## SPEC® CPU2017 Integer Speed Result

### Dell Inc.

**PowerEdge MX840C (Intel Xeon Gold 5218, 2.30GHz)**

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

### Hardware

- **CPU Name:** Intel Xeon Gold 5218  
  - **Max MHZ.:** 3900  
  - **Nominal:** 2300  
  - **Enabled:** 64 cores, 4 chips, 2 threads/core  
  - **Orderable:** 2,4 chips  
  - **Cache L1:** 32 KB I+ 32 KB D on chip per core  
  - **Cache L2:** 1 MB I+D on chip per core  
  - **Cache L3:** 22 MB I+D on chip per chip  
  - **Other:** None  
  - **Memory:** 768 GB (48 x 16 GB 2Rx4 PC4-2933Y-R, running at 2666)  
  - **Storage:** 1 x 480 GB SATA SSD  
  - **Other:** None

### Software

- **OS:** Ubuntu 18.04.2 LTS  
  - **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 2.2.1 released Feb-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

### Benchmark Results

<table>
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<tr>
<th>Benchmark</th>
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<tr>
<td>perlbench_s</td>
<td>128</td>
<td>6.48</td>
<td>7.65</td>
</tr>
<tr>
<td>gcc_s</td>
<td>128</td>
<td>9.10</td>
<td>11.9</td>
</tr>
<tr>
<td>mcf_s</td>
<td>128</td>
<td>9.18</td>
<td>11.7</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>128</td>
<td>7.37</td>
<td>11.7</td>
</tr>
<tr>
<td>xalanchmk_s</td>
<td>128</td>
<td>7.25</td>
<td>12.5</td>
</tr>
<tr>
<td>x264_s</td>
<td>128</td>
<td>11.3</td>
<td>12.4</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>128</td>
<td>5.32</td>
<td>5.31</td>
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<tr>
<td>leela_s</td>
<td>128</td>
<td>4.76</td>
<td>4.76</td>
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<tr>
<td>exchange2_s</td>
<td>128</td>
<td>14.0</td>
<td>14.0</td>
</tr>
<tr>
<td>xz_s</td>
<td>128</td>
<td></td>
<td>22.6</td>
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### 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)
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General Notes (Continued)
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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 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 Apr 17 21:38:32 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 5218 CPU @ 2.30GHz
 4 "physical id"s (chips)
128 "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 : 32
  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

(Continued on next page)
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Platform Notes (Continued)

```plaintext
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
Stepping: 6
CPU MHz: 2427.420
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s):
0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100,104,108,112,116,120,124
NUMA node1 CPU(s):
1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101,105,109,113,117,121,125
NUMA node2 CPU(s):
2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,110,114,118,122,126
NUMA node3 CPU(s):
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 xtrig pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebp cat_1 cd_p1 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cmx mpx rdt_a avx512f avx512dq rdseed adx smap cflshopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaveopt xsaves cqm_llc cqm_occu_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lid 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.
```

(Continued on next page)
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### SPEC CPU2017 Integer Speed Result

**SPECspeed2017_int_base** = 9.48

**SPECspeed2017_int_peak** = 9.60

### Platform Notes (Continued)

- **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 72 76 80 84 88 92 96 100 104 108 112 116 120 124
- **node 0 size**: 191932 MB
- **node 0 free**: 191029 MB
- **node 1 cpus**: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97 101 105 109 113 117 121 125
- **node 1 size**: 193530 MB
- **node 1 free**: 192643 MB
- **node 2 cpus**: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98 102 106 110 114 118 122 126
- **node 2 size**: 193530 MB
- **node 2 free**: 192584 MB
- **node 3 cpus**: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99 103 107 111 115 119 123 127
- **node 3 size**: 193507 MB
- **node 3 free**: 192518 MB
- **node distances**:
  - **node 0**: 10 21 31 21
  - **node 1**: 21 10 21 31
  - **node 2**: 31 21 10 21
  - **node 3**: 21 31 21 10

**From /proc/meminfo**

- **MemTotal**: 791040116 kB
- **HugePages_Total**: 0
- **Hugepagesize**: 2048 kB

**From /usr/bin/lsb_release -d**

- Ubuntu 18.04.2 LTS

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

- **debian_version**: buster/sid
- **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

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### Platform Notes (Continued)

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

```
runtime 3 Apr 15 20:00
```

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. 2.2.1 02/19/2019
- Memory:
  - 26x 002C00B3002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666  
  - 2x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666  
  - 1x 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666  
  - 19x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666

(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,  
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```

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Compiler Version Notes (Continued)

CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base, peak) 631.deepsjeng_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.

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

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**Base Portability Flags (Continued)**

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

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
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Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass1) -prof-use(pass2) -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(pass1) -prof-use(pass2) -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(pass1) -prof-use(pass2) -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

Fortran benchmarks:

641.leela_s: Same as 623.xalancbmk_s

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<td>Fortran benchmarks (continued):</td>
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<tr>
<td>-nostandard-realloc-lhs</td>
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The flags files that were used to format this result can be browsed at:


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


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

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