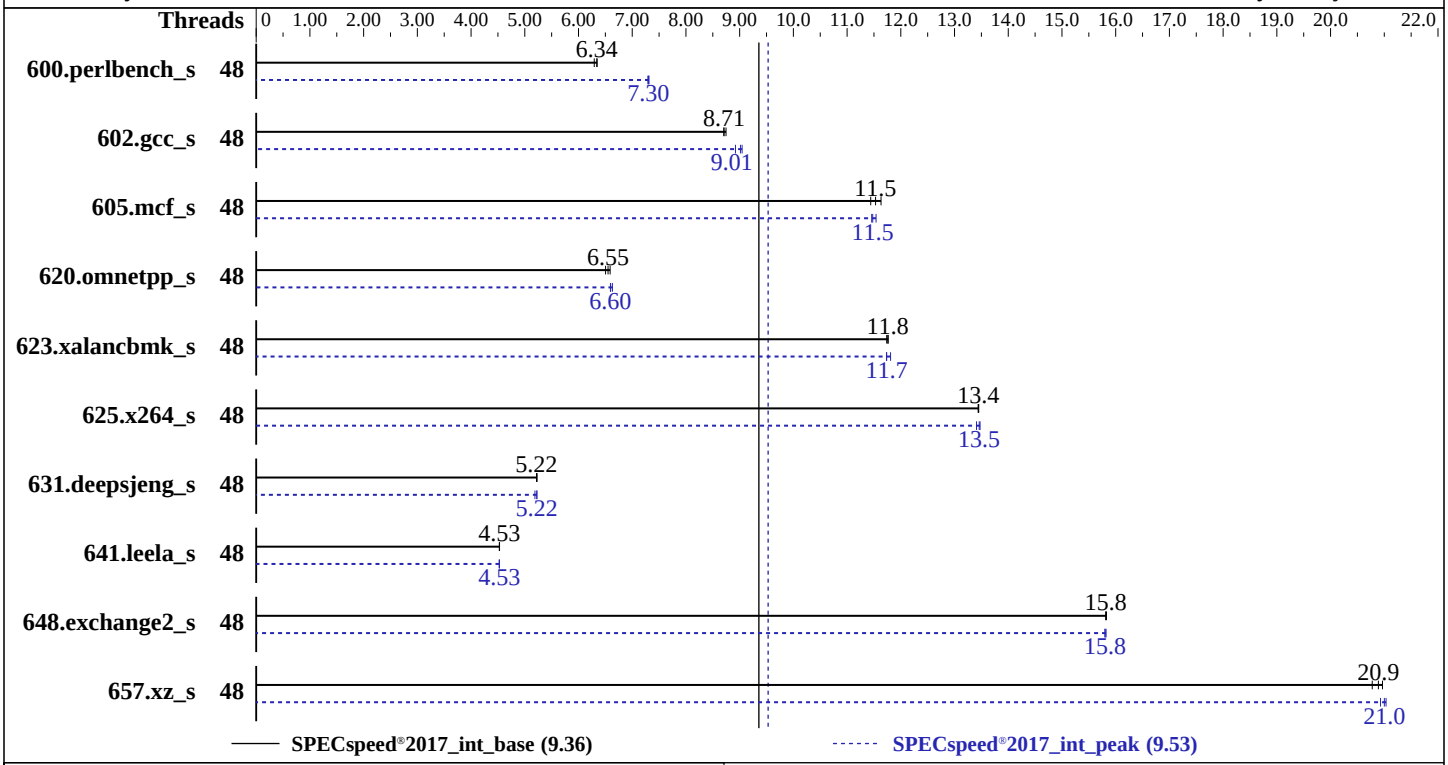
PowerEdge MX840c (Intel Xeon Gold 6226, 2.70GHz)

SPECspeed®2017_int_base = 9.36

SPECspeed®2017_int_peak = 9.53

**CPU2017 License:** 55
**Test Sponsor:** Dell Inc.
**Tested by:** Dell Inc.

**Test Date:** Jun-2019
**Hardware Availability:** Apr-2019
**Software Availability:** May-2019




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 6226 |
| Max MHz: | 3700 |
| Nominal: | 2700 |
| Enabled: | 48 cores, 4 chips |
| 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: | 19.25 MB I+D on chip per chip |
| Other: | None |
| Memory: | 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R) |
| Storage: | 1 x 480 GB SATA SSD |
| Other: | None |

## Software

| | |
|---|---|
| OS: | Ubuntu 18.04.2 LTS<br>kernel 4.15.0-45-generic |
| Compiler: | C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;<br>Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux |
| Parallel: | Yes |
| Firmware: | Version 2.2.9 released May-2019 |
| File System: | ext4 |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 64-bit |
| Other: | jemalloc memory allocator V5.0.1 |
| Power Management: | -- |

# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Dell Inc.

