## SPEC® CPU2017 Integer Speed Result

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Platinum 8276M, 2.20GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>9.89</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>10.1</td>
</tr>
</tbody>
</table>

### CPU2017 License: 55

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

#### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>112</td>
</tr>
<tr>
<td>602.gcc_s</td>
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<tr>
<td>605.mcf_s</td>
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<tr>
<td>620.omnetpp_s</td>
<td>112</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>112</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>112</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>112</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>112</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>112</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>112</td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name:** Intel Xeon Platinum 8276M  
- **Max MHz.:** 4000  
- **Nominal:** 2200  
- **Enabled:** 56 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:** 38.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)  
- **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 2.1.6 released Mar-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
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
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<tr>
<td>600.perlbench_s</td>
<td>112</td>
<td>266</td>
<td>6.68</td>
<td>265</td>
<td>6.69</td>
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<td>602.gcc_s</td>
<td>112</td>
<td>413</td>
<td>9.63</td>
<td>414</td>
<td>9.62</td>
<td>413</td>
<td>9.64</td>
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<td>605.mcf_s</td>
<td>112</td>
<td>388</td>
<td>12.2</td>
<td>384</td>
<td><strong>12.3</strong></td>
<td>384</td>
<td>12.3</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>112</td>
<td><strong>235</strong></td>
<td><strong>6.94</strong></td>
<td>232</td>
<td>7.04</td>
<td>248</td>
<td>6.58</td>
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<td>623.xalanchmk_s</td>
<td>112</td>
<td><strong>111</strong></td>
<td><strong>12.8</strong></td>
<td>110</td>
<td>12.8</td>
<td>112</td>
<td>12.7</td>
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<tr>
<td>625.x264_s</td>
<td>112</td>
<td>124</td>
<td>14.2</td>
<td>127</td>
<td>13.9</td>
<td><strong>125</strong></td>
<td><strong>14.1</strong></td>
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<tr>
<td>631.deepsjeng_s</td>
<td>112</td>
<td>256</td>
<td>5.60</td>
<td>257</td>
<td><strong>5.59</strong></td>
<td>257</td>
<td>5.58</td>
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<tr>
<td>641.leela_s</td>
<td>112</td>
<td>349</td>
<td>4.89</td>
<td><strong>349</strong></td>
<td><strong>4.89</strong></td>
<td>349</td>
<td>4.89</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>112</td>
<td>205</td>
<td>14.3</td>
<td>204</td>
<td>14.4</td>
<td><strong>205</strong></td>
<td><strong>14.4</strong></td>
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<tr>
<td>657.xz_s</td>
<td>112</td>
<td>269</td>
<td>23.0</td>
<td>267</td>
<td>23.1</td>
<td><strong>268</strong></td>
<td><strong>23.0</strong></td>
</tr>
</tbody>
</table>

**SPECspeed2017_int_base = 9.89**

**SPECspeed2017_int_peak = 10.1**

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)
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SPEC CPU2017 Integer Speed Result  

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SPECspeed2017_int_peak = 10.1

**General Notes**


**Platform Notes**

BIOS settings:
ADDDC setting disabled
Sub NUMA Cluster enabled
Virtualization Technology disabled
DCU Streamer Prefetcher enabled
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 Sun Apr 21 15:49:19 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 8276M CPU @ 2.20GHz  
2 "physical id"s (chips)
112 "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 : 28
siblings : 56
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

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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Hardware Availability: Apr-2019
Tested by: Dell Inc.
Software Availability: Feb-2019

Platform Notes (Continued)

CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276M CPU @ 2.20GHz
Stepping: 6
CPU MHz: 3602.880
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
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
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
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
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 pdelgb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtr pdc md ccd sse4_1 sse4_2 x2apic movbe popcnt aes xsave axv f16c rdrand
lahf_lm abm 3dnowprefetch cpuid fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs
ibbp stibp ibrs enhance tpr_shadow vni flexiority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erms invpcid rtm cmp mpx rdt_a avx512f avx512dq rdseed adx
smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbvl
xsavec qm llc qm_occup llc qm_mbm_total qm_mbm_local dtherm ida arat pln pts pkp
ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 39424 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 72 76 80 84 88 92 96
100 104 108
node 0 size: 95165 MB

(Continued on next page)
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| CPU2017 License: | 55 |
| Test Sponsor: | Dell Inc. |
| Tested by: | Dell Inc. |

**Platform Notes (Continued)**

```
node 0 free: 94330 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
node 1 size: 96741 MB
node 1 free: 96047 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
node 2 size: 96762 MB
node 2 free: 95874 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
node 3 size: 96761 MB
node 3 free: 95818 MB
node distances:
  node 0 1 2 3
  0:  10  21  11  21
  1:  21  10  21  11
  2:  11  21  10  21
  3:  21  11  21  10
```

From /proc/meminfo

- MemTotal: 394681384 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
  - IDLIKE=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

(Continued on next page)
SPEC CPU2017 Integer Speed Result

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CPU2017 License: 55
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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 5 Apr 18 17:16

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. 2.1.6 03/04/2019
   Memory:
      11x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
      1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
      4x 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,
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Dell Inc.

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Compiler Version Notes (Continued)
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
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
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
### Dell Inc.

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#### Base Optimization Flags

C benchmarks:
- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-ipo`  
- `-O3`  
- `-no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-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

#### 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`  
  - `-fopenmp`  
  - `-DSPEC_OPENMP`  
  - `-fno-strict-overflow`  
  - `-L/usr/local/je5.0.1-64/lib`  
  - `-ljemalloc`
Peak Optimization Flags (Continued)

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 -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:

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
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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.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-21 11:49:19-0400.
Originally published on 2019-05-29.