PowerEdge MX840c (Intel Xeon Gold 6226, 2.70GHz)

SPECspeed®2017_int_base = 9.36

SPECspeed®2017_int_peak = 9.53

**CPU2017 License:** 55
**Test Sponsor:** Dell Inc.
**Tested by:** Dell Inc.

**Test Date:** Jun-2019
**Hardware Availability:** Apr-2019
**Software Availability:** May-2019

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 600.perlbench_s | 48 | 280 | 6.35 | **280** | **6.34** | 282 | 6.29 | 48 | 243 | 7.29 | 243 | 7.31 | **243** | **7.30** |
| 602.gcc_s | 48 | 455 | 8.75 | 457 | 8.71 | **457** | **8.71** | 48 | 446 | 8.92 | 440 | 9.05 | **442** | **9.01** |
| 605.mcf_s | 48 | 413 | 11.4 | **409** | **11.5** | 406 | 11.6 | 48 | 409 | 11.5 | 412 | 11.5 | **411** | **11.5** |
| 620.omnetpp_s | 48 | 251 | 6.50 | **249** | **6.55** | 248 | 6.59 | 48 | 246 | 6.63 | **247** | **6.60** | 247 | 6.59 |
| 623.xalancbmk_s | 48 | **121** | **11.8** | 120 | 11.8 | 121 | 11.7 | 48 | 121 | 11.7 | **121** | **11.7** | 120 | 11.8 |
| 625.x264_s | 48 | **131** | **13.4** | 131 | 13.5 | 131 | 13.4 | 48 | 132 | 13.4 | 131 | 13.5 | **131** | **13.5** |
| 631.deepsjeng_s | 48 | 275 | 5.22 | 274 | 5.23 | **274** | **5.22** | 48 | 274 | 5.23 | 276 | 5.19 | **274** | **5.22** |
| 641.leela_s | 48 | **377** | **4.53** | 377 | 4.53 | 377 | 4.53 | 48 | 377 | 4.52 | **377** | **4.53** | 377 | 4.53 |
| 648.exchange2_s | 48 | **186** | **15.8** | 186 | 15.8 | 186 | 15.8 | 48 | 186 | 15.8 | **186** | **15.8** | 186 | 15.8 |
| 657.xz_s | 48 | 298 | 20.8 | **296** | **20.9** | 295 | 21.0 | 48 | 294 | 21.0 | 295 | 20.9 | **294** | **21.0** |

**SPECspeed®2017_int_base = 9.36**

**SPECspeed®2017_int_peak = 9.53**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

```
The numactl mechanism was used to bind copies to processors. The config file option 'submit'
was used to generate numactl commands to bind each copy to a specific processor.
For details, please see the config file.
```

## 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:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

 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
 runcpu command invoked through numactl i.e.:
 numactl --interleave=all runcpu <etc>
```

**(Continued on next page)**

## General Notes (Continued)

```
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
```

## Platform Notes

```
BIOS settings
ADDDC setting disabled
Sub NUMA Cluster enabled
Virtualization Technology disabled
DCU Streamer Prefetcher disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1E disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Logical Processor disabled
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 Thu Sep  5 18:42:48 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
      4  "physical id"s (chips)
      48 "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 0 2 3 4 5 6 8 9 10 11 12 13
      physical 1: cores 0 2 3 5 6 8 9 10 11 12 13 14
      physical 2: cores 1 2 3 4 5 6 8 9 10 11 12 13
      physical 3: cores 0 1 2 3 4 5 6 8 10 11 12 14

From lscpu:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      CPU(s):              48
      On-line CPU(s) list: 0-47
      Thread(s) per core:  1
      Core(s) per socket:  12
      Socket(s):           4
      NUMA node(s):        4
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Gold 6226 CPU @ 2.70GHz
      Stepping:            7
      CPU MHz:             3213.384
      BogoMIPS:            5400.00
      Virtualization:      VT-x
      L1d cache:           32K
      L1i cache:           32K
      L2 cache:            1024K
      L3 cache:            19712K
      NUMA node0 CPU(s):   0,4,8,12,16,20,24,28,32,36,40,44
      NUMA node1 CPU(s):   1,5,9,13,17,21,25,29,33,37,41,45
      NUMA node2 CPU(s):   2,6,10,14,18,22,26,30,34,38,42,46
      NUMA node3 CPU(s):   3,7,11,15,19,23,27,31,35,39,43,47
      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
      aperfmperf 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 intel_ppin
      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_l1d arch_capabilities

  /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: 4 nodes (0-3)
    node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44
    node 0 size: 191916 MB
    node 0 free: 191593 MB
    node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45
    node 1 size: 193533 MB
    node 1 free: 193169 MB
    node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46
```

**(Continued on next page)**

## Platform Notes (Continued)

```
   node 2 size: 193512 MB
   node 2 free: 193230 MB
   node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47
   node 3 size: 193532 MB
   node 3 free: 193278 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

 From /proc/meminfo
    MemTotal:       791034928 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 3 Sep 5 18:40

 SPEC is set to: /home/cpu2017
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      ext4  439G   31G  386G   8% /
```

**(Continued on next page)**

## Platform Notes (Continued)

```
 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. 2.2.9 05/08/2019
   Memory:
    16x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    8x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    24x Not Specified Not Specified

 (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,
  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
```

**(Continued on next page)**

## Base Compiler Invocation (Continued)

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_2019.4.227/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
-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

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

**(Continued on next page)**

## Peak Optimization Flags (Continued)

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_2019.4.227/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_2019.4.227/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-ic19.0u1-official-linux64.2019-07-09.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revE3.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/Dell-Platform-Flags-PowerEdge14G-revE3.xml`


SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.


For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.0.5 on 2019-09-05 14:42:48-0400.
Report generated on 2019-10-01 14:14:54 by CPU2017 PS formatter v6255.
Originally published on 2019-10-01